



OVERVIEW OF WIRELESS SENSOR NETWORKS AND THEIR APPLICATIONS

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ABSTRACT

Sensor networks are dense wireless networks of small, low-cost sensors, which collect and disseminate environmental data. Wireless sensor networks facilitate monitoring and controlling of physical environments from remote locations with better accuracy. They have applications in a variety of fields such as environmental monitoring, military purposes, gathering sensing information in inhospitable locations etc. Sensor nodes have various energy and computational constraints because they are inexpensive and adhoc method of deployment. Considerable research has been focused at overcoming these deficiencies through energy efficient routing protocols, localization algorithms and system design. In this paper, we provide an overview of wireless sensor networks highlighting sensor network requirements, their operation, challenges and their applications in various fields.

Keywords : Sensor, clusters, parent mode, sink mode, children data centric, topology global identification, base's tuition, Access points, multi-hop, scalability, algorithm

INTRODUCTION

Recent technological developments have made the deployment of small, inexpensive, low-power, distributed devices, which are capable of local processing and wireless communication, a reality. Such nodes are called as sensor nodes. Each sensor node is capable of only a limited amount of processing. But when coordinated with the information from a large number of other nodes, they have the ability to measure a given physical environment in great detail. Thus, a sensor network can be described as a collection of sensor nodes which co-ordinate to perform some specific action. Unlike traditional networks, sensor networks depend on dense deployment and co-ordination to carry out their tasks. Previously, sensor networks consisted of small number of sensor nodes that were wired to a central processing station. However, nowadays, the focus is more on wireless distributed sensing nodes. When the exact location of a particular phenomenon is unknown, distributed sensing allows for closer placement to the phenomenon than a single sensor would permit. Also, in many cases, multiple sensor nodes are required to overcome environmental obstacles like obstructions, line-of-sight (LOS) constraints etc. In most cases, the environment to be monitored does not have an existing infrastructure for either energy or communication. It becomes imperative for sensor nodes to survive on small, finite sources of energy and communicate through a wireless communication channel. Another requirement for sensor networks would be distributed processing capability. This is necessary since communication is a major consumer of energy. A centralized system would mean that some of the sensors would need to communicate over long

distances that lead to even more energy depletion. Hence, it would be a good idea to process locally as much information as possible in order to minimize the total number of bits transmitted.

A HIERARCHICAL SENSOR NETWORK

Fig.1 depicts an example wireless sensor network to show how sensors cooperate among themselves and how they disseminate and aggregate the data. The wireless sensor network architecture consists of a group of units called clusters that are managed by parent nodes. These parent nodes receive orders from sink nodes and, in return, send back their report. The parent nodes send the order received from sink nodes to their cluster heads. Every cluster head is responsible for a group of children in a unit. Children communicate locally (i.e., within a unit) with their counterparts or their cluster heads. Children in a unit cannot communicate with cluster heads from other units whereas cluster heads can only communicate among themselves. After hearing the messages from their children, cluster heads send their observations to their parent nodes.

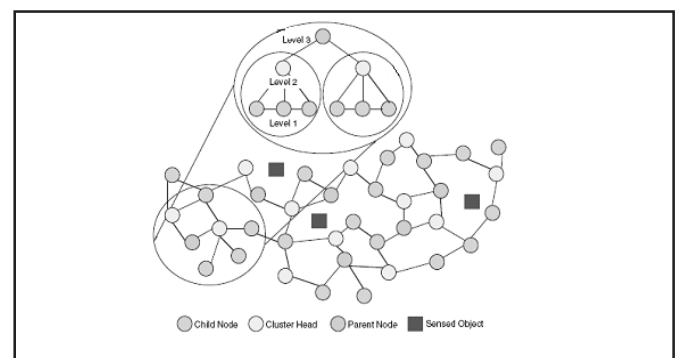


Fig.1 : Example hierarchical network architecture

SENSOR NETWORK REQUIREMENTS

Sensor network requirements include the following :

Large number of sensors :

To make use of the cheap small-sized sensors, sensor networks may contain thousands of nodes. Scalability and managing these huge numbers of sensors is a major issue. Clustering is one solution to this problem. In clustering, neighbor sensors join to build one cluster and elect a cluster head to manage this cluster.

Low energy use :

In many applications, the sensor nodes will be deployed in a remote area in which case servicing a node may not be possible. Thus, the lifetime of a node may be determined by the battery life, thereby requiring minimal energy expenditure.

Efficient use of small memory :

When building sensor networks, issues such as routing-tables, data replication, security should be considered to fit the small size of memory in the sensor nodes.

Data aggregation :

The huge number of sensing nodes may congest the network with information. To solve this problem, some sensors such as the cluster heads can aggregate the data, do some computation (e.g., average, summation, highest, etc.), and then broadcast the summarized new information.

Network self-organization :

Given the large number of nodes and their potential placement in hostile locations, it is essential that the network be able to self-organize itself. Moreover, nodes may fail (either from lack of energy or from physical destruction), and new nodes may need to join the network. Therefore, the network must be able to periodically reconfigure itself so that it can continue to function. Individual nodes may become disconnected from the rest of the network, but a high degree of connectivity must be maintained.

Querying ability :

There are two types of addressing in sensor network: data-centric and address-centric. In data-centric, a query will be sent to specific region in the network. Whereas, in address-centric, the query will be sent to an individual node.

SENSOR NETWORK CHALLENGES

Challenges in hardware design, communication protocols and applications design face sensor network technology to make it a reality. Major challenges are extending the lifetime of the sensor network and building an intelligent data collecting systems. Other

challenges include:

- ∇ Sensor networks' topology changes very frequently;
- ∇ Sensors use a broadcast communication paradigm whereas most networks are based on point-to-point communications;
- ∇ Sensors are very limited in power, computational capacities and memory;
- ∇ Sensors are very prone to failures;
- ∇ Sensors may not have global identification (ID) because of large amount of overhead;
- ∇ Sensors are densely deployed in large numbers. The problem can be viewed in terms of collision and congestion. To avoid collisions, sensors that are in the transmission range of each other should not transmit simultaneously.
- ∇ Ad hoc deployment requires that the system identifies and copes with the resulting distribution and connectivity of nodes, and
- ∇ Dynamic environmental conditions require the system to adapt over time to changing connectivity and system stimuli.

HOW SENSOR NETWORKS OPERATE ?

An ad hoc sensor network is a collection of sensor nodes forming a temporary network without the aid of any central administration or support services. In other words, there is no stationary infrastructure such as base stations (BSs) or access points (APs). In general, the sensor nodes use wireless radio frequency (RF) transceivers as their network interface and communicate with each other using multi-hop wireless links. Each sensor node in the network also acts as a router, forwarding data packets for its neighbor nodes. Sensor networks must deal with frequent changes in topology. This is because sensor nodes are prone to failure and also new sensor nodes may join the network to compensate the failed nodes or to maximize the area of interest. Because of these characteristics, a central challenge in the design of the sensor network is the development of self-organizing sensor network and dynamic routing protocols that can efficiently find routes between two communicating nodes. For the tiny sensors to coordinate among themselves to achieve a large sensing task in a less power consumption, they should work in a cluster. Each cluster assigns a cluster head to manage its sensors. The advantages of cluster heads are:

- ∇ Clustering allows sensors to efficiently coordinate their local interactions in order to achieve global goals;
- ∇ Scalability;
- ∇ Improved robustness;

- ∇ More efficient resource utilization;
- ∇ Lower energy consumption; and
- ∇ Robust link or node failures and network partitions

In Fig. 2, shows the general architecture of a sensor network. As shown in the figure, in a sensor network, there are three layers: the services-layer, the data-layer and the physical-layer. The services include, but are not restricted to, routing protocol, data dissemination and data aggregation. The physical-layer consists of the physical nodes. These nodes are the sinks, children nodes, the cluster heads and the parents. Parent nodes are those connected to two or more cluster heads. All the messages are virtually modeled in the data-layer. The sink node(s) broadcast a query either to the entire sensor network or toward a specific region depending on type of query used.

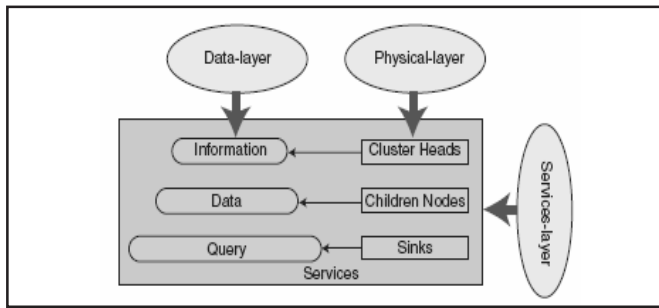


Fig.2 : Wireless sensor network architecture

When the sensor nodes close to the sensed object, detect for example a change in heat, location, speed, etc., then they broadcast this data to their neighboring sensor nodes. Since each sensor (i.e., child) is connected to at least one cluster head, cluster head(s) will eventually receive this data. Cluster head's task is to process and aggregate this data and broadcast it to the sink node(s) through the neighboring nodes. This is because the cluster head receives many data packets from its children. Hence, it is the cluster head's task to process and filter this data as information. To compensate the hardware limitations in the sensor nodes such as memory, battery and computation power, sensor applications deploy a large number of sensor nodes in the targeted region. These sensor nodes then collaborate among themselves to perform as one big wireless ad hoc network. The close distance between the nodes helps also in saving power by reducing the radius of transmission for each node.

SENSOR NETWORK APPLICATIONS

Sensor networks have variety of applications. Some of them are listed below.

- ∇ Detecting environmental hazards, monitoring remote

terrain, or even customer behavior surveillance is among many sensor network applications.

- ∇ Sensors are deployed to analyze remote locations, such as, the motion of a tornado, fire detection in a forest, etc.;
- ∇ Sensors are attached to taxi cabs in a large metropolitan area to study the traffic conditions and plan routes effectively;
- ∇ Wireless parking lot sensor networks that determine which spots are occupied and which spots are free;
- ∇ Wireless surveillance sensor networks for providing security in a shopping mall, parking garage or at some other facility;
- ∇ Military sensor networks to detect, locate or track enemy movements, and
- ∇ Sensor networks can increase alertness to potential terrorist threats.

Due to the pervasive nature of micro-sensors, sensor networks have the potential to revolutionize the way we understand and construct complex physical systems [3].

CONCLUSION

Wireless sensor networks enable dense sensing of the environment, offering unprecedented opportunities for observing the physical world. These systems offer unique challenges to researchers, such as, scalability, unpredictable wireless communication conditions, energy and resource constraints, etc. In this paper, we have presented an example of a hierarchical wireless sensor network, requirements to setup a sensor network, its operation and some applications. Sensor network is an evolving field, which offers scope for lot of research in developing energy efficient algorithms, security, etc.

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CRACKS IN HIRAKUD DAM : AND THEIR TREATMENT

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ABSTRACT

It is a common experience to have cracks in concrete gravity dams even though some crack prevention measures are implied during construction. Hirakud dam across river Mahanadi has two concrete spillways, which experienced problem of cracking and its associated operational distress. The paper discusses the causes of cracking and remedial measures undertaken in consideration of safety and long term performance of the dam.

Keywords : Hirakud dam project, reservoir, spillways, flood, cracks, treatment, performance.

INTRODUCTION

Virtually all concrete gravity dams continue to undergo some cracking. Traditionally cracking is prevented by designing the shape and adopting construction procedure so that no tensile stress are developed or if developed are less than the tensile strength of concrete. Cracks are generally found to occur along the planes of weakness of lift joints. The cracking is accentuated further due to raising of the mass concrete dam in faster rate than admissible.

PROJECT FEATURES

Hirakud dam across river Mahanadi in eastern India is a composite structure of earth, concrete and masonry. Length of the main dam is 4.80 Km, flanked by 21 km earthen dykes on left and right sides, making a total length of 25.8km. Two concrete spillways of average height 45.75 m and maximum height 60.96 m are located in the two arms of the river. The spillways are founded on firm rock. Maximum spillways section is shown in Fig. 1. The two spillways have 64 nos river level sluices (40 on left+24 on right) and 34 nos of crest gates (21 on left + 13 on right) with maximum release capacity of 42,450 cumecs (15.0 lakh cusecs).

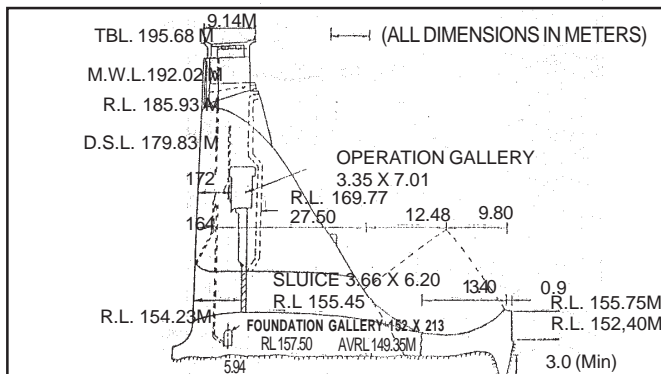


Fig. 1 : Hirakud dam-maximum spillway section

The spillway section has a large opening of size 3.35M x 7.01M, named operation gallery, from which vertical sluice gates are operated, by use of travelling gantry cranes, to discharge flood flow through the river level under sluices of size 3.66m x 6.20 M each. Vertical gate shafts size 1.04M x 4.98M connects the sluice barrels to the operation gallery.

1.525M x 2.135M size drainage gallery in the right side spillway and 0.90M dia header pipe in left side spillway, provided at foundation level, helps drainage of foundation through drainage holes. Live storage of 5818M cum in Hirakud reservoir, provides direct irrigation to 1,59,100 hect. in districts of Sambalpur, Bargarh, Subarnapur and Bolangir, generates average annual 956M units of hydropower in addition to providing flood control benefit to Mahanadi delta area.

CRACKS IN SPILLWAY

The construction of the dam was started in 1948 and completed in 1957. The first impounding of the reservoir in 1956 was accompanied by seepage of water at various locations, specifically in the galleries, gate shafts and sluice barrels of right spillway, mainly through construction lift joints, formed drains. These were considered normal for concrete dam and were treated with shallow depth cement grouting as and when required upto 1974.

Nearly horizontal cracks also appeared in almost all the exposed faces of the openings like operation gallery, sluice barrels and around the gate shafts. Cracks were also observed on the upstream face and downstream ogee surface of the concrete spillway. The cracking were concentrated close to the block joints. Manifestation of cracking were observed in buckling of steel frame fixed above collapsible gate in entrance of the gallery, touching of end crest gates to the side steel liners, buckling of embedded steel frames of manhole openings at the junction of the two road way slabs and failure of large number of M.S. bolts

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fixing the sluice gate roller tracks to the concrete Misalignment of the sluice gate roller tracks in the some gate shafts created difficulty in operation of the sluice gates, warranting immediate remedial measures.

In March 1981, Govt. of Orissa constituted a the committee of experts, headed by Dr. Y.K. Murty, Ex. Chairman, Central Water Commission of India, to study the problem of cracks in Hirakud dam and to advise remedial measures. The Committee undertook detailed investigations and studies, assisted by following specialist institutions.

(i) Central Water & Power Research Station, Pune (CWPRS)-Stress analysis of Hirakud dam (1978), Non-destructive studies of concrete Spillway section (April. 1983), Vibration studies of gates and pressure studies in sluice barrel (Aug-Sept. 1976, Jan 1098). ii) Central Water Commission, Delhi (C.W.C) - Conventional stress analysis of Hirakud dam (Sept. 1983) iii) Indian Institute of Technology (I.I.T.) Delhi Stress analysis of Hirakud dam (July 1983) iv) Cement Research Institute, New Delhi (C.R.I.) - Assessment of concrete in Spillway blocks of Hirakud dam (July 1983) v) Geological Survey of India (G.S.I.) - Petrographic and Chemical examination of aggregate from Laxmidungri quarry (!April. 1983), Petrographic examination of aggregate from Mahanadi river bed and drills cores of Hirakud dam (July 1983), Note on foundation of right spillway and its treatment (Aug 1983) vi) Hirakud Research Station, Hirakud - Determination of modulus of elasticity of rock from foundation of right spillway of Hirakud Dam, logging of cracks, convergence measurement and other instrumentation in dam. vii) Survey of India (Dehradun)- Dam deformation study and precision levelling. viii) Central Soil and Material Research Station, New Delhi (CSMRS)- Monitoring of ASR activities.

The Committee considered the following probable causes of cracking for detailed critical study.

i) Geology and foundation treatment (ii) Deep scour in plunge pool and deep pit for generating unit no. 7. (iii) Effect of static and dynamic loads on the structural stability considering large size openings in the spillway blocks (iv) Vibration due to opening of gates and operation of power house. (v) The effect of construction method and rate of placement of concrete.(vi) The effect of heat of hydration and thermal stress.(vii) Deterioration of concrete.

After detailed study, the committee concluded that the principal causes of cracking are:-

(i) Thermal stress due to rapid construction during summer months, without precooling arrangement for the mass concrete.

(ii) Deterioration of concrete due to Alkali-Aggregate reaction.

Major problem in concluding the reasons of crack before the committee was why the left spillway had no

cracks with the source of aggregates and design being almost same. But similar cracks and other signs of distress were also noticed in the left bank spillway in 1983, though to a lesser extent.

CAUSES OF CRACKING

Thermal stress :

Major distinguishing feature between left and right spillway was that few blocks in the latter were raised as high as 30M in a short period of three summer months (March to May 1955) where as the left spillway was raised by maximum 15 M in three winter months. The leakage through the lift joints in right spillway during initial filling was attributed to initial cracking caused by high thermal stress that developed due to high rate of concrete placement without adequate either precooling or post cooling arrangement.

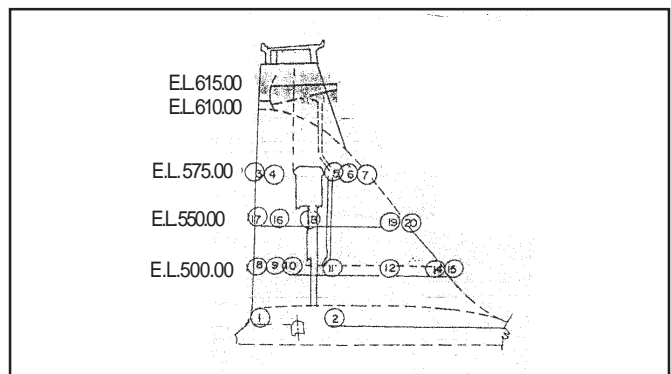


Fig.2 : Cross section of dam showing thermometers installed, Block - 41(1,2,3 ; location of thermometers)

Figures 2 and 3 indicate temperature rise of 45° F at some locations of block 41. With gravity load, water pressure, uplift and temperature gradient of 45° F over 1.2M (linear) considered along the upstream, downstream and the gallery faces of the dam, stress analysis by 2-D F.E. method showed maximum principal stress along the different faces ranging from 28.74 Kg/cm² to 33.4 kg/cm² (tensile), exceeding limiting value of 23.4 kg/cm². Similarly from 3 D.F.E. analysis, the maximum tensile stress in the wall of the sluice is 25.70 kg/cm². Thus the faces are prone to cracking.

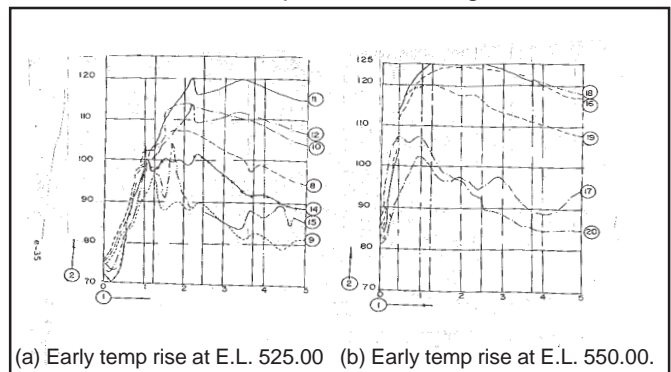


Fig.3 : Records of temperature rise of concrete following placement. Time period in days from pouring, Temperature rise in Farenheit. 8 to 20 temperature record in thermometers No. 8 to 20, respectively

Alkali-aggregate reaction :

Manifestation of distress such as snapping of the bolts of sluice gate roller tracks, binding of crest gates, buckling of the steel members of adit gallery and steel frame of the man hole opening at the junction of the two road way slabs, observed nearly 18 years after the completion of the dam were attributed to be due to expansion of concrete caused by Alkali Sillica Reaction (ASR), one of the three forms of Alkali Aggregate Reaction (AAR). This period of lag is considered normal for exhibiting the reaction.

Alkali silica reaction :

ASR is charecterised by formation of gel due to reaction of alkali in the cement with reactive aggregate in concrete, causing expansion of concrete, formation of dark reaction rings and internal cracking of the aggregate. ASR occurs an presence of (i) alkali reactive aggregates ii) sufficient alkali in the mix (% equivalent of sodium oxide being more than 0.60%) and iii) sufficient availability of moisture for the reaction.

Cement Research Institute of India (C.R.I.), presently renamed as National Council of Building Materials (NCBM), conducted elaborate tests on concrete drill cores collected from the spillways and established the cause beyond doubt. The reaction occured primarily because of use of relatively large proportion of river shingles in concrete for construction of spillways (specifically in right spillway, where the cracking is more). Coarse aggregates for concrete were collected from several quarries, with rock types granite, diorite to granite gneisses and miscelaneous quartz-rich minerals. On petrographic examination the rocks showed to have reactive component. It may be mentioned that during construction stage, the crushed rock aggregates from different quarries were investigated and pronounced 'innecous' in absence of reactive minerals like opal, cholcodony, chert, flint etc. Chemical tests like mortar-bar test and rapid chemical test, specific to alkali reactivity were not available then.

The extensive seepage through the cracks caused by thermal stress that occurred in the initial years after the first filling of the dam was responsible for ingress of moisture necessary for initiating the reaction. The alkali aggregate reaction in Hirakud Dam is considered as "moderate to mild".

Distress to concrete dams due to deleterious alkali-silica reaction (ASR) has been experienced in many countries the world over. Parker Dam (USA), Steward Mountain Dam (USA), Cooliage Dam (USA), Mactaqual Power Dam (Canada), Val De La Mare Dam (USA), Fontane Dam (USA), Friant Dam (USA), Churchil Dam (South Africa), Sales Dam (Spain) and Kambora Dam (Keniya) are examples of concrete dams suffered due to Alkali Sillica Reaction (ASR). In addition to

Hirakud, Rihand Dam in state of UP, India have been affected by ASR. Depending upon the charracteristics and reactivity of the aggregates, the reaction takes time, usually in years, to manifest and continue there after for considerable time, In cases like Copper dam, Genewash and Stewart Mountain dam, the dimensional changes continue to be experienced even after 40 years after construction. In these cases of archdams, the increase in the elevation of mid-crest and movement of crest to upstream were of the order of 90-105 mm and 100-150mm respectively. Wild horse Dam (U.S.A) became so badly cracked that it had to be abandoned and replaced. Some of the dams in France had to adopt partial drawdown in addition to other remedial measures.

MONITORING OF CRACKS

Total length of cracks observed upto end of 1997, in right spillway and left spillway are 14078 M and 8328 M respectively. Out of the above, cracks observed underwater in uspstream faces of right & left spillway are 4706M and 4115M respectively. Balance are cracks in the galleries, sluice barrels and gate shafts. The rate of growth of total length in the spillways is shown in Fig. 4

Width of cracks, monitored through number of extensometers, range from 0.099mm to 0.930 mm in operation gallery and 0.069 mm to 0.312mm in foundation gallery.

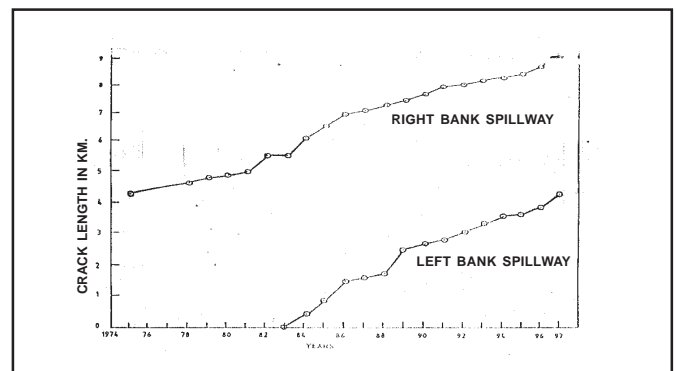


Fig.4 : Cumulative crack length in spillways of Hirakud dam till December 1997.

SURVEILLANCE

Though there is no cause for undue alarm about the structural stability of the dam, the phenomenon of cracking due to ASR is still active (though at a much reduced rate) as evidenced by continuous progress even to this date. Constant surveillance is required to monitor the safety and servicability of the structure. Following measurements and studies are conducted through different expert agencies/ departments as part of surveillance.

- i) Mapping of cracks (ii) Masurement of convergence
- (iii) Measurement of strain at foundation level through strain meters (iv) Measurement of strain in steel rails for sluice gate guides through strain gauges. (v) Geodatic Survey for dam deformation and precision levelling by survey of India

(during 1987 to 90) (vi) Periodic assessment of progress at ASR - through either C.S.M.R.S. Delhi or NCBM, Delhi. Tests conducted on concrete core samples from the dam shows expansion of the order of 0.02% in under water storage and 0.04% to 0.06% in alkali solution, which is considered to be corresponding to 'low' reactivity. (vii) Measurement of deflection of dam through tilt meters.

TREATMENT OF CRACKS

On recommendation of the Expert Committee to study and advise remedial measures (headed by Shri Y.K. Murty during 1981-83), Standing committee for long term surveillance of cracks (under Chairmanship of E.I.C. Irrigation, Orissa, during 1987-89), Hirakud Dam Crack Review panel (under Chairmanship of Mr. G. N. Tandon, from 1990-1992) and Dam Safety Panel (headed by Sri M.G. Padhye, Ex-Chairman, CWC, constituted in Aug 1991) from time to time, following remedial measures were adopted. (i) Refixing snapped bolts, removing bulged concrete and resetting side guide rails and roller tracks of sluice gates. (Total 304 nos bolts snapped upto end of 1992 were refixed) (ii) Drilling new drainage holes in the foundation gallery. (iii) Epoxy grouting of cracks on exposed faces inside operation gallery, gate shafts, sluice barrels and downstream surface. Total 3104kg of epoxy grade Dobeckot - 505c and Hardner EH-411 of M/s Dr. Beck & Co, Pune was consumed in treatment of 3615M length of crack. (iv) Resetting of end crest gates. (v) Resetting buckled embedded frames of manhole openings in road slab. (vi) Upgradation of sluice barrels and bucket surface by epoxy plastering after grouting of cracks. (vii) Renovation of sluice gates and procurement of four numbers of sluice gates for spare. (viii) Sealing of leakage through formed drain no.39 at joint of block no. 39-40 (2002-03) (ix) Filling of cavities formed close to upstream face of both spillways. (2002-03) (x) Under water treatment of crack on upstream face.

Under water grouting of cracks in upstream face of six blocks of right spillway was done using epoxy systems (Concessive -1380) and sealing material (Concessive - 1448) imported from M/s European Structural Bonding Division (ESBD), Netherland. Dutch divers were engaged for the work. Similar treatment of cracks and other structural defects in upstream face of other blocks of right spillway and left spillway was done using indigenous epoxy systems (EPCO-2020) received from M/s Krishna Products, Mumbai and Sicco, Kolkata. Core samples collected after grouting of cracks indicated that penetration of grout was full and complete, the failure under compression was in concrete and not in epoxy treated crack plane. Thus efficacy of grouting was considered to

be fully satisfactory. The entire underwater treatment of cracks has been video monitored through C.C. TV, which posed great confidence on the treatment activities taken up under water.

Total cost of treatment was around Rs31.75 crores, included under Dam Safety Assurance & Rehabilitation Project (DSARP) of Govt. of India, funded by World Bank.

