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বন অধিদপ্তর
পরিবেশ ও বন মন্ত্রণালয়

WCS

HANDBOOK FOR SMART PATROLS IN THE SUNDARBANS MANGROVE FOREST OF BANGLADESH

Bangladesh Forest Department, Ministry of Environment and Forests, Bangladesh
Wildlife Conservation Society, Bangladesh
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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The vision of the **Bangladesh Forest Department (BFD)** is the conservation of forests, environment and biodiversity and socio-economic development through modern technology and innovation. Its mission is forest expansion, biodiversity conservation, poverty alleviation and wildlife conservation through active participation of people.

As a federally owned enterprise, the ***Deutsche Gesellschaft für Internationale Zusammenarbeit*** **(GIZ)** supports the German Government, on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), in achieving its objectives in the field of international cooperation for sustainable development. GIZ is a value-driven global player and manages change by providing know-how, developing solutions, advising policymakers, and securing results.

The **Wildlife Conservation Society (WCS)** saves wildlife and wild places worldwide through science, conservation action, education, and inspiring people to value nature. To achieve our mission, WCS, based at the Bronx Zoo, harnesses the power of its Global Conservation Program in nearly 60 nations and in all the world's oceans and its five wildlife parks in New York City, visited by 4 million people annually.

MESSAGE

The Sundarbans is the largest contiguous mangrove forest in the world. It supports globally significant biodiversity including threatened wildlife such as tigers and freshwater dolphins. The forest and its waterways also provide essential ecosystem services critical to Bangladeshi people living in communities bordering the forest. Enforcing the laws and rules that protect the Sundarbans and its diverse wildlife both on land and in the water is a challenging task particularly due to the large size and remoteness of the forest. Also the high density of trees and exposed roots of mangroves make foot patrols nearly impossible in many areas. Meanwhile large tidal variations make navigating its waterways especially difficult.

The Bangladesh Forest Department has made a strong commitment towards protecting biodiversity and fighting against forestry and fisheries crime in the Sundarbans. As part of this commitment, we are collaborating with the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) to use a Spatial Monitoring and Reporting Tool (SMART). This tool is a combination of software, training materials and implementation standards for systematic law enforcement and monitoring patrols. SMART is designed for use by front-line staff in protected areas. The SMART software provides access to information, easy to understand maps and the locations of threats. The approach for SMART patrolling will allow the Forest Department to improve patrol planning and evaluate if patrols are successfully combatting wildlife poaching, illegal fishing, vessel traffic and pollution risks, and other forest crimes.

Publication of the Handbook for SMART patrolling in the Sundarbans mangrove forest of Bangladesh is a tremendous step towards strengthening forest administration, law enforcement, awareness raising and wildlife monitoring efforts in the Sundarbans. It provides a wealth of essential information for front-line staff to conduct safe and effective SMART patrols. Together with ongoing training and mentoring, the handbook will help the Forest Department ensure that Sundarbans remain a stronghold for tigers, dolphins and other globally threatened species while continuing to provide resources and ecosystem services, including protection from extreme storms, for the people of Bangladesh.

(Mohammed Shafiul Alam Chowdhury)
Chief Conservator of Forests
Bangladesh Forest Department

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We intend for the handbook to play an important role in establishing effective SMART patrols in the Sundarbans that will strengthen the protection of forest resources vital to local livelihoods and increase the survival prospects of some of the world's most endangered and iconic wildlife.

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List of acronyms

BFD	:	Bangladesh Forest Department
BGB	:	Border Guard Bangladesh
CCF	:	Chief Conservator of Forests
CF	:	Conservator of Forests
CT	:	Cedar Tree
COR	:	Compound Offence Report
DFO	:	Divisional Forest Officer
FIR	:	First Information Report
GD	:	General Diary
GIS	:	Geographic Information System
GIZ	:	*Deutsche Gesellschaft für Internationale Zusammenarbeit*
GPS	:	Global Positioning System
MoEF	:	Ministry of Environment and Forest
POR	:	Prosecution Offence Report
RAB	:	Rapid Action Battalion
SIM	:	Subscriber Identification Module
SMART	:	Spatial Monitoring and Reporting Tool
SMART OPs	:	SMART Operating Procedures
SMF	:	Sundarbans Mangrove Forest
SMP	:	Management of the Sundarbans Mangrove Forests for Biodiversity Conservation and Increased Adaptation to Climate Change
UDOR	:	Undetected Offence Report
VHF	:	Very High Frequency
WCS	:	Wildlife Conservation Society

1. Preface

The Sundarbans is the world's largest mangrove forest, a Ramsar Wetland of International Importance, and it includes a UNESCO World Heritage Site harbouring globally threatened biodiversity. Resource harvesting and access to the forest is regulated through a permit system. However, the unique Sundarbans ecosystem is threatened by illegal activities such as poison fishing, logging and poaching. A lack of strategic biomonitoring data also hampers effective conservation management.

