

## CHAPTER – 9

### RESEARCH, MONITORING AND TRAINING

#### 9.1. Research.

Research in Satkosia is in initial stage. During 1980s research on Gharial was carried out by one Dr. L.A.K.Singh, Senior Research Officer, who is now at State Wildlife Hrs., Orissa. There are 9 Silvicultural plots within the sanctuary where the Silviculturist, Bhubaneswar is conducting study on growth parameters in different types of forests. This study is not that much relevant so far as wildlife conservation is concerned. Recently one NGO, “Foundation for Ecological Security” is conducting a study on biomass aspect of the sanctuary. At present the same NGO has been allowed to continue their further studies on “Conservation and Peoples livelihood rights in India: in Satkosia Gorge.” There is absolutely no research on wild animals or management aspects going on.

#### 9.1.1. Therefore it is suggested to conduct research on the following subjects:

1. Determination of range of different elephant families of Satkosia Gorge Sanctuary and identification of their corridors..
2. Causes of decline of wild dog, Nilgai, Hornbill, vulture and Gharial population in Satkosia Gorge Sanctuary.
3. Identification of endoparasites of major wild animals for pathological study. Biodiversity study in general and medicinal plants in particular available in Satkosia Gorge Sanctuary.

4. Study on Giant squirrel.
5. Existence of dwarf variety of elephant (Gunthuni Hati),if any in Satkosia Gorge Sanctuary.
6. Identification of butter flies, birds, Harpeto fauna.
7. Habitat of king cobra.

**9.1.2. Broad Strategies:-**

Linkages with organizations possessing research capabilities and subject experts shall be established .Collaborative summer internship studies shall be carried out involving the Senior Research Officers of Wildlife organization.

Continuous assessment of population, distribution pattern, habitat mapping of 15 to 20 flagship species including ecological impact assessment studies shall be done as a regular in house monitoring mechanism.

Study documentation, inventorisation of all groups of plants/animals shall be done in the plan period including soil and aquatic flora/fauna .For this purpose a sum of about Rs. 10-15 lakhs has been kept in the budget for each taxonomic group (annelids/arthropods/mollusks/fishes/ amphibians/reptiles/birds/mammals /soil fauna/ aquatic fauna etc.) which shall be collaborative in nature 3 years. Specific budget for Socio-economic as well as ecological monitoring including impact assessment studies has also been made.

The PA shall have museum/herbarium of locally available specimens. All research activities shall be under the supervision and guidance of Senior Research

Officers of State Wildlife Organization headquarters . Similarly research activities taken up by outside organizations shall be collaborative in nature involving Senior Research Officers of State Wildlife Organization headquarters.

#### **9.1.3. Agency for conducting research.**

External agencies as follows will be assigned to conduct research on the above subjects involving Senior Research Officers of the State Wildlife Organization headquarters in collaboration with Satkosia Gorge Sanctuary authority. It is also proposed to appoint full time researchers in the sanctuary with provision of supporting logistics.

1. Wildlife Institute of India.
2. Forest Research Institute.
3. Bombay Natural History Society.
4. World Wildlife Fund.
5. Zoological Survey of India.
6. Botanical Survey of India.
7. Universities and colleges of Orissa..
8. National Level NGOs.

#### **9.1.4.Funding Agency.**

The respective interested organisations will arrange their funds for conducting research. The Satkosia Gorge Sanctuary authority will provide all logistic support and necessary assistance for conducting research. The researchers

may seek assistance of different funding organisations like UGC, USDFWL, WWF, IUCN, UNDP, and GTF etc.

#### **9.1.5. Infrastructure.**

##### **1. Establishing observatories.**

One observatory at Badamul and other at Tikarapara will be established to record rainfall, temperature, humidity, wind velocity etc. Necessary instruments like rain gauge, mini-max thermometers, anemometers, Stevenson's screen etc. will be purchased and installed in open areas with proper fencing. One Research Assistant at each station will be posted for recording data and maintenance of instruments.

##### **2. Establishment of a Museum/Herbarium:-**

One museum will be established at Tikarpada where specimens of all invertebrates, insects, small reptiles exclusively available in the sanctuary will be kept under label for identification. Similarly, the museum will have a herbarium which will contain the different endangered plant parts locally available for identification and to provide information about their usefulness to the mankind.

##### **3. Library.**

At Angul, a good library is required to keep books, journals, papers, research papers, reprints on wildlife study and research. A building will be

constructed. Steel racks, almirahs will be purchased to keep all above articles.

A computer system with Internet facilities will be kept in the library for updating knowledge.

#### **4. Preservation plot.**

Since the entire sanctuary is under tremendous biotic pressure, a piece of representative plot of about 20 ha will be preserved for biodiversity study. The area will be fenced with barbed wire with iron angles. Fire lines will be traced around the plot to protect the conservation plot from fire. The exact location of the conservation plot in compartments will be described and depicted on the map.