SAFETY OF THE DAM

- ✓ The Committee of Experts (under Chairmanship of Sri Y.K. Murty) in their final report of Sept 1983, observed that "though there was no cause for any undue alarm about the structural stability of the dam, the various aspects of the behaviour of the affected Components of the dam should be observed, investigated and studied to evolve remedial measures".
- ✓ Hirakud Dam Crack Review Panel (headed by Er. G.N. Tandon, 1990) in their report of Aug 90 opined that the eventuality of a sudden and catastrophic failure of the dam can safely be ruled out and there is no risk to continued useful performance of the dam".
- ✓ Mr. David Stark, Senior Principal Scientist from U.S.A., who visited Hirakud Dam during Jan 93 as a World Bank Consultant, remarked that "ASR will neither endanger the safety of Hirakud Dam nor will it limit the functional operation of the dam."

CONCLUSION

In India, cracking due to ASR was first experienced in Hirakud Dam. Monitoring of cracking and health of the dam is being carried out by project authorities with help of specialised agencies. ASR activity is still progressing after 48 years of completion of the dam but at a slower rate. Constant surveillance is required to monitor the safety and serviceability of the spillways of Hirakud dam.

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GROUNDWATER RECHARGE PROSPECTIVE IN HARD ROCK AREAS OF ORISSA

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ABSTRACT

Water demand is an ever-increasing phenomenon and it has to be met from available surface and groundwater resources. Vagaries of monsoon and over abstraction of groundwater in aquifer system results into continuous declining of water table causing economic problems and deterioration of water quality. In Orissa 85 % of the area is covered by hard rock areas where groundwater development status is not uniform. Hence integrated management of surface and groundwater resources in these areas can improve water use efficiencies and agricultural productivity and also recharge groundwater in a sustainable way. Present paper deals with the present status of water resources and the recharge prospective in hard rock areas of Orissa.

Key words: Groundwater recharge, rainfall, agriculture, catchment, monsoon.

INTRODUCTION

Spatial and temporal uneven distribution of resources like rainfall and groundwater has called for a holistic approach towards sustainable and equitable use of them. Uneven rainfall leads to both drought and water logging situation throughout the year whereas overexploitation of groundwater leads to depletion of groundwater level in most part of India. Especially in the coastal areas of India, irrational and unscientific withdrawal of groundwater due to unawareness leads to failure of wells as well as seawater intrusion. Age-old dependency on vagaries of nature and lack of capital (human, financial and structural) to exploit the possibility of groundwater resource has added to the impoverished condition of many regions of Orissa. Large part of the state is suitable for groundwater exploration hence; feasibility of recharging groundwater is in order to maintain the sustainable groundwater level. Groundwater of these areas can be exploited and recharged scientifically by surface and rainwater through economically viable and geologically sustainable structures. Areas where already groundwater resource had been depleted can be recharged and exploitation can be restricted to around 60%. This objective technology of recharging the groundwater has proven time and again to be ecologically sustainable, economically viable and socially acceptable. This effort can lead to sustainable growth of the above areas and could be a scientific tool towards ameliorating the starving condition of the inhabiting population.

PRESENT STATUS

Out of total 1,55,707 sq. km geographical area of Orissa, around 1,18,800-sq. km area is suitable for

groundwater exploration. The area covered by hard rock and alluvium is 86444 sq. km and 32356 sq. km, respectively. Based on the geological set up, occurrence and distribution of aquifers and their yield potentials the state has been divided into three major hydro-geological formations, viz., consolidated (12,579 sq. km area), semi-consolidated (924 sq. km area) and un-consolidated formation (2056 sq. km area). Major portion (about 85%) of the state covered by hard rock are normally compact and rendered ground water bearing only when fractured and weathered.

The state is endowed with sub-tropical climate with three distinct seasons i.e. summer, monsoon and winter. During monsoon period the humidity is highest in the east and is mostly dry during summer in the western part. The southwest monsoon rains starts from June and continues till middle of October. Summer season extends from March to early part of June and winter season spreads from November to February. State receives on an average annual precipitation of 1503 mm. Nearly 86% of the annual rainfall is contributed by the southwest monsoon. The spatial distribution of the rainfall in the state is uneven and erratic. The rainfall is highest in the northern part of the coastal tract, which ranges from 1502.32 to 1697.87 mm. The rainfall reduces westwards, from 1487.02 mm to 1211.08 mm in Kandhamal, Angul, Keonjhar districts and also southwards to 1221.14 mm around Gopalpur in Ganjam. The rainfall ranges from 1331.85 to 1491.89 mm in Koraput, Kalahandi, Bolangir, Sambalpur and Sundargarh districts. The frequency of the mild drought varied from 11.11% to 60% in different districts, whereas normal drought varies

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from 0% to 33%. It was observed from 1961 to 2000 that the state experiences a natural calamities in the way of drought or flood or cyclone almost every year. This has created a most unpredictable climate for any agricultural activity in the State. Orissa comes under two major Agro-climatic zones i.e. Central and Western hill and plateau, east coast plains and hilly region. The net sown area of the state is 38.54% and the forest coverage is 36.07%. Balance 25.53% of the geographical area belongs to the following types of land: fallow 5.12%, cultivable waste 2.86%, permanent pastures 3.44%, land put to non-agricultural uses 5.52%, barren and uncultivable land 3.67% and land belonging to miscellaneous tree 4.92%.

GROUNDWATER RESOURCES POTENTIAL

Total annual replenishable groundwater resources of Orissa is 2.1 million ha-m. Out of this, 1,12,272 ha-m is committed for domestic and industrial requirements for coming 25 years. The balance utilizable resources for irrigation is 19,88,856 ha-m. The annual draft for irrigation use is 2,36,044 ha-m through existing 3,00,469 dug wells, 11,598 filter point tube-wells, 153 bore wells, 4,304 shallow tube-wells, 2,258 medium deep tube wells and 12 deep tube wells in the irrigation sectors. For sustainable use of groundwater resources in future there is a need to adopt a strategy to explore untapped aquifers, optimization of groundwater use efficiency as well as conservation of water resources by rainwater harvesting. In hard rock terrain groundwater is mainly confined to weathered residuum and fractured zones, which limited to moderate yield potentials (Pati and Chakladar, 2005). Out of 30 districts of Orissa, 21 districts fall under the hard rock (consolidated aquifer), 2 districts under semi consolidated aquifer and 7 districts under coastal alluvial area (unconsolidated aquifer). Restricting the stage of groundwater development to a safe limit of 60%, there exists further scope for utilization of 9,14,101 ha-m of resources for future irrigation use. Additional 11,36,738 dug wells, 27,425 filter point tubewells, 5,365 shallow tube wells and 2,155 medium deep tubewells, can be executed over a span of 25 years to create irrigation potential of 17,69,685 ha at an estimated cropping intensity of 200%.

REVIEW ON GROUNDWATER RECHARGE PROSPECT

It is fact that rainfall is the only source to replenish the exploited groundwater resources, which is limited to few months in a year. Using different methods of estimation of recharge, it has been found that about 5 to 10 per cent of

seasonal rainfall contributes to annual recharge in the hard rock regions of the peninsula. In case of the alluvial areas it is about 15 to 20 per cent of the annual rainfall which contributes to groundwater (Rangarajan et al., 2000). In Nayeli area of Tamil Nadu studies were carried out to quantify the recharge rate to the Nayeli basin through GIS based micro level study and possibility of artificial recharge and development of comprehensive 3D quantitative and qualitative groundwater models (Anandan, et al., 2003). As per National Water Policy, groundwater development is limited to annual replenishable groundwater resources; hence groundwater exploitation is not permitted in over exploited areas. The pre and post monsoon water table trends and their levels are the ultimate indicators of the extent of groundwater development taking place in an area. Areas are classified based on the stage of groundwater development i.e. safe <70 %, semi-critical 70-90%, critical 90-100% and over exploited >100%.

Soil-physical approach to recharge estimation is pursued and periodically reported on as part of overall recharge quantification projects (Sophocleous and Perry, 1985). In monsoon regions, rainwater harvesting and recharge approach seems important as the bulk of the year's rainfall (about 80%) is received in 100 hours of heavy downpour, providing little time for recharging the ground water. Moreover, the relationship between the recharge area, recharge rate and extent of sustainable groundwater irrigation is becoming increasingly important.

RESEARCH APPROACH

Hydro-geological Studies:

Detailed knowledge of geological and hydrological features of the area is the prime component for adequately selecting the site and type of recharge structure. In particular, the features, parameters and data to be considered are geological and hydraulic boundaries, inflow and outflow of water, storage capacity, porosity, hydraulic conductivity, transmissivity, natural discharge of the springs, water resources available for recharge, water balance, lithology of the area.

In-situ water harvest through land use manipulation:

Soil conservation measures are required for controlling soil erosion as well as retaining maximum rainfall within the slope and safe disposal of excess runoff from the top to the foothills. This would involve suitable contour bunds or barriers across the slope. The idea is to divert the excess runoff during rains to the grassed waterways and retain eroded soil with the bund. In order to exploit more ground

water, enhancement of ground water recharge is a must and top priority should go to in-situ and surface rain water harvesting through watershed development and management. This is possible, if total catchment is divided into smaller catchments depending upon their slope and soil type conditions. Upper catchments having undulating/sloppy forest lands should be treated with contour trench and contour vegetative hedges to reduce runoff flow and allow more water for soil storage, sub-surface flow and groundwater recharge. In cropped area basic land development works can harvest substantial amount of rainwater for storage in soil profiles and aquifers. Some of the methods are terracing, land leveling and shoulder bunding, graded border strips, contour bunding, contour ditching etc.

Raising bund height :

Bund height (crest of outlet weir) upto a tolerable limit in rice fields can increase rainwater storage and its utilization. Under rainfed upland ecosystem, it can make more water availability to crop reducing drought period whereas it can increase ground water recharge.

Quantification of water balance components:

Assessment of water loss through infiltration, seepage, percolation and deep percolation in various soil types of the region under various soil and water conservation practices is important as substantial amount of water contribute to ground water . In cropped land following intra-plot rain water harvesting measures can be adopted to increase infiltration and more water storage in soil profile i.e. off-season tillage, crop cover during rainy season, conservation tillage/mulch tillage, deep ploughing, surface mulching, soil amendments and soil conditioners

Analysis of long-term historical meteorological data:

Long term data on rainfall, ground water fluctuation and water quality from the areas give more reliable information about the water availability over time span and its effect on crop yield.

Development of ponds (seasonal and perennial):

Depending upon the topography, seasonal and perennial ponds could be helpful for utilization of available

rainwater during off-season. This would be useful for recharge too. Location specific and appropriate well and tube well construction designs should be developed which would be helpful for more water discharge as well as recharge purposes.

INFERENCE

These scientific ways of exploitation of available groundwater resource to bring out equitable and sustainable growth in the drought prone areas of the state can be implemented and the proven techniques can be extended to other regions with similar geological conditions and geographical, ecological, human, financial and structural impediments. This technology had brought development in other parts of the country with similar impediments. So, there is an absolute hope of changing the agricultural scenario of this state and in turn economic and social well being of the population by sincere endeavor in implementing this knowledge in the areas in need.

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SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF MINOR IRRIGATION COMMAND AREA – A CASE STUDY

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ABSTRACT

Development of rural areas can be sustained only through improved technology in agriculture and farming systems. Since agriculture by and large predominates rural as well as our national economy, therefore concerted efforts are needed to increase agricultural production in order to meet the requirements of our increasing population. Irrigation is needed not only to improve production in normal years but also to protect agriculture during drought years. A number of major irrigation projects have come up which have failed in its mission. So present answer to mitigate the difficulty is by constructing minor irrigation projects and utilizing ground water. Simultaneously its impact on environment has also been outlined. Study of Suhagi Minor Irrigation Project demonstrates the change in socio-economic pattern and brings out the environmental pollution due to use of higher fertilizer, pesticides, excessive use of water and continuous growing of paddy. Problem of deforestation and lack of animal shelter has been discussed.

Key words : Irrigation project, agriculture, fertiliser, pesticides, paddy, deforestation, drought year.

INTRODUCTION

The command area of Suhagi Minor Irrigation Project is located in Narsinghpur block of Athagarh sub-division in Cuttack district of Orissa state. The project is near village Sisupathar at a distance of 5 km on forest road from Jorumu situated on Narsinghpur-Kamaladihi Public Works Department road. The watershed area (95 sq.km.) is covered with dense forest. The command area of this project has several features common to many similar areas of the states of Orissa, Bihar, Madhya Pradesh etc. Some of the important characteristics peculiar to backward states like this are

- (i) Dependence of the population on traditional agriculture practices and minor forest produces.
- (ii) Poor soil fertility
- (iii) Seasonal rainfall
- (iv) Poor education and skill
- (v) Low income level
- (vi) Fragmented land holding and large number of marginal farmers and landless labourers.
- (vii) Mal-nutrition
- (viii) High un-employment level of the work force who have skill and experience in traditional agricultural practices only.
- (ix) Affinity to particular food habits and sentimental considerations to raise the staple food requirements from the land owned by farmers.

- (x) Availability of skill in small scale dairy and poultry farming.

Keeping above things in view, a study was undertaken to ascertain the impact of irrigation and technological development on cropping pattern, productivity, input-output of important crops and to examine the social setting with special reference to standard of living i.e. necessities, comforts and luxuries of the selected farmers. Also impact of the project on environment was studied.

METHODOLOGY

Methodology is the nucleus of any socio-economic investigations, which covers the sampling technique, design of schedules, collection of data, final presentation and interpretation of data. Information was collected on land holding, social composition of the family, educational level, capital assets, land rent, irrigation charges, cropping pattern, productivity, cost and returns, profitability of crops, household economy etc. Multi objective programming technique has been used to allocate different types of crops, animals and poultry on the basis of availability of irrigation water from the minor irrigation project. STEP method has been followed for product allocation in the planning environment in Suhagi command area. Sensitivity analysis has also been carried out for the recommended plan to bring out the optimum indicator of socio-economic condition.

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RESULTS AND DISCUSSION

The success of irrigation project and irrigated farming in any command area depends on the participation of farming community. The scenario of the Suhagi Command area reveals that about 81 percent of farmers in the region belong to marginal and small categories and that they are constrained by their meager resources to invest in modern farm inputs like fertilizer and improved seeds. It is concluded from survey that 50 percent holdings are less than 1 ha, 31 percent of the holdings are in between 1 to 2 hectares, 14 percent holdings are in between 2 to 4 ha and only 5 percent holdings are above 4 ha. Further, most of the holdings are fragmented and scattered.

From survey it is observed that

- (i) Large percentage of area belong to marginal, medium and small farmer categories (80%) who cannot invest much for improved farming practices.
- (ii) Farmers with large holding contribute only about 20 percent of the farming area who are in a better position to invest and switch over to improved farming once the other essential input like water is made available.
- (iii) Animal husbandry is not an attractive economic activity in the command area due to less number of milch cattle.
- (iv) Per capita income in the command area is very low (Rs. 808 at 1997 level). Income distribution per family is below (Rs. 2467). Labour force utilization in the command area is at very low level.
- (v) In existing situation (without irrigation project) labour utilization is 13.33 per cent in kharif 4.33 percent in rabi and 0.37 per cent in summer. Due to this around 60 percent people go to other area or do other non remunerative work. Therefore the command area labourers will get employments for 2.5 months only.

Cropping Pattern :

The survey indicates the following pattern

- (i) Traditional variety and rainfed high yielding paddy accounts for nearly 92.93 per cent of total cultivated area. Cultivation of the remaining crops accounts for only a small percentage of the total cultivable area.
- (ii) A large percentage of the total cultivable area remains fallow, even in kharif due to unavailability of irrigation facility and its consequential higher risk.
- (iii) Rabi cultivation is very small and accounts for only 23 percent of the cultivable area. Pulses, oilseeds and vegetable cultivation use 58.42, 21.13 and 13.44 percent of the total cultivated land. The farmers resort

to these crops as pulse crops require practically no irrigation and oilseeds & vegetables require little localized irrigation through tanks or dug wells during rabi. The yield from these crops is currently very low and can be substantially increased through irrigation.

- (iv) Existing intensity of cropping in the area is very low. It is only 84.85 percent. This can be substantially increased if the irrigation facility is made available in the area.

After the irrigation project was completed, the water available to command area villages have brought substantial changes in the socio-economic setups as well as in environmental condition. The capital inflow and outflow was increased due to more coverage under high yielding varieties of paddy and rice based cropping pattern using residual moisture and life saving irrigation. The change has been listed below.

Socio-economic Impact :

- (i) The utilization of labour force changed from 2.5 man months to 5.5 man months.
- (ii) Cropping intensity increases to 167.35 per cent from 84.85 percent in kharif. Land use in kharif is almost 100 percent where as in rabi, it is about 65 percent.
- (iii) Production of cereal, pulses, oilseed and vegetables are about 120, 478.8, 469 and 22.3 percent more than the existing level.
- (iv) Per capita income exceeded from Rs. 808 to Rs. 2056 and family income exceeds from Rs. 2467 to Rs. 6729.
- (v) For further increase of water resources by 10, 15, 20 percent, the profit to the farmers will increase by 13.8, 19.53 and 27.67 percent respectively. The pay back periods for extra investment are 0.302, 0.316 and 0.301 years respectively.
- (vi) Rice crop could yield only Rs. 3500 per ha in head reach, Rs. 3107 in middle reach, Rs. 2430 in tail reach. Farmers earned more net returns in head reach in all crops. This is due to absence of field channel in the entire command area.
- (vii) Large and medium farmers earned more net returns per hectare than marginal and small farmers in respect of all the important crops which was mainly due to better financial position of former category.
- (viii) Fertilizer consumption was increased from 12% to 35% in case of nitrogenous fertilizer and 2% to 20% in case of other fertilizer.
9. Credit from cooperative societies, Gramaya bank increased from 17% to 62%.
10. No. of tractors and pump sets increased from 24 to 175 and 320 to 1234 respectively.

11. Two wheelers, mopeds, T.V., sets etc. increased considerably.

Environmental Impact :

With the above positive changes certain environment impacts are slowly coming up due to water resources project. The agricultural development could transform low productivity system into a system of relatively high productivity which has generated environmental side effects of varying degrees of importance. Intensive cultivation and deep ploughing of land with tractors generated fumes which were emitted into atmosphere which led to a substantial air pollution and consequently caused health hazards. Diesel operated tractors, pump sets etc. released sulphur dioxide during operations. It is believed that increased levels of sulphur dioxides in air lead to incidence of bronchitis and emphysema. Hydro carbons emitted due to inefficient combustion process also led to human sickness. The environmental hazards increased mainly from the chemical control of pests and weeds. Excessive use of irrigation in the head reach resulted waterlogging in some pockets of the village farms. Drainage system in the villages was found to be worst. This resulted some scattered spots of waterlogged area, which became the breeding ground of mosquitoes spreading malaria in entire command. Many farmers in the survey area started applying granular insecticides in rice crops for the control of some minor insect-pests and even for bacterial leaf blight diseases. The insecticides are highly toxic which caused health hazards. Due to pace of development as a consequence of water resource project, infrastructure facility has changed enormously. The area became flooded with mopeds, two wheelers,

trucks, tractors and pump sets etc, which in turn causes air pollution & noise pollution.

CONCLUSION

As a whole, the analysis of data revealed that the economic factors influence the productivity of the farms which registered an impressive growth due to provision of assumed irrigation facility. Quality of life of the farmer has improved. Marginal and small farmers adopted mixed farming to supplement their income. Agricultural development could however generate some environmental side effects but its impact is low because of the miniature size of the project. To set aside the effect of environmental hazards, several new bio-insecticides like nimin and nimazol etc. have come up and is being used. Bel leaf extracts have also been used for blast disease of rice. Percentage of pollution is far less in comparison to the improvement in living standard due to construction of minor irrigation project. Hence, minor irrigation projects are more suitable not only for higher socio-economic growth but also for their low environmental impact.

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TRIPHALA - A WONDERFUL INDIAN HERBAL FORMULA FOR CONSTIPATION, BOWEL CLEANSING AND ASSOCIATED MALADIES

M. Brahmam, N.K. Dhal, S.C. Sahu and S. N. Dash

ABSTRACT

Triphala is a classic Indian remedy, probably the best known among all Ayurvedic compounds. It normally consists of dried and ground fruits of 3 Indian trees-Amla, Harida and Bahada in equal proportions. Amla works for *pitta* disorders and cleanses the small intestine. Harida attacks the *vata* disorders and cleanses the larger intestine or colon. Bahada remedies *kapha* particularly congestive disorders including stomach cleansing. Triphala plays a vital role in preventing diseases, especially degenerative diseases of old age and other attributes include lowering of cholesterol, reducing high blood pressure, improving blood circulation, improving digestion, regulating elimination without causing any laxative dependency.

Key words: Triphala-Indian drug-constipation-Intestinal cleansing - detoxification

INTRODUCTION

People's dependence on plants for various remedies is well apparent from the fact that all the major systems of medications- Mayo, Oriental (Chinese), Indian (Ayurveda, Unani, Siddha etc.) Tibetan (Tibbi), Homeopathy, etc. are dependent on plants and plant based medicaments. They have been fulfilling the medical needs of the indigenous people for millennia and in fact over 120 pharmaceutical products currently in use are plant derived and more than 75 % of them were discovered by obtaining clues from the indigenous medicaments (Brahmam, 2000). The herbal market all over the globe is experiencing an unprecedented demand and the pharmaceutical industry is under constant pressure to discover, develop and deliver chemicals and biological entities to combat various diseases. To cope up with the fast moving life, man undergoes several stresses that result in deterioration of health (Schultes, 1963). Allopathic medication for the ailments of body and mind, in many cases has resulted in development of several side effects. These side effects have not been tackled properly due to lack of knowledge on their manifestations. One of the popular herbal formulae with high rate of success from indigenous system is *Triphala* (mixture of three fruits in equal quantities). *Triphala* has been shown clinically to cleanse and detoxify at the deepest organic levels without depleting the body's reserves.

BOWEL CLEANSING *Vis-a-Vis* TRIPHALA

The commonest problem encountered by most of the people all over the globe is bowel irregularity leading to constipation. There are three primary types of herbal laxatives. The **first type** is more irritating and draining while the other two are more lubricating and nourishing. It is called 'purgative' and includes species like senna (*Cassia angustifolia*), rhubarb (*Rheum rhabarbarum*), coffeeberry (*Rhamnus californica*), leptandra (*Leptandra virginica*),

buckthorn (*Rhamnus cathartica*), cascara (*Rhamnus purshiana*) etc. These often contain bitter principles in the form of anthroquinones which work by stimulating the peristaltic action of the intestinal lining or by promoting the secretion of bile through liver and gall bladder. The bitterness induces several secretions of which many are useful in digestion. Most of the herbal healers resort to purgatives to detoxify the bowels. The **second type** is a lubricating, oily or moist laxative. Species included in this category are *Cannabis sativum* (oils and seeds of hemp), *Sesamum indicum* (sesame oil), *Prunus armeniaca* (Apricot), *Prunus persica* (Peach), *Eugenia myrtifolia* (Bush Cherry), *Ricinus communis* (Castor oil but not seed) etc. Oils stimulate the gallbladder to secrete bile which helps in digestion too. These are more nourishing than purging but care is needed for their effective administration. The **third type** is the soluble fibre or mucilaginous bulk laxative including demulcent herbs like psyllium (*Plantago ovata*), flax (*Linum usitatissimum*) etc.. The latter is more nutritional and usually does not have any significant effect directly on liver or gall bladder but works like an intestinal broom by swelling and absorbing fluids.

The constitution of vegetarians of Asia unlike Europeans and Africans cannot tolerate the harsh laxatives. Constipation can be tackled through herbal healing in two ways i.e. tonification and elimination. The problem with overemphasizing tonification is that it can lead to further stagnation and congestion in an excess condition. Emphasizing elimination through the overuse of purgatives in an already deficient individual can further deplete the body's store of minerals and essential B vitamins as well as imbalance beneficial intestinal micro-organisms. The result is weakness with a likely tendency towards chronic fatigue and anaemia. Since the body is constantly involved in building and maintenance of strength, nutrition and

elimination (nitrogenous wastes) plays a vital role. *Triphala* is unique in that it supports both the processes simultaneously.

Triphala is not a mere laxative but an effective blood purifier. It stimulates bile secretion, detoxifies the liver, improves digestion and assimilation, and reduces serum cholesterol and lipid levels. It can be regarded as a 'universal panacea' as it harbours some of the best characteristics of Ginseng (*Panax ginseng*) and Ginkgo (*Ginkgo biloba*). It not only regulates bowel movement but also

a). reduces serum cholesterol, b). improves circulation (potentiates adrenergic function), c). contains 31 % linoleic acid, vitamin C and other important nutrients (tonic) d). exerts a marked cardio-protective effect, e). reduces high blood pressure, f). improves liver function, g). has anti-inflammatory and anti-viral properties, h). acts as an expectorant and hypotensive.

THREE HUMOURS & TRIDOSHA THEORY

The three fruits of Triphala i.e. Harida (*Terminalia chebula*, the Chebulic myrobalan) Bahada (*Terminalia bellirica*, the Beleric myrobalan) and Amla (*Emblica officinalis*, the Emblica myrobalan) correspond to the 'three humours' or 'tridosha' of Ayurveda. According to Ayurveda, the body is composed of three doshas or humours- *Vata* (sometimes translated as wind), corresponds to the mind and nervous system. Its nature is dry, cold, light and activating. The second is *Pitta* which is also translated as "fire" or "bile." It is responsible for all metabolic transformations including the digestion and assimilation of food as well as assimilation and clarity of thought and understanding. The nature of *pitta* is primarily hot, moist and light. *Kapha* is sometimes translated as the "water" or "mucus" humour and is responsible for all anabolic or building functions such as the development of muscle and bone tissue. Its nature is cool, moist and heavy.

Terminalia chebula (Combretaceae):

Harida, having a bitter flavour, is associated with the *vata* humour as well as the air and space elements. It treats imbalances and diseases of the *vata* humour. The dried fruit is rich in tannins; also contains a variety of carbohydrates, glucose, sorbitol (Kim et al., 1993) etc.. The pericarp contains anthraquinone glycosides, which are responsible for the laxative effect. The presence of saponins, anthrones and anthranols has also been documented. *Harida* possesses laxative, astringent, lubricant, anti-parasitical, alterative, antispasmodic and nervine properties. It is therefore used to treat acute and chronic constipation, nervousness, anxiety and feelings of physical heaviness. Among Tibetans, *Harada* is so highly revered for its purifying attributes that it is the small fruit which is depicted in the hands of the "medicine Buddha" in their sacred paintings or *tankas*. Of the three fruits, *Harada* is the most laxative

and contains anthroquinones similar to those found in rhubarb and cascara. One of numerous studies of *Harada* (Inamdar and Rajarama Rao, 1961b) demonstrated its anti-vata or anti-spasmodic properties by the reduction of abnormal blood pressure as well as intestinal spasms. This confirms its traditional use for heart conditions, spastic colon and other intestinal disorders. The fruit has 24-32 % of tannins consisting of Chebulagic acid, Chebulinic acid, Corilagin and Gallic acid. It has 18 amino acids, sugars, phosphoric acid, succinic acid a few other acids in minute quantities. The tannin concentration decreases in fruit as it matures and the acidity increases. Resin and purgative principles of anthraquinones and sennosides are also present.

Emblica officinalis (Euphorbiaceae):

Amla has a sour flavour and corresponds to the pitta humour and the fire element in Ayurvedic medicine. It is a cooling tonic, astringent, mildly laxative, alterative, anti-pyretic. It is used to treat fire imbalances that include ulcers, inflammation of the stomach, intestines, constipation, diarrhoea, liver congestion, eruptions, infections and burning feelings throughout the body. It is considered astringent, bitter, digestive, aphrodisiac, laxative, diuretic and tonic. It has been used in the treatment of vomiting, haemorrhage, fever, coughs, eye inflammation, ulceration, anorexia, scurvy, diabetes, jaundice (Gulati, Agarwal and Agarwal, 1995), menorrhagia, leucorrhoea, and toxicosis. It is also said to relieve thirst, burning sensations, impurity of the blood and to promote abundant hair growth and has been used for the treatment of the common cold, scurvy, cancer and heart diseases. In various studies, *Amla* has been shown to have mild anti-bacterial (Khorana, et.al.1959) properties, pronounced expectorant (Khorana, et.al.1960), anti-viral (Nakanishi, 1965) and cardiotoxic (Hussain, 1975) activity. *Amla* is the highest natural known source of vitamin C. Having 20 times the vitamin C content of an orange, *Amla* is also uniquely heat stable. Even when subjected to prolonged high heat, as in the making of the Ayurvedic tonic formula called *Chyavanprash*, *Amla*, as the primary herb comprising 50% of the formula hardly loses any of the vitamin C that is present when it is freshly harvested off the tree. The same is true of *Amla* that has been dried and kept for up to a year. This age and heat stable form of vitamin C in *Amla* is due to the presence of certain tannins that bind and inhibit its dissipation. The compounds found in the fruits are- gallic acid, ellagic acid, 1-O-galloyl-beta-D-glucose, 3,6-di-O-galloyl-D-glucose, chebulinic acid, quercetin, chebulagic acid, corilagin, 3-ethylgallic acid (3-ethoxy-4,5-dihydroxy-benzoic acid), isostrictiniin.