An immediate priority for protecting the Sundarbans and its biodiversity is to move from a reactive law enforcement approach to preventing illegal activities. A critical component of a proactive approach to protecting wildlife and its habitat is to strengthen the capacity and accountability of law enforcement and monitoring patrols.

The Spatial Monitoring and Reporting Tool (SMART) is an approach used for evaluating and improving the effectiveness of conservation law enforcement patrols and monitoring. The "*Management of the Sundarbans Mangrove Forests for Biodiversity Conservation and Increased Adaptation to Climate Change*" Project (SMP) supports the Bangladesh Forest Department (BFD) to ensure effective implementation of SMART in the Sundarbans. SMP is a project of the Ministry of Environment and Forests of the Government of the People's Republic of Bangladesh, supported by the German Federal Ministry for Economic Cooperation and Development and jointly implemented by the BFD, and the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH. SMP's support to the BFD for SMART is being implemented in collaboration with the Wildlife Conservation Society (WCS). Experiences so far have demonstrated the value of SMART for improved management and conservation of biodiversity and natural resources in the Sundarbans, and the BFD intends to continue their efforts to employ a SMART approach across the entire Sundarbans of Bangladesh.

Under the umbrella of SMP, WCS developed a "*Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh*". This handbook was jointly developed with the BFD and includes valuable contributions by other SMART initiatives in the Sundarbans. These include the USAID supported *Bagh* project and the former World Bank financed SRCWP project. It provides practical guidance for conducting effective SMART patrols in the Sundarbans with an earlier draft tested during training and implementation of SMART patrols by the BFD during 2016. It includes the main handbook and 18 appendices. The appendices include detailed information on Operating Procedures for SMART patrols (Appendix 1); laws and rules in the Sundarbans (Appendix 2); log books and forms to be completed during SMART patrols (Appendices 3-7); field manual for using CyberTracker to collect SMART data (Appendix 8); field guides for identifying wildlife, fish and crabs, traps and snares, fishing gears, and vessels (Appendices 9-13); field guide for examining dolphin carcasses (Appendix 14) and manuals on the use of a GPS, binoculars and CyberTracker equipped smart tablets and phones (Appendices 15-18).

2. Patrolling Objectives

2.1 Law Enforcement

The primary objective of SMART patrols is to achieve a safe environment for aquatic and terrestrial biodiversity through the enforcement of relevant acts, rules, policies, standing orders and ordinances. SMART patrols aim to reduce wildlife poaching and illegal fishing, wood cutting and harvesting of non-timber forest products, and enforce navigation and pollution rules through the deterrence, detection, arrest, and prosecution of forest criminals.

2.2 Monitoring Threats

Monitoring threats is essential to evaluate the effectiveness of wildlife law enforcement patrols. Observations of threats include wildlife poaching and hunting equipment, illegal fishing gear and practices, forest encroachment and camps, wood cutting and signs or evidence of wood cutting, vessel traffic infractions, and pollution sources.

2.3 Wildlife Monitoring

Wildlife monitoring is vital for evaluating the success of patrolling efforts in reducing poaching and other sources of human-caused mortality. Wildlife sightings made during SMART patrols provide a record of the presence and absence of wildlife needed for detecting biodiversity trends.

2.4 Awareness Raising on Laws and Rules

Awareness among resource users is critical to ensure compliance with laws and rules and reduce conservation threats. Awareness raising can be achieved by making contact with resource users, sharing information on relevant regulations, issuing warnings for first-time violators of minor offenses, and distributing easy-to-understand, illustrated educational outreach materials.

3. Planning Patrols

3.1 Approval of Patrol Plan

Before starting a patrol, a *SMART Patrol Plan Approval Form* (Appendix 3) should be filled out by the Patrol Team Leader and approved and signed by the Range Officer. This form contains the team name, detailed information on the planned patrol including the time of departure and return, names and contact numbers of all patrol team members, emergency contact numbers, patrol route illustrated on a map, firearms numbers and a checklist of equipment and supplies.

3.2 How often should Patrols be Conducted?

Patrols are the foundation of a SMART approach. Ideally, each patrolling team will conduct one 12-14 day long patrol each month with 6-8 hours of patrolling effort per day. With two patrol teams for each of the four ranges (Sarankhola, Chandpai, Khulna and Satkhira), this means there will be a patrolling presence across the SMF for 8 patrols each month for a total of 96-112 days.

3.3 When to Conduct Patrols?

The timing of patrols should be unpredictable. If a poacher or illegal fisher can predict when patrols will be conducted, they will recognize the pattern and avoid being detected. Illegal activities often take place at night, so at least two night patrols should be conducted during the 12-14 day long patrols. To maximize the chance of detecting illegal activity, the patrol teams should be prepared to conduct patrols at any time of the day or night.