#### **9.1.6. Study:**

Study and inventorisation of all groups of plants and animals of all taxonomic group like Annelids, Arthropods, mollusks, fishes, amphibians, reptiles, birds, mammals ,soil fauna & aquatic fauna etc.shall be conducted by the concerned colleges, Universities and institutions. The out come of the study will be documented and published in the reported journals and released on website. Above study will be completed within 1<sup>st</sup>. 3 years of the plan period. Rs.10-15 lakhs / taxa will be spent.

#### **9.1.7. Documentation:**

All the research papers, results will be kept in the library. Field information, inventory, enumeration, survey reports, resources will be documented properly and systematically. A GIS data base will be developed. This data base will be helpful for managing the park effectively.

#### **9.1.8. Summer Internship study:**

During summer vacation of the colleges, the interested students will be allowed to camp in the nature to know about the details of elements of the sanctuary. The senior Research Officer of the State Wildlife Organization will be involved to participate such summer internship studies to educate them.

#### **9.1.9. Website for Satkosia Gorge Sanctuary.**

A website will be opened for Satkosia Gorge Sanctuary furnishing all sort of information about the sanctuary including photographs. The management plan, research articles on Satkosia Gorge Sanctuary, various ongoing and proposed activities will also find place in the website. An I.T. trained person will be engaged as part time worker to document all data in the website.

#### **9.2. Website Monitoring.**

Techniques and methodologies used in monitoring different events will be utilized efficiently. This will involve different stages from actual field work to record keeping. The value of the current monitoring activities for management will be assessed and documented. The activities to be monitored are given below.

##### **9.2.1 Monitoring of capacity building of staff.**

- Technical skill and field ability of the staff.
- Field skill includes ability to walk long distance, observe carefully, recognize and record animals and plants.
- Regular recruitment of young and energetic staff.
- Training (Pre-service and in-service) to staff in regular manner.
- Analytical skill of the staff for design, survey, analysis of data.
- Involvement of wildlife biologists, naturalists, researchers from Universities, NGOs etc in Park Management.
- Requirement of post, present position, vacancy and deployment of staff.

#### **9.2.2. Website. Monitoring of material resources.**

- Availability of basic tools like rudimentary maps, chain, tape.
- Availability of special tools like compass, camera, range finder, GPS, spotting scope.
- Availability of advanced tools like camera trap, computers.
- Maintenance of above equipments.
- Capacity of staff to handle all these equipments.

#### **9.2.3. Monitoring on documentation and data upkeeping.**

- Every information collected from the field will be documented chapter wise.
- Basic data on soil, geology, rain fall, temperature, humidity, wind speed, drought, vegetation type, habitat type, change on forest composition,

- species composition/ diversity, their abundance, fire incidents, grazing pressure, research activities will be documented in computer.
- Maps on above parameters will be prepared separately and stored in GIS software for analysis or made over transparencies for Manual GIS.
  - The limitations and threat to park animals to be identified and listed
  - The zone of influence, smuggling routes, strategic points, poaching and accident prone areas to be listed and shown on the map.
  - Year wise survey reports, animals estimation data, vegetation survey data will be documented.
  - Grass land to be developed, villages relocated, waterholes created, watch towers constructed, areas earmarked for grazing will be recorded.
  - Data base prepared in the computer will help the managers to think, plan, implement, monitor and finally evaluate the improvement of habitat and health condition of animal population.
  - Updating of data every year.
  - Data updating in Ethnobotany, traditional practice.

#### **9.2.4. Monitoring of animal population and their health.**

- Line transect method is statistically more sound than block count or waterhole count. So permanent line transects of 2 - 4 km each will be laid all over the sanctuary. The laying of transect will be statistically designed. Strata can be divided basing on forest types.

- Time of census will be in January every year as all the animals are equally distributed all over the sanctuary due to availability of water every where.
- Pugmark census will be carried out for large cat population estimate on roads and paths available in animal abundance area every year.
- Camera trap method will be followed to study the survival, mortality, recruitment and dispersal rate. Capture- recapture model to be followed once in 3-4 years during January.
- To study the biology and behaviour, home range social organisation / interactions, Radio-telemetry study will be carried out with the help of scientists in Wildlife Institution of India.
- To check the periodic growth in population vehicle transect census will be done twice in a year, once in summer and another after rainy season.
- The health condition of the ungulates will be monitored from waterhole observation. Their population structure and sex ratio will be assessed from water hole count. Water towers near every water hole will be constructed for monitoring. There are only 4 watch towers in this sanctuary. 5 more watch towers at 150 mtr from water holes will be constructed.
- Relative abundance of animals in a particular habitat can be estimated from dung / pallet/ scat count.
- Bird population will be estimated by adopting point sample method or capture – recapture method.