The fruit pulp constituting 90.97 % of the fruit, contains 70.5 % moisture. The total soluble solids constitute 23.8 % of the juice. The pulp contains 5.09 % total sugars and

5.08 % reducing sugars. The ascorbic acid content is 1,094.53 mg per 100 ml of juice. The tannins and pectin content of the pulp is 2.73 % and 0.59 % respectively. The fruit pulp contains 0.75 % protein. The mineral content of the edible portion, as represented by its ash, is 2.922 % The percentage content of the mineral elements, viz. phosphorus, potassium, calcium, magnesium, and iron is 0.027, 0.368, 0.059, 0.248 and 0.004 respectively.

Terminalia billirica (Combretaceae):

Behada fruit (dried) contains about 20% of both condensed and hydrolysable tannins. Other constituents include lipids, b-sitosterol, saponins, gallic and ellagic acids and their derivatives, glycosides and various carbohydrates. In Ayurveda it is used as bitter, acrid, astringent, laxative, germicidal and antipyretic and is applied in a diverse range of conditions including cough, tuberculosis, eye diseases, dyspepsia, diarrhoea, dysentery, inflammation of the small intestine, biliousness, flatulence, liver disease and leprosy. It is also said to cleanse the blood and the voice. Bahada is astringent, tonic, digestive and anti-spasmodic. Its primary flavour is astringent and the secondary is sweet, bitter and pungent. It targets imbalances associated with the kapha or mucus humour, corresponding to the earth and water elements in Ayurvedic medicine. Specifically Bahada purifies and balances excess mucus, treats asthma, bronchiole conditions, allergies and hiccoughs. Bahada fruit (Inamdar and Rajarama Rao, 1961a) contains up to 35% oil and 40% protein (Rukmini and Udayasekhara Rao 1986). The oil is used for soap making and for cooking by the poorer classes. The sweet smelling oil is 35% palmitic, 24% oleic and 31% linoleic. Linoleic oil is an essential fatty acid important for increasing HDL cholesterol, associated with a healthy state and reducing LDL cholesterol, considered to indicate a higher-than-average risk for developing coronary-heart disease. The fruit contains 17% of tannins viz gallic acid, ellagic acid, ethyl gallate, galloyl glucose and chebulaginic acid; minor contents being -phyllembin, b-sitosterol, mannitol, glucose, fructose, rhamnose etc.

AGEING PROCESS

Ama is a term denoting a substance associated in Ayurveda with chronic disease patterns and symptoms of ageing. It is described as a kind of sticky built up of material that clogs the circulatory channels. In many ways it is nearly identical to the accumulation of excess cholesterol and blood lipids described in the West. Both conditions seem to contribute to a wide variety of circulatory disorders ranging from senility, rheumatic conditions, cancer and heart disease. It is interesting that in Traditional Chinese Medicine there is also a pathological condition associated with the heart called 'invisible mucus' that is similar to the descriptions of both excess cholesterol and ama in

Ayurveda. The effectiveness of *Amla* on reducing serum, aortic and hepatic cholesterol in rabbits was demonstratively reported (Thakur, 1984). In another study (Tariq et al., 1977), extracts of *Amla* fruit were found to decrease serum free fatty acids and increase cardiac glycogen. This helps to prevent heart attacks by providing significantly greater protection and nourishment to the heart muscle. One of the body's reactions to coping with stress is to increase the production of corticosteroids. The accumulation of these stress hormones can also contribute to the formation of cholesterol. Internal stress and the resultant build up of cholesterol can be caused by the abuse of stimulants, spicy, hot foods such as garlic and cayenne, excessive aerobic exercise and repression of the emotions. It is interesting that an excess of some of those very substances and activities that lower cholesterol in some, when not utilized in a holistic, balanced manner, can act as a stimulant and add further stress that would precipitate the further accumulation of cholesterol. Triphala is one of two Ayurvedic formulations that are specific for eliminating *Ama* and cholesterol from the body (Thakur et al. 1984).

ROLE OF TRIPHALA

Triphala is a completely balanced energetic formula, being neither too cold, nor too hot. When taken regularly over a long period, it gently effects the elimination and purification of *Ama* from the tissues of the entire body. The three fruits have been scientifically studied for some of its claimed traditional benefits. These include lowering of cholesterol, reducing high blood pressure, benefiting circulation, improving digestion, regulating elimination without causing any laxative dependency. With all the virtues of the three individual herbs, Triphala has many wide and varied uses as a therapeutic herbal food. Before considering pathological indications for which Triphala would be appropriate, we should never ignore the value of taking it on some regular basis whether once daily or once or twice a week simply for health maintenance. Triphala, having great nutritional properties, will help to prevent sickness. Regardless of any other herbs used, Triphala can be prescribed singly or adjunctively whenever there are symptoms of inflammation, heat, infection, obesity and other conditions of excess. Because of its combined tonic and eliminative properties, it is generally quite safe to give even for deficiency diseases including anaemia, fatigue, candid, poor digestion and assimilation. Unlike other eliminative and cleansing herbs, Triphala can be taken safely by those who suffer from tuberculosis, pneumonia, AIDS etc. *In vitro* anti-mutagenic effect of Triphala was also studied (Kaur 2002) and the results were encouraging.

PREPARATION AND DOSAGE

Triphala is prepared by mixing equal parts of Harida (*Terminalia chebula*), Amla (*Emblica officinalis*) and Behada (*Terminalia bellirica*) and is taken in dosages of 3-

6 g twice daily against flatulence, constipation, Diabetes and eye diseases. The combination can be altered depending upon the needs of the patient. To treat, for example, *vata* diseases such as constipation, the quantum of Harida is increased to ensure more laxative activity. Triphala can be taken both as a powder or a tablet form. Traditionally, it is taken as a *churna* (powder), normally 1-3 g of the powder is stirred in warm water and consumed the entire amount each evening or divided into three doses throughout the day. Since no flavour is noticed, it can be made into tablets or capsules for consumption. Generally the dose is from two tablets 1-3 times daily or four to six tablets one time daily. Children may only require one or two tablets in the evening. The larger dose is more a laxative while the smaller dose tends to be a blood purifier. A smaller dose might be one or two tablets three times daily. One should increase or decrease the dose according to one's bowel movements. Since there are no problems in using Triphala, the dose can be adjusted upwards from the suggested amount. Triphala is also widely consumed for all eye diseases including the treatment of conjunctivitis, progressive myopia, early stages of glaucoma and cataracts. For these conditions, it is taken daily both internally as described above, as well as externally as an eye wash. Triphala has been found to be very effective for helping to control weight gain, chronic constipation and as an adjunctive treatment for many chronic degenerative conditions.

CONCLUSION

Composed of three fruits, namely Harida (*Terminalia chebula*), Amla (*Emblica officinalis*) and Behada (*Terminalia bellirica*), the 'Triphala' is the most effective laxative that supports the body's strength. Triphala is normally an equal blend of these three herbs and because of its high nutritional value, this mixture not only cleanses the intestine but also detoxifies at organic levels without depleting the body's reserves. It promotes longevity and rejuvenates body and mind. Although all the components of Triphala, were found to reduce serum cholesterol and cholesterol of liver and aorta, it is Harida which has been to have greatest effect. As Triphala possesses laxative, astringent, lubricant, anti-parasitical, alterative, antispasmodic and nervine properties it is being used widely to treat acute and chronic constipation, nervousness, anxiety and feelings of physical heaviness. Hence, this is regarded as one of the most valuable herbal preparations in the world. Ayurveda believes that the body is composed of three humours- **Vata** (space and air), **Pitta** (fire and water) and **Kapha** (Water and Earth) and these humours regulate every physiological and psychological process of the living organism. A harmonious state of the three humours creates

balance and health whereas an imbalance (excess or deficiency) manifests as disease. Vata, pitta and kapha are present in every cell, tissue and organ but differ in permutations and combinations. It is Triphala which effectively answers these 3 humours or *doshas*. It has very strong rejuvenative properties and hence referred to in ancient texts as the best medicine to prevent ageing. It is one of the richest sources of antioxidant vitamin C, varying between 720-900 mg/100g. Triphala also purifies the urine and prevents urinary tract diseases.

ACKNOWLEDGEMENTS

The authors are thankful to Prof. B.K. Mishra, Director, Regional Research Laboratory, Bhubaneswar for his constant encouragement and the Forest Department, Govt. of Orissa for extending field assistance in the forests.

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CASES OF FEMALE INFERTILITY AND ITS TREATMENT

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ABSTRACT

Infertility, faced by about 10% of the world population does not arise from a single cause or one factor. Causes are varied. It could equally affect to both males and females. Timely medical intervention with experienced practitioner's lead to proper diagnosis. Treatment depends on the cause of infertility. If it is corrected then success rate becomes high. From different towns of Orissa, seven numbers of couples were examined against infertility under the study and treatment extended accordingly. Result was significant with successful conception of 6 number of cases except one.

Key words : Puberty, intercourse, infertility, tubopathy, anovulation, endometritis, hypospadias, nidation, conceive, menopause.

INTRODUCTION

In this present world man is entangled in a variety of activities relating to his ever demanding job, his commitment towards his family and children and he has to race against time to keep up to the pace. Man has become a busy animal now. He has to overcome various adverse situations to prove him in society. Couples now believe in the 'one child norm' so that they can provide the best of everything to their offspring. Generally 80% of couples achieve conception if they so desire, within one year of having regular intercourse with adequate frequency (4-5 times a week). Another 10% achieve the objective by the end of second year. The rest 10% are mostly diagnosed to have some pathology, which inhibit them from conceiving successfully. Infertility is a manifestation, which comes under the last category. This factor drives them to visit medical practitioners for proper interventions and necessary advice and treatment. Infertility is defined as a failure to conceive within one or more years of regular unprotected coitus. Infertility can be of two types. (a) Primary infertility which denotes those patients who have never conceived. (b) Secondary Infertility which indicates previous pregnancy but failure to conceive subsequently within one or more years of unprotected regular intercourse.

FACTORS RESPONSIBLE FOR FERTILITY

- (i) Healthy spermatozoa should be deposited high in the vagina,
- (ii) The spermatozoa remain healthy and penetrate into the uterine cavity and then into the uterine tube.
- (iii) The ovum finds its way into the uterine tube where it can be fertilized by a spermatozoon.
- (iv) The fertilized ovum migrates into the uterus and the endometrium must be in a state, suitable for the nidation and subsequent development.

CAUSES OF INFERTILITY

Physiological :

- Prior to puberty
- Post menopause
- Relatively during lactation

Pathological :

Either due to faults in male or female . The cases of in fertility have been broadly classified into 3 categories such as :

(A) Common causes of male infertility :

Defective spermatogenesis

- ∇ Un-descended testis
- ∇ Orchitis
- ∇ Genetic(47xxy)
- ∇ Testicular toxins(drugs,radiation)
- ∇ Endocrinal (thyroid dysfunction, gonadotrophin deficiency)
- ∇ Varicocele
- ∇ Primary gonadal failure

Obstruction of efferent duct

- ∇ Congenital:
 - Absence of vasdeferens
 - Young's syndrome
- ∇ Acquired:
 - Infective (TB,gonorrhoea)
 - Surgical trauma (herniorrhaphy)·

Coital problems

- ∇ Impotency
- ∇ Absence of or premature ejaculation
- ∇ Retrograde ejaculation
- ∇ Hypospadias
- ∇ Psychosexual

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Defect in sperm & seminal fluid

- ∇ Immotile sperm (Kartagener syndrome)
- ∇ Astheno or Terato- zoospermia
- ∇ Low fructose content
- ∇ Sperm antibodies
- ∇ Undue viscosity

(B) Common causes of female infertility :

Tubal (40%)

- ∇ Tubopathy
- ∇ Following tubal infection
- ∇ Pelvic endometriosis

Ovarian (30- 40%)

- ∇ Dysovulatory
- ∇ Anovulation
- ∇ Corpus luteum deficiency

Uterine (10%)

- ∇ Unfavourable endometrium for nidation
- ∇ Chronic endometritis(TB)
- ∇ Fibroid
- ∇ Synechiac
- ∇ Congenital malformation

Pelvic (10%)

- ∇ Endo-metriosis
- ∇ Adhesions

Cervical (5%)

- ∇ Ineffective sperm penetration
- ∇ Chronic cervicitis
- ∇ Immunological factor (presence of antisperm antibody)

(C) Combined factors :

- a) General factors: Advanced age of wife beyond 35 yrs.
- b) Infrequent intercourse, lack of knowledge of coital technique and timing of coitus to utilize the fertile period.
- c) Apareunia and Dyspareunia
- d) Anxiety and apprehension
- e) Use of lubricants during intercourse which may be spermicidal
- f) Immunological factors.

CASE STUDIES

(I) Sabitri Sahu : 25 yrs HF, Dhenkanal

C/O- Unable to conceive after 2 yrs of marriage; Partners staying together; No family H/O HTN or DM; Menstrual history normal.

General Examination

O/E - Pulse 76/min Temp - (N)
 BP - 110/70 mm Hg P/A - NAD
 Anaemia - nil P/V - ut AV, Cx long
 Thyroid - no swelling Os - closed.

Advised for investigation

- ∇ DC, TLC, ESR, Hb (low), FBS
- ∇ S.VDRL (both)
- ∇ USG Abdomen and Pelvis

Semen analysis of husband (after 5 days abstinence)

Observation and result

Husband is found to have oligospermia (sperm concentration 20 million/ml)

Treatment given :

- (1) Cap Ecod 1 cap OD X 1 month
- (2) Cap Dory I 1 cap OD X 1 month

To report after one month for evaluation.

(II) Kancanbala Mohanty : 23 yrs HF; Choudwar.

C/O- Inability to conceive after 3 yrs of marriage; Partners staying together; After intercourse the seminal fluid flows out from vagina immediately.

General Examination

Wife	Husband
Pulse - 76/min, neg	Pulse - 74/min, neg.
BP - 120/80 mm Hg	BP - 120/82 mm Hg
Anaemia - Nil	Temp - (N)
Temp - (N)	Hypospadias
P/A - NAD	(abnormal position of urethral meatus)
P/V - ut AV, Cx long	
Os - closed	

Advice for Treatment

Surgery to correct Hypospadias

III) Shalini Rout : 26 HF, Angul; Bhima Rout; 34 HF Angul;

Inability to conceive after 1 ½ years marriage; Partners staying together; Menstrual History normal.

Past History : wife had TB 7 years back, Treated.

General Examination

Pulse - 76/min, neg	P/A - NAD
BP - 120/76 mmHs	P/V - Ut normal size
Anaemia - Nil	AV, Cx long
Temp - (N)	Os - closed.

Investigation

Total blood count, FBS, Mx, S.VDRL (both); USG Ahd & pelvis; Hyoterosalpingography (HSG);

To be done 2-3 days after stoppage of menstruation.

Findings

Left side tubal Block. (by HSG)

Treatment

Tuboplasty (surgery on fallopian tubes to restore the anatomy and physiology as far as practicable).

(IV) Prasanti Panda : 26 yrs HF; Athgarh, Raghunath Panda 36 yrs HM; C/O- Inability to conceive after 6 years marriage.

Previous investigations done :

- ✓ Seminal fluid analysis of husband normal
- ✓ HSG shows normal spillage
- ✓ Blood tests within normal limits

Advised for endometrial biopsy and ovulation study:

Endometrial Biopsy

Done on 21- 23 rd day of cycle.

Finding : No evidence of any secretory activity of endometrial glands seen.

Inference : Anovulatory cycle.

Ovulation study

Serial sonography done on days 9th to 12th of a regular menstrual cycle.

Finding : No evidence of any ovulation seen, ie, no follicles seen in ovaries.

Treatment

Clomiphene citrate 50 mg daily from 2nd day of cycle for 5 days. Repeat for 4-5 cycles

(V) Swapna Pattnaik : 29 yrs HF; Chaudwar; W/o Ravi Pattnaik, 36 yrs HM; C/O Unable to conceive after 7 years of marriage.

Investigations already done

- ✓ Blood parameters normal
- ✓ Hystero-salpingography normal
- ✓ Ovulation study normal
- ✓ Endometrial Biopsy normal

Advised for

Post Coital Test (PCT) and Sperm Cervical Mucus Contact Test (SCMCT)

Finding

Cervical mucus unfavorable for sperm penetration

Treatment

- ✓ Vaginal Douching (using sodium-bicarbonate one tsf to 300 ml water)
- ✓ Oestrogen (1.25 mg) once a day in follicular phase
- ✓ Doxy 100 mg twice a day X 14 days to both partners

RESULT AND DISCUSSION

A follow up study of patients treated for the various causes of infertility showed that mostly all patients were successful in conceiving after the treatment. In case I, a follow up study after one month showed a good response to the medication. But patient was advised to continue the same medication for another three months. Case II gave 100% result after the surgery for Hypospadias. Tuboplasty was performed on case III and the patient conceived after eight months of surgery. Treatment with Clomiphene Citrate of Prasanti Panda unfortunately failed to produce ovulation in case IV and even after repeated treatment, she failed to conceive. Swapna Pattnaik (Case-V), after treatment for a period of one month resulted in her conception after five months.

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CONTROL OF MONKEY MENACE IN ORISSA

(Series - 1)

R.K. Samantaray¹ and Alok das²

ABSTRACT

Monkey menace is an acute problem in different parts of the state of Orissa. In almost all cases the male ones are involved. The expert team from Nandankanan under leadership of Zoo vet Dr. R.K.Samantaray is being pressed into action for capture of these problematic monkeys to save life and property. This type of capture through chemical immobilization by dart firing through a pistol require definite skill, expertise, experience, courage, presence of mind and more so sound technical application. In this study 7 cases of 2 different species of male monkeys viz. Hanuman langur & Rhesus macaque were successfully captured and traslocated to different locations of Orissa by using Diazepam tabs (0.3mg in powder form) inside ripe banana as lure initially, followed by tranquilization with combination of chemicals xylazene Hcl (100mg) & Ketamine Hcl (200mg) in the proportion of 1:2 by dart firing through pistol using blue cartridge from average distance of 10ft to 25 ft in the recommended doses of xylazene Hcl (5mg per kg b wt) & Ketamine Hcl (10 mg per kg. b. wt) in the animal body weight range of 20-25 kg. Yuhimbine Hcl in the doses of 1 mg per kg. b. wt, given intravenously was found to be sufficient for timely reversal except one case.

Key Words : Monkey menace, capture, darting, sedation, lateral recumbency, antidote, traslocation.

INTRODUCTION

This belongs to phylum-vertebrate, class-mammalia, sub-class-Eutheria (placental), order-primate, sub-order-simii, Family- cercopithecidae (Old world monkey)

Both rhesus monkey (*Macaca mulatta*) and Hanuman langur (*Presbytis entellus*) are abundantly available in jungles and villages of Orissa. Out of them some are completely wild category followed by a sizeable proportion very much acquainted with human population. Another group belong to a completely tamed category, which is apposed as pet animal. This species resemble more like human and happens to be one of the naughtiest animal in earth. They are good climbers and frugivorous. Orissa is famed internationally for its snake charmers and monkey dancing show. That means the people of Orissa are capable of handling the dreaded animals including the naughtiest ones. This particular study is an outcome of emergent attendance to law and order situation at different place, time and situations of the state arising out of monkey menace. Nandankanan Zoological Park is traditionally famed for its animals, expertise facility, infrastructure with picturesque natural setting and above all catering to handle the wild animal menace at different locations. Under the study author himself a wild life expert accompanied by a team of skilled personnel under Government order have successfully captured 7 problematic monkeys, and trans located 4 cases in deep jungle. Finally three of the most dreaded and notorious



Fig.1 : Children injured out of monkey scratch and bites ones have been kept in Nandankanan zoo for further transfer after proper planning.

MONKEY MENACE OF THE STATE AT ITS PEAK

Because of habitation depletion, lack of space, shortage of food, population explosion, breeding, hierarchical dominancy and after all, the naughty behavior of the species there are increasing report of monkey menace at the state of Orissa. At village Bhaichuan at the outskirts of Bhubaneswar only one male Hanuman langur created havoc. It became so erratic that within couple of weeks it scratched and had bitten almost 40 people, 5 cases being serious and hospitalized. We could notice on 18th January the day of intervention that all the boys and girls visiting school were carrying a stick in their hand. At the city of Brahmapur during month of February 2006 at Badasahi of Shantinagar an erratic male rhesus monkey lifted one month old

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daughter of Smt. Ahalya Maharana and threw her into a well and the girl child died & later evacuated by fire extinguishing team. At Chhatrapur many troupes of rhesus monkeys have been creating fear and destroying properties since last couple of years. The District Magistrate of Ganjam intervened and required immediate intervention. At the Konark temple premises, most of the rhesus monkeys were snatching food & belongings from tourists, mostly foreign tourists. Among them 3 male notorious ones were attacking and biting visitors since long. Women and children were the most sufferers. It was reported that about 40-50 people got injured and many were hospitalized. Even once at the expert's den at Nandankanan a Hanuman langur created panic, injured staffs of zoo hospital, broke instruments, sat on doctor's chair, catching pen imitated doctor's writing. In another case at village Gandarpur / Khairput a male Hanuman langur injured many villagers. These are some of the instances which are just the tips of iceberg. Later there was report of growing menace at village Tikarpada of Satyabadi, Puri. Recently it was reported at Lord Jagannath's Temple, Puri monkeys are creating panic amongst the visitors and tourists. Under this circumstances all the cases were successfully trapped by expert team of Nandankanan using combined method of sedative drugs viz. tabs through ripe banana followed with darting through tranquilizing gun except the monkeys of Lord Jagannath Temple which would be planned and taken care of shortly without disturbing the sentiments of sebayats, public and also without deviating the temple rituals.

CASE STUDY

Following 7 cases at different places of state of Orissa were taken up.

Case No.1 - 18.1.2006 - Hanuman langur of Bhaichuan

Case No.2 - 25.2.2006 - Rhesus Macaque Of Brahmapur

Case No.3 - 26.2.2006 - Rhesus Macaque Of Chhatrapur

Case No.4/5- 20.3.2006 - Rhesus Macaque Of Konark

Case No.6- 8.5.2006 - Hanuman langur at zoo hospital

Case No.7- 11.5.2006 - Hanuman langur of Gandarpur

Case No. 1 (Male Hanuman Langur of Bhaichuan) :

Date of Reporting: - 18.01.2006. It was reported that number of people including school children were bitten, scratched and snatched by one male hanuman langur at village Bhaichuan, near Balakati at the outskirts of Bhubaneswar. Reaching out at the village on 18.1.06. could notice that all the school children were attending school with sticks in their hands. We were informed that 4 – 5 people (Bitten case) were seriously wounded and undergoing treatment at critical condition at SCB Medical, Cuttack. Then we camped at the village end. At 3.15 PM one of our team member powdered 10 tabs of Dizepam

(10mg) and put inside dozen of ripe bananas. Then we all traced the particular monkey at one of the roof. When I took position to dart from other roof, it immediately jumped over a couple of buildings and sat on a slab of a first floor building. By that period my team member started feeding ripe banana. The monkey must have eaten out 5-7 banana. After half an hour it started dozing. Then I came from behind without any sound and darted from 5-7 meters at 3.20 PM by pistol using combination of drug Xylazene Hcl 1 ml (100mg) + Ketamine Hcl 2ml (200mg). Since the monkey was having back towards me, I tried to hit whatever thigh portion was visible towards me. With the sound of the shot it vanished and the dart hit the backbone, rebounded & hit the wall & on the first floor roof. The drug could not be punched because it hit the wrong position. Then I sent some of my team members to create disturbances from other end so that it will come to my side. This time I hid myself behind a grill. Once the monkey came nearer the grill it continually sat facing to my side. So, only target left was both inner thigh. From close range, I took the shot at 3.35 P.M. with a second dart with same drug dosage. But with a dash, like a Karate specialist, the monkey covered its right palm. The dart punched into the gap between fingers & drug flushed. After about 5 minutes the monkey was in lateral recumbency and completely sedated. Then my assistants tied the hands from behind and then tied both the legs by jute rope. Then there was huge crowd. For better ventilation and other treatment I preferred to bring it to village end first. Then we drove down to the village end. Under the shed of a Banyan tree at 4 PM, we sprinkled water over its face and body, gave injection atropine sulphate (0.3 mg) I/M which acts as antidote of diazepam and maintain better cardiac movement. Then we put the monkey inside a gunny bag freeing its head out and tying the rest portion of the sac from side and brought it to



Fig.2 : Male Hanuman Langur of Bhaichuan trapped and caged at Nandankanan

We put it in a cage and applied betadine lotion to the wound. Then we gave antidote of xylazene Hcl i.e. Yuhimbine Hcl 1ml (20mg) I/V at 5.45 PM. Finally at 5.50 PM there was reversal and the monkey got up and sat inside the cage.

Case No. 2 (Male Rhesus Macaque of Brahmapur) :

Date of reporting: - 26.2.2006. History revealed that it reportedly threw a 1 month old girl child to one of the well during mid February and killed her. It also wounded number of people. We (Anti-Depredation Team of Nandankanan) moved to Brahmapur on 25th February afternoon and halted at Forest Rest House. Then we arranged a meeting where DFO, Brahmapur, local Range Officer, Forester, staffs of Nandankanan participated. We gathered all the informations, drew necessary plan for tomorrow and in the night sent some of forest staffs to trace out the particular monkey. By next morning we couldn't trace the monkey. Later we were divided into 3 groups and in a manner of combing operation searched the lanes and by-lanes of Brahmapur. After searching at Tulasinagar, Shantinager and finally at Bada bazar area, I could gather information that the particular lone adult male rhesus monkey amidst a troupe of 10-15 is creating havoc in the police colony. Getting information about our presence most of the police staffs came out of office. Requesting them to stay little away, I entered the colony with my staffs and hid myself behind a wall of a Government quarter. I observed that this particular monkey was in a arrogant mood. Our all kinds of approach of feeding them with diazepam tabs inside ripe banana failed. Hence, I decided that since it's a very crowded place I should go for darting by pistol from close range maintaing all safety. In one hand with a stick keeping in line with my hand and the dart loaded pistol under my backside belt, I moved forward. That male monkey showed its teeth, tried to chase me front to front but I didn't move back. Most of the times monkeys taste your guts. Finally it ran away & sat on a half built wall of an abandoned building inside police colony. When I proceeded further, I could notice that in different signals the other members were passing message of my movement to the male one. I got a chance on the corridor. There was a low height roof. Without my knowledge 2-3 members of the troupe were guarding me hanging the head down from the roof. When I lifted the pistol, a sound came from my team member to look to the top. Almost 2-3 monkeys combiningly tried to attack me from top of the roof. I rotated the stick in my hand in a circular manner over my head. Monkeys then moved to a little distance. I had already loaded the syringe barrel with drug xylazene Hcl (100mg), Ketamine Hcl (200mg) and atropine sulphate 0.3mg. I lifted the pistol, took the target and shoot at 11.30 AM. In full view of my eye the dart punched the left thigh. This house was under a Ficus tree. After I darted, the monkey rode the parapit of another building. In between these two buildings one drain was there. After 15 minutes the monkey with the support of the Ficus branch fell to the drain. Hence, I sent my staff to enter through a narrow

lane from road side with stick in hand since all other troupe members shouted, showed their teeth & guarded the body. Hence in one hand with a stick and the other hand holding the pistol I rode the boundary wall beside the tree and guarded some monkeys approaching from branches. My people in the meanwhile lifted the body and carried it to the Forest Range Office (See Fig. 3)



Fig.3 : The Monkey after being tranquilized and sedated taken to Forest Range Office, Brahmapur

At 12.15 PM gave antidote i.e. Yuhibine Hcl 20 mg. 1 ml I/V. By 12.20 PM the animal recovered. Then its hands and legs were tied and carefully it was transported and released at deep jungle of Tangi-Chandipur enroute successfully.