3.4 Where to Conduct Patrols?

Patrols should focus on choke points (channel confluences of narrow sections) where boats may be intercepted and stopped. They should also cover all possible routes where violators move, including large (≥200 meters or 650 feet wide), medium (<200 meters or 650 feet wide to >15 meters or 50 feet wide) and small (≤15 meters or 50 feet wide) channels.

The river bank should be carefully searched for human footprints or trails. If any footprints or trails are found, the patrol team should search by foot for hunting traps, snares and camps. Problem hotspots, defined as areas where illegal activities have been recorded at least three times by a patrol team, should be visited more frequently. Some patrols should be conducted in the boundary area of the SMF adjacent to villages. These patrols can be used especially for intelligence gathering and raising awareness on laws and rules.

Generally, 75% of all accessible areas should be covered during each patrol. The remaining 25% should be covered during the next patrol along with at least 50% of the area that was covered during the previous patrol. At least 5% of the patrolling effort should be on foot.

Local knowledge is vital for deciding which creeks are accessible during what tidal conditions and when to turn back to avoid getting stuck in a small creek during a falling tide. Make sure to plan your patrol so that whenever possible you are traveling with the tide and not against it (see the tides section 3.5 below). Veteran BFD field staff, boat crews and local resource users generally have this knowledge and their input can help keep the patrol team safe from becoming grounded in smaller creeks. Figures 1-4 show all navigable creeks in the four ranges of the SMF. Rivers coloured in red indicate a fishing ban.

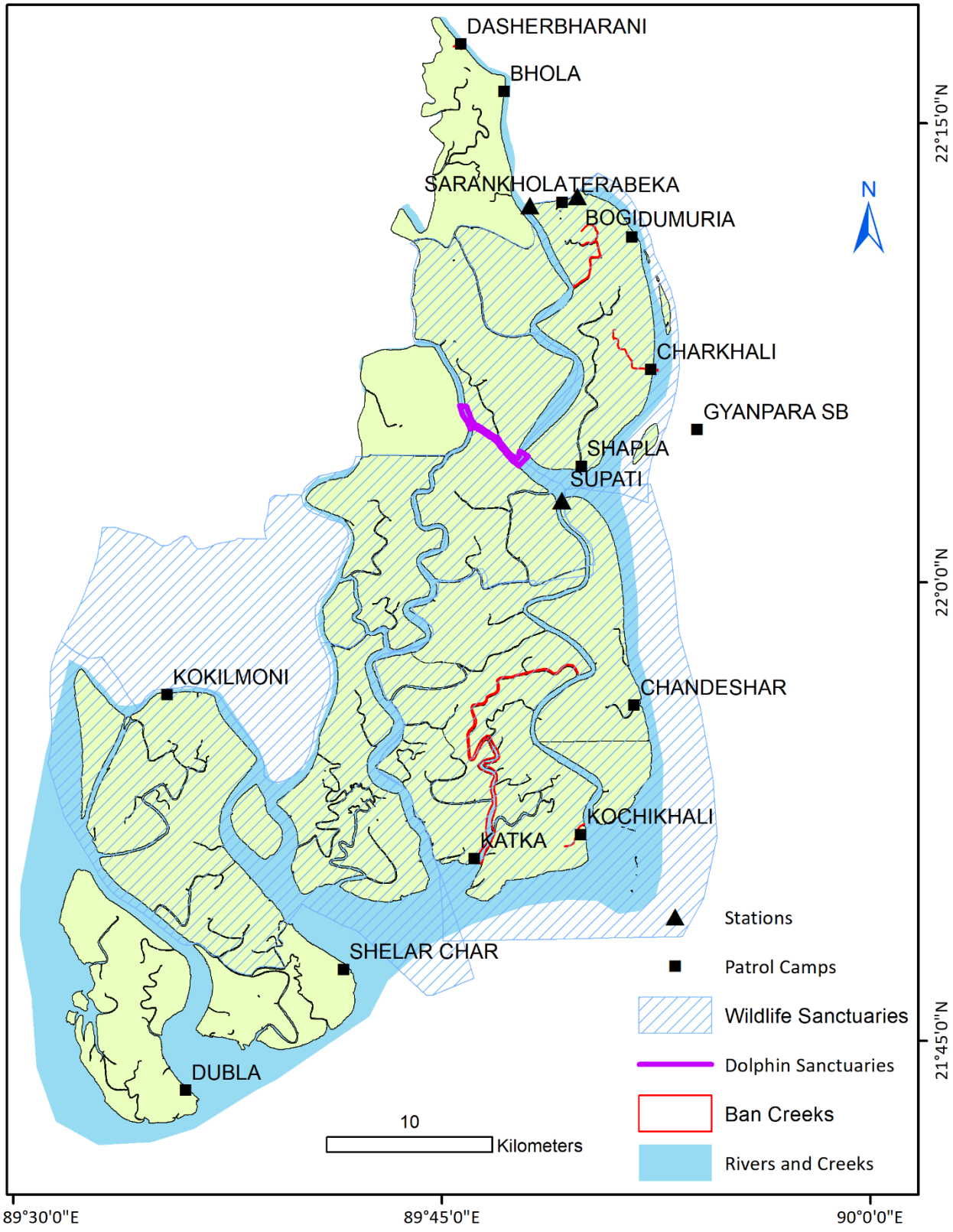


Figure 1. Map of Sarankhola Range (Source: Bangladesh Forest Department).

