**The Existing Management Plan:-**

The management plan includes:-

1. Protection Working Circle
2. Small Wood & Fuel Wood Working Circle
3. Rehabilitation Working Circle
4. Sanctuary Working Circle.

 e) Mangrove Biodiversity Enhancement Working Circle

f) Wildlife Management and Protection Working Circle

g) Eco-Tourism Working Circle

h) Non Timber Forest Produce Overlapping Working Circle

The Management Plans have given due importance with Protection as the pivotal priority. Salient features are furnished below:

1. Specific Aims & Objectives have been formulated keeping in mind the wildlife aspects.
2. Any sort of harvesting has been ruled out and biotic interference has been attempted to be minimized.
3. Eco-tourism and Eco-development aspects have been well-elaborated to ascertain the participatory management involving fringe people.
4. Human Resource Development and Research issues have been dealt with thoroughly in the context of cohesive implementation towards management.

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 **Non Timber Forest Produce (NTFP):**

 Other than timber and firewood, this area is a good source of Non Timber Forest Produce (NTFP). Though many NTFP namely fishes, honey and wax are abundant in this sanctuary but collection of these NTFP is strictly prohibited.

 **Other programmes and activities:**

Many programmes and activities should be undertaken by the Forest Department to improve the Sanctuary from different angles of management, e.g. habitat improvement, protection of flora and fauna, staff and local people's welfare etc.

 It is needless to mention that only forest department will do activities inside the Sanctuary.

No N.G.O. is involved in activities related to Sanctuary except research works.

 No special programmes and activities occur in the Sanctuary except forestry and protection of wildlife

 Guided tours have been started to minimise the adverse affect of tourism on the P.A.

Different programmes and activities taken up by Forest department under various state plan and centrally sponsored schemes are as follows -

 1. Afforestation activities.

 2. Improvement of communication.

 3. Intensification of management and protection.

 4. Habitat improvement works.

 5. Immunisation of cattle of fringe villages.

 6. Procurement and training of chemical capture equipments and drugs.

 7. Awareness generation and nature education activities.

 8. Amenities for forest staff.

 9. Periodic population estimation of wild animals.

 10. Monitoring works.

 11 Reduction in man-animal conflict.

1. Eco-development activities.
2. Promotion of Eco-tourism.
3. Creation of eco-sensitive zone.

 **Forest Protection:**

Protection of flora and fauna of the area is ensured through day and night patrolling using launches and speedboats. There are watch towers and land based Camps at strategic points to watch over the area. The area is well-communicated through RT network and staffs are not well equipped with firearms. Soil conservation measures- both structural and vegetative, are taken up to stabilize the vulnerable sites.

High-speed Fibre Boats would be pressed into service for patrolling in narrow creeks where poachers and wood-cutters take shelter. These narrow creeks are difficult to navigate with even mechanized boats. On-foot patrolling, using tiger guard would be resorted to wherever possible to neutralize poaching of deer and wild boar by noose-trap.

Radio Telephone network is good. Yearwise maintanence is required.

As the period of Tiger Conservation Plan has been over in 2017 so the writing new Conservation Plan is urgent. The prepeared management prescription of both Core and Buffer is almost same except certain points.

**Core Area Plan:**

Vision:To conserve viable population of tiger, its co-predator and prey species along with unique mangrove eco-system.

Management Goal:To provide a secure habitat for the tiger and its prey species.

Management Objectives of Core Area is as follows:

1. To protect tiger along with mangrove eco-system by strengthening infrastructural support and existing protection regime.
2. To promote research activities to provide input for managerial activities.
3. To promote the existing monitoring programmes.
4. To promote staff-welfare through capacity buildings, training programmes etc.

**Buffer Area Plan:**

Problems in achieving the management goals are as follows:

1. Trans-boundary problem with Bangladesh.
2. Inadequate staff strength with 50% vacancies in front-line staff.
3. Poor infrastructure like insufficient number of fast-moving watercrafts, sophisticated firearms & ammunition, protection camp etc.
4. Heavy biotic pressure on forests by fringe villagers for fuelwood, collection of crab, honey and tiger prawn seeds, catching fishes as the socio-economic condition of villagers is very poor.
5. Hunting of Spotted Deer and Wild Boar.
6. Absence of Research Officer.
7. Eco-tourism in Netidhopani–I compartment.
8. Natural calamities like cyclones, ‘Sidr’, ‘Aila’ etc.
9. Global warming and climate change.
10. Human-Tiger conflicts and poaching of tiger prey species.
11. Difficult terrain, unstable soil, corrosive nature.
12. Lack of inter-agency co-ordination, poor intelligence sharing and lack of awareness.
13. Increase salinity due to reduced flow of sweet water.
14. Socio-political conflicts.
15. Insufficient and timely fund flow.
16. Pollution created by old watercraft.

Zonation of Core Area Plan: Core Area has been divided into two zones, namely—*(i)* Core Zone and *(ii)* Eco-tourism Zone. Total area is 1699.62 sq. km., out of which 26.42 sq. km. is used for tourism activities. Except Netidhopani-1 Compartment entire Forests Blocks of Matla (1–4), Chamta (1–8), Chhotahardi (1–3), Gosaba (1–4), Gona (1–3), Baghmara (1–8), Mayadwip (1–5), Chandkhali (1–4) and Netidhopani (1–3) are belongs to Core Area Plan.

Buffer Area Plan:

Vision:The conservation of fragile mangrove eco-system of STR.

Management goals: The area to serve as a sink for the population dispersing out from the core. Local communities shall be made partners in conservation by strengthening the alternative livelihood approach with an aim of reducing the natural resource dependency.

**Management Objectives:**

*1.* To intensify the proper protection of natural resources of Tiger Reserves.

*2.* To mitigate the man-animal conflict through active management interventions along with co-operation from the local stakeholders.

*3.* To strengthen the alternate livelihood approaches by carrying out need-based site-specific, priority basis eco-development activities in the fringe villages so as to elicit the support of the local communities for conservation to reduce forest resource-based dependency.

*4.* To promote eco-tourism in a planned manner based on the carrying capacities with a view to promote awareness generation regarding conservation among the masses.

*5.* Generation of conservation awareness among JFMC members, school children and other communities to develop them as a guard against loss of biodiversity.

*6.* To act as a nodal agency to co-ordinate the activities of the various governmental and non-governmental agencies working for the development of the area.

 **Problems in Achieving Objectives:**

*1.* Proximity of the area to Kolkata, which has emerged as a major centre for smuggling of wildlife articles/goods to Bhutan, Nepal, China, and South East Asian countries.

*2.* High degree of natural resource dependency for both sustenance and livelihood by fringe villagers.

*3.* Hunting, especially of Spotted Deer (*Axis axis*) and Wild Boar (*Sus scrofa*) has traditionally been carried out by many sections of the society at the time of local festivals like *Dol, Kali Puja* etc.

*4*. Lack of proper guidelines regulating tourist numbers, waste management etc.

*5.* Presence of an international streamer route, which passes along the boundary of the Core Area and is used by vessels carrying fly ash etc. may poses an ecological hazard in the event of any mishap by way of sinking of the vessel.

**Zone Plans of Buffer Area:** Buffer Area of STR can be divided in to 3 zones like— *(i)* Multiple-use Zone, *(ii)* Tourism Zone and *(iii)* Eco-development Zone. Total area of Multiple-use Zone will be 522.77 sq. km. having entire area of Arbesi, Jhilla, Khatuajhuri and Harinbhanga blocks. Total area of tourism zone, which is an overlapping zone with Core and Multiple-use Zone is 911.96 sq km. Eco-development zone shall lie in the fringe area of STR and extend up to 1.0–1.5 km. from the boundary of the forests.

**Following Theme Plans have been prescribed in new Tiger Conservation Plan:**

1. Protection Management
2. Habitat Management
3. Research & Monitoring and
4. Disaster Management.

**Management Strategies for Protection:**

1. Strengthening protection by *(a)* vacancy filling of staff, *(b)* constructing new camps in strategic locations, *(c)* providing fast-moving & silent watercrafts, *(d)* sophisticated firearms & ammunition.
2. Formation of strike force (Tiger Protection Force)
3. Recruitment of motivated young staffs.
4. Aware generation among fringe people.
5. Provision of sufficient fund.
6. Site-specific, need-based priority basis eco-development activities to reduce nature-base dependency by poor fringe people, as well as to provide alternative livelihood.
7. Patrolling should be done on house boat, dingi boat, speedboats & launches.
8. Patrolling should be framed out in such a way that no area to be uncovered in a month. More night-patrolling to be done in vulnerable areas.
9. Organization of Joint Patrolling frequently with the staff, officers of adjoining South 24-Parganas Division, BST, Coastal Police and other organisations.
10. Vulnerable areas like Bangladesh borders, sea-facing areas, and sweet waterbodies should be frequently monitored by extensive patrolling. Special patrolling to be organised in strategic areas.
11. Patrolling schedule to be prepared for pre-monsoon, monsoon and post-monsoon period.
12. Wildlife Crime Dossier should be maintained.
13. Inter-agency condition shall be increased.
14. Intelligence network shall also be improved to control poaching.

**Strategies for Disaster Management:**

1. Advance warning system.
2. Construction of elevated building for staff.
3. Provision of sufficient number of life jackets, tarpaulins, search light.
4. Construction of flood centre in villages.
5. Provision of speedboat in each camp.
6. Rain-water harvesting system in each camp.
7. Capacity building.
8. Provision of sufficient first-aid in each camp.
9. Liaisoning with other line-department.

**Strategies for Research Activities:**

1. The Research Range should be started full-fledged.
2. Estimation of tiger densities, dispersal and ranging pattern.
3. Estimation of prey species, especially spotted deer or wild boar.
4. Spatial distribution of ‘Sundari’ (*Heritiera fomes*) with special reference to the salinity regime.
5. Tiger straying in fringe villages.
6. Impact of eco-development activities in villages.
7. Impact of eco-tourism.
8. Study on salinity, effect of global warming etc.

**Eco-development Plan:**

Co-operation of fringe people in the conservation of tiger habitat as it could gradually be felt, has been possible through constant motivation and awareness-building of the fringe people as well as public liaison and their involvement in the planning process for implementation of eco-development programme. Participatory Management has already been introduced in STR 26 Joint Forest Management Committee (JFMCs) have been formed in the fringe villages of the STR and the response is positive. JFMCs (12 Nos.) are formed in the reserved forests areas like under Basirhat Range and JFMCs are formed in PAs like NPW Range (5 Nos.) and SWLS Range (9 Nos.). 9087 families of 33 fringe villages are involved in the process of conservation of forests and wildlife that are protecting 25000 ha. mangrove forest area.

Objectives:

1. To provide alternative livelihood to reduce dependency on mangrove forest based resources by fringe peoples.
2. Raising awareness among villages.

Problems:

1. High-level resource dependency by fringe villagers.
2. Poor infrastructure, inadequate market facilities.
3. Budgetary constraints.

Following eco-development activities shall be has undertaken to improve socio-economic condition, to provide alternate livelihood programme to some extent and as a trust-building activities:

1. Excavation of Rain-water Irrigation Channel to increase agricultural production.
2. Provision of Piscicultural Pond in the Buffer Area to be managed by villagers for prawn and sweet-water fish.
3. Construction of RCC Jetty for easy communication.
4. Sinking Deep Tubewell to provide drinking water.
5. Provision of Solar Lights in the villages on the periphery both for lighting as well as to scare away tiger from straying into the villages.
6. Provision of Smokeless Chullah for optimisation of fuel consumption.
7. Raising Mangrove Plantation on the periphery as a shelter belt.
8. Raising Strip Plantation along roadside to meet local fuelwood demand.
9. Provision of Medical Care facilities to the villages through collaborative efforts of the management and NGOs.
10. Individual inputs which given are—supply of Van Rickshaw, Pump Set, Paddy Threshers’ Machines, Spray Machine, Solar Light, Sewing Machines etc.
11. Capacity Building by providing training input given on Computers, Cycle Repairing, Poultry, Boutique, Carpentry, Masonry, Bamboo Basket Making, Embroidery, etc.
12. Provide financial input to SHGs for their substance.
13. Provision of Veterinary Healthcare facilities to the villages through vaccination by Tiger Reserve Veterinary Officer.
14. Construction of School Building to provide educational facilities in rural villages.
15. Construction of Community Hall for social gathering as well as for flood centre purposes.
16. Construction of Brick Paved Road (double soling) for through communication in remote villages.

**Protection and Intelligence Gathering:**

One of the most important issues is protection and intelligence gathering for conservation of tiger, its co-predator and other prey species including their habitat. A strong intelligence network is essential to prevent wildlife crime. To achieve this objective following strategies may undertake:

1. Formation of Tiger Cell by involving all concerned agencies.
2. Establishment of Tiger Strike Force for carrying out proper patrolling over strategic areas, organising raids, checking of nearby weekly markets, assisting tiger straying case and to control other illegal activities.
3. Improvement of Communication by providing fast-moving silent watercrafts.
4. Establishment of new Protection Camps in Strategic Locations as present area coverage by each camp is too big. These camps may be established at Chandkhali-2, Chamta-8, Matla-2, Mayadwip-1, Arbesi-1 and Panchamukhani-5 Compartment to reduce the existing camp coverage area.
5. Internal transfer of field staff at an interval of 5–6 years from interiorly located camps to nearby camps and vice versa.

## Eco-tourism and Interpretation:

Tourism in PAs is primarily aimed at spreading conservation awareness among the people by exposing them to the rich bio-diversity and natural values of the area. Presently eco-tourism in STR is confined to entire Basirhat Range, part of SWLS Range and NPW Range (Netidhopani-1 Compartment) having an area of 911.96 sq. km.

Objectives:

Main objective of tourism in STR is to—

1. create conservations awareness, education and interpretation among masses.
2. forging partnership with the local communities & thereby developing their stakes in the conservation process.
3. to provide entertainment of recreation.
4. to carry out low impact tourism.

Problem in Achieving the Objectives are—

1. Limited access to the forest area on foot and poor visibility in the forest.
2. Limited number of tourist spots and watercrafts is the only mean of transport, which is very old and create pollution to water.
3. Inadequate tourist facilities.
4. No restriction on the number of watercraft as well as tourists.
5. No proper policy of garbage disposal.
6. Lack of trained tourist guides.

Presently tourist permit is issued from Canning, Gosaba, Sajnekhali, Sonakhali, Bagna and Kolkata. Approximate 1 lakh tourists including foreign visitors visited STR annually, which is almost double than last five years. At present, 6 sites, *i.e.* Sajnekhali, Sudhandyakhali, Dobanki, Netidhopani, Jhingekhali & Burirdabri is being opened for tourism. In the entire sites Watch Tower is existing except Dobanki. Two important attractions are Canopy Walking at Dobanki & Cage Trail at Burirdabri.

Strategies:

1. Determination of carrying capacity of tourists: As per NTCA guidelines, revised calculated carrying capacity of tourists in STR is approx. 5200 per day.
2. New site-development proposals.
3. New Interpretation Centre to be developed on eastern side of the Reserve with all modern visitor facilities.
4. Improvement of good collection of audio-visual medium on wild.
5. Selling of newsletter, brochure, local handicrafts, honey, publicity material etc.
6. Sensitisation school childrens’ by arranging visit to Sundarban for them.
7. Developing more trained guides.
8. Improvement of existing visitor system.
9. Publication of newsletter, pamphlets, leaflets, brochures etc.

**Education and Awareness:**

Mangrove eco-system is very fragile and peoples’ sustenance in the area, again mainly depends on the maintenance and sustainable use of the eco-system. At the same time, eco-system is the most productive on the planet guiding the benefit of the nutrient cycling of both terrestrial as well as marine system. Therefore, understanding of the system and its importance is very useful to the people and awareness building among the people around the mangrove forest is necessary. Educating people around the reserve about the importance of conservation of mangrove eco-system and its natural resources as well as launching of programme of training and demonstration of improved technology for bringing socio-economic development in the region will certainly help in the conservation of this unique eco-system. Thus, seminars, workshops, awareness camps etc. to be organised frequently in the vicinity of the Reserve. Interpretation trips are also to be arranged for school students, villagers, Panchayat members and women folk. Audio-visual equipment should be used to highlight the need of conservation of nature and eco-system. Short-term training course about the mangrove eco-system should be conducted for the registered local tourist guides, which has generated local interest and employment. The Mangrove Interpretation Centre located at Sajnekhali will play a great role in awareness building and orientation of the people and tourists towards the paramount importance of conservation of nature in general and the mangrove eco-systems in particular.

#### Natural Resource-Use Management:

At present natural resource use is permitted in the Buffer Area only. Tiger Reserve authority allows fishing against valid permit knows as Boat License Certificate (BLCs) as well honey collection for certain period.

Objective of Natural Resource Management is as follows:

1. Streaming the process of mutation of existing BLCs.
2. Gradual reduction in the dependency of the fringe communities on forest-based natural resources.
3. Sustainable uses of natural resources.

Problems:

1. Poor socio-economic condition of the fringe people.
2. Most of the BLCs are being controlled by middleman who is not the actual owner.
3. In absence of I-Cards it is difficult to check the actual identity of the fisherman in the field.
4. Despite accident there is huge pressure for honey collection permits.
5. Limited staff & trans-boundary problem.

### Strategies:

1. Fishing is allowed against permit of BLC, which is non-transferable and renewed annually. As per records, 923 BLCs have issued out of them 691 are active now. It has been found that major part of BLCs has been loaned out to other peoples. Due to limited staff strength it is very difficult to check all BLCs in the field. Sometimes fisherman enters the Core Area illegally. As there is no I-Card and 5-6 persons per boat is going for fishing, so it is difficult to understand whether poacher is moving with fishing team.
2. Fishing is closed for 3 months in a year.
3. Group Insurance policy for fisherman & honey collector.
4. Raising awareness among fishermen.
5. Alternative Livelihood Activities to reduce nature-based dependency.

**Strategies for Training and HRD Plan:**

Different formal and informal training to be imparted to different level staff and officer such as—

1. Diploma course on Wildlife Management for AFD & DFD at WII.
2. Eco-development (3 months) for AFD & DFD at WII.
3. Certificate course on Improved Wildlife Management for Forest Rangers (FR) at WII.
4. Training on Tranquillization and use of Arms for field-level staff.
5. On Legal issues for FD, DFD, AFD & FR.
6. On First-Aid & Hospitality for field-level staff (FR downward).
7. On Tourism, Interpretation & Conservation Awareness for DFD, AFD & FR.
8. On Radio-Collaring and Monitoring for FD, DFD, AFD, FR & DR/Fr.
9. On Mob Control, Livelihood Option for FR & other ground-level staff Training should be both on long & short terms on need-based, in-house or institutional, within the country or abroad and a yearly framework to be designed.

In addition to training for exposure of staff, study tour to other PAs, adjoining country Bangladesh, other Tiger Range countries to get exposure, exchange views, widens outlook and broaden thought of staff officers.

Moreover, 1 or 2 days Workshops for field-level staff are the most important.

**Strategies for the Tiger Population and Habitat Assessment will be as follows:**

1. Radio-Collaring of Tiger.
2. Camera Trapping.
3. Study of vegetation on laying out Sample Plot in different compartments.
4. Study on aquatic species.
5. A tiger population estimation monitoring framework to be designed on the basis of four phases like—
6. Optical Mapping & Monitoring of Tiger, Prey and Habitat.
7. Spatial Attribute Data.

*(c)* Estimating the Population of Tiger and its Prey.

*(d)* Intensive Monitoring of Source Population.

**Tiger Straying:**

The major issue in managing Human-Tiger conflict in STR is the straying of tiger into fringe villages and rescue of the same without causing any harm on either side. It is worth-mentioning here that STR’s only north–western boundary has an interface with 25 fringe villages, which are densely populated with human and livestock.

Many times it becomes possible for the staff and local villagers to drive the tiger back to the forest by using drums, crackers, fire etc. Sometimes tiger also goes back to the forest on its own. These straying incidents are termed as “Temporary Straying”, where in case of any repeated phenomenon, trap cage with live bait is being used to trap the tiger and then relocate the same in their wilderness.

In “Permanent Straying”, the tiger takes refuge in a cattle shed or inside any village hut, when tranquilization is the only resort to rescue the animal. Tigers stray into the neighbouring villages because they are situated in the reclaimed forest land and in same places the boundary between the forest and agricultural land is even not distinct. Some villages have small patches of mangrove forests so the tiger gets into these forests by losing direction. Tigress sometimes litters inside the paddy field as she wants to avoid the danger of male tiger. An old aged and diseased tiger having broken canine is another cause of straying because it makes it difficult to hunt its prey in forest and finds easy to prey on domestic cattle.

Mitigation Strategies of Tiger Straying:

To reduce the reaction time in any permanent tiger straying situation, following action protocol is suggested:

* 1. Displaying of contact numbers of local Police, other concerned Administrative Officials, local public representative, Panchayet Pradhan/member at Range, Beat Office and other convenient public places so that message can be send timely as well as contacted properly for mob-controlling and other necessary actions.
	2. A speedboat to be kept always in ready condition so that the Quick Response Team (QRT) may act immediately.
	3. Tranquilization equipment, translocation cages etc to be kept ready along with tiger guard and other necessary tools like nylon net, crackers, flame torch, arms and ammunitions, helmet etc. for the Tiger Straying Combat Force (TSCF).
	4. The Veterinary Surgeon and at least one staff who are trained in tranquilization and the speed boat driver should be always ready to act impromptu. In case of allowing leave, this issue has to be taken care of.
	5. Time to time group meeting in the villages to generate public awareness, eco- development works etc. help a lot in getting information and co-operation from the villagers during tiger straying and rescuing of the animal.
	6. At present, total 96 km. long nylon net fencing has been erected in interface area out of 96 km. villages and it is needless to mention that it is very effective to control straying out of tiger in fringe villages as well as entry of cattle even human being from villages to the forests. Due to saline soil, corrosive nature and every 6 hours interval high and ebb tide both nylon net fences as well as *Bamboo post*, which act as a support get damaged frequently. In order to make it more effective regular checking of nylon net fencing is done starting from lower-level staff to Dy Field Director and damaged portion is being changed. It is proposed to gradual changing of bamboo post to RCC post on hard ground. Experimentally it has been done in Basirhat Range and Sajnekhali Range and found it is very effective.
	7. To make strong relationship with the villagers trust building as well as alternate livelihood activities shall be undertaken as a Eco-development activities.
	8. To minimise the revengeful attitude of the local people, if any, regular awareness campaign is already in practice, which needs further intensification. Payment of compensation on spot for human and livestock death and treatment of injured negates the chance of revenge killing of tiger. Presently, the compensation for the human death is Rs. 2.50 lakh and that of cattle death is Rs. 2000/-, which requires further consideration. Payment of actual market price on spot in cattle death can minimise the apathy of local villagers. Regular meeting with JFMC and Panchayet members to reduce the grievance against the staff as well as tiger.
	9. Awareness generation should be done departmentally or by bonafide NGOs.
	10. More staff should be trained in tranquilization of wildlife and trained competent staff should be posted in vulnerable areas so that they can reach place of occurrence in time for action. Every tranquilization team should be covered by a supporting team to avoid failures, which may lead to accidents.