Case No. 3 (Male Rhesus Macaque of Chhatrapur) :

Date of reporting: - 26.02.2006 Nuisance about monkeys was reported by Sri Amrish Mishra, Advocate & later from the collector cum District Magistrate Ganjam. Taking clearance of Chief Wildlife Warden, Orissa, we then proceeded to Chhatrapur.

History revealed that one of the troupe leader of a particular locality created panic among the inhabitants. First I met the collector, Ganjam and then Sri A. Mishra, advocate and collected detail informations. I was informed that a large number of male monkeys are creating problem at different colony area. Here, the particular monkeys were very clever & didn't accept the diazepam contained ripe banana although I tried for more than one hour. Evening came. By normal principle I should have packed up. But I was not interested to dishearten the young, dashing Collector & District Magistrate and the leading advocate. Finally, I called for an engineer Mr. Rao who happens to be very friendly with all monkeys. Advised him to go on feeding coconuts from his hand. Finally as per my advice, Rao put 2-3 large pieces of coconut on the slab end. The monkey came little ahead and concentrated on eating coconut under a powerful street light. Visibility was clear. I darted from close range and it heat to right thigh successfully, Within seconds the monkey fled

and jumped buildings to buildings and it fell flat i.e. in lateral recumbancy on the 3rd floor of a building. It was all darkness. Under guidance of the advocate and some localites, my team searched house to house and finally located the sedated animal. We lifted it, then tied the hands and legs.(See Fig. 4)



Fig.4 : Male Rhesus Macaque of Chhatrapur

Then it was put inside a gunny bag. While we returned back to Bhubaneswar, enroute we released this particular monkey at deep jungle of Tangi-Chandipur successfully.(See Fig. 5)



Fig.5 : Release of Monkeys at Tangi-Chandipur jungle

Case No. 4/5 (Male Rhesus monkeys of Konark) :

Date of reporting: - 07.03.2006/19.03.2006 to 21.03.2006

First operation:- (07.03.2006)- Result:- Operation failed even though darted thrice.

Second operation: - 19.03.2006 to 21.03.2006

Details of operation :

19.03.2006- At 2 PM. left Nandankanan from Konark. Inspected the animals and halted.

20.03.2006:- Trapped the group leader the oldest one named Manu in the first attempt in the morning hour . Displayed tied Manu before the young and dangerous male one named Khandi from a distance in order to attract him to come closer. Basically "Khandi" was very clever, agile, swift and did not allow me to take target. Operation failed. Halted the second night at Konark.

21.03.2006:- Next day , early morning, the team traced the monkey sitting on the scattered stones outside the boundary wall towards the city side of the temple. It was possible because the animal's movement was studied during midnight. Successfully fed the monkey with diazepam tabs embedded ripe banana. Then chased the monkey to bring it from jungle side into the temple premises. Finally it remained under hide amidst the erased iron pillars. It was next to impossible to dart. An idea struck me. The monkey sat on 40 ft height. I avoided the face to face approach. I rode the metal cross binded pillars from side ways where the monkey cannot see me. I rode 45 ft. on the iron pillar structure specially made for renovation from one side. I rode infact 5 ft above the height where the monkey couldn't know my presence. That apart because it had consumed some banana containing 2-4 diazepam tabs, it was little sleepy. Hence I came down one cross pillar and took grip in both the legs and put both of my



Fig.6 : Male Rhesus monkeys of Konark

legs on 2 different metal pipes, over 40ft. It was one of my daring attempt in my wildlife career. I took aim and fired with the pistol with combination of Xyla + Keta + Atropine sulphate from behind in standing state and it heat exactly to the thigh. Immediately as I noticed, the said monkey rode another 20ft high and from where the top umbrella like cover (Angular magnificent roof) starts between the stone wall gap and it remained calm in lateral recumbancy. One of my expert staff could ride high. Myself and others also rode another 10-15 feet and finally we all alternatingly passed the animal and got down 40 ft from metal structure of Konark. Then took the animal to the plain platform of standing horse. Then injected antidote i.e. Yuhimsine Hydrochloride 1ml (100mg) I/V. At about 11 AM the animal revived. Brought both Manu and Khandi to Chandaka Wild Life Sanctuary and released them in deep jungle successfully.

Case No. 6 (Male hanuman Langur creating havoc inside Zoo Hospital premises) :

History - Previous day i.e. on 8.5.06 the monkey caused lot of damage in the zoo hospital premises and even in side the dispensing room. Also it wounded some visitors.

Details of operation on 9.5.06 - The monkey was located on the small tree between Isolation Ward and Hospital Dispensing Room. Obviously it was very restless and

agitated on slight provocation. It was first darted with pistol while on a side tree using xyla + keta + Atropine sulphate. But the drug couldn't bring the animal into sedation despite 45 minutes of waiting. Hence it was again darted from a long range with MOD- 60N dart gun while sitting on a tall mango tree. Finally after 10 minutes taking support of small branches below it was fallen to the ground (See Fig.7).



Fig. 7: Male hanuman Langur creating havoc inside Zoo successfully tranquilized

It was lifted & kept in the isolation ward of zoo hospital. Then antidote yuhimbine Hydrochloride (100mg) given I/Vly and reversal was there after 5 minutes .

Case No.7 (Male Hanuman Langur of Gandarpur, Baranga) :

Date of reporting - 11.05. 2006 at 11 AM

Detail of operation - Left Nandankanan from 12:30 AM. Operation started at 1:30 PM. At 2 PM fed Diazepam tab through ripe banana. Drug Xylazene Hcl 1ml (100mg),



Fig.8 : Male Hanuman Langur of Khairput, Baranga

Ketamine Hcl 2ml (200mg) and Atropine sulphate 0.5ml (0.3mg) were loaded to a 4 ml syringe barrel. Rest was filled with water. A small collared needle and stabilizer were fitted. Inside the plunger 1-5 ml cartouche was put in place. Then dart was ready. The monkey jumped from house to house, roof to roof, and did not allow to take on target. Finally I got a chance and darted it at 2.30 PM. Dart struck the lumbar region with drug punched partially. So, I was little confused as to whether I would go for 2nd time darting or not. On query my staff told it had almost consumed 10 number of 10mg dizepam

tabs . So, I thought it proper to wait. After 5 minutes it took the support of piles of hey stacks and fell to the ground gracefully under state of sedation. With the forked stick on its neck our staffs trapped it, tied both hands & legs. Then I gave Romaverse 0.5 ml (Yuhimbine Hcl 10mg) I/V. It got revived after 15 minutes. Then we brought it to Nandankanan Zoological Park and then kept it in a special isolated chamber.

DISCUSSION

In past occasions the monkeys have been trapped luring to feed like ripe banana given with sedative drugs like Diazepam by staffs of Nandankanan. (Personal communication). Under the study in five cases author had the privilege of using combination of feeding of sedative drugs and dart gun of short range (pistol) simultaneously with all success. But in one case, over dosage of sedative tabs could facilitate the trapping (case No.7) . In another case i.e. at zoo hospital campus, Nandankanan the male langur was tranquilized by Mod 60 N dart gun through using Xylazine & Ketamine Hcl., since it did not co-operate in eating the sedative tabbed banana.

INFERENCE

From above it is suggestive that combination of oral sedative followed by darting resulted in maximum success without much disturbance to the animal as well as the surrounding. Oral sedative with feeding of Diazepam up to a level of 100mg has been well tolerated by both rhesus monkeys and hanuman langurs. Atropine sulphate 0.3 mg has been enough for better cardiac monitoring. Amongst different food items, ripe banana proved to be the best option for giving oral sedation. The mode of sedation comprises of powdered Diazepam tab being embedded in to ripe banana through making a longitudinal groove on its body. Combination of Xylazine Hcl and Ketamine Hcl in 1:2 ratio i.e. with amount of 100 mg : 200 mg (Food Drodge, Germany) was proven to be most successful method of chemical immobilization. Yuhimbine Hydrochloride was given as antidote against Xylazine Hcl (100 mg/ 1ml) with the reversal time ranging from 5 to 20 minutes except once which almost took 2 hours. The drug dosage has been given in little higher side considering the animal's problematic nature and to avoid further human injuries. However the drug at little lower dosage can be further studied.

ACKNOWLEDGEMENT

Authors are thankful to Mr. Suresh Kumar Mohanty, PCCF (WL) cum C.W.L.W., Orissa, Sri S.K. Sinha, Director Nandankanan, Sri. A.C. Dinakar., Dy. Dir. Nandankanan, Sri. S. K. Mishra D.C.F and all the tranquilizing team members of Nandankanan who had co-operated to make all the tranquilization programmes successful.

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NOISE POLLUTION : IT'S ENVIRONMENTAL IMPLICATION AND EVALUATION

A. B. Das

INTRODCUTION

Environmental aspects assume great significance in view of growing deforestation activities, soil erosion, water pollution, land degradation, biodiversity loss and also noise pollution that continue to worsen and hinder sustainable economic development in rural India. The healthy green belt in recent years has encountered divergent environment hazards as an addition to their existing issues of social and economic hardships which badly affects the local community. Hence sustainable development can be promoted at grass root level by not only creating awareness but also protection and restoration of eco-friendly activities which benefits the society and safe guards the flora and fauna of that region. In this context a general study was undertaken regarding noise pollution which is almost ignored and escaped by the public. This study concludes that peoples awareness and participation regarding such pollution is the need of the hour for promoting a healthy society.

WHAT IS NOISE POLLUTION?

It refers to the sound without any value or noise that is undesired by the recipient. The kind of environment impact of noise pollution is slightly different from other kinds of pollution. The noise pollution is an alarming danger that has arise due to developmental activities that are inevitable for providing the basic needs and progress of a nation. Hence care should be taken not to explode the earth by noise pollution.

EVALUATION OF NOISE

Noise as a potent menace can be evaluated in terms of noise level scale in form of decibel unit. However, the health hazard is measured through PNDB (perceived noise level decibel). According to WHO the optimum noise level is 45 db in day and 35 db in night but anything more than 80 db is serious hazards to human being and ecosystem.

According to Central Pollution Board the following areas and sources must have an optimum level of noise as presented below (See Table-1 & Table-2)

Table - 1: Optimum level of noise from different sources (on time basis)

Places or sources of noise	Optimum noise (in db)	
	Day	Night
	(6am to 6pm)	(6pm to 6am)
Industrial area	75	70
Commercial place	65	55
Residential area	55	45

Table - 2: Optimum level of noise pollution from different sources (on basis of distance)

Sl. No.	Name of the vehicle source	Distance from (in meter)	Noise creation (in db)
1.	Jet fighter plane	3	140
2.	Boeing plane	5	100
3.	Various horns of vehicles	1	110
4.	Diesel operated heavy vehicle	8	90
5.	General motor cycle	6	90
6.	Passenger carrying vehicle	1	79
7.	Mini bus and car	1	91
8.	Sports car	1	94
9.	Motor cycle (two cylinder four stroke)	1	80
10.	Scooter (one cylinder four stroke)	1	50-60

CAUSE OF NOISE POLLUTION

In ancient time the roads and other infrastructures were not much developed but due to rapid industrialization and urbanization the road and transport facilities increased manifold day by day with various types of light to heavy vehicles running along the roads besides the noise coming out from the heavy industries, factories, aircraft, loud speakers during public speeches and festivals natural sources like thunders, railway and heavy locomotives etc. These are the major sources of noise which affects badly to the environment.

HOW TO GAUGE NOISE POLLUTION?

Environmental scientists have developed a special type of instrument that measures the intensity of sound which is expressed in form of decibel (db). If the noise intensity exceeds 80 db then we feel uneasy to receive such noise. Similarly if the noise ranges between 10-20 db then we cannot listen clearly. Generally the people are able to accept the noise better if the range is between 50-60 db. Beyond this, it gives a negative physiological impact to our body. Under such circumstances we have to assume that there is a noise pollution.

SOURCES OF NOISE POLLUTION

Noise pollution comes from many sources, out of which few important sources with their general noise intensity are described in the table mentioned below . (See Table -3)

Table - 3: Noise created by different sources with their intensity

Sl. No.	Sources	Noise created (in db)
1	Heavy Engg. Industries	94-124
2	Motor industry	104-120
3	Cracker and explosive	94-140
4	Pharmaceuticals	94-128
5	Synthetic fiber	90-113
6	Electronic goods	87-112
7	Textile industry	92-105
8	Fertilizer industry	104-118
9.	Winds of tree	20
10.	Breathing	10
11.	Quiet conversation	20-30
12.	Radio & rock music	50-60
13	Office noise	60
14.	Vacuum cleaner	80
15.	Traffic noise	60-90
16.	Lawn mower	60-80
17.	Heavy vehicle	90-100
18.	Motor cycle	90
19.	Thunders storm	110
20.	Air craft noise	90-120
21.	Air craft landing	140-170
22.	Public Address System	Up to 100
23.	Air craft take up	120
24.	Pneumatic drill	90-100
25.	Telephone ring	60
26.	Speaking to each other	20-30
27.	Clock alarm	30

IMPACT OF NOISE POLLUTION

Impact of noise pollution on ecosystem generally affects the flora and fauna such as (i) wild animals and birds, (ii) pet animals and birds, (iii) human beings, (iv) plants ultimately disturbing their overall environment which are briefly discussed below

On wild animals and birds :

Wild animals and birds living in the forest area besides the human habitat come across receiving severe noise pollution and in the impact they do have auditory problems, habitat disturbance, loss of fertility, physiological, psychological and behavioural disorders. Most of the birds and reptiles have hearing capacity equivalent to human

being but rats, rabbits, parrots, dogs and cats have delicate hearing capability. High intensity of sound hampers the communication among themselves. Birds have ability to receive noise of 36 db whereas they can tolerate the noise up to 63 db. Beyond this they get frightened. That is why these birds and animals prefer to stay with low intensity of sound. High intensity of sound also compels the animals and birds to change their habitat. 80 db sound is sufficient to make the birds leave their nests. Rabbits, elephants and deer are generally unable to tolerate high intensity of sound where as butterflies die at only 65 db sound. However, carnivores and birds like eagle and vulture can tolerate the sound up to 70db but beyond that they tend to leave their nest.

On pet animals and birds

Pet animals and birds have less physiological change than that of wild animals. If the sound intensity is more than 100 db then it results in serious damage to these wild animals. If such intensity perceives for a period of 15 days or more, then definitely they lose their fertility resulting in fatigue, giddiness and many other ailments.

On plants

Plants are very sensitive to noise pollution by which the growth and pollination activity ceases. Due to noise pollution, once the pollination is affected means there is a reduction in crop yield. Honey bees feed on nectar of several crop plants starting from sprouting till completion of inflorescences. An experiment was conducted in a flowery garden of 50-60 sqm. of a progressive farmer at Ersama block in district Jagatsinghpur. A spot of 1sqm was marked and the total numbers of pollination performance were calculated on each day before and after the initiation of artificial sound. Such experiment was carried out for a month exclusively during the flowering period from morning 6-8a.m. to noon 12-2p.m. and late afternoon i.e., 4-6 p.m. The different activities and results were presented below (See Table - 4).

Table 4. Performance of pollination by noise pollution

Period	Pollination type	Before noise	After noise
6am-8am	Cross pollination by insects and honey bees	Very good	good
12noon-2pm	Cross pollination by insects and honey bees	Satisfactory	Unsatisfactory
4pm-6pm	Cross pollination by insects and honey bees	Good	Fair

* (Pollination performances were observed on every one hour interval before and after creating noise)

On human beings :

Noise leads to emotional disturbances during work, sleep, concentration, meditation etc. Constant noise at working place declines the concentration, efficiency and

working capacity. Sometimes it also increases the risk of accident in different workshops, heavy engineering industries or in automobiles when the noise ranges in between 85-90 db. Besides, some side effects like whistling and buzzing of the ears also occur.

The most serious problem occurred due to noise pollution is deafness or impaired hearing. It may either temporary or permanent. Temporary loss of hearing occurs due to constant exposure to the noise. But this disability disappears within 10-15 hours of rest. However, repeated or continued exposure to high noise level of more than 90 db may result in permanent loss of hearing. Persons having hearing problem either since child hood or due to some disorder/ accidents are later more prone to such type of disabilities.

Many persons out loud their voice to make a clear speech in noisy areas like market places, railway station etc. A good example is that of a sales man in central market or taluk hat. He continuously has to utter the name of the product and its brand in a variety of way for better marketability. Such workers often suffer from both deaf and dumb disorder resulting chronic cancer in later stage. People having nervine disorders become more irritable in noisy areas. Physiological disorder like high blood pressure, high pulse rate, difficult breathing, improper sweating or headaches may occur due to exposure to noise. Besides that, giddiness, nausea, general weakness, skin disorder, insomnia, fatigue, disturbed sleep, defective colour perception and reduced vision are general symptoms caused by noise pollution.

On overall environment :

All living beings adopt their environment for survival of life in ecosystems. Initially the ecosystem was balanced as the human population was limited and level of scientific and technological developments were low. But due to ever growing population, human needs have been increased to a greater extent inviting continued scientific and technological intervention to exploit the nature and natural resources. This has often led to serious environmental imbalance through air, water and soil pollution besides noise pollutions.

CONTROL OF NOISE POLLUTION

Elimination and control of noise pollution can only become possible by following practices such as

- ∇ e-marketing and telemarketing should be promoted to give a check to growing no. of noisy of markets.
- ∇ Say no to high noisy cracker and only light crackers at open field might be carefully used.

- ∇ According to Indian penal law prevention and control of pollution act 1860; article 268, 290, 291 and act 1973; article 33 should be strictly to be followed.
- ∇ According to motor vehicle act 1998; section 119 and 120 and central vehicle act 89; article 93 must be strictly implemented in order to check both air and noise pollution.
- ∇ Use of multi-tone horns should be strictly prohibited
- ∇ Vehicle sound must be around 50 db and in no case it should exceed this range.
- ∇ More coverage of forest area under wasteland management and social forestry should be encouraged in order to check the noise as well as air pollution.
- ∇ Flight and air craft landing area must be surrounded by high rough wall so that high volume sound can be diffused.
- ∇ Restrict the use of Public Address System and mike systems in busy places
- ∇ Forest conservation act 1980 must be strictly followed
- ∇ Use of ear phone and cotton swab wherever necessary may be welcomed.
- ∇ Protect the people from noise working in industry and factory areas.
- ∇ There should be heavy penalties for violating the rules and regulations related to noise pollution.
- ∇ Regular campaigning, meeting and training on noise pollution should be implemented.

CONCLUSION

Noise pollution is certainly a burning problem of our country. Most of the developing nations and also some of the developed countries do have the same crisis. Now it has turned into a global concern. Hence increasing general awareness, adopting better technologies, strictly promulgating laws and after all changing some of our practices, we can expect a better world to live in.

THE CURRENT SCENARIO OF DISEASE ASSESSMENT, PREVENTION AND MONITORING IN INDIAN ZOOS

M.C. John

INTRODUCTION

The growing awareness for nature and wildlife conservation has made zoos a popular institution. The need for making conservation as one of the main objective of management of zoos was realised by the Government of India in true spirit. The Government set up an expert committee on management of zoos and its recommendations were accepted in 1973 (June). In India many well designed zoos were set up in some of the states, but for the most part, zoos have not been able to meet the modern requirements. The amendment of the Wildlife (protection) Act of 1991, provide for the enforcement of the required standards and norms for the management of zoos through the Central Zoo Authority of India. Every zoo shall maintain a healthy, hygienic and natural environment in the zoos to upkeep a better health care. Zoos shall ensure availability of veterinary care, quarantine rules and regulations, vaccination schedule to safeguard against infectious diseases and provision for isolation of infected animals to avoid further spread of infection. The zoos are classified as large, medium, small and mini zoos. Every zoos shall have veterinarians according to the type of zoos. Large Zoos - 1 Senior Vet and 1 Junior Vet. Medium Zoos - 1 Senior vet. Small Zoos - 1 Senior Vet. The vets are supposed to be registered with the State Veterinary Council/Veterinary Council of India.

VETERINARY FACILITIES

The large and medium zoos shall have a full - fledged veterinary unit with basic diagnostic facilities, range of drugs and a reference library on animal health care. Zoos shall have a qualified laboratory assistant and computer assistant for assisting the Veterinarians. The small and mini zoos where full-fledged veterinary unit is not available, shall have at least a treatment room in the premises. Any animal that dies in a zoo shall be subjected to a detailed post-mortem examination by a veterinarian attached to the zoo.

MONITORING OF DIFFERNT DISEASES IN A ZOO

Bacterial Dieases:

(i) Colibacillosis (*E. Coli*) - Young animals with enteric problems can be diagnosed by culture of the faeces. (ii) Salmonellosis - If enteric complications are noticed, it can be diagnosed by isolation of the organisms from faeces. Commonly *S. typhimurium* is the causative agent. Many other species are also involved. (iii) Tuberculosis - The disease manifests, commonly as pulmonary form, mostly caused by Bovine strain (*M. bovis*). Also the human strain and Avian strain rarely cause the disease in concerned animals. (iv) Anthrax- Caused by *Bacillus anthracis*. Symptoms of sudden death and oozing of tarry coloured blood from natural orifices. (v)

Pasteurellosis-It is caused by *P. Multocida*. and affects the herbivores and also the carnivores. Here in mostly the respiratory system is involved. (vi) Brucellosis - Abortions are most characteristic feature in this disease. *Br. abortus* is the causative agent. (Other strains are *Br. suis*, *Br. meletensis*, *Br. ovis* and *Br. canis*.) (vii) The other less reported conditions are *staphylococcus*, *streptococcus*, *klebsiella*, *listeriosis*, *leptospirosis*, *corynebacterium pyogenes*, *clostridial* diseases like *tetanus*, *black quarter*, *enterotoxaemia* etc.

Viral Diseases : (i) Foot and mouth disease (ii) Rinderpest. (viii) Bovine viral diarrhoea, (iv) Rabies, (v) Pox. (vi) Canine distemper. (vii) Feline panleucopenia. (viii) Infectious-rhino-tracheitis. (ix) Feline calcivirus (x) Feline infectious peritonitis. (xi) Swine fever. Fungal Diseases : (i) Coccidiosis (ii) Candidiosis. (iii) Ringworm. Parasitic Diseases Endoparasite-(Nematodes, cestodes, flukes) Ectoparasite-Ticks, mites fleas Protozoan Diseases (i) Trypanosomiasis (ii) Anaplasmosis (iii) Toxoplasmosis (iv) Babesiosis (v) Coccidiosis. Nutritional diseases : Many diseases occur due to deficiencies of protein, vitamins, minerals etc.

CONCLUSION

Health of wildlife essentially depends on the rapid diagnosis and treatment of infectious diseases. Conventionally, diagnosis of disease is achieved by either direct demonstration of the disease causing agents and indirectly through demonstration of antibodies produced by these microbes. Demonstration of antibodies has been achieved using the Haemagglutination Inhibition Test, Agglutination Test, Compliment Fixation Test and Heutralisation Test. These test lacks sensitivity and are more cumbersome to conduct the test. Advent of immunoassays has revolutionized the diagnosis, Enzyme linked immunosorbent assay (ELISA) has been used for almost all disease for demonstration of antibodies as well as disease causing agents. Immuno assays coupled with monoclonal antibodies have increased the sensitivity and specificity of these diagnostic methods. Another area which has developed recently is the DNA based methods in disease diagnosis. Recently, polymerase chain reaction (PCR) method has been increasingly used for detection of pathogens in clinical samples. Very minute amount of nucleic acid of microbes could be amplified to million times within hours for better analysis of presence of microbes. A modification of PCR method, random amplified polymorphic DNA fingerprinting has been used for detection and characterization of microbes directly in clinical samples.

BIRD FLU-THE CURRENT SCENARIO

P. Panda

INTRODUCTION

The "avian influenza" or "bird flu" is an emerging disease with significant global concern. It is an infectious disease of birds caused by 15 subtypes of the influenza A virus. The virus influenza H5N1 is highly contagious and lethal in domestic and wild birds. Previously the flu that was seen to move from domestic fowl to wild birds now shows evidence that virus strain is being transmitted between wild birds. The occurrence of the highly pathogenic H5N1 infection in migratory birds indicates that if some migratory birds carrying the virus are strong enough to migrate back, the disease could spread far and pose a global threat. Scientists fear that the virus now has the potential to ignite a pandemic and endanger the lives of millions of people worldwide if it acquires the ability to transmit to humans.

CARRIER

Most of the the wild birds affected world wide are (i) Bar-headed geese (*Anser indicus*) (ii) Great black headed gull or palla's gull (*Larus ichthyaetus*) (iii) Brown headed gull (*Larus brunnicehalus*) (iv) Ruddy shelduck (*Tadorna ferruginea*) (v) Great cormornt (*Phalacrocorax carbo*) Domestic birds affected are (i) chicken (ii) Duck and other poultry birds such as geese, guinea fowl, pheasant etc.

DISEASE OUTBREAK

Outbreaks of influenza virus have occurred among poultry in eight countries in Asia in late 2003 and early 2004. By March 2004 the outbreak was reported to be under control. The countries in which avian flu encountered in birds are (i) China (ii) Vietnam (iii) Thailand (iv) Indonesia (v) Cambodia (vi) Japan (vii) Laos (viii) South Korea. Beginning late June 2004 new outbreaks of influenza H5N1 among poultry were reported by several countries in Asia. These are (i) China (ii) Vietnam (iii)Thiland (iv) Indonesia (v) Combodia (vi) Kazakhstan (vii) Malaysia (viii) Mongolia (ix) Russia (Siberia). Most recently, influenza H5N1 has been reported among poultry in Turkey and Rumania. Though the virus does not usually infect humans the first case of spread from a bird to a human was reported from Hong Kong in 1997 and 2003; and in Vietnam in 2004.

SYMPTOMS

Infection causes a wide spectrum of symptoms in birds ranging from mild illness to a highly contagious and rapidly fatal disease resulting in severe epidemics. Highly pathogenic form is characterized by sudden onset of severe illness and rapid death (can reach even 100%). Affected birds display clinical signs such as depression, anorexia, decreased egg production, coughing, sneezing, tremors,

diarrhoea, head tilt and paralysis. The characteristic signs are black combs, vesicle on comb, oedematous wattle, haemorrhage on legs. The symptoms noticed in layers are : (i) Sudden onset and die without signs. (ii) Weakness and staggering gait. (iii) Lay soft shelled eggs but soon laying eggs. (iv) Combs and wattles cyanotic and oedematous. (v) Watery diarrhoea and excessive thirst. (vi) Haemorrhages on unfeathered area of skin. (vii) Mortality-50-100%. Symptoms noticed in broilers are : (i) Anorexia (ii) Oedema in face and neck. (iii) Nervous sign. However in human beings fever, cough, sore throat, muscle aches, eye infection, pneumonia, severe respiratory distress are the important symptoms noticed.

MODE OF TRANSMISSION

Direct or indirect contact of domestic flocks with wild migratory waterfowl has been implicated as the frequent cause of epidemics. Infected birds shed virus in their saliva, nasal secretions and faeces. Susceptible birds get infected when they come in contact with contaminated excretions, or surfaces contaminated with excretions. Viruses are readily transmitted from farm to farm by mechanical means such as by contaminated equipment, vehicles, feed, cages or clothing. Bird flu infection in humans have resulted from contact with infected poultry or contaminated surfaces. The transmission of the virus from human to human has been reported rarely and the infected human has been found to be the dead host for the virus. However, because all influenza viruses have the ability to change, scientists are concerned that H5N1 virus can one day infect humans and spread easily from one person to another. Transmission can occur via several mediums like: (i) Introduced to a new area by migratory/wild birds. (ii) Virus excreted in faeces, oral and nasal discharge. (iii) Spread from flock to flock (s/c, Intra conjunctival, oral). (iv) Movement of infected birds. (v) Contaminated equipment, feed trucks. (vi) Close proximity with infected birds as it is airborne infection.