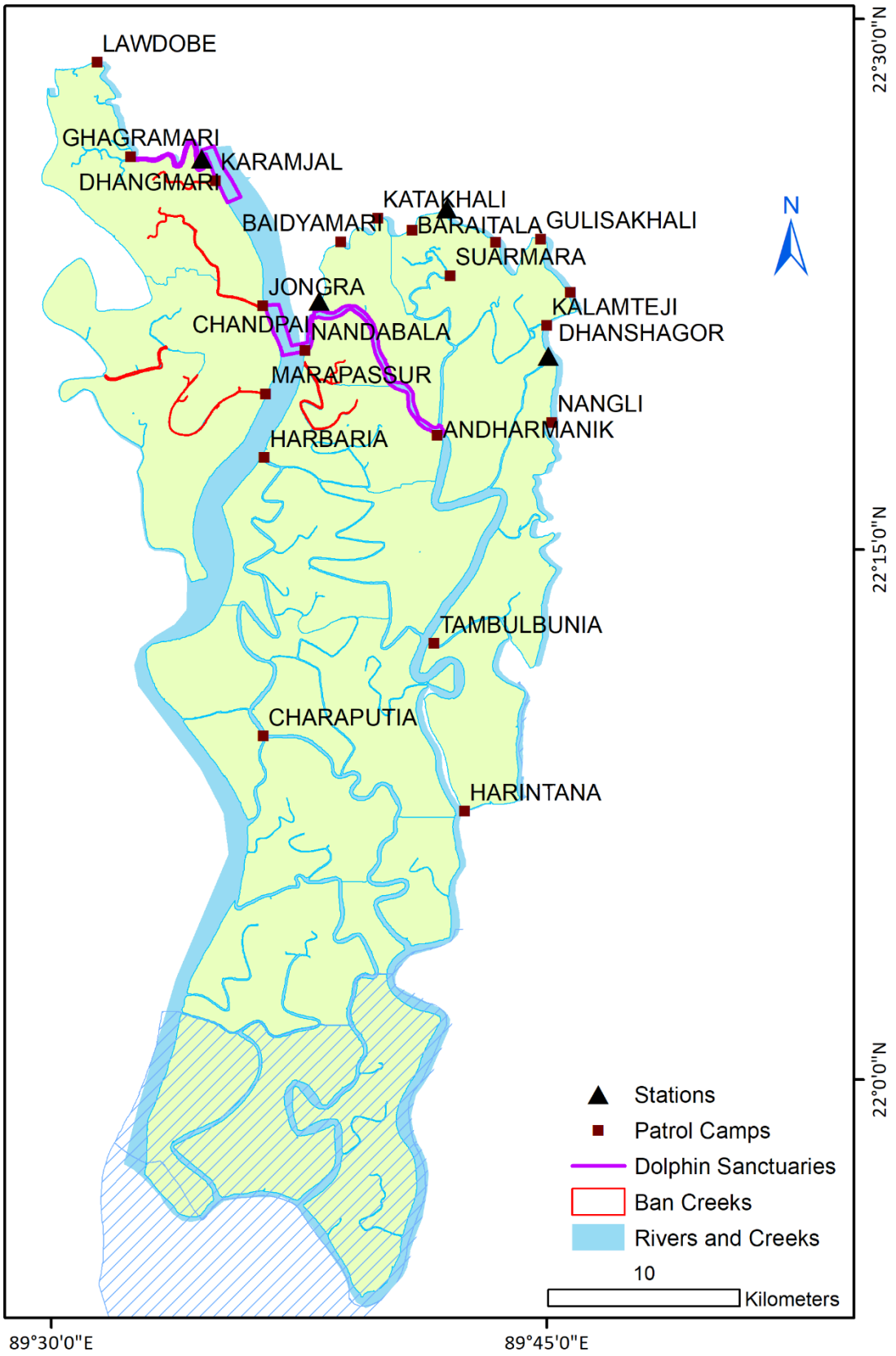


Figure 2. Map of Chandpai Range (Source: Bangladesh Forest Department).