- Maintenance of direct sighting registers. The animals sighted by staff or tourists will be recorded compartment-wise in a spacio-temporal table, where RFs , compartment. No. will be written on column heads. Data will be written on row heads. In each cell the sighted animals will be mentioned with code.
- Regular collection of fresh faecal sample and testing in pathological lab to know the helminthes.
- Disinfection of water holes.
- Regular vaccination to domestic cattle in and around the sanctuary against FMD, Rinderpest, Tuberculosis, Protozoan diseases.
- Tranquilization will be adopted if any animal is found sick for its treatment.
- Involvement NGO and locals in census.
- Continuous assessment of population , distribution pattern and habitat mapping of `15-20 flagship species like elephant, tiger, leopard, giant squirrel, chousinga, gharial mugger, barking deer etc. will be conducted every year.

#### **9.2.5. Vegetation Monitoring.**

- Growth and abundance of trees, shrubs, grasses, palatable for herbivores which provide cover, shelter will also be monitored.
- Floristic inventory will be made in every 5 years, which will speak about elimination or introduction of any species.

- Vegetative map and habitat map will be prepared once in every 5 years.
- Estimation of ground cover percentage to be made every year after rainy season. Counting of grass, herb, rock and soil cover area in 50 cm x 50 cm iron frame following point sample technique.

More percentage of palatable grass and herb on ground cover indicates better habitat condition for ungulates.

- Estimation of shrub density is to be made every year after rainy season in a circular plot laid at 5 mt radius around sample points uniformly distributed over the sanctuary on fixed transects.
- Tree cover and its regeneration rate will be in every alternate year by following circular plot sampling at 15 mt radius around sampling points laid at 400 mt interval on transect line.
- PCQ method will be followed in same time to compare the abundance of particular tree species.
- Tree canopy cover will be estimated by using Densitometer and cross wire sighting to estimate the openness or closeness of the canopy. It is to be made in every 3 year.
- Photographic record provides all time series of habitat factors undergoing change. At every 3 years interval the habitat (where intensive treatment is given) be photographed from a particular vantage point.

#### **9.2.6. Monitoring habitat quality.**

- Grass land development in the Relocation zone.

- Fruit bearing tree / shrub plantation in open forest areas, their growth.
- Invasion of Eupatorium and other weeds in new areas suppressing grass.
- Availability of water for animals during pinch period in the natural and artificial water holes.
- Quality of water in the water holes.
- Availability of wallowing area for Sambar.
- Checking of salt licks.
- Desilting of water holes before rain.
- Ecological impact assessment studies shall be done every year.

#### **9.2.7. Monitoring Tiger movement.**

- Day today monitoring will be done for each tiger, observing pug marks on tracks.
- Since tiger is territorial, the movement& location of every tiger will be recorded in individual files.
- Pug mark, scat, scratch, claw mark on trees (Mahua or Jamun or Bombax or Schleicheria) with place of observation will be recorded with date in the file.
- Record of direct sighting, listening call, kill evidence, cattle lift evidence will be made.
- The territory of each individual tiger will be marked on the map.
- Camera trap will be used at mostly used area to take photograph of the tiger which will be taken periodically and kept in the individual file.

- Pug mark tracings will be kept in the file with all detail information.
- Plaster caste of pug mark with Id. No. of tiger will be stored.

#### **9.2.8. Monitoring Protection.**

- Functioning of anti-poaching squads, elephant trackers, movement of staff, their stay there and doing duty as per schedule.
- No. of illicit felling, NTFP collection, encroachment cases booked in every month.
- Functioning of VHF and utilisation in communication. At every VHF station, a VHF register will be maintained date wise. The details of message either received or sent from / to a particular station will be recorded putting time. If instructions are given over VHF, the station in charge will ensure compliance of the instructions, and keep it in writing on the VHF registers. This will be presented before the Senior Officers during their visit.
- Maintenance of roads.
- Movement of vehicles and their maintenance.
- Provision of food, water, ration to the staff staying in remote areas in anti-poaching / anti-smuggling camps.
- Condition of arms and ammunitions and supply of them to needy places.
- Tracking and resolving offence cases.

- Intelligence gathering, watching movement of habitual offenders, taking informants in to confidence, giving some tips / financial assistance from secret funds.
- Formation of mobile party consisting Forest Guards and hired Home Guards, APR force.
- Directing the mobile party over V.H.F. to attend duties at any place.
- Rapport building with Judiciary, District Administration and Police.
- Arms training, self defence training to the staff.
- Deployment of young & energetic staff in patrolling work.
- Update the list of arms license holders
- Well equipped Mobile party.
- Fixing time of movement of vehicle, fixing them speed limit while moving inside the PWD road inside the park and regulate them.
- All entry gates to be manned properly.
- Identification of commercially exploited plant / animal parts which are smuggled frequently.
- Special attention / protection to core area, special and unique habitats, riverine area and animal congregation area.
- Ensure foot patrolling by local staff in forest.
- Ensure higher officers camps at times in remote areas to realise the problems& working conditions.