PATHOGENESIS

The incubation period of the virus is 3-7 days. Birds that survive infection excrete virus for at least 10 days orally and in faeces thus facilitating further spread at live poultry markets and by migratory birds. The course of the disease is from 24 hrs to 48 hrs.

POST-MORTEM LESIONS

The important post-mortem lesions noticed are : (i) Haemorrhage on leg muscles (ii) Trachea filled with caeseous material and exhudates. (iii) Inflammed and haemorrhagic trachea. (iv) Blocked intestine. (v) Folded

mucous membrane. (vi) Pinpoint necrotic foci on spleen. (vii) Pancreatitis. (viii) Congestion of kidney and urates.

COLLECTION OF SAMPLE IN BIRDS

Collection of samples from suspected / affected birds should be carried out in 3 stages :

Before collection of sample:

Protective gear comprising of hand gloves, a long apron, face mask, cap and shoes should be used. The gloved hand can be washed with spirit of alcohol for sterilization. Direct contact with carcass should be avoided through respiration. The face can be kept sideways and samples can be collected.

Collection of sample :

(i) Samples should include intestinal contents (faeces or cloacal swabs and oropharyngeal swab). (ii) Samples taken from trachea, lungs, air sacs, intestine, spleen, kidney, brain, liver and heart may be collected and processed either separately or as a pool. Sample when collected from trachea 1" from the tip of trachea should be left as food contents might contaminate the sample. In live birds - (iii) Tracheal swab and cloacal swab. In case of dead birds - (iv) The entire carcass can be packed in a polythene bag and transported.

Transport of sample :

(i) Collected sample should be placed in isotonic phosphate buffer solution (PBS) with a pH of 7-7.4. (ii) To increase the shelf life of the transport medium 50% PBS and 50% glycerine can be used. Antibiotics like penicillin (2000 units/ml), streptomycin (2mg/ml), gentamycin (50microgram/ml) and nystatin (1000units/ml) for tissues and tracheal swabs but at 5 fold higher concentration for faeces and cloacal swabs. It is important to readjust the pH of the solution to ph 7-7.4 following addition of antibiotics. (iii) Suspension should be processed as soon as possible after incubation for 1-2hrs at room temperature (iv) When immediate processing is impracticable sample may be stored at 4c for 4 days. (v) For prolonged storage diagnostic sample should be kept at - 80 c. (vi) The dead carcass packed in polythene bag should be kept in a vaccine container with ice bottles and dispatched to diagnostic labs.

DIAGNOSTIC LABORATORIES IN INDIA

In India there are five regional disease diagnostic laboratories located at - (i) Jalandhar (North) (ii) Kolkota (East) (iii) Bangalore (South) (iv) Pune (West) (v) Bareilly (Central) Besides the five laboratories a High Security Animal Disease Laboratory is present in Bhopal for the detection of the virus.

BIRD FLU IN INDIA

Over the past years government scientists have screened more than 12,000 sample from population of poultry, pigs and at least 120 birds but no confirmatory case of the H5N1 virus has been reported in India. India is host to

more than 16,000 bar headed geese and the bird is reported to breed in Ladakh. These birds are known to migrate to India from Qinghai Lake known to have an affected population of the species. The other four affected species though seen during winter in India, there is no evidence that these birds come from Qinghai Lake.

CAUSE OF CONCERN OF AVIAN FLU IN HUMANS

Viruses of low pathogenesis after short period of circulation in poultry population can mutate to highly pathogenic virus. The viruses lack the mechanisms for "proofreading" and repair of errors that occur during replication. As a result of these the genetic composition of the virus change and the existing strain is replaced with a new antigenic variant (antigenic "drift"). If a person who already has flu comes in close contact with birds that have highly pathogenic avian flu, there is a chance that the person could become infected with the avian flu virus. If this happens the person would carry both avian flu virus and human flu virus. The subtypes of the two viruses can swap or "reassort" genetic materials and merge (called as antigenic "shift") resulting in new subtypes different from both the parents. As populations will have no immunity to the new subtype and no existing vaccines can confer protection this can lead to lethal pandemics.

The spread of infection in birds increases the opportunities for direct infection of humans. If more humans become infected over time, the probability of humans serving as the "mixing vessel" for the emergence of the novel subtype with sufficient human genes to be easily transmitted from person to person.

HUMAN VACCINE

Two antiviral medications, oseltamavir and zanamavir would probably work to treat flu caused by H5N1 virus. But there is currently no commercially available vaccine to protect humans against the virus .

PRECAUTIONS

(i) Quarantine of infected farms and destruction of infected or potentially exposed flocks can prevent spread to other farms and eventual establishment of the virus in a country's poultry population. (ii) Vaccination of persons at high risk of exposure to infected poultry using existing vaccines effective against currently circulating human influenza strains. (iii) Workers involved in the culling of poultry flocks must be protected by proper clothing and equipment against infection. These workers should also be administered antiviral drugs as a prophylactic measure. (iv) Stringent sanitary measures can confer some degree of protection against the infection. (v) The wintering grounds of bar-headed geese, brown headed gull, pall's gull, ruddy shell duck and great cormorant need to be closely watched for aberrant clinical symptoms as quick as possible for better monitoring.

ORGANIC FARMING AND ECORESTORATION

H.K. Patra¹ and A. K. Jena²

INTRODUCTION

The use of irrational, imbalanced, excessive chemical fertilizers and pesticides have become a major concern in several countries including India due to its adverse effect on human health. Several deadly diseases like mental retardation, kidney problems, loss of appetite, damage to central and peripheral nervous system and even cancer are reported due to pesticide toxicity. A study conducted by Indian Council of Medical Research (ICMR) revealed that 51 percent of food items in India were contaminated with pesticides (Garg, 2006 January, Science Reporter). In another study, jointly undertaken by Toxic Links Imperial College of London and ICAR, vegetables such as spinach, cauliflower were found to contain high level of lead, zinc and cadmium – with 72 percent of the samples having metal content beyond the prevention of food adulteration norms (Garg, 2006 January, Science Reporter). A Delhi based NGO 'The Center for Science and Environment' has shown their studies conducted on two occasions that neither the bottled water nor the cola is free from contamination with agrochemicals such as DDT and Melathion (Garg, 2006 January, Science Reporter). The source of water for most of the bottled drinks or cold drinks is surface or municipal piped supplied or in some cases, local river system. All these sources are polluted not only by the over dumping of Industrial waste but also by overuse of insecticides and other chemicals. The massive usages of synthetic fertilizers, pesticides and insecticides has decimated beneficial biota and microbiota that suppress bacterial and fungal diseases which eventually leads more susceptible to pest and diseases to the agricultural farms.

Organic farming and sustainable development :

The answer to the above problems can be the organic farming practices. The process has already been started in several countries like US, Australia, Canada, France, Germany, Italy, Japan, including India etc. Organic farming demands a healthy environment, healthy crops and the health of those consuming them. Organic farming views the entire system – plants, animals, soil, air, water and microorganisms, soil flora and fauna in order to increase the productivity of soil in one hand and minimizing the pollution, which results from commercial use of fertilizers, pesticides etc. on the other. So the aim of organic farming is to maintain sustainable agricultural productivity. In order to maintain sustainability, natural resource conservation technologies as well as natural processes are utilized to reduce external inputs in the farming system. The National Organic Standards Board of the US (1996) defines organic farming as; an ecological production system that promote and enhances biodiversity, biological cycles and soil biological activities (Garg, 2006 January, Science Reporter). The organic farming enfold the following

characteristics, 1. No use of synthetic chemicals such as fertilizers, pesticides, antibiotics, growth hormones etc. in agricultural production. 2. Use of organic materials such as compost, manure, mulch as protective physical cover over the top soil which protects it from erosion, excessive temperature and desiccation, thereby optimizing conditions for activity of soil microorganisms and to maintain the organic matter balance of soil and source of nutrients. 3. Use of nitrogen fixing leguminous crops as well as resistant traditional plant varieties. 4. Incorporation of soil management techniques such as mulching, intercropping, crop rotation etc. 5. Use of bioagriinputs such as biopesticides obtained either from (i) microbial source like bacteria, fungi, viruses, protozoa, nematodes etc., or (ii) botanical pesticides obtained either from neem, tobacco, chrysanthemum, karanj etc. and (iii) biofertilizers such as Blue Green Algae (BGA), Azolla, Azotobacter, Phosphate Solubilizing Microorganism (MSM), Vesicular Arbuscular Mycorrhiza (VAM) etc., and humic substances from vermin compost.

Therefore, organic farming is a "holistic production management system" which promotes and enhances agroecosystem health including biodiversity, recycling of biological wastes and soil biological activity in a sustainable soil fertility maintenance. Soil fertility should be understood as the totality of conditions (physiochemical and biological). Now people all over the world are becoming more and more cautious about what they eat, which inputs were used to produce it and how it was grown and prepared. Agricultural scientists and farmers have come to realize that heavy doses of agrochemicals are not always the most judicious way of nutrition management and pest control rather it significantly alter the bio-physiochemical characteristics of the soil and leads to deplete the populations of soil organisms and soil microorganism such as earthworms, mycorrhiza etc, and their allies responsible for healthy plant growth. So the potent of organic farming is tremendous but an honest commitment from the farmer is necessary to make the difference.

CONCLUSION

It is high time to learn from past mistakes and rectify those in accordance to natural principles and 'man' has to admit that "Nature is the best Teacher" and reciprocal respect comes from the basic principles of ecology i.e. "use and Maintain", because man has to remain here in this planet as a member of the community and more importantly a pollution free life support system is essential for sustenance of life for all living organism in this planet.

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SHANKAR, A TRUE STOREY OF AN ORISSAN ELEPHANT

R. K. Samantaray

INTRODUCTION

The very name Shankar discussed in this article does not relate to God. Even then it has been a household name in the state of Orissa. The wild tusker, which once killed two persons, injured many, ravaged innumerable property; later became the darling of the crowd. On March 1st 2006, this majestic healthy bull elephant having uniformly grown marble white tusks, entered into village Biraramchandrapur under Satyabadi police station near Sakhigopal of Puri district from somewhere not exactly known. The villagers in and around Sakhigopal rarely get chance to see a captive elephant. There are too many impositions made on elephant keeping in view of its endangered status and stringent wildlife laws. To get a close look of a wild tusker is next to impossible.

HUMAN KILLING

Seeing such a huge tusker in the close vicinity the people assembled all around, confused what to do and what not to do. Finally they tried to disturb the elephant and attempted to drive it out in their own ways. Any wild animal unless and until disturbed would not attack. Shankar, provoked by human presence and disturbance went on rampage. In the morning hour it chased a group of villagers and critically injured Padmanav Bhoi of village Dungar. Then Budhia Bho (40) of Biraramchandrapur going to the field with a spade was lifted by its trunk, thrown and then trampled. He was died on the spot. In the afternoon it trampled and killed Kula Bhoi of village Balisahi. Under this situation the administration wanted to take help of Nandankanan tranquilizing team and as a tranquilizing expert I was privileged to lead the operation. And then the story began ...

HISTORY

From time immemorial elephant, the associate of Goddess Laxmi used to be taken as a symbol of peace and prosperity. In Khandagiri, Ratnagiri caves and Konark temple fine carvings of elephants adorn the stone wall to tell the glorious saga of Orissan elephant. The tuskers of Orissa happened to be war elephants, which were reared at Chudangagada, Khurdagada, Barabatigada etc. History speaks; British were not able to conquer these gadas. Here also the contribution of these healthy captive elephants were exemplary. They have shown exceptional workmanship

and prowess to fight back strongly against mighty British soldiers. Much importance was given for its precious ivory. The then mahouts were much competent carrying exceptional knowledge on elephant rearing, feeding, management, health care and of course the knowledge on warfare. At that time the elephant sheds were much better than present captive sheds all around the country.

BACKGROUND STORY

I got a telephonic call from the Director, Nandankanan when I was relaxing at my sister-in-law's house at Central Excise colony near Vanivihar. I was on leave and had dropped my daughter for her examination at D.M. School. Hence, I was waiting there to again get my daughter back. But my Director was much perturbed and that was clear from his faint and anxious voice. "Doctor! Please rush down to Biramchandrapur of Sakhigopal, where a tusker has already killed people, damaged property. Note down the route, make contact to Divisional Forest Officer, Puri immediately etc etc." I was in a dilemma. Then calls poured in from DFO, Puri, DFO, Chandaka, Assistant Director and Veterinary Officer, Nandankanan Zoological Park, Bhubaneswar, Orissa, India, Deputy Director, Nandankanan about this emergent situation.. Hence I had to move fast. Requesting my sister-in-law to take care of my daughter, I rushed down to Nandankanan. It was 12 Noon. Reaching at Nandankanan I could see that it would minimum take 2 hours for arranging tranquilizing equipments, capture equipments (like chains, ropes, belts etc.), manpower and the official directives. This is mainly because, Nandankanan team is basically meant for their priority job of zoo animal health care & management. In fact my assumption was correct. By 2 p.m. I started with one forester, one of my assistant, 2 mahouts in one vehicle and DFO, Chandaka moved with 8-10 of his staffs in another vehicle of Chandaka, which was specially meant for anti-depredation activities. DFO Puri who was waiting us at Balakati accompanied us en-route.

PLANNING

At Balakati, we have had a brief discussion. A contingent plan was drawn as to how we would handle the situation. To control the crowd taking assistance of police personnel must be the first job. Volunteers, forest personnel and people from administration should remain alert of elephant's movement. Only tranquilizing expert, his

assistants, DFO Chandaka, Puri and 2-3 Range Officers would be there with the special team to carry out tranquilization operation. I started planning within as to how best I can deal with the crowd, the tusker, my team members, location, high expectation from people etc. Meanwhile we reached the spot through narrow lanes and by lanes of Biraramchandrapur. At the middle of the village one canal passes and a culvert waylaying our path. We parked our jeep and anti-depredation vehicle before the culvert. First we walked up to the spot to take a close view of the animal. Collecting the required informations we walked down along the canal road. After about 200 meters of walk we halted. With close observation I noticed that a deep black coloured pachyderm having evenly balanced tusks (must have been wild natured) is running helter-skelter inside a banana plantation about 80-100 meters away from road. It was my good luck that besides canal road there was a water body with long stretching marshes. Without wasting time I informed the police officials to leave the canal road and make a cordon at the culvert.

DARTING OPERATION: (ON 01-03-2006 AFTERNOON)

Then I went to the Anti-depredation vehicle, loaded the dart with immobilon (etorphine hydrochloride, a dreaded drug, thousand times more potent than king cobra venom). Then I fitted it into a Mod 60 N dart gun (similar to a conventional rifle but more expensive and sophisticated). Inside the gun the highest-powered cartridge i.e. orange cartridge whose maximum distance range is 70 meters was loaded. Then I walked down the spot. I have had a brief walk on the road and observed the animal for few minutes. Thank God! This was possibly the best side to approach the elephant. Why you know? From all other (3) sides the elephant in the present mood can chase fast and catch and maul you as per its sweet will. There is this popular belief about "elephantine walk". Can you believe, elephant can run at a speed of 40-50 kilo- meters /hr. Hence on chase, it can easily outpace you. The site, which I had chosen, had a water body of 70-150ft width and half a km length. In case I would dart, then with the gun shot sound, punching of dart into its body, sighting of me straightaway may induce the elephant to chase me and ultimately this water body would save me. Calmly I stood on the canal road. Then I could analyze from eye estimation that the range is beyond reach. Hence, I applied sense and walked down the canal road to the bank of this water body. To reduce the distance to at least 70-75 ft, I had to be very closer to muddy area. I did exactly that and took a strong grip to my foot to the ground. Then I observed that the

elephant was dancing down with forward and backward movement imitating the role of Hanuman described in the Ramlila. Hence, to get a good target was apparently difficult. That is the reason why I was waiting for the first opportunity of the elephant giving me a stand still position for seconds to shoot. In any operation, there could be chaotic condition, but a seasoned campaigner like me has to maintain all coolness. You know that at Biraramchandrapur at that point of time with 10 - 20,000 odd crowds, I was the center of cynosure. If you do something silly then the crowd will not forgive you and if you control the elephant, then you would be the darling of the crowd. In my wildlife career as a zoo vet I have had many shooting (tranquilizing) operation. From my vast repertoire viz. in 99 % cases if the first shot is perfect, then there is 100% probability of winning the situation. If the first shot is missed, then the probability is always 50/50 i.e. then either you tend to commit mistakes being over cautious or the animal becomes perturbed, may not give you more chances. As an experienced zoo vet, I was more less acquainted to shooting & darting. They say, a zoo vet should necessarily become a good shooter. But in any case this was a tougher proposition.

I lifted the gun, put the butt into my shoulder, opened the lock of the trigger, took the aim, remained in position to wait for a perfect opportunity. The elephant moved forward and backward for a few occasion and then stood calmly for a while keeping its backside. Without wasting time I fired in the name of Lord Jagannath, because I knew that this shot could have been a million dollar shot. As an Oriya, before any big occasion we take the name of Lord Jagannath. As my target was at a long distance and marginally beyond the limit I had no other options but to shoot in the name of Lord. I cannot approach closer because I cannot enter into mud as I may lose my foothold. Lord Jagannath finally blessed and came to my rescue.

With the full view of my eyes, the dart (as you see the arrows moving in the Ramayan or Mahabharat.) flew in a projectile motion and hit the right rump perfectly. I had kept so much concentration that I could completely see the path of the movement of the dart. Getting a sudden unexpected blow, the elephant ran fast and entered straight into the banana thickets and further towards mango orchards. I was thrilled. A ray of glow touched my mind and it was electrified I got the enlightenment. For a while I forgot my existence, as it was quite exhilarating. Then I got my mind back, came to reality and tried to think that such a powerful drug I have used that it would pull down the elephant to lateral recumbency maximum within 3-5 minutes. I had to act fast.

Then I discussed with both DFOs, Chandaka and Puri to form two groups and to initiate combing operation in the mango orchards and banana thickets just to trace the elephant. This particular village periphery was full of different kind of vegetations, orchards, coconut farms etc. We searched for a long half an hour inside the thickets but could not locate the elephant. Finally from the other end of the village a loud voice came from a group of people i.e. Hati ! Hati ! (Indicating presence of elephant). So we rushed to the other side of village through the vegetations and finally at the center of a large field could found that the elephant was found fallen flat. In fact it was under a deep sleep with interim snoring. (See Fig.1) Once again I thanked to Lord Jagannath. That particular field's three sides had water bodies and one side with mixed vegetation of mango trees, jackfruits, coconuts etc. Hence there was every possibility that it could have fallen into that water body and during the state of sedation it could have died instantly. But God is great. Everything worked well.



Fig.1 : The tusker was successfully tranquilized by Mod 60N dart gun using immobilon at Biraramchandrapur

I embraced both the Divisional Forest Officer. An unexpected shout of Ha! Ha! Come spontaneously something that comes after winning a war by brave soldiers. All the forest staffs danced for a while for such a success. You know, just a couple of hours back it had killed the second man at the said village. At least now, we were sure that there would be no more casualties. I believe, all the administrators, the police personnel took a long breath and shown signs of relief after the successful tranquilization of this killer elephant. Even some of police officials applauded; what a shot! This doctor must have been a sharp shooter, one of the police officer remarked. I felt flattered.

CHAINING OPERATION AND REVIVAL

However for the doctor its the revival, which was important. At 5:15 PM the animal was located in lateral recumbency. Without wasting time I advised the forester, two other mahouts and my assistant to start the chaining operation. Then both forelegs were tied with circular chain

and hind legs were tied with spiked clamp (Local name Bedhi). Right foreleg was finally tied with the bamboo clump (taking a large number of culms together) and both the hind legs were tied to crowbar specially fixed to the ground. In the meanwhile I went on recording the TPR i.e. Temperature, pulse & respiration notes.(See Fig. 2)



Fig.2 : Doctor examining the Pachyderm and water being continually sprinkled for fast recovery

Accordingly some intravenous fluid, cardiac stimulant etc. were administered. By 6:20 PM chaining formalities were completed. Without wasting further time, I gave the antidote i.e. revivon(anti-dote of immobilon) intravenously at 6:25 PM. Generally within 3-5 minutes the animal should have been revived back. But in this case as I had given a little higher dose of immobilon the pachyderm of revived partly by 6:30 PM. It slowly woke up from deep sleep and struggled to lift its head. There was swinging of its tail, frequent limb movements and it made several attempts to get up but all in vain. Finally the animal got up at 7:10 PM with a jerk and there was complete revival. (See Fig. 3)



Fig.3 : Shankar successfully recovered and stood in late evening after giving antidote (01.03.2006)

This was the time of jubilation for all of us. Media lights flashed unflinchingly. We all the forest officials entrusted for the purpose congratulated each other, shook hands and finally decided to depart. Before leaving the place, I prescribed the feeding regime for the elephant.

**DATE WISE DEVELOPMENTS (FROM 2.3.06 to 17.5.06)
MARCH - 2006**

02.03.2006:- On 2.03.2006 the bull elephant has accepted some ficus branches and banana plants only but did not accept water.

3.3.06 - From 3rd March onwards it accepted wheat, bamboo leaves, sugar cane, banana tree etc. It was reported that the chain that tied to left hind leg was broken by the tusker. Reached the spot, darted the pachyderm with a drug combination of xylazine and ketamine HCL. This particular drug can induce a standing type sedation. I was again successful. Under the state of standing sedation tried to drag by chains and rear push but the elephant did not move. By 2 PM antidote was given. During process of revival it was pushed from behind, attempted from front by luring with sugar cane and dragging the chain. The pachyderm was forced to move 10 ft. for better chaining. Keeping to 180 ft. angle the elephant was tied to two big trees.

4.3.2006 – By this time the name of this tusker was given as 'Shankar'. Noticed that Shankar's health was markedly reduced. Took decision for future translocation of the pachyderm after little taming and a brief treatment. For that different routes were surveyed. Finally avoiding all three routes of water bodies, selected the ground route through coconut orchards, village road.

5.03.2006 - From Similipal Tiger Reserve one 30 years old female elephant including its 5 years calf were transported to Biraramchandrapur. Mahouts Shyam Singh and Babuli Khamari from Nandankanan zoo reached Biraramchandrapur for looking after better feeding and management of Shankar.

6.03.2006 – The elephant by then was chained to 4 legs including 2 rings in both fore and hind legs. By this time it had broken one chain that was fixed to right hind leg. Both left and right hind legs were badly wounded on the line of the chain. In 1st phase of treatment, tetanus toxoid was given by darting from distance of 20 meters.



Fig.4 : Tetanus toxoid injection giving through darting

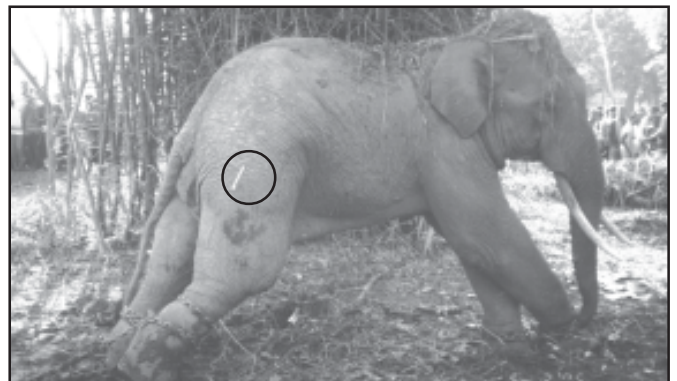


Fig.5 : Tetanus toxoid contained dart hit to right hind leg thigh with proper injection of the drug

Tried to change the chain by patting from back but it didn't co-operate. Hence it was required to go for standing type sedation to change the chain & rest of the treatment. Wound dressed at all legs. Ring (Bedhi) lifted little upward to keep chain above the wound. Right hind leg tied to a Jamu tree (*Sizygium*) and right fore leg was tied to a Kendu (*Diospyros peregrina*) tree. Sobha elephant from Similipal reached and was tied 40 feet away to another Jamu tree. Bamboo clumps from the bush were cleared which were vulnerable for wound. The mahout on top of elephant Sobha came nearer to tusker. It extended its trunk, smelt, patted and in a manner communicated nicely.

7.3.06 to 9.3.06 – Feed acceptance improved with tree fodder, banana plant, coconut, wheat, ripe banana, watermelon, sugar cane leaves, bamboo leaves, molasses, turmeric etc. A plastic drum put digging the soil and in it sufficient clean drinking water was provided. Water was and accepted by the elephant. Shankar slowly regained health.

10.03.2006 – Reached in the afternoon. Carried out treatment in the state of standing sedation after successfully darting by Mod 60N rifle. (See Fig. 6)



Fig.6 : Treatment extended to chain wounds

Suddenly the pachyderm came to sternal recumbency because of impact of the drug. Hence by help of Sobha pushed it to lateral recumbency to save its life. In case of

elephants, lungs are fixed to the sternum. Hence if the animal remains in sternal recumbency or dog sitting position for more than 20 minutes, the situation could have been fatal. Immediately I gave antidote i.e. Yuhimbine HCL intravenously but reversal delayed. It was revived by 11 P.M.

11.03.2006 – Proceeded to Biraramchandrapur by early morning. Planned to extend treatment without sedation taking a cautious approach. Dressed all wounds properly. Attempted to give injectables without sedation but failed. The elephant became restless, stretched its legs and urinated, came into half sitting position, with all gruntings and trumpet created a situation by which the chains caused more injury to the legs (See Fig.7).



Fig.7 : Shankar urinating and not cooperating the treatment

Hence, dropped treatment. Supervised the ramp. Discussed some of the pertinent points with Subrat Palchowdhury of West Bengal who had been invited officially for facilitating shifting of the animal to Chandaka Wild Life sanctuary.

12.3.2006 – PCCF & CWLW, Orissa called for a special meeting inviting Divisional Forest Officers, Chandaka and Puri, the Research Officer and myself to plan for transfer of Shankar from Biraramchandrapur tomorrow i.e. 13th March 2006. To avoid media and public disturbances it was planned to start the operation much early.

13.03.2006 – As per plan, everybody reached the spot at 5 AM. Loading operation started (See Fig. 8).

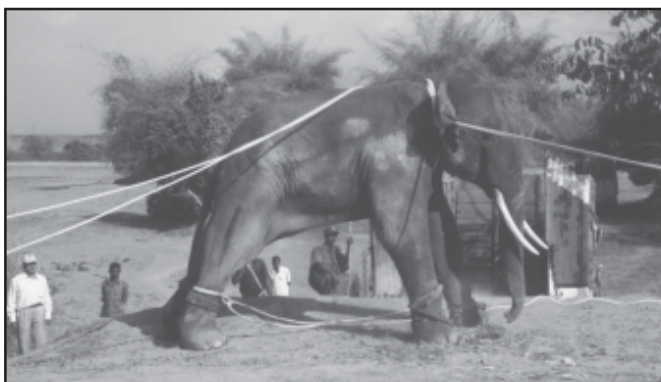


Fig.8 : Roping technique and dragging by tractors

The pachyderm was facilitated to move to the ramp and nearer the truck with the support of dragging of two ropes tied to neck from both sides fixing to two tractors. Then a mild sedation was extended through darting from close range (See Fig. 9).



Fig.9 : Tranquilization for mild sedation to facilitate its transfer (13.03.2006)

Here, a sudden mishap happened. A huge soil pack was dropped down from inches away of Shankar's left fore leg , a kind of situation could have forced the pachyderm kneel down and ultimately loosing major portion of soil from ramp and could have lost foot-hold and fallen down to the ground in style of vault or summer-sault taking its life in turn. But however, immediately, I rushed to the left side of elephant, advised staffs to strongly drag the right neck rope by tractor and the labourers to give 20-30 sand bag packing in left side so that the grip of the pachyderm will be retained. Finally a strong rear push by Sobha (Elephant from Simlipal) could load the elephant into the truck in a jerk (See Fig. 10).



Fig10 : Kumki elephant from Simlipal giving a strong push before Shankar was loaded into the truck

Later neck ropes were tied to the body of the truck and leg chains were tied to the chassis through specially made holes. By 10AM left Biraramchandrapur and reached to Kumarkhunti of Chandaka at 2.30PM. En-route had break at 3 different points and extended water bath to the animal to protect it from heat stress. At a special ramp made at Kumarkhunti with a 2nd mild sedation with xylazene and ketamine combination supported by smooth dragging by 2

tractors backwardly, the elephant was unloaded. Then necessary dressing was carried out. Antidote was given by 3.15 PM. By 3.30 PM it was revived. The team came to a distance and the elephant seen walking gracefully towards us (See Fig. 11).



Fig.11 : Shankar released successfully at Kumarkhunti of Chandaka Wildlife Sanctuary

Later in late evening it came to deep sleep. Finally Shankar entered into thicket of Chandaka and mingled in the wilderness.

22.03 to 25.03.2006 - It was reported that Shankar moved to Bharatpur, remained few days there, and then back to Andharua area. Finally it came to Tubibandh dam- Cashew-nut field- Gangapatna watch tower triangle suspected to be its known corridor.

APRIL – 2006

04.04.2006 – In the afternoon proceeded to Tubibandh dam on getting report of the tusker being injured. Large quantity of pus seen at the bank of the said dam. The tusker suspected to be Shankar had by then moved after having bath as reported by forest officials of Chandaka. Halted at Deras Forest Rest House. At 10 P.M. went on night patrolling from Deras to Tubibandh. Then proceeded to Gangapatna area but couldn't trace the pachyderm. Returned back to Deras.

05.04.2006 – Morning got VHF message that the elephant was traced at cashew-nut field of city forest division besides the east side hillock near Tubibandh. By the time we proceeded there, it was moving downward. At 3 P.M. dart fired with sedative drug and at 3.45 PM it was under standing sedation. The team came closer and reach into conclusion that this particular elephant was Shankar. Treatment extended in state of standing sedation against large-scale wounds. Treated with long acting antibiotics, analgesics, neuro-tonics etc. Followed wound dressings after wound pockets were cleaned with P.P. lotion.

Significant Observation :

Major wound pockets noticed are (i) Right rump, (ii) Left fore leg down the shoulder, (iii) Right fore leg at the carpal joint, (iv) Left foreleg above fetlock joint, (v) Brisket zone- 2 no. wounds, (vi) Fore head- 2 no. wounds, (vii) Near anal zone- 1 large sized wound with a pocket & 7 nos. small wounds all around the anus, (viii) Right gluteal region and (ix) Tail tip burst & maggoted.

Actions :

- i) Two iron pellets suspected from chhara (Country made gun) shot wound recovered, one from brisket zone & the other from left fore leg down the shoulder.
- ii) Two bone pieces recovered from large deep wound i.e. right fore leg at carpal joint during the course of dressing.
- iii) Bifurcated necrosed mass including hair brush were surgically amputated. Oil turpentine soaked gauze introduced into the bifurcated cavity to clean the maggots.
- iv) Anti-dote yuhimbine hydrochloride given I/V ly by 4.45 PM and after 10 minutes the animal revived and moved into the thickets.
- v) Treated with long acting antibiotics, analgesics, neuro-tonics etc. Followed wound dressings after wound pockets were cleaned with P.P. lotion.

08.04.2006 – PCCF (WL) arranged discussion with Dr. J.V.Cheeran over telephone. It was a lengthy discussion of mine to avail valued tips from Dr. Cheeran although I have had several discussions later for Shankar's health care and management.

09.04.2006 – At 11 A.M. traced the elephant inside the cashew field. Because of thickets could not dart the animal for treatment. The elephant took downward movement but did not come to Tubibandh dam by 6 P.M. and moved deep inside the Jungle. Decided to halt at the camp. The camp house was built amidst vegetation so that Shankar while bathing and drinking the camp site will not be visible.

10.04.2006 - By late night at 1A.M went on patrolling towards village Gangapatna. Search continued. At 2.30 A.M (late night) noticed under vehicle light, the tusker crossing the road nearer the watchtower. Once, it crossed the road, came a bamboo orchard. At ones of the plant it gracefully plucked the mangoes by its trunk and went on consuming. For half an hour I enjoyed this under the jeep light. Advised 4 staffs available with me to keep track of the elephant movement. Took rest inside the vehicle. Staffs also took rest in the other vehicle in wee hours. At 5.30 A.M. searched the elephant with the team and found that the elephant was bathing inside a small dam besides the village. First informed the villagers about the presence of the tusker

for safety reasons. By 6.30 A.M. darted with xylazene and Ketamine HCL combination. First dart missed and it didn't heat the target as it was deflected by a thin bamboo branch. The pachyderm with anguish picked the dart by the of trunk, checked, smelt and then mauled under its footpad. By 6.50 A.M. darted once again with the same drug combination and at 7.15A.M the treatment extended in state of standing sedation against large-scale wounds. Treated with long acting antibiotics, liver supplementation, analgesics, neuro-tonics etc. Followed wound dressings after wound pockets cleaned with P.P. lotion. In addition, Rintose (1 bottle) and Astymin (3 bottles) administered I/ V ly. Surgically intervened 3 major abscesses. Incised the abscess at dependable portion i.e. one at right rump, one at left shoulder joint and the other one at left fore leg. At 9.00 A.M. antidote yuhimbine hydrochloride given intravenously and 5 minutes later it was recovered gracefully.

13.04.2006 – Decision was taken to involve professors of different faculty of Orissa Veterinary College (O.V.C.) to support treatment inside the jungle. Accordingly Dr. V.S.C. Bose from Surgery, Dr. Jogesh Jena from Medicine, Dr. Debanand Panda from Parasitology and Dr. Hermant Panda from Bacteriology Department left at 2.00 P.M. and reached Tubibandh and examined the animal from close quarter. Betadine lotion sprayed from distance. Faecal matters collected for parasitological studies. Expert committee gave recommendations after checking the animal.

14.04.2006 - As reported the pachyderm remained in the cover all throughout the day.

15.04.2006 –It was reported that for last couple of days Shankar remained near Tubibandh & also accepting fodder and feed provided by the Department. Its movement ceased to only 10-15 meters. Sometimes remaining inside water and sometimes in the bank.

16.04.2006 – I came with Professors of Surgery and Medicine from Orissa Veterinary College to Tubibandh for the treatment. At 1.20 P.M. Shankar was dart fired with the same drug combination as earlier. After 20 minutes, animal was under standing sedation. Followed same treatment and wound dressings. In addition to it move of fluid and protein (Astymin) administered intra-venously. All wounds including cavities after washing with P.P. lotion were applied with Paraxine+glycerine+mag-sulph paste. Infected wound was examined by metal detector but it was negative to pellets. In the meanwhile a specially designed house i.e

stockade meant for elephant was made by wooden poles having top cover of tarpoolin roof (See Fig. 12).



Fig.12 : Shankar housed in a specially designed stockade at Tubibandh

Dr. Bose surgically intervened the right fore leg at the point of sinus. Sterilized swab collected from 2 different pockets. Blood samples/ smears/ serum collected for routine pathological and bio-chemical profiles and sterilized swab collected for further anti-biogram. Small necrosed portion cut from tail tip. Animal tied to hind legs by chains and the neck by ropes. At 3 P.M. the anti-dote yuhimbine HCL given i/v ly and by 3.10 P.M the animal was revived and started moving. In the evening deworming made as per faecal sample result.

17.04.2006 – Dispatched the samples to Regional Center for Wildlife Health, Deptt. Of Medicine, O.V.C. for blood profile & antibiogram. Team of doctors from Deptt. Of surgery, carried out the wound management at the site.

19.04.2006– Collected anti-biogram reports from O.V.C. Dressing of wounds continued in similar fashion but used pole syringe to flush drug into cavities. Animal did not cooperate to give injections. Anti-biotics Ofloxacin as per anti-biogram report started through oral route. Sporolac, Gelusil and vitamins supplemented

20.04.2006 - Observed that the chain in left hind leg created deep wound. Shyam Singh, mahout from Nandankanan with help of Chiluf of Chandaka tied the elephant from shoulder point wrapping the tail & loose end to the thigh and finally tying the rope to the backside pillar. Untied the chain completely.

21 - 30.04.2006 – Meditation and dressing with similar fashion and anti-biotic Ofloxacin continued upto 25.04.2006. Chain created wound at left leg was also dressed .

MAY – 2006

01.05.2006 – i) Wounds developed at lumbar and shoulder region from jute ropes. ii) Opened all ropes excluding ropes at shoulder. iii) Two nos. ropes tied down the fetlock of both hind legs and finally tied to the strong pillars. iv) Meloxicam

I/M as analgesic followed with usual dressing.

02 / 03.05.2006 – Usual dressing followed with supplementation of vitamins & minerals.

04.05.2006 - A fresh swelling developed at upper side on the growing granulation tissue of right fore leg. Opened the pocket by clearing the tissue. White viscous fluid flushed out. After cleansing with P.P. lotion introduced paraxin solution into both sinus cavity. There was huge growth of unhealthy granulation tissue over sinus wound. Cryo-surgery conducted to right fore leg at the sinus with swab & probe. A prominent crack noticed at foot-pad of left forelimb.

06.05.2006 – Expert committee member Dr. V.S.C. Bose from Orissa Veterinary College conducted cryo-application at the sinus wound (See Fig.13).



Fig.13 : Surgery expert extending cryo-surgery to the deep sinus wound.

Wound healing improved in the hind limbs. Deticking done with Butox solution in proper dilution through (soaked gauze touched to different areas keeping view of large-scale wounds.)

07.-5.2006 – Antibiotic Mikacin started as per fresh antibiogram report.

08.05.2006 – Crack enlarged at foot pad of left fore leg. Body weight resting on left fore leg affected. Animal started to take some load with wounded right leg. The size of sinus enlarged. Necrosed tissue cleared from site of cryo-application.

i) Wounds at right fore & hind leg flared up. ii) Continued white viscous fluid from both holes. iii) Ropes from neck & hind quarters freed. Shankar was for the first time free of all ropes. iv) Animal twisted the body & stood front side back. v) Anti-biotics Mikacin started as per 2nd time anti-biogram report.

09.05.2006 – Former Prof. Dr. J.N.Mohanty was invited to inspect the animal. He also recommended certain things which was carried out.

10.05.2006 i) Cryo-application repeated at sight of unhealthy granulation tissue. ii) Left foot crack flared up and unable to take further load. It was forced to share load

on right affected leg. iii) Right fore leg heavily swollen.

11.05.2006 – It seems nothing is working. Ayurvedic preparation made by both mohuts Shyam and Chilun as hot fomentation at swollen parts extended.

12.05.2006 - Anti-biotic Mikacin course completed today swelling enhanced.

13- 15.05.2006 – Dressing as per recommendations continued.

16.05.2006 – Shankar left taking feed from 16th night.

17.05.2006 – Message that Shankar fell down by 4 P.M. 10 bottles of Ringers Lactate given I/V ly. (See Fig. 14).



Fig.14 : Last attempt to save Shankar. (In set) Fluid therapy given Intra-veinously after it fell down.

Support extended with soft padding at back & under head. At 10.10 P.M Shankar reported dead. Finally a long chapter was closed. A strong human bond after brief man-animal conflict came to an end Shankar left the mortal world

18.05.2006 – Post mortem examination conducted by team of pathologists from Orissa Veterinary College.

SHANKAR LEAVING THE MORTAL WORLD

We all the team members were shocked of Shankar's death. In fact when on 8th may 2006 when the crack developed in the left foreleg, I tried to think the consequences. In elephants front legs are the major load bearing legs of the body. Once right leg is seriously affected and left leg's footpad is gone there is every possibility that the animal may fall down. Had it been developed countries, decision could have been taken to go for euthanecizing the animal. But here at orissa, we can't even dream of this step. Hence, only step was to continue the treatment. The recommended treatment here is washing the footpad with strong antiseptic lotion and applying coal tar. But the elephant in no case was lifting this particular leg (left fore leg) for cleaning. Hence, it was not possible to extend this sort of treatment. By then we have received the updated antibiogram report, which revealed Mikacin was the highly sensitive drug apart from two others. Rest 10-15 antibiotics that were highly sensitive in earlier tests got resistant indicating the overall deterioration of the animal. Then rest

of the ropes was freed as a first step to allow all legs to do their job and to go for the particular antibiotic for overall healing. Then by passage of each day left foot crack aggravated and the elephant was having no other options than to take body load with the right leg (which was already adly affected) resulting huge swelling and further increased inflammation of the wound. In this situation nothing worked. None of the anti-biotic worked. Even ayurvedic preparation to reduce swelling and inflammation didn't work. Cryo-application with definite interval didn't work much. From 15th may onwards the animal struggled to stand taking load with trunk and tusk including taking load in both forelegs equivalently. Finally on 17th evening it was fallen with knees taking a side support to one of wooden structure. Timely fluid therapy and other life saving drugs given were in vain. It was succumbed by 10.10 PM.

CONDUCT OF POST MORTEM

On 18th morning postmortem was conducted by the Assistant Professor, Department of pathology from Orissa veterinary College with some of his associates. By this time the Director, regional Museum, Bhubaneswar had already reached the spot with a mission. DFO, advised the doctors to conduct PME without damaging the bones since Regional Museum for Natural History would preserve the skeleton in complete shape for scientific, educational and evolutionary significance. But doctors suggested that they may leave other bones but have to open the sinus pocket at the carpal joint of right foreleg. Now it may be too early to give any statement on postmortem finding but grossly it was noticed that a cylindrical hole with necrosis entered into the bone. Huge quantity of gelatinous mass came out of the carpal joint. Different layer of muscles shown large quantity of pus inside spreading the whole of right foreleg indicating possibility of osteolysis and suppurative myositis. Tissues from heart, lungs, liver, kidney and spleen were collected for further pathological examination to support diagnosis.

ABOUT PRESERVATION OF SKELETON

Story did not end even after death of Shankar. Later Director, Regional Museum for Natural History (RMNH), Dr. A. S.Ray with his assistants cut all legs first, then head and later shifted to the museum campus at the city. On 19th may there was all confusions whether the skeleton would be kept at State Museum or the RMNH but finally it was decided that it would be preserved in the RMNH. Later during the processing Dr, Ray collected another pellet (must have been from a country made gun) from the spinal chord. Now it may take some more time to chemically clean, process and preserve it in a huge glass box.

ANALYSIS

There are so many things to be discussed and debated. If we critically analyze, there would be so many

ifs and buts. Lets discuss in two important areas. i.e. Constraints of wild elephant treatment at Orissa and any left out possibility of saving Shankar

Constraints of wild elephant treatment at Orissan condition :

(i) Trained elephants (kumkis) are not available at Orissa to attend wild elephant tranquilization and treatment. It's commonly used in Assam with more success. (ii) No organized team is solely available for such a tougher job. People (Vets and experienced staffs do have their priority with some other jobs) and this team frequently changes. (iii) No separate anti-depredation office was available earlier. After Shankar's case Chief Wild Life Warden (CWLW), Orissa directed to open a special squad office at Nandankanan to function in line with police, fire brigade etc. by quickly responding to emergent situations. (It is pertinent to mention herewith that if the tranquilizing team could have reached half an hour earlier; the second casualty could have been checked).

(iv) Chandaka WL Sanctuary remains besides the capital city of Bhubaneswar. Often because of city expansion, habitats of elephants are significantly depleted resulting man animal conflict. To treat a wild elephant besides the capital city does have so many implications. (v) Even though in restraint operations things have been developed to some extent in Orissa, we are not much experienced in translocation, relocation and habitat management. (vi) Method of chaining as adopted in Orissa creates more problems. To give less injury ropes made of jute starting from thick and divided & subdivided into thin line of 10 – 16 thin ropes may be tied covering more breadth of the area to catch a good grip to meet the requirement but would not cause injuries. Thin ropes tied to leg slowly get thick and thicker. Finally thickest of the position can be tied to the log of pillar. This technique is in practice at the state of Kerala. (vii) Poaching or drive out of wild animal. (Gun shot injuries and psychological stress).

Any left out possibility of saving Shanker :

(i) It has to take a concrete decision well in ahead. Either to immediately transfer the animal from village zone or to keep it for large period and train it with support of mahout and Kumkis. Shanker could have been transferred within couple of days had we been much experienced. Long days of purposeless chaining may be risky at times.(ii) Doctors should have necessarily camped at the site and take care of the situation like routine health check up and treatment there of. But one way looking after an establishment like Nandankanan and looking into Shankar simultaneously was difficult.(iii) Unnecessary political pressure to take Shankar back to any of wild life establishment disturbed the wildlife managers for decision making.(iv) Best option in my personal opinion was to make a stockade at the

village Birramchandrapur itself for smooth feeding, treatment and training for a period of minimum one month and then transfer it to a near by captive establishment.(v) Later on 13.3.06 also with the still remaining chain wounds it should not have been supposedly released to the jungle of Kumarkhunti of Chandaka. Even a stockade could have been made at some place of Chandaka WL sanctuary, possibly better at Kumarkhunti itself for a better treatment and training there of.(vi) There is no answer to hunting, poaching, chasing and drive out.(vii) Between 14th March till 4th April 2006. Praying with pellets from a miscreant by country made gun could have been avoided.

CAUSE OF DEATH

It's a combination of so many things that really made the animal sleep forever.

(i) Elephant if wounded severely become fatal, ultimately leading to death in most occasions. Skin wound of elephants take long time to heal. Skin is thick, less vascular and healing delays. iii) Shooting from close range sprayed iron pellets and caused large-scale injuries. Further infections were aggravated and as a result from cavities huge quantity of pus came out. iv) Psychological stress and human handling (imprint) is a factor .(v) Little food security was there at Chandaka Sanctuary zone where Shankar was released.(vi) Deep serious wound at right fore leg. (vii) Development of foot crack in left fore leg. (viii) Financial involvement for food, treatment, man power and watch and ward etc.ix) Treating the animal inside jungle with people guarding at camp house amidst incline weather.x) Un-availability of trained Kumkis. (xi) Elephant to its size is always difficult to manoeuvre. We can't have x-ray picture or radiogram of any position of elephant for better surgery.xii) Bull elephants or tuskers are not usually accepted by the herd. Hence Shankar was singled out though herd was often coming nearer to Shankar. (xiii) Once it has become a killer to avoid risk you have to chain or rope which at times create wound. (xiv) Trained mahout for wild elephant not available in Orissa as like as Assam, West Bengal & Kerala. (xv) By any means the animal had to come in contact of water, mud and wetsand causing re infection.After dressing because of its habit of sand bath it immediately spray sand to the wounds. Hence, wound healing becomes difficult. (xvi) Inflicted wound in trunk once it started taking support with trunk further affecting acceptance of food. (xvii) Excessive media and public intervention.

derign of truck etc. were got from Sri Palchoudhury.iii) I as a zoo vet was in constant touch with Dr. Paneer Sylvam of Delhi Zoo.iv) Advice of Menaka Gandhi Hon'ble minister - - , New Delhi really boosted all concerned here at Orissa to make the pachyderm live.

TECHNOLOGY / METHODS ADOPTED TO TRANSFER, UPKEEP AND SAVE THE ANIMAL

i) Cryo – application i.e. liquid nitrogen over the unhealthy granulation tissue.ii) Support of 2 tractors, kumki and combination of light tranquilization could get in the animal into a specially designed truck.iii) Preparation of 2 different ramps at Biraramachandrapur & kumarkhunti.iv) Usage of Aurvedic prepare to reduce the swell, inflammation & pain. v) Use of trained female elephant Moti to extend psychological support.vi) Assistance of Dr. J.V. Cheram of Kerala over telephone almost daily.v) All the top surgery experts were involved in the operation.vi) After releasing metal chain used polypropelen ropes at Tubibandh, Shankar was kept in special house under jute rope.

CONCLUSION

It seemed that amidst many a difficulty the vets, forest managers, administrators and public did their best possible effort to save the pachyderm in vein. I myself, the doctor having majority of involvement can give so many examples. Within this March to May 2006 I got scope to trap 7 no. of different species of male monkeys creating havoc at different parts of Orissa. In all cases except one, I tranquilized the animals by dart gun (pistol), successfully translocated 4 numbers into different jungles of Orissa & kept 3 most dangerous at Nandankanan in living condition. Also in so many occasions both in wild and captive we successfully translocate different species of animals. A couple of years back by tranquilizing we successfully controlled a male elephant at Dhenkanal and successfully translocated to Chandaka via Nandankanan. Hence, people should wash this confusion of un-trained, unspecialized, more drug, lack of treatment etc and try to believe that once its a case of wild elephant, it becomes a difficult proposition. Lets get the last satisfaction that we trained ourselves better and in future can better handle the situation. We cannot forget Shankar. We were much immotionally attached to him. I in particular was so close to Shankar that on one occasion on 2.5.2006, I ventured to ride the pillars of the stockade and sat on the back of Shankar to dress the wounds without any retreat. Now we can see it at Regional Museum for Natural Histroy, Bhubaneswar. Shankar might have left the mortal world but preserving its skeleton for posterity is one of the big step taken up to keep it alive in the hearts of millions of Oriyas.

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BIODIVERSITY AND HUMAN RIGHTS

S P C N

WHAT IS BIODIVERSITY ?

Biodiversity is short form of biological diversity-the variety of living beings on earth. Our planet is so rich with life that scientists don't even know for sure how many different kinds of organisms may exist. So far, they have identified and named more than 1.7 million species.

IMPORTANT THREE LEVELS OF DIVERSITY

Ecosystem diversity :

Ecosystem diversity relates to Earth's ecosystems; its savannas, rain forests, oceans, marshes, deserts, and all the other environments where species evolve and live.

Species diversity :

It refers to the variety of living organisms on earth. Although only about 1.7 million organisms have so far been identified, it is believed that the total number is likely to be between 10 and 50 million.

Genetic diversity :

It refers to the variation of genes within species, colour, flavour, size etc. Disease resistance in crops are expressions of genetic diversity.

Biodiversity is often described in terms of ecosystems, species and genes. Cultural diversity also needs to be considered as human activities have huge positive and negative impacts on biodiversity.

Cultural diversity :

It refers to existence of thousands of different cultures in human society. Cultural diversity also contributes in terms of how diverse human cultures interact with biodiversity. Agricultural practices such as nomadism, shifting cultivation or monoculture cropping will each affect biodiversity in different ways. Religious beliefs and social structures also have important influences on the way we use and care for natural resources. It doesn't make sense to think of the three levels of biodiversity - genes, species, and ecosystems - as separate categories, because each level influences the others in significant ways. And if one level is disrupted, the effects can ripple through the others. Biological diversity is much essential to human welfare. Food, medicines, clothes and tools are just some of the products we obtain from wild and domesticated components of biodiversity. In addition, ecosystems resulting from the interactions between species provide a range of essential services and functions. By absorbing huge volumes of atmospheric carbon dioxide, for example, forests help regulate global climate and slow down the effects of global warming. Wetlands such as lakes and marshes regulate the flow of water and help in prevent flooding. Without these goods and services, our

planet extends a better life support system.

CAUSES OF BIODIVERSITY LOSS

Habitat loss and fragmentation :

A habitat is the place where a plant or animal naturally lives. Habitat loss is identified as a main threat to 85 per cent of all species described as threatened or endangered. Factors responsible for this are deforestation, fire, biotic interference over-use and urbanization.

Over-exploitation for commercialisation :

India, Thailand, Ecuador and Indonesia produce 70 percent of the world's farmed prawns and the main consumers are the United States, Europe and Japan. Shrimp farming results (Aqua culture) in wetland destruction, pollution of coastal waters, and degradation of coastal fisheries. FAO describes this as a "rape and run". Analysing these factors, scientific studies in India concluded that the cost of environmental degradation resulting from shrimp farming was costing the country more than it was earning through shrimp exports.

Invasive species :

An "alien" or "exotic" species is one that occurs in an area outside its historically known natural ranges as a result of either intentional or accidental dispersal by human activities. Sometimes, alien plants or animals become established in their new environment and spread unchecked, threatening native biodiversity. When this occurs, they are known as "invasive alien species" Invasive alien species have been identified as the second greatest threat to biodiversity after habitat loss.

Pollution :

Pollution is a major threat to biodiversity and one of the most difficult problems to overcome. Pollutants do not recognize international boundaries. For example, agricultural runoff, which contains a variety of fertilizers and pesticides, may seep into ground-water aquifers and rivers before ending up in the ocean. Atmospheric pollutants drift with prevailing air currents and are deposited far from their original source. Millions of tonnes of ore and rock are mined worldwide each month and pollution resulting from mining can have serious local consequences.

Global climate change :

Many climatologists believe that the greenhouse effect is likely to rise world temperatures by about 2° C by 2030, meaning that sea levels will rise by around 30-50 cm by this time. Global warming, coupled with human population growth

* Courtesy : Society for Preservation and Conservation of Nature (SPCN) Bhubaneswar, Orissa, India.

and accelerating rates of resource use, will bring further losses in biological diversity. Vast areas of the world will be inundated causing loss of human as well as ecosystems.

Population growth and over-consumption :

From a population of one billion of the beginning of the 19th century, our species now numbers more than six billion people. Such rapid population growth has meant a rapid growth in the exploitation of natural resources - water, foods and minerals. Although there is evidence that our population growth rate is beginning to slow down, it is clear that the exploitation of natural resources is currently not sustainable. Added to this is the fact that 25 per cent of the population consumes about 75 per cent of the world's natural resources. This problem of over-consumption is one part of the broader issues of unsustainable resource use.

Illegal wildlife trade :

The international trade in wild plants and animals is enormous. Live animals are taken for the pet trade, or their parts exported for medicines or food. Plants are also taken from the wild for their horticultural or medicinal value.

SPECIES EXTINCTION

Extinction is a natural process : the geological record indicates that many hundreds of thousands of plant and animal species have disappeared over the years as they have failed to adapt to changing conditions. Recent findings however, indicate that the current rate of species extinction is at least a hundred to a thousand times higher than the natural rate.

BIODIVERSITY CONSERVATION

Many people believe that biodiversity should be preserved not just because it is valuable to us in some way, but simply because it exists. People who hold this opinion believe that each species should be respected and protected because it is the product of many thousands or millions of years of evolution, and we have no right to interrupt the evolutionary process. They also argue that we have no right to destroy something we did not create and that future generations deserve a natural world that is rich and varied. Because we have the power to destroy species and ecosystems, they say, humans have a moral obligation to be the careful stewards of the earth.

BIODIVERSITY AND HUMAN RIGHTS

Our children will inherit the planet with whatever biodiversity we pass on to them. The decisions we make as individuals and a society today will determine the diversity of genes, species, and ecosystems that need remain in the future. Many of these decisions are not easy, especially when they involve balancing the immediate needs, rights, and desires of individuals and communities with the measures necessary to protect nature for posterity. Understanding what biodiversity is and how different people value it, is an essential first step to designing strategies for long-term conservation. The connection between human rights and biodiversity is often overlooked but it is an emerging aspect in the international human rights debate. Our natural environment, access to genetic resources and cultural patrimony, food sovereignty and the right to an environment free of pollutants are all basic human rights that remain unrecognized.

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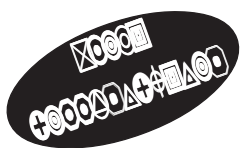


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ACTIVITIES OF TURTLE CONSERVATION PROJECT (TCP) IN SRI LANKA

T. Kapurusinghe

INTRODUCTION

Million of years before man colonized Srilanka, sea turtles had been coming to the undisturbed beaches of this island to lay their eggs. Five out of 7 species of sea turtles come ashore to nest in Srilanka. All 5 species are either critically endangered or endangered. Because of its meat and egg value most of these are killed and the eggs are robbed. Once the question of conservation came, UNDP with the support of local community started the Turtle Conservation Project (TCP).

THE TURTLE CONSERVATION PROJECT (TCP) SRI LANKA

The Turtle Conservation Project started its pioneering conservation program at Rekawa in 1996. It aims to protect sea turtles in their natural habitat while providing an alternative source of income to local people formerly dependent on the illegal collection of eggs.

TCP initiated its second conservation program in Kosgodda in August 2003. Surveys revealed that almost 100% of the sea turtle nests occurring on the Kosgodda beach are robbed for their eggs. The eggs are, either consumed raw on the spot, sold to private dealers for distribution and consumption or sold to turtle hatcheries. The goal of TCP is to conserve five species of marine turtles and their nesting habitats in 1 km stretch of Kosgodda beach through community participation and community education.

RESEARCH AND PROTECTION

Funding from GEF/SGP of UNDP made it possible for the TCP to start its protection activities in Kosgodda. TCP aims a sustainable and participatory "insitu" turtle nest protection (in the natural environment) program in Kosgodda.

The TCP research program employs those individuals who were dependent on the egg poaching. This search includes: identifying and counting the number of turtles coming to nest on Kosgodda beach, measuring the turtles, nest counting, measuring and weighing the eggs. To get accurate data TCP conducts research 24 hours a day and throughout the year.

TCP ACTIVITIES IN SRILANKA

Local people are educated by TCP to make a career "Tourist Guides" to give them an alternative income to egg poaching. TCP started a Turtle Watch program in Kosgodda and Rekawa and is conducting tourist guide lectures for locals. The TCP established a small community library in Rekawa and is carrying out English classes. A mangrove rehabilitation program had been set up by TCP in Rekawa and Puttlam.

TCP is sponsoring primary schools in Rekawa, Kalpitiya, Bundala, Panadura and Kosgodda through teaching materials and equipments.

Education and awareness exhibitions are held throughout the year and TCP staffs run a school lecture program in the coastal areas.

TURTLE WATCH

TCP's Turtle Watch is not a typical hatchery as you can find along the south-west coast of Srilanka. The Turtle Watch program is a nature tourism initiative and leaves nature as it is. Don't expect to see turtles or hatchlings (baby turtles) in a tank.

The Turtle Watches take place in Rekawa and Kosgodda, both important nesting sites. There is no guarantee that sea turtles come to nest every night but being on these wonderful Srilankan beaches is already an exciting night time adventure.

Turtles are nervous when they are looking for a place to nest and can be easily scared. The turtle can only be approached when she starts laying the eggs. The whole process of nesting of turtle takes from 2 to 3 hours.

If you want to visit the Turtle Watch then you should avoid light clothing. Only the Turtle Guides are allowed to use a torch on the beach for any other reasons using flashlight is strictly forbidden.

THE TURTLE WATCH FEE

The fee charged for the Turtle Watch contributes to the continuation of ongoing community based programs such as turtle nest protection program, the tourist guide program, alternative income generation scheme, English classes, sponsoring primary schools and education & awareness programs. We cannot guarantee that a turtle coming to the beach will actually lay eggs that moment. If you did not see a turtle at all, the fee will not be charged but a donation in the official turtle donation box in the hut for the work of the TCP and the guides will be welcomed.

Fee structure :

Adults	Rs. 350
Children/Students	Rs. 250
For Sri Lankans	Rs. 50

Where to find us :

The Turtle Watch starts daily at 8 pm at the TCP Beach Hut on Kosgodda Beach (please try to arrive before 9 pm). Your hotel / guest house or TCP can arrange your transport. The TCP Hut is located on the beach just at the north side of the Kosgodda Beach Resort.

FERAL POPULATIONS - THREATS AND PROSPECTS

S. Dash

INTRODUCTION

A feral animal or plant is one that has escaped from domestication and returned, partly or wholly, to its wild state. They cause extinction of some indigenous species and hence reduce the pristine quality of wilderness.

Both plants and animals undergo 'feralization'. In case of plants, the process is variously known as introduction, naturalization, escape etc. Even then the adaptive and ecological variables associated with 'feralization' are largely similar to those observed in animals.

The process is more conspicuous in animals. Animals vary in their susceptibility towards 'feralization'. Animals also show differences in their degree of feralization i.e., while some don't stray far away from humans even after pursuing their own devices, others depart and seek new territories to exploit. The persistence of feralization in a species depends on its ability to establish itself and reproduce reliably in the new environment. Very interestingly, neither the duration nor the intensity of domestication offers any useful correlation with feralization.

EXAMPLES OF FERAL ANIMALS

Pigeons were earlier reared for meat. Their escape and / or granting of freedom by generous keepers allowed them to revert back to their wild habitats.

Goats, one of earliest animals to be domesticated, more than 3000 years ago, readily adopts and adopts itself to a feral livelihood.

Cats often escape domestication and become feral. They remain in close proximity to human habitation but fall short of socialization. They live by scavenging food leftover by humans. But they prove dangerous to the local bird populations. Kitten learn to be feral from their mothers or through bad experiences. Such cats behave as pests. If mistakenly domesticated, they are found to be unfriendly. Cats above six months of age are hard to domesticate.

Dogs, after escaping domestication, are as dangerous to humans and livestock as big cats of their size. The Australian Dingo is the descendant of domestic dogs.

Honeybees occasionally expand beyond domesticated apiaries. Cattle have a long history of human domination. Although, they do well for years without supervision, their independence was shortlived perhaps because of their utility enabling their recapture.

Horses have been a feral invader in the American continent. They are known as "Mustang". Pigs are also a feral species. In Australia, camels have been seen to be a feral species.

HARMFUL EFFECTS

Ecological damage :

Feral species decimate the natural population by predation and competition. Thereby, they aid in the loss of biodiversity and damage to the ecosystem.

Genetic pollution :

They effect "genetic pollution" by forming hybrids with the wild population.

Economic losses :

The competition faced by the domesticated species from the feral population is very irritating. They exert pressure on pastures by overgrazing and also cause stress at water points. The cogeneric savages (ferals) cause embarrassment to stock breeders by exciting the domesticated population to rebel and make attempts to escape.

USE OF FERAL ANIMALS

Economic utility : The feral animals are being harvested primarily for meat. Their nurture is not a headache and thereby returns are a bonus.

Scientific study : They offer bright prospects for study of population dynamics and ethology (animal behaviours).

Patrimonial interest : The feral populations constitute the domestic biodiversity. They are thus being domesticated and safeguarded.

Zootechnical utility : These races constitute a genetic resource for breeding.

CONCLUSION

The process of feralization is a double-edged weapon. The brighter prospects lie in the blunting of the precarious edge. A better study of species - specific ethology and ecology may deter or reduce chances of feralization. Further, post - feralization animals, if tough at recapture and/ or redomestication should be harnessed otherwise to the maximum possibility because they are dangerous pests on natural ecosystems in the new environment. Very interestingly, neither the duration nor the intensity of domestication offers any useful correlation with feralization.

FERAL ANIMALS AS SEEN IN DIFFERENT PARTS OF THE WORLD



Fig.1 : Pigs having long history of feralization



Fig. 2 : Feral Cats, more or less taken as pests



Fig. 3 : Goats having one of the earliest feral livelihood



Fig. 4 : Horses, the feral invader in America- the Mustang



Fig. 5 : Feral dogs (Dingo dog) as dangerous as tigers



Fig. 6 : A group of feral camels in Australia

HARNESS WATER RESOURCE FOR A BETTER FUTURE

S.S. Nayak



Realising water as the fundamental life support base on this planet and a growing perception of a crisis in the not-too distant future, "Harness Water Resources for a Better Future" was chosen as the theme for 2004-2005 National Children's Science Congress (NCSC). As ambassadors of water awareness, the budding children scientists all over India drew the much needed attention and generated awareness and took action to attain a water secure world through their participation in NCSC.

Finally it was on 27th December that the historic visit of Dr. A.P.J. Abdul Kalam, His excellency the president of India, to the KIIT (DU) brought a positive vision about the futuristic relief from the water problem which sometimes seen to be an inevitable problem. Interacting with the little scientists, he declared that a time may come when these tiny scientists would be the inventor of medicines for AIDS. There were participants from different parts of the country but especially the students of KSSC (KIIT) who belong to the most backward places, had participated and came out with flying colours. That was highly acclimatized by one and all. The man who is always behind the screen is nobody other than Dr. Achyuta Samanta who has been the mother source to this unflinching support. He is an epithet of dynamism and has the unique distinction of creating a wave in educational field. His mission with the right vision is just incomparable. Now the planners of our country and the policy makers of our country are reiterating the sustainable development. They are now making policies for conserving forests, soil and water. Global population is increasing at an alarming pace. Science and technology is progressing at a break neck speed. People are using water in an unjudicious manner and water is getting polluted never before.

If such unjudicious utilization of water continues, obviously time would come in future while human civilization would perish

from this earth & before that stage, also our future generation would face the acute scarcity of water. Water, is basically the life sustaining force of this earth which must necessarily be pollution free. So here a question arises as to how can it be made pollution free and be used in a judicious manner. The only answer to the above question is to go for scientific water harvesting projects. Keeping this thing in mind under the said project the boys tried their best not to waste a single drop of water. The rain water from the roof tops & the waste water from the dining & many other sources were properly channelled by drainage system and allowed to be collected in a common pool. This common pool of water was used (by recycling) for multiple purposes such as duckery, fishery, dairy, agriculture, kitchen gardening etc.

We cannot artificially produce water and if it is produced then 1 drop of water would cost more than billions of rupees. We may produce stem cells and cloned children in a cost effective manner but it is not possible in case of production of artificial water. Water is the gift of God to the human civilization. We are very much privileged to be there in 21st century, the century of exceptional scientific achievements. With this scientific world view, we must agree with the dictom that, 'Water saved is water produced'. The timeless efforts of Dr. Prasant Ku. Routray (the Chief Programme co-ordinator) of KSSC, KIIT) and Dr. P.K. Das (the project Director) and their divine touch have definitely helped the five students to shine with splendour. The five students have also been properly guided by Smita Sucharita Nayak, Lecturer in Zoology, KSSC, KIIT. They are 1.Sashi Bhusan Kuldy 2. Jiten Kiskee 3. Jagannath Seren 4.Prasant Dalai and 5. Manoj Garada. They are the students of KSSC who were awarded in the National Children's Science Congress for their work on water harvesting system in KIIT, Campus- 10.

THALASSAEMIA

N. Patnaik

WHAT IS THALASSAEMIA ?

Thalassemia is a severe genetic blood disorder, which leads to the formation of faulty red blood cells that die fast. There are two types of thalassemia. Thalassemia minor and Thalassemia major.

Thalassemia Minor :

Carriers of thalassemia have one normal gene for haemoglobin and another abnormal one. These people are known as thalassemia minors. They look absolutely normal and healthy, but may remain anaemic.

Thalassemia Major :

Children suffering from thalassemia major require blood transfusion and drugs to remove the excessive deposit of iron in the body. The treatment is very cumbersome and expensive. The complications of prolonged treatment, infections from the transfusion and cost of maintaining the child are the major risk factors. As per an estimate, there are nearly 1,00,000 thalassaemic children in our country and 3-5% of Indian population carry thalassaemia gene.

INHERITANCE OF THALASSAEMIA

If both the parents are found to be the carriers, there is 25% chance of mother giving birth to a thalassaemic major child in each pregnancy.

PREVENTION OF THALASSAEMIA

Since the disease is totally preventable, greater thrust is needed for its total prevention. People should get themselves screened for thalassaemia carrier status. It requires a blood test, which is quite simple. This test (HBA₂) can be done at any age. It would be an ideal situation if couples undergo this blood test before taking their marital vows. If not done before, it can still be done during the second month of pregnancy to check for the thalassaemia gene.

THALASSAEMIA - A BRIEF DISCUSSION

As per estimate of World Health Organisation (WHO) 4.5% of the world population are carriers of haemoglobinopathes (about 250 million). Nearly 300,000 infants are born every year with major haemoglobinometries. Thalassemia/ Sickle Cell Anaemia belongs to the class of haemoglobinometries. Approximately, 10,000 children are born every year with thalassaemia disease in India.

As per a recent survey by Indian Council of Medical Research (ICMR) in three major metropolis of the country like Mumbai, Delhi and Kolkata thalassaemic trait was noticed in 3% ;6% and 10% of the population respectively. As such it may be estimated that out of total population of 3 crores in Orissa probably there will be 15 lakh carriers or more. Thalassemia is generally noticed in coastal district and Sickle Cell Anaemia in western district of Orissa.

Thalassaemia is a genetic blood disorder. This disease is characterised by lower percentage of haemoglobin and as such the patient has to take blood for his life time in order to survive for a longer period. Generally the child develops the symptoms within six months of the birth. Gradually the symptoms like immobility, lack of appetite, irritability and temperature develop in the body of the thalassaemic child. The percentage of haemoglobin lowers down and the patient looks anaemic. Lack of treatment at this stage leads to death of the child.

A normal man requires haemoglobin level above 10mg/dl. A thalassaemic child requires repeated blood transfusion to attain this level due to its inability to produce healthy haemoglobin. But regular transfusion of blood causes the deposition of iron in different organs which may damage them. So the child requires treatment for removing excess iron, by "Kelfer" capsule or "Desferal" injection. When the thalassaemic child needs more blood than his regular need, the spleen of that child is operated out which is known as "Splenectomy". The cost of treatment of patient varies from Rs. 50 thousand to Rs. 2 lakhs a year. The only permanent cure to this disease is B.M.T. (Bone Marrow Transplantation) which hardly any common Indian can afford.

If both the parents have a thalassaemic trait, then there is a chance that 50% children are born as thalassaemia carries and 25% are likely to be affected by the disease and balance 25% are found to be absolutely normal.

Thalassaemia is not curable but preventable through genetic screening. Thus matching of blood is essential before marriage. All unmarried, newly married and

expecting parents who are interested to have a child should do an ordinary blood test (HbA₂) through electrophoresis to find-out if the genes carry for thalassaemia trait. If the parents with thalassaemia carries are expecting their child, it should be tested for thalassaemia within 8-12 weeks of pregnancy. If the expected child is affected one the pregnancy should be terminated.

- v There is no substitute for human blood. Therefore kindly remember that the life of a thalassaemic child depends on your blood. Donating blood does not affect

the donors' health in any way. The civilization is recognized by its donation and dedication towards humanity.

- v If you have sufficient awareness about thalassaemia, you can save yourself, your friends, relatives and the society from this dreadly disease. Let's be united together and take an oath to donate blood atleast twice a year and spread awareness in thalassaemia and benefits of blood donation. Together we can make Orissa thalassaemia birth free and reduce the pain of diseased.

PREGNANCY CARE

ABOUT THREE MONTHS BEFORE YOU TRY TO BE PREGNANT

- (i) Stop taking the pill; use another method of contraception.
- (ii) Find out if you have had rubella (German measles) in the past. If not then you should get vaccinated against it. Also make sure you get vaccinated against tetanus.
- (iii) If you are on medication for a chronic disease, e.g. diabetes, epilepsy or a heart disease, consult your doctor.

SEEK GENETIC COUNSELLING IF

- (i) you are 35 years or older, (ii) your husband is 45 years or older, (iii) you have had two or more miscarriages, (iv) you have given birth to a child with a congenital or hereditary disorder, (v) there is any history of any hereditary / genetic disease in your husband's family-irrespective of how long ago you and your husband are related.

AVOID FOLLOWING RISK FACTORS

Since the confirmation of pregnancy is usually obtained only after you are already two or more weeks pregnant you ought to avoid the following risk factors now.

- (i) Alcohol and smoking (ii) Unprescribed medicines (iii) Contact with anyone suffering from an infectious disease, especially rubella. (iv) Abdominal x-rays (v) Regular contact with anaesthetic gases (vi) Excessive heat, e.g. saunas and very hot baths (vii) Uninspected undercooked meat. (viii) Cat litter.

WHEN YOU ARE PREGNANT

- (i) Visit your obstetrician or antenatal clinic regularly. (ii) Inform your doctor if any birth defects or mental health

- problems that have occurred in you or your husband's family. (iii) Ensure that you get sufficient rest and light exercise. (iv) Eat a balanced, vitamin-rich diet. (v) Genetic tests for prenatal diagnosis can be done at 9-11 weeks of gestation by chorionic villus aspiration, or at 14-17 weeks of gestation by amniocentesis.

GENETIC COUNSELLING

Contact the Genetic Counselling Clinic at these times if you have had a previous child with a congenital / unknown problem, especially: (i) Thalassaemia (blood disease) (ii) Down syndrome (mongolism) (iii) Muscular dystrophy (iv) Malformations, e.g. spina bifida

CONSULT OBSTETRICIAN

Contact your obstetrician immediately if you experience (i) bleeding from the vagina (ii) severe or persistent nausea and vomiting (iii) persistent headaches (iv) swelling of the feet or legs (v) excessive or sudden weight gain (vi) abdominal pains (vii) a marked decrease in urine (viii) a sudden, strong flow of water from the vagina.

After the birth of your baby :

- (i) Take your baby to the pediatrician regularly for a general examination and the necessary vaccinations. (ii) Visit your pediatrician about six weeks after the birth of the baby for a thorough post-natal examination. (iii) Consult your doctor or family planning clinic with regard to an appropriate contraceptive. (iv) Contact your pediatrician if you experience any problems with breast feeding. (v) Immunizations usually required are BCG and oral at birth, polio and DPT at 2,3 and 4th months, Measles vaccine at 9-12 months, and MMR (Measles, Mumps, Rubella) at 15-18 months of age.

FACTS/ FREQUENTLY ASKED QUESTIONS (FAQs) ABOUT BIRD FLU

S. K. Mohanty

BASIC QUESTIONS

Q: What is Bird Flu?

A: Bird Flu or Highly Pathogenic Avian Influenza is a highly contagious poultry disease that is caused by Type A influenza virus. It causes high mortalities in poultry. It can also infected a variety of birds, but domestic poultry such as chickens and turkeys are the most susceptible.

Q: What animal can be affected by bird flu?

A: Bird flu can affect a wide variety of birds. Domestic poultry such as chickens and turkeys are the most susceptible.

Q: How is bird flu spread?

A: The virus can be spread to susceptible birds through:

(i) Direct contact with nasal and respiratory secretions from infected birds (ii) Direct contact with the faeces of infected birds (iii) Contamination of feed and water (iv) Contact with contaminated equipment and humans

Many species of water fowl, especially wild geese, ducks and swans, may carry the virus without clinical signs. The virus is concentrated in faeces, nasal and eye discharges. Infection may be introduced by migratory wild birds.

Q: what are signs that infected poultry will show?

A: Infected poultry can show signs such as:

(i) Sudden death (ii) Lack of energy and appetite (iii) Swelling of the head, eyelids, combs, wattles and legs (iv) Purple discolouration of the wattles and combs (v) Nasal discharge (vi) Coughing and sneezing and diarrhoea

PUBLIC HEALTH RISKS

Q: Can bird flu be transmitted from chickens to humans?

A: Of all the bird flu virus strains, only the H5N1, H5N₂ and H7N1 strains have been known to pass from chickens to humans.

Q: How is the disease transmitted to humans?

A: The virus is transmitted to humans through close contact with infected chickens. Transmission occurs through inhalation of droplets of nasal and respiratory secretions from the infected chickens when they cough or sneeze as well as inhalation of fresh faecal matter.

Q: What are the symptoms of humans infected with bird flu?

A: the reported symptoms of bird flu in human have ranged from typical flu-like symptoms such as cough, fever, sore throat and muscle aches to eye infections, pneumonia and other complications.

Q: Can bird flu transmitted from human to human?

A: There is no evidence of human-to-human transmissions.

Q: How do humans get infected?

A: It is rare for bird flu to infect humans. In the few cases where humans are infected, the virus is transmitted through close contact with infected chickens. You can only catch the bird flu virus if an infected chicken cough or sneezes directly into your face, or if you breathe in particles from its droppings. To date the World Health Organization (WHO) has stated that there is no evidence of human-to-human transmission.

Q: What are the symptoms of bird flu in humans?

A: The reported symptoms of bird flu in humans have ranged from typical flu-like symptoms (e.g., fever, cough, sore throat and muscle aches) to eye infections, pneumonia and other complications.

Q: Is there any way to treat bird flu?

A: Anti-viral drugs (e.g., Tamiflu) appear to be effective in treating bird flu. Further testing is being done to confirm this. If you think you might have been exposed to bird flu, consult your doctor for advice.

Q: Does flu vaccination help to prevent bird flu?

A: The vaccine currently in use worldwide protects against different strains of the human flu virus, but offers little protection from bird flu. However, the World Health Organization (WHO) has recommended that people exposed to infected chickens or farms under suspicion should be vaccinated with the current WHO recommended human flu vaccine. This is to avoid situations where people may be infected by the prevailing variety of human flu and bird flu and at the same time, thus enabling the bird flu virus to mutate and trigger a flu pandemic (i.e., when the disease spreads to the whole of a country or over the whole world).

EATING CHICKEN AND POULTRY

Q: Is there any risk in eating canned and processed poultry products such as essence of chicken?

A: Such food products are safe to eat. All canned products undergo a heat process that effectively destroys any viruses.

Q: Is it safe to handle chickens, eggs and other poultry bought from the market or supermarket?

A: It is safe to handle them. However, one should still practise general food safety precautions such as separating raw food from cooked food, and washing your hands after preparing food.

Q: Are there guidelines to cooking poultry?

A: One should cook poultry meat thoroughly. This will help kill germs present.

Q: Is it safe to consume raw or half-boiled eggs, and semi-cooked meat?

A: One should eat food that is well cooked. Eating any raw or semi-cooked food comes with an inherent food safety risk.

CONCERNS ABOUT CHICKEN MANURE

Q: Are imported vegetables grown using chicken manure as fertilizers, especially in bird flu affected countries, safe to eat?

A: Yes, imported vegetables are safe for consumption. Chicken manure has to be composted before it is useful as a fertilizer. The heat generated during the composting process would have destroyed any bird flu virus, if present. Also in normal agronomic practice, the organic fertilizer is applied only during preparation of the land, before sowing of seeds. It is not applied when the plants are growing. Hence, vegetable crops are not likely to be contaminated at harvest. However, there has to be in place a food safety assurance programme to ensure the safety of imported and locally produced vegetables. Regular tests have to be conducted on imported vegetables for microbial and chemical contaminants. Nonetheless, as a general food safety practice, all fruit and vegetables should be properly washed before they are consumed. Rinse them thoroughly in a basin of water to remove any dirt or residues. Soak the vegetables in a basin of fresh tap water for 15 minutes and then rinse them again.

Q: How about locally produced vegetables? Are they safe for consumption?

A: Locally produced vegetables are safe for consumption in areas free from bird flu. Local vegetable farms should not be allowed to use fresh chicken manure as fertilizer. Only properly composted chicken manure has to be allowed for use. Any virus present will be destroyed by high temperature during the composting process. Locally produced vegetables have to be regularly tested for microbial and chemical contaminants. Nonetheless, as a general food safety practice, all fruit and vegetables should be properly washed before they are consumed, rinse them thoroughly in a basin of water to remove any dirt or residues. Soak the vegetables in a basin of fresh tap water for 15 minutes and then rinse them again.

CONCERNS ABOUT OTHER DEAD AND LIVE BIRDS?

Q: What should I do if I come across dead birds in public places?

A: As a precaution, do not touch the dead birds with bare hands. Practise good hygiene such as washing your

hands thoroughly with soap if you come into contact with dead birds. Contact the nearest veterinary hospital if you come across numerous dead birds.

Q: what should I do if my pet bird falls sick?

A: Call your veterinarian for advice. If you have more than one bird, separate the healthy birds from the sick birds if possible. The birds could be kept in enclosures (e.g. cage, hen house or a netted area in the garden) that are not adjacent to each other. As a general precaution, adopt hygiene practices such as washing hands thoroughly with soap after handling the birds.

Q: What should I do if my pet bird dies?

A: Put the dead bird into a plastic bag, tie the bag up firmly by knotting it and dispose it together with your garbage. Adopt good hygiene practices (e.g. disinfections of bird cage) and wash your hands thoroughly after disposing the dead bird.

Q: Is it safe to keep birds or poultry as pets, or to come in contact with live birds and poultry?

A: All live birds imported are to be monitored for infectious diseases including bird flu. The risk of pet birds getting infected is very low. However, as a precaution, one should keep the birds in a bird-proof enclosure (e.g., cage, hen house or a netted area in garden) so that they do not come into contact with wild birds. Wash your hands thoroughly with soap after handling your pets.

GOING OVERSEAS

Q: Is it safe to visit countries with cases of bird flu?

A: WHO has not advised any travel restrictions so far. When visiting affected countries, avoid farms and live poultry and birds, and adopt good hygiene practices.

Q: Should I get vaccinated against influenza before I travel?

A: Be vaccinated if travelling to temperate countries in the Northern Hemisphere or if you are exposed to infected chickens or farms while overseas. This will protect you from getting normal flu and bird flu at the same time. Otherwise it might cause the virus to mutate and trigger a flu pandemic.

Q: what should I do if I suspect I have bird flu after returning from overseas?

A: You should consult your doctor as soon as possible and inform your doctor if you have had contact with live birds or have recently travelled to a country which has cases of bird flu. Alternatively, you could go to the Communicable Disease Center of a hospital for further evaluation.

VISITS TO NATURE RESERVES, BIRD PARKS & ZOO

Q: Bird flu is usually spread by migratory birds. Is it safe to go to Zoos and Wetland Reserves?

A: Orissa at present is free from bird flu. It is safe to visit wetland reserves and zoos, as it is highly unlikely that visitors would catch avian flu from wild birds. Only

infected chickens have been known to spread the disease to people who have come in close contact with them. Insist visitors not to come in close contact with the wild birds at the zoos. They should view the birds at a distance with their binoculars and telescopes. In addition, managers of zoos and wetland reserves have been asked to have an on-going surveillance programme for bird flu in wild birds. A programme is being developed to collect blood samples and cloacal swabs from trapped wild birds for tasting. To date, no bird flu has been detected.

Q: Is it safe to visit other parks and reservoirs?

A: Orissa at present is free from bird flu. It is safe to visit parks and reservoirs, as it is highly unlikely that visitors would catch avian flu from wild birds. Only infected chickens have been known to spread the disease to people who have come in close contact with them. Moreover, visitors to reservoirs and parks would not come in close contact with the wild birds.

Q: Is it safe to visit the Bird park and the Zoo?

A: Orissa at present is free from bird flu. It is safe to visit the bird enclosures in the zoo. The bird enclosures in zoos have been asked to take additional precautions to prevent the introduction of bird flu. They have been asked to put in place precautionary measures to protect their birds, staff and visitors, and to prevent visitors from coming into close contact with wild birds.

PREPAREDNESS FOR DELIBERATE EPIDEMICS

ACTIONS TAKEN BY THE GOVERNMENT

Q: What the government is doing to prevent the

introduction of bird flu into Orissa?

A: Orissa has taken the necessary precautionary measures to prevent the incursion of bird flu. It includes banning the import of live birds, poultry meat, poultry products and eggs from countries affected by bird flu. We have also taken steps for intensifying our checks and surveillance on imported poultry and eggs at points of entry. Testing of imported poultry and eggs for bird flu has also been stepped up. In addition, concerned officers of various departments have stepped up checks and surveillance on our poultry slaughter houses and poultry farms. The concerned departments have briefed the operators of slaughter houses and farms on how to look out for signs of bird flu, and they are required to immediately report to the nearest veterinary hospitals if they suspect bird flu. As an added precaution, local poultry farm operators have been instructed not to allow the public to visit their farms. Farms are also required to ensure that proper biosecurity measures (e.g. disinfection and bird-proofing) are put in place.

Q: What happens if cases of bird flu are discovered in our poultry farms?

A: The state is developing a contingency plan to deal an outbreak of bird flu in Orissa. In the event of an outbreak of bird flu in any of our poultry farms, the concerned departments will take immediate actions to control and eradicate the disease. The poultry farms would be advised to cull all the birds using a humane method and safe disposal of carcass.

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ALL INDIA CONFERENCE ON MASTER PLANNING OF ZOOS AT BHUBANESWAR



Hon'ble Chief minister of Orissa, S.J. Naveen Patanaik inaugurating the conference on Master Planning of Zoos



Approved Draft Plan of Nandankanan Zoological Park was appreciated and accepted as a model plan.

A national training programme on master planning of zoos was organised by Central Zoo Authority in collaboration with Department of Forest, Government of India, Department of Forest & Environment, Government of Orissa. The programme was inaugurated by Hon'ble Chief Minister of Orissa Sri Naveen Patnaik, on 11.4.06 at a very natural settings of Nandankanan Zoological Park. Sri Prasanna Pattsani, Hon'ble Member of Parliament, Lok Sabha attended the programme as Guest of Honour. Sri B.R. Sharma, Member Secretary to Central Zoo Authority and Sri Suresh Kumar Mohanty, PCCF(WL) cum Chief Wild Life Warden, Orissa gave deliberation on the said occasion. Director, Nandankanan Zoological Park Sri Shraavan Kumar Sihna gave vote of thanks. From afternoon of 11th April till morning of 15th April different technical sessions were conducted where recommendations were made for zoo planning. A mandate for every zoos was prepared which would facilitate tapping financial resources as well as smooth continuity of the zoos. Later zoo management plan for 5 years supported by micro plan for 1 year were prepared. The Draft plan of Nandankanan Zoological park which was already approved by Central Zoo Authority and Department of Forests and Environment, Government of India and also the state Government was presented by Director Nandankanan to the floor. This particular plan was highly appreciated and accepted as a model plan to be followed by other zoos of the country. On 15th April 2006, the validictory function was attended by Principal Secretary.

OTHER CONFERENCES IN ORISSA

ROTARY ENVIRONMENT CONFERENCE AT ROURKELA

A multi-district seminar on 'Preserve Planet Earth' was organized on 'preserve planet Earth' on 16th April 2006 (Sunday). It was organized by the Rotarians of steel city Rourkela where eminent environmentalists and Rotarians of 3 different states i.e. Orissa, Chhatisgarh and Madhya Pradesh, eminent persons and experts from Government and Quasi Government organizations participated. It was organized in the A.M. palace, Civil Township, Rourkela. During the business sessions the topic Environmental challenges and challenges due to over exploitation of resources were discussed and debated.

WORKSHOP ON E- GOVERNANCE AT KIIT, BHUBANESWAR

KIIT Deemed University in collaboration with National Informatics Center (NIC) conducted a two days national workshop on e-Governance. During the workshop the Joint Director Ajit Baidya from Department of Information and Technology, Government of India attended the workshop as chief guest. Vice Chancellor Achyuta Samanta in his address talked elaborately on passing on information through image of electronic media. Deputy Director General of National Informatics Center, Dr. M.Mauna attended the workshop as chief speaker. Amongst others Sri S.N. Tripathy, Principal secretary, Department of Information and Technology Government of Orissa and Director Sri Bisal Dev also participated in the said workshop. From different parts of the country around 40 numbers of information Technology expert participated in the programme to make it grand success.

INTERNATIONAL CONGRESS ON WILD ANIMAL REHABILITATION

R.K. Samantaray



Fig.1 : Director, Vizag zoo, Andhra Pradesh addressing the trainees on the inaugural day of the congress



Fig.2 : Dr. V.Srinivas of Vizag zoo presenting a demonstration to the trainees on tranquilization technique.



Fig.3 : Trainees studying the impact of lights on sea turtle behaviour and movement during night.



Fig.4 : The trainees displaying the shell of a huge turtle at night time survey in the Visakhapatnam beach.



Fig.5 : participants from across the country visiting the Rescue centre of lions at the outskirts of the city.



Fig.6 : Mr. Salim from Chennai Snake Park demonstrating on handling of snake.

Wild Life Trust of India (WTI) organized its fifth regional workshop on wildlife rehabilitation at Vishakhapatnam from 27.3.2006 to 29.3.2006 with the support of International Fund For Animal Welfare (IFAW), USA. It was inaugurated by Dr. Ian Robinson from IFAW. On 27th, Sri Brij Kishore Gupta of C.Z.A., Dr. N.V.K. Ashraf of WTI, Dr. Anand Ramanathan of India and Dr. Ian Robinson of U.K. from IFAW presented their papers. On the 2nd day Dr. Prajna Paramita Panda from Orissa, Kadambari Mainkar from WTI, Thusan Kapursinghe from Turtle Conservation Project, Srilanka, Dr. B.C. Choudhury from WII, Mr. Saleem from Chennai Snake Park presented their papers. On the penultimate day Dr. R. K. Samantaray from Orissa, Dr. Anirudha from Maharashtra, Dr. Tanmay Ghosh from West Bengal on behalf of the participants presented their papers on wild animal rescue and rehabilitation. Many biologists, researchers, representatives of NGOs, wildlife enthusiasts and animal lovers from different parts of the country and abroad participated in the workshop. On the concluding day PCCF (AP) presented certificates to the participants.

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CURRENT ENVIRONMENT NEWS

Reitz

- For the first time vegetable oil was used to run a generator that lighted up a small village in Ganjam district of Orissa. The nonpollution vegetable oil was extracted from minor forest produces like neem and karanja seeds.
- Plants thought to help treat or cure cancer, AIDS and malaria have been found in the rain forests of Borneo.
- BaliPadar - Betnoi area of Orissa's Ganjam district has provide to be a safe heaven for black buck. The villagers have been actively protecting the antelopes for about 2 decades for which they have recently awarded the prestigious Biju Patnaik Award for Wild Life Conservation. The black buck population in the region is considered the 2nd highest in the country.
- Wildlife crimes at Champanalla near Swang Reserve Forest in Nawagaon district of Assam has come down drastically, thanks to the efforts of a group of young amateur wildlife conservationists.
- Narmada Bachao Andolan (NBA) leader Medha Patekar recently made hunger strike to protest inadequate rehabilitation of dam oustees. As per the interim report of CAG V.K. Shunglu and further recommendation of The Prime Minister of India Dr. Manmohan Singh a bench headed by Chief Justice Y.K.Sabharwal ordered that there should be no restriction on the construction work at the dam site.
- Aneeta Mehta from Calcutta got international reputation to receive Radcliffe Fellowship to undertake research in Physics. She is the only Indian to be elected to the executive council of the forum of the International Physics of the American Physical Society.
- Launching of India's most powerful and advanced long-range (heating target of 3,500 kms) ballistic missile Agni-III from Wheeler Island, Orissa coast was unsuccessful. It was meant for carrying nuclear warheads weighing upto 1.5 tonnes. Since it crashed into the sea, environmentalists fear that it could have unfavourable impact on the marine ecosystem.
- India is now ready with a highly effective avian vaccine to combat the deadly bird flu virus H5N1. It has been developed by India's High Security Animal Disease Laboratory in Bhopal. It has been created using the most potent strains of H5 N1 virus that recently heat India.
- The rare black rhinoceros of Cameroon is nearer to extinction. After census only 3-4 numbers were seen. Environmentalists of Africa see a disaster in the offing.
- The Geo-synchronous Satellite Launch Vehicle (GSLV-102) veered its projected path and came crashing down into the Bay of Bengal, scuttling the launch of the Byat4C Communication Satellite that was to be programmed for broadcasting TV signals and transmitting data. It was designed to work for 10 years.
- Scientists of Australia's tropical north are collecting blood from crocodiles in the hope of developing a powerful antibiotic for humans, after tests showed that the reptiles immune system kills the HIV virus.
- Malaria vaccine trials had also brought hope that children could soon be immunized against the disease, which now kills about one million people a year, mainly in sub-Saharan Africa.
- Natural disasters displace more people than war.
- The decline in the number of Orangutans found in dense forests of Africa has become the cause of trouble for environmentalists. The people of Congo kill these animals and eat their flesh which has resulted in such a disaster. Now their killing has been prohibited.
- The Oriya lad Apurv Mishra, a young boy from DAV School, Bhubaneswar with his unique charm & luminous radiance has brought laurels not only for the state but for the country by inventing Glabinator, which can give audio output to ensure effective communication for the disable and reaching to ultimate height by bagging the young scientist award in the International Science & Engineering Exhibition held at Indianapolis, USA.
- A heartening news that the population of estuarine crocodiles in Bhitarkanika National Park has been increased to 1454 during the census conducted in early February, 2006. During 2000 census the number was 1192. Thanks to UNDP to support Union Ministry of Forest & Environment, Government of India to carryout the crocodile breeding & rearing project in Dangamal of Bhitarkanika National Park, Orissa, India.
- Pluto was recently stripped of its status as a planet. Astronomers from around the world redefined it as a "dwarf planet", leaving just eight classical planets in the solar system. Pluto was disqualified because its oblong orbit overlaps with Neptune's.
- The Animal Welfare Board of India plans to intensify anti-rabies vaccination and animal birth control (ABC) programmes to achieve a rabies-free India.

WILD ANIMAL RESCUE AND REHABILITATION



Elephant fallen into a deep pool of mud - Successfully lifted and rehabilitated into Banibandh reserve forest, Athgarh.



Storm falling of birds from a Ficus tree at Nandankanan- Two open bill storks rescued and given new life

After getting information that a sub-adult female elephant had fallen into a pool of mud at the outskirts of Baniabandh Reserve Forest, Athagarh on 20.10.2005. The rescue team under the leadership of Dr. R.K. Samantaray of Nandankanan Zoological Park reached the spot at about 7 PM. After preliminary inspection, a detailed planning was drawn. Accordingly, the team from Nandankanan with assistance of fire brigade team and forest staff of Athagarh through support of wooden logs and ropes managed to lift the body and left the pachyderm at a higher platform besides the pool of mud. Treatment was carried out viz: injectables such as long acting antibiotics, analgesics, steroids, nervine tonics etc. After the successful operation, at mid night left the animal at the platform in sitting position. Early morning the animal was reported to slowly walked into the forest. It was one of the calculated rescue and rehabilitation measure carried out by the Anti-degradation team of Nandankanan.

Birds falling is a common feature noticed during storm and cyclone. However at Nandankanan Sanctuary area during September 2006 night there was a big storm. In the early morning it was noticed that large number of birds with eggs neonates. sub-adults and nests were fallen down from the large Banyan tree which was the usual habitat of large number of open-bill storks.. Two of the sub-adult Open bill storks were saved from these mass deaths with immediate intervention and treatment there of at Nandankanan Sanctuary. Out of 80 birds fallen from this tree in such a bad storm, 69 were instantly died. 11 numbers in serious condition were shifted to the Intensive Care Unit of zoo hospital, Nandankanan. However 9 birds were died within a week even though lot of care and treatment were carried out. Finally 2 were saved, reared at zoo hospital Isolation Ward for a month & later transferred in a special cage to Enclosure No. 76 of the Zoological Park. Now these have been gracefully grown and enjoying a free flight at the said enclosure.

OUR CONCERN AGAINST WILD ANIMAL POACHING



A wild boar (female) was shot on 14.4.2006 afternoon by a team of poachers who entered into the Chandaka Wildlife Sanctuary illegally. But the poachers fled due to timely intervention of forest officials leaving the carcass. It was reported dead with gunshot wound, one hitting the chest region and the other one in leg region. The circular hole at both sides and the post mortem examination report revealed that the bullet was not inside the body and it had entered from left side chest through and passed with an exit point at right side chest causing massive damage and excessive internal bleeding resulting in shock. However, it was a pregnant one and a number of fetuses were recovered dead after post mortem (clearly displayed in the photograph).

BIRD FLU SURVEILLANCE AT NALABANA, CHILIKA, ORISSA, INDIA

**P. Satpathy¹, R.K.Samantaray²,
A.Behera³ and B.K.Mahapatra³**



Fig.1 : Winter flocking of exotic birds at Nalabana, Chilka



Fig.2 : Scientific team at core area of Nalabana



Fig.3 :Expert team with complete kit at Nalabana, Chilka.



Fig.4 : Collection of faecal matters at Nalabana, Chilka.



Fig.5 : Collection of blood sample from free ranging birds of Nandankanan Sanctuary.



Fig.6 : Collection of faecal matters at Nandankanan Sanctuary.

Recently on a call from Government of India on the international crisis of bird flu, Venkateswar Hatcheries Group responded quickly to send its panel of expert vets to Nalabana Sanctuary, Chilka Wetland on 15.11.2005 to conduct a preliminary surveillance on incidence of bird flu in collaboration with Department of Forest and Environment, Government of Orissa. Under the leadership of expert vet from Eastern Hatcheries Regional Laboratory, Bhubaneswar, the scientists from V.H.Group,Pune, the zoo vet from Nandankanan, the Divisional Forest Officer and Assistant Conservator of Forest from Chilka Wildlife Division stayed at Chilka from 15.11.2005 to 16.11.2005. In the process they collected faecal samples and blood samples aseptically with the help of special kit from 30 numbers of exotic birds from different pockets of Nalabana. Then on 17,11.2005 the scientists assisted the zoo vets of Nandankanan Zoological Park to collect faecal and blood samples from 5 number of free ranging birds from Nandankanan Sanctuary. These samples were then sent to Pune for further testing. Later it was confirmed that there is no indication of presence of any type of influenza virus, thus getting relief to both the establishments of Chilka and Nandankanan.

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2. Veterinary Officer and Head, Anti-Depredation Squad, Orissa, Nandankanan Zoological Park, Orissa, India : e-mail - rtdrranjit@yahoo.com.
3. Divisional Forest Officer and Assistant Conservator of Forests, Chilka Wildlife Division, Orissa, India.

HAPPENINGS IN NORTH-EASTERN PART OF INDIA

R . Mohanty



Fig.1 : Nature's acclimatization of animals to higher altitude by having more fur to prevent them from cold at North Sikkim.



Fig.2 : Nature's miracle - Water turning into ice and vice-versa at Tsango Lake, some 12,000 feet above sea level.



Fig.3 : Adversities will not hamper trade - Opening of world trade between 2 countries. Nathula Pass, 2nd highest motorable pass i.e.14400 feet in the world.



Fig.5: Rhododendrun flowers in its full bloom at Mukteswar, Uttaranchal.



Fig. 4 : A huge crowd riding the Tiger Hill, Darjeeling, Uttaranchal to see the beauty of morning sun rise

A LEASE OF NEW LIFE FOR A IRRAWADY DOLPHIN

(A CASE REPORT AT PARADEEP, JAGATSingHPUR, ORISSA)

B. Mahapatra



Fig.1 : Confluence where the Dolphin was sand trapped and noticed by Rtn. Bhagaban Mahapatra.



Fig.2 : Marine Department of Paradeep Port Trust timely intervened.



Fig.3 : Dolphin being lifted physically after administrative clearance

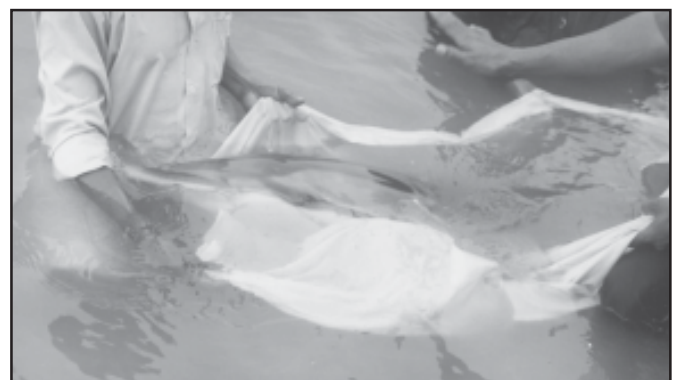


Fig.4 : Transfer of the Dolphin with a netlon cloth

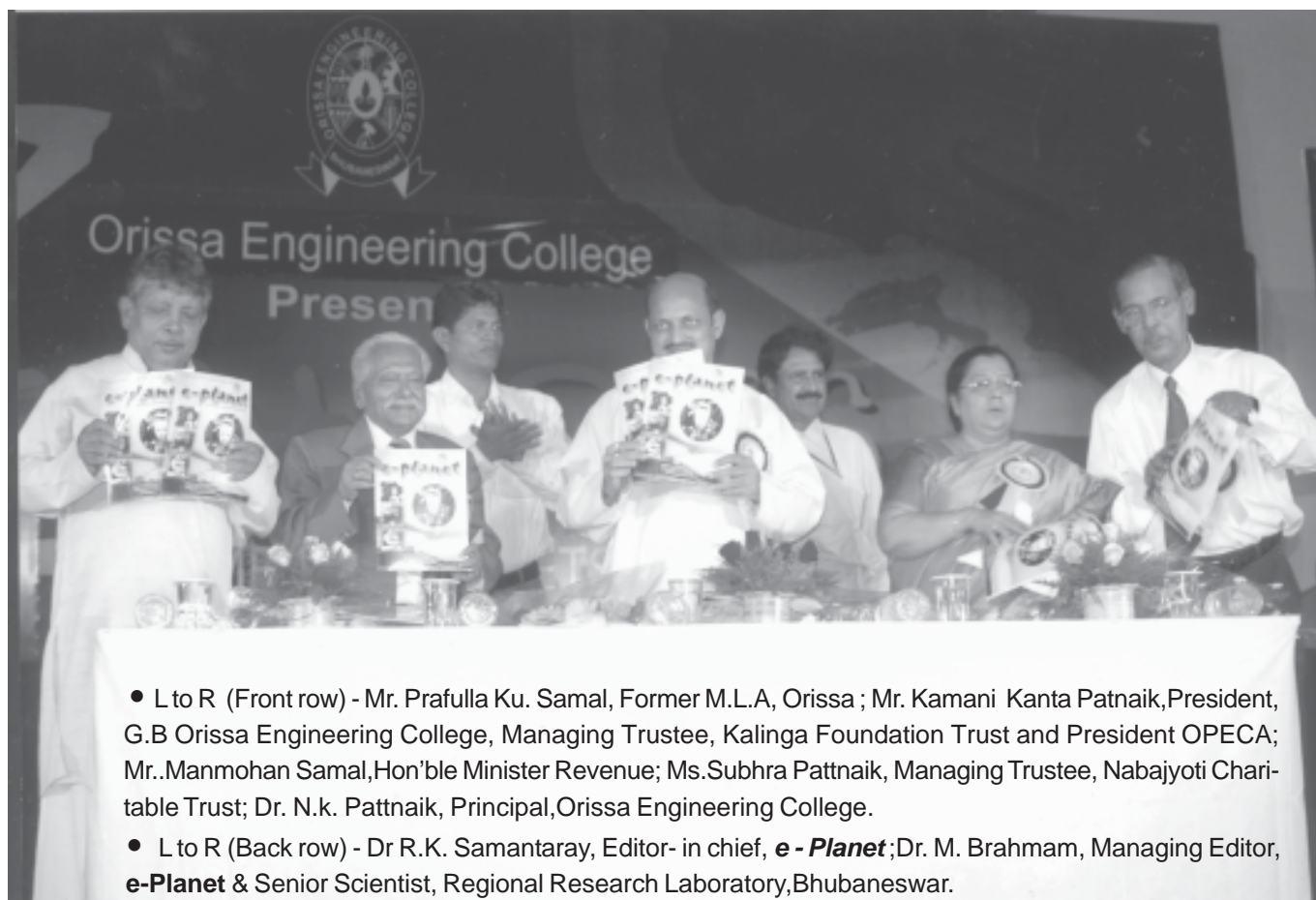


Fig.5 : Dolphin being unloaded from the motor boat



Fig.6 : Release of dolphin into the safe water of sea.

VOLUME-3 (ISSUE NO-2) OF *e-planet* REALEASED AT THE ANNUAL FUNCTION (ZEPHY-06) AT OEC CAMPUS ON 27-02-2006 EVENING.



- L to R (Front row) - Mr. Prafulla Ku. Samal, Former M.L.A, Orissa ; Mr. Kamani Kanta Patnaik, President, G.B Orissa Engineering College, Managing Trustee, Kalinga Foundation Trust and President OPECA; Mr..Manmohan Samal, Hon'ble Minister Revenue; Ms.Subhra Pattnaik, Managing Trustee, Nabajyoti Charitable Trust; Dr. N.k. Pattnaik, Principal, Orissa Engineering College.
- L to R (Back row) - Dr R.K. Samantaray, Editor- in chief, **e - Planet**; Dr. M. Brahmam, Managing Editor, **e-Planet** & Senior Scientist, Regional Research Laboratory, Bhubaneswar.



INTERNATIONAL CONFERENCE IN GERMANY ATTENDED BY THE EDITOR (TECHNICAL) OF *e-planet*

The 5th European Conference on Ecological Restoration was organized at the Greifswald University, Greifswald, Germany from 21– 25 August 2006 by the Society of Ecological Restoration, Europe and the University of Greifswald (Germany), in collaboration with the International Mire Conservation Group, the International Peat Society, and the Gesellschaft für Ökologie. It was convened to explore the challenges of land use changes by exchanging knowledge and experience on the ecological, economical, and ethical dimensions of Ecological Restoration. The Conference was attended by over 400 experts from 47 countries and 5 continents.

Dr. Jaya Krushna Panigrahi, Head of the Deptt. of Zoology, Choudwar College and Secretary, Orissa Environmental Society was among the three participants from India who attended this significant congregation of the restoration ecologists of the world. Dr. Panigrahi presented his research paper entitled 'Enhanced fish landing consequent to ecorestoration measures – A case study of Chilika Lake' in the Session 9 : Rivers, lakes and other inland waters. After the conference he visited the Institute of Freshwater Ecology and Inland Fisheries at Berlin on the invitation of Prof. Thomas Mehner and discussed about the research facilities available and the research programmes undertaken by the Institute.





CENTRAL ZOO AUTHORITY

(STATUTORY BODY UNDER THE MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

Bikaner House, Annexe VI, Shahjahan Road, New Delhi – 110011

Website : <http://www.cza.nic.in>

F.No. 25-1/2002-CZA(290)(M)

DATE:20.9.2005

CIRCULAR

To The director/Zoo Superintendent/ In-charge of Large, Medium and Small Zoos.

Sub:- Incidence of avian influenza.

Sir, Please refer to this office letter No. 7-12/2000-CZA dated 28.1.2004.

Incidences of avian influenza virus (bird flu) has been reported from the South-east Asian countries, which has affected domestic poultry. Human beings have also been reported to get infected by this disease which has led deaths.

It is understood that the waterfowls are major reservoir of avian influenza virus. Keeping in view of the fact that during the months of September to December all the migratory waterfowls come to India for winter nesting, it will be advisable to take necessary precautionary measure for preventing exposure of the fowls being displayed in your zoos to the wild birds as well as to the keepers/personnel directly in-charge for handling of animals in the zoos. The animal husbandry department and the medical services department of your area may be approached for drawing up a suitable contingency plan to tackle any eventuality in this regard.

Yours faithfully,
Sd/-(B.R.Sharma)
Member Secretary

A SCHOOL BOYS PERCEPTION OF ENVIRONMENT - OUR EARTH

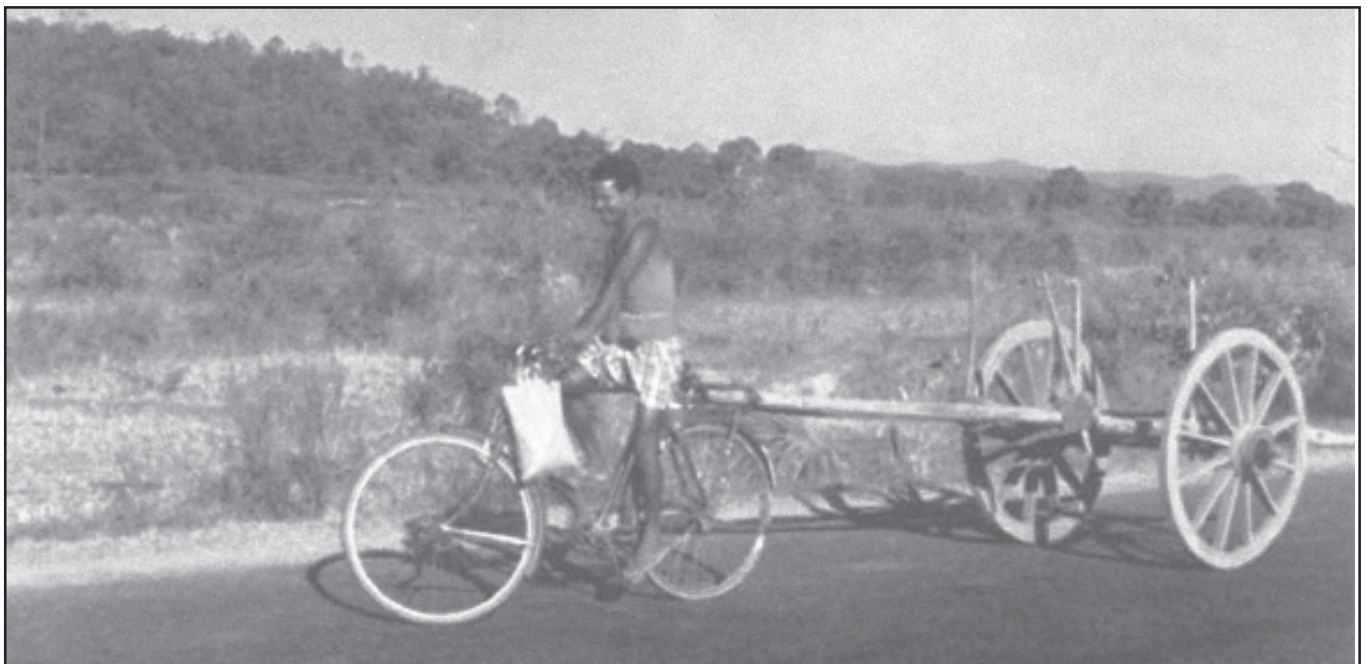


Sattwik Deb Mishra

Our earth is beautiful and almost a magical place to live in. Billions of years ago when dinosaurs ruled the earth it was covered with trees. Everything was lush and green.

The ozone layer was unaffected. There were no greenhouse gases to increase the temperature on the earth. The soil was rich with minerals. Water was clean on earth. The earth was in a golden age. Everything was flourishing. But then human being appeared. He made more and more discoveries. He started cutting down trees. He did not think of conserving the earth by throwing all sorts of waste materials in to the water. He did not think of conserving the natural resources, instead he wasted them. He started affecting the ozone layer by using C.F.C. Mankind while doing this for his own needs, in the name of modernization did not realize that he was causing harm to himself. He got diseases by drinking water polluted by him. Would you like to get skin diseases by the harmful ultra-violet rays coming from the Sun due to the holes in the ozone layer? No. Then why do we hurt the Earth like this? Why are we runing our beloved Earth? Let's go ahead and start a revolution to save the Earth.

Class – V, DAV Public School, MCL, Burla



A CYCLIST DRAGGING A CART, INNOVATION IS KEY TO SUCCESS

QUESTION

QUIZ

1. Birds' feathers are made of what ?
2. Parrot keeps 20 words in mind; which bird keeps 100 words in mind ?
3. Which bird has the greatest wingspan ?
4. Which animal lives in a drey ?
5. A giant panda exclusively live on ?
6. In which Indian city the crocodile bank is located ?
7. Which fish does not fall sick and almost knows medication for all kinds of ailments
8. Giant Pandas are native of ?
9. Which bird can travel very long distances without flapping its wings ?
10. What was the name given to the first sheep created through cloning ?
11. Which legs of stripped hyena are shorter ?
12. Which is the smallest flower in the World ?
13. Litmus, the dye used in chemical tests is the natural dye obtained from which plants
14. What are the simplest plants (Thalophytes, Bryophytes, Pteridophytes) ?
15. Which bacterium is responsible to make milk into curd ?
16. Which group of mushroom are highly poisonous ?
17. Which group of mushroom are edible ?
18. What is the tallest plant in the world
19. Which chemical/hormone helps in flowering ?
20. What is called "power house" of a cell ?
21. Which plant has the longest inflorescence ?
22. The plants which grow in marshes with saline water are called ?
23. The maximum photosynthetic activities in plants takes place in which light ?
24. Which is the largest lizard in India ?
25. Which is the only marine sanctuary in the State of Orissa ?

A. Mishra

25. Gahirmatha
24. Water monitor
23. Red light
22. Halophytes
21. Agave
20. Mitochondria
19. The florigen
18. Giant sequoia 83 mtr. USA
17. Agaricus
16. Amanita
15. The lactobacillus
14. Thalophytes
13. Lichens
12. Wolffia arrhiza
11. Hind limb
10. Dolly
9. Andean condour
8. China
7. Shark
6. Chennai
5. Bamboo shoots
4. The squirrel
3. The Albatros
2. Grez of Africa
1. Keratin

ANSWER