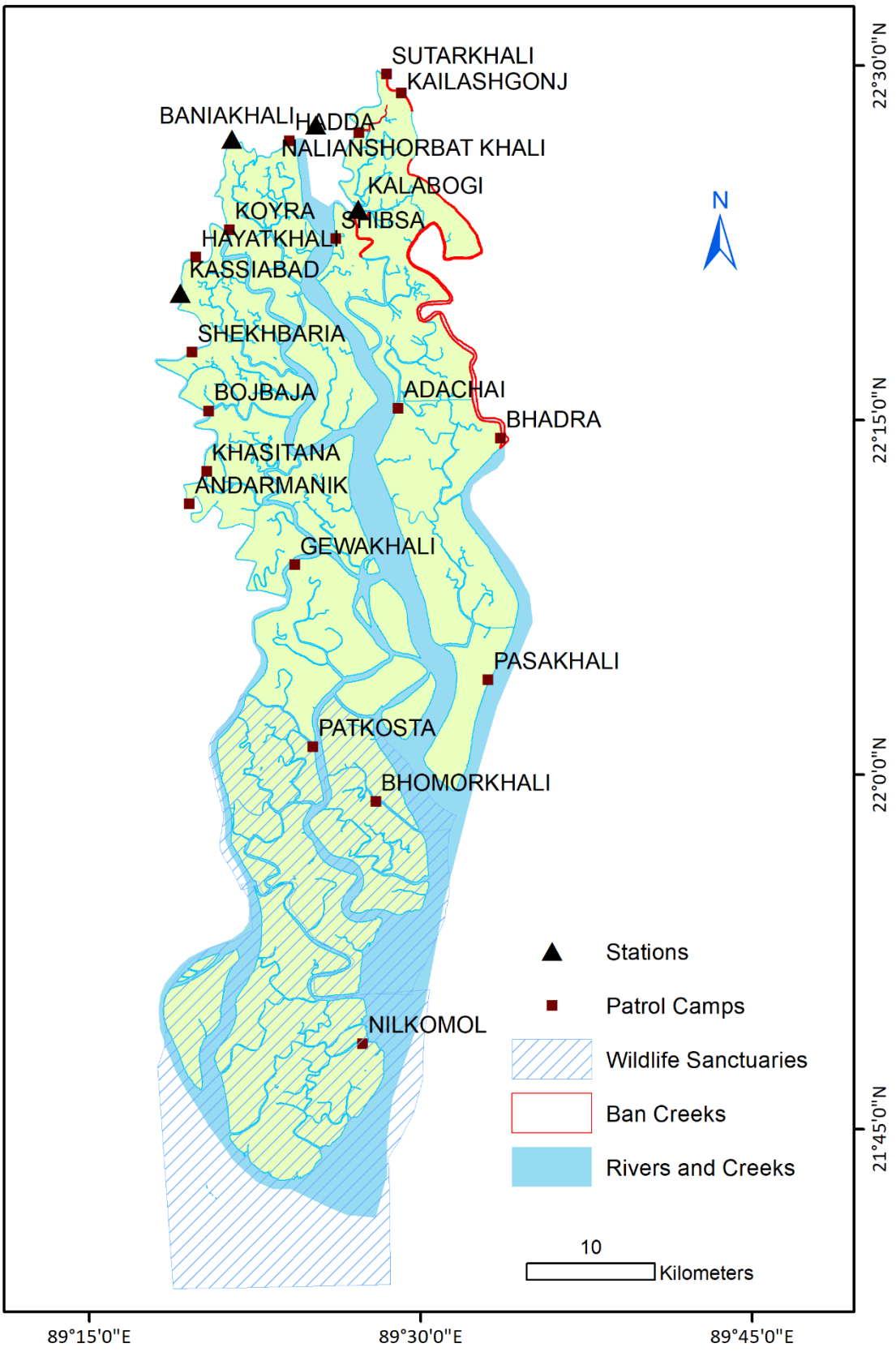


Figure 3. Map of Khulna Range (Source: Bangladesh Forest Department).

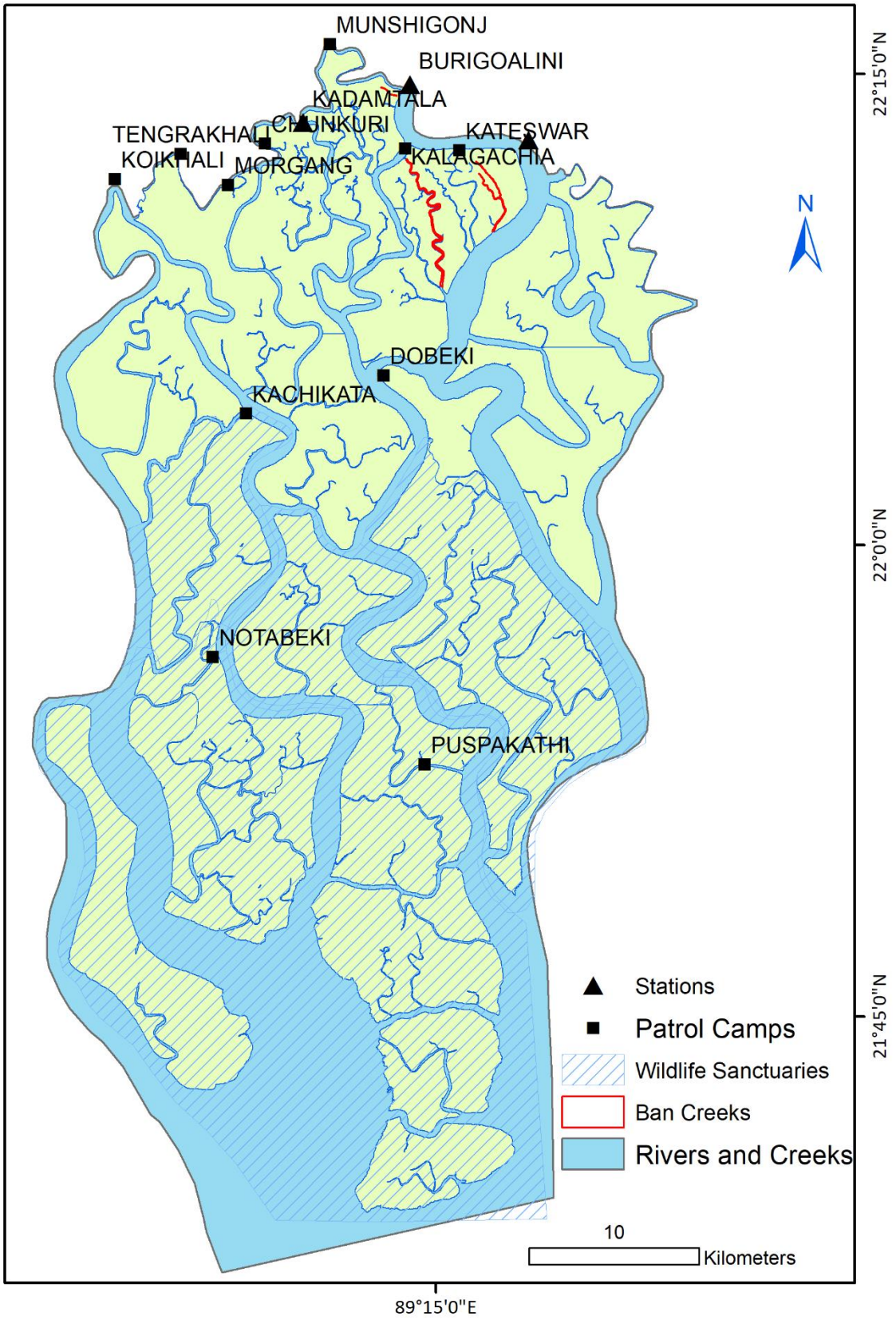


Figure 4. Map of Satkhira Range (Source: Bangladesh Forest Department).

3.5 Tides

Planning for patrols must consider tides. As the moon rotates around the earth, the gravitational pull of the moon and to a lesser extent the sun cause waterways of the SMF to rise for about 6 hours and 12 minutes and then fall again for the same amount of time. This means there are generally two high tides and two low tides each day with the times advancing about 50 minutes later each day. The height of high and low tides vary throughout the month. High and low tides rise and fall most quickly and they are most extreme before and after the full or new moon.

Due to currents at both ends, tides in the connecting creeks or channels (locally known as *varani*), generally flow in one direction for half the tide and in the other direction during the other half. The strongest tidal flows are in the deeper part of the river and the weakest flows are at the edge. Sometimes at the edge of channels the water flows in the opposite direction because the tide changes direction faster in mid-river where there is more water flow.

Tides will strongly influence vessel speed. If you are going with the tide, your vessel will go faster and use less fuel. The speed of the current in the first few hours of the tide is stronger than in the later hours. While traveling north, you can utilize the incoming tide for more than 6 hours from when it turns. This is because the tide originates at sea and travels upstream in the same direction you are traveling. When traveling south, you will be able to take advantage of the outgoing tide for only about 3-4 hours because you are headed towards the sea. It is better to start a patrol headed downstream on an outgoing tide and then turn back upstream when the current changes during the incoming tide. For dead-end channels, it will save time and fuel if you start on an incoming tide and attempt to time your arrival so you can reach the end and turn around on an outgoing tide. This will ensure that your boat or trawler will not become stuck inside the creek.

3.6 Weather

Weather is an important consideration especially between April and October when cyclones generally occur. Local radio is a good source of information with updates provided at least twice a day on the channels below (Table 1).

Table 1. Frequencies of Bangladesh National Radio stations based in Khulna.

	Frequency	Power (KW)	Broadcast Time (Local Time)
FM	88.8 (MHz)	10	06:30-13:00 & 19:00-23:15
FM	90.0 (MHz)	5	10:15-11:15 & 19:30-23:00
FM	102.0 (MHz)	1	06:30-10:00 & 14:30-23:15
AM	558 (KHz)	100	06:30-10:00 & 12:00-23:15

If you have access to the internet, a good source of information on storms in the SMF is the 'Joint Typhoon Warning Center' (https://metoc.ndbc.noaa.gov/web/gnest/jtwc). This website provides updates every 3-6 hours. Scroll to the bottom of the page where it says ABIO10 (Indian Ocean). Here you will find latest information and satellite images. Another excellent source of information is the 'Weather Underground'. The web link for Khulna is http://maps.wunderground.com/global/stations/41947.html.

4. General Patrolling Procedures

4.1 Size and Composition of Patrol Teams

SMART patrol teams should consist of eight members: 1) One Patrol Team Leader who also serves as the Navigator and Law Enforcement Officer, 2) One Deputy Team Leader who also serves as a Communication Officer, 3) One Wildlife and Threats Monitoring Officer, 4) One SMART Data Recorder and 5) Four armed Security Guards. All team members should accompany foot patrols or small boat patrols in smaller creeks, except for two Security Guards who should remain on the main vessel (launch). Additional crew members may be on board depending on the vessel type. For a launch: one boat master, one driver, one cleaner, two laborers and one cook are needed. For a fiberglass boat: one driver and one helper are needed. For a speed boat: only a single driver is needed.

4.2 Responsibilities of Patrol Team Members

4.2.1 Patrol Team Leader

a. Brief and consult with the patrolling team on the details of the patrol plan.

b. Complete a *SMART Patrol Plan Approval Form* (Appendix 3), get it signed off by the Range Officer, and deposit a copy with the Range Officer.

c. Make sure all necessary equipment is on board and in good working condition.

d. Make sure a list of emergency contact numbers is placed in an easily accessible location.

e. Collect mobile phones from all team members to ensure that communication is only conducted using the official smart mobile phone.

f. Ensure that all patrol team members are wearing their uniform.

g. Turn on the GPS at the start of the patrol, record waypoints of patrol start and end, observations of threats, violations of laws and rules, and sightings of priority wildlife.

h. Take geo-referenced photos of threats, violations, suspects, illegal gear, weapons and wildlife carcasses.

i. Navigate the patrol vessels safely along the patrolling route.

j. Pay special attention to the potential for becoming grounded by outgoing tides or damaging the vessel by hitting submerged logs or trees.

k. Ensure proper care of the GPS, CyberTracker equipped handheld device (smart tablets or phones) and other equipment.

l. Ensure that all patrolling data is collected in a systematic manner using the *General Log Book* (Appendix 4a) and *Human Encounter Log Book* (Appendix 4b) for SMART Patrolling in the SMF or the same information in a CyberTracker (Appendix 8) equipped handheld device (Appendices 17 and 18).

m. Make decisions about navigation, educational outreach, and enforcement contacts after consulting with the team.

n. Ensure that the public is treated with respect and patrols are conducted in a professional manner following the government code of conduct.

o. Create awareness among resource users by informing them and providing them with printed educational materials on relevant acts, rules, policies, standing orders and ordinances in the SMF.

p. At the end of each day, download and save all track-lines and waypoints (GPX folder), photographs, and video in a computer folder, and rename the folder with the patrol team name, GPS number and the date (e.g., Chandpai1-GPS3-20March2016), or upload CyberTracker data directly into a SMART database.

q. After completing the 12-14 day patrol, prepare a brief note on the security situation and threats to wildlife, forest and fisheries observed during the patrol.

See section 5.2.1 below for other responsibilities of the Patrol Team Leader as a Data Entry User.

4.2.2 Deputy Team Leader and Communication Officer

a. Ensure safety protocols (see section 4.3 below) are followed at all times.

b. Stay updated on weather developments that could affect the patrol.

c. Maintain communication with the base camp or main vessel (launch) including checking in with them every 30 minutes while on patrol.

d. Maintain communication with the base station (range office) including checking in with them every four hours while on patrol.

e. Ensure that all safety equipment are onboard and in good condition, including a two-way radio, signal flares, a first-aid kit, and rescue buoys and life jackets for all people on board.

f. Carry a map of the patrolling range.

g. Search suspected criminals and boats as per the guidelines in section 4.10.5 below.

h. Carry a Go-Pro camera (if available) and ensure that it is turned on when a threat or suspected criminal is detected.

i. Ensure proper care of the Go-Pro, VHF radio and Walkie-Talkie during and after the patrols.

j. Assist the Patrol Team Leader in creating awareness among resource users on relevant acts, rules, policies and standing orders in the SMF.

4.2.3 Wildlife and Threat Monitoring Officer

a. Search using binoculars and naked eye for priority wildlife according to the list in section 4.16.2 and identification guide in Appendix 9.

b. Search using binoculars and naked eye for conservation threats and evidence of wildlife, forest and fishery crime in the forest and waterways including direct observations and signs of illegal fishing, wildlife poaching, wood cutting, vessel traffic infractions, and pollution sources.

c. Notify the Patrol Team Leader and Data Collection Officer to record observations on wildlife sightings, conservation threats, and wildlife, forest and fishery crime.

d. Assist the Patrol Team Leader in raising awareness on laws and rules among resource users and in making enforcement contacts.

e. Ensure proper care of the binoculars during and after the patrols.

4.2.4 Data Collection Officer

a. Search for wildlife, forest and fishery violations using naked eye.

b. Record data on all wildlife sightings, observations of threats, and wildlife, forest and fishery

violations, as well as awareness raising and enforcement contacts.

c. Communicate with Patrol Team Leader to ensure photographs are taken and recorded with frame numbers in the log book.

d. If collecting SMART data using CyberTracker follow detailed instructions in Appendix 8.

e. Ensure proper care of the CyberTracker equipped handheld device (smart tablet or phones) and log books during and after the patrols.

4.2.5 Security Guards

a. Maintain safety protocols as detailed in section 4.3 below.

b. Ensure all firearms are in good working order and that they are handled properly before, during and after patrols.

c. Assist the Deputy Team Leader to ensure that all safety equipment are on board and well maintained including a two-way radio, signal flares, a first-aid kit, rescue buoys and life jackets for all people on board.

d. Assist in searching for threats, human activities and wildlife.

4.2.6 Boat Driver

a. Ensure that the boat is in good and safe operating condition before leaving on a patrol.

b. Drive the boat according to the patrol plan and directions from the Patrol Team Leader.

c. Stay alert for navigational or mechanical problems. If such problems arise, notify the Patrol Team Leader immediately.

d. Provide expertise on tides, currents and weather conditions to the team.

e. Make minor repairs to the boat as needed.

4.3 Safety

Safety should be paramount during SMART patrols. To ensure the safety of all team members, make sure to carefully follow the patrol plan. In addition:

- If there are any non-swimmers in the patrol team, they must wear a life jacket at all times while on the deck.
- During the night all team members on the deck or moving between boats must wear a life jacket.
- Overnight patrols should have a sentry on duty throughout sleeping hours. The sentry position should be rotated between members of the team.
- If a patrol cannot follow the patrol plan they should immediately contact the Range Officer for communicating changes.
- Patrols should camp in areas where communications can be maintained by cell phone or VHF radio unless otherwise instructed or authorized by the Range Officer.
- During a storm, the patrol team should enter into a narrow creek that is deep enough for the draft of the boat for protection.
- Do not enter into a narrow creek during outgoing tide to avoid becoming stuck.
- Dead trees and logs are often submerged close to the surface in smaller creeks (such as in

Karamjal, Jongra or Shorbat Khali creeks). Be careful not to drive over them because they could damage the boat hull or propeller.

- There should be two armed security guards on board the main boat or launch, fiberglass or speed boat, or while on foot patrol.
- When walking in areas of high tiger risk or following a tiger trail the team should stay together and armed security guards should be in the front and back carrying flares.
- If a tiger approaches a foot patrol, the team should stay tight together with arms raised, shouting loudly, and detonating the flares. Retreat slowly without turning your back to the tiger.
- If illegal camps are found, the Patrol Team Leader will assess the situation and risk. If the camp is active, the Patrol Team Leader should record the GPS location, contact the Range Officer or Divisional Forest Officer and wait at a safe distance for reinforcements from the Reserve Team, Rapid Action Battalion (RAB), Navy, Coast Guard and/or Border Guard Bangladesh (BGB), who are better equipped to handle these types of situations.
- Weather should be carefully considered when planning patrols. Patrolling vessels should be prepared for encountering any weather condition, including cyclones.

4.4 Navigation

The GPS is your best tool for navigation (see instructions for its use in Appendix 15). A series of patrolling routes will be created in the GPS with waypoints at channel junctions. The trackback function of the GPS should be used to follow the previously uploaded tracks.

Patrolling routes should be unpredictable or guided by intelligence to maximize the chances of catching wildlife poachers or illegal fishers and woodcutters. While navigating in meandering channels, keep in mind that one side is the eroding bank where the river is deep and the opposite side is the deposition bank with very little water depth. Be careful not to get stuck on the shallow side.

4.5 Communication

Before starting a patrol, make sure your phone and power bank are fully charged and that you bring the solar charger and smart phone with a SIM card. Also make sure to bring the phone numbers of officials from your patrol range office or camp as well as emergency numbers for communicating with the Range Officer, Assistant Conservator of Forest, Divisional Forest Officer, Command and Control Centre of the RAB, Navy, Coast Guard and BGB.

The main vessel (launch) should be equipped with a 25-watt VHF radio (156.800 MHz) and a high antenna. The range office or camp should be equipped with a 100-200-watt radio for use as a base station. The Navy and Coast Guard monitor Channel 16 on their VHF radios. They should be contacted in case of emergency. If a hand-held radio is used, the team member responsible for communication should be posted on the upper deck to maximize line-of-sight communication.

To avoid confusion and ensure confidentiality, all mobile phone or radio communication must be directed through the Patrol Team Leader or Deputy Team Leader and conducted using the designated smart mobile phone. All team members