- Registers to be maintained at antipoaching camps for recording day to day movement of staff and their observations.
- Providing awards, prizes, incentives to staff doing better job in protection.

#### **9.2.9. Monitoring Fire control.**

- Like monitoring protection.
- Fire to be handled at early stage.
- Villagers passing through sanctuary during fire season are to be made aware not to carry match box, smoke bidi or take fire with them.
- Collection of match box and bidi from them during period.
- Fire line tracing during December or latest by February 15.
- Amenities for fire fighting squads.
- Providing rewards, prizes, incentives to staff and villagers for their better performances.

#### **9.2.10. Monitoring grazing Control.**

- Issue of grazing permits to the villagers living inside the sanctuary, mentioning the permissible cattle number.
- Restriction of cattle in the marked grazing areas.

#### **9.2.11. Monitoring tourism.**

It is dealt in detail in Chapter 7.

#### **9.2.12. Monitoring Eco-Development works.**

It is dealt in detail in Chapter 8.

### **9.2.13. Monitoring Research and training.**

- Documentation of monthly progress.
- Interaction with researchers and trainers regularly.
- Attending such programmes.

### **9.2.14. Monitoring Awareness Programme.**

- Fixing number of awareness programme in a month.
- Publication of leaflets, hand bills and circulars.
- Movement of vehicles for the programme.
- Organising film show, slide shows every month in every village.

### **9.2.15. Midterm Evaluation**

After 4<sup>th</sup> and 8<sup>th</sup> year, mid term evaluation will be made on the efficacy of the prescriptions of the management plan. If it is thought that some of the prescriptions are not suitable for changed environment / situation those may be modified by the Divisional Forest Officer with intimation to higher authority.

## **9.3. Training.**

### **9.3.1. On the Job training.**

Quarterly training on following subjects:

- Conduct enquiry and writing reports.
- Intelligence gathering techniques.
- Documentation method.
- Handling the offenders

- Legal provisions.
- Witnessing the evidence in court.
- Recording and processing defence cases.
- Collection of evidences.
- Patrolling drill, house search, raid drill.
- Awareness building, eco-development activity.
- Visitor handling, integrated tourism management.

**Annually.**

- Use and maintenance of fire arms and connected responsibilities.
- Fire fighting.
- Sting operation.
- Forensic
- First aid, handling emergency cases.
- Field craft and skill.
- How to sensitize other departmental officers.
- Organising probe meetings, awareness camps.
- Wild animal census techniques, GIS.
- Vegetation survey technique.
- Use of special equipments like GPS, Camera trap, Range finder.
- Operation of electronic article, VHF, TV, computer
- Soil and moisture conservation measures.

**9.3. 2. Formal training Course.**

Wildlife Trained staff / officers are very few. Only Asst. Conservator of Forests of this Division is trained in wildlife management, rest field staff have not been trained.

- The untrained Dy.C.F. and ACFs will be sent for PG Diploma Training in Wildlife Management at Wildlife Institute of India, Dehradun which is of 9 months duration. The Range Forest Officers will be sent for certificate courses in Wildlife Management in W.I.I., Dehradun one in every year.
- Short course trainings in Forensic Science, Investigation in WL crime, interpretation and visitor management, Eco-development are being organised in W.I.I which can be attended by higher officers.
- Government departments like Agriculture and Soil Conservation are organising training for 2 weeks on Watershed Management, Community organisation, Soil conservation measures. Those opportunities will be availed. Lower level staff like Foresters and Forest Guards may attend these training.
- Exposure visit to “Rally gaon” in Maharashtra, Periyar in Kerala and other places where Eco development, participatory management, soil conservation, water shed management have been done successfully.

### **9.3. 3. Establishing a Learning Centre.**

Satkosia Gorge Sanctuary has many such locations which can be grouped under special habitats, cliffs, plateau, mesic area, riverine areas which are unique.

There are caves and dens where large cats take shelter. The detail descriptions have been given in Chapter-2.

- All such important places will be identified by GPS and listed.
- Located on the habitat map.
- The routes to these places are identified.
- The staff of Satkosia Gorge Sanctuary and of other divisions of Orissa will be taken to these places to educate them what are the unique and special habitat. Seeing is believing.
- Field tours to these places will be organised once in a year.
- Nature trails, interpretation centres, science parks, relief plans can be artificially developed which will be helpful in imparting training to the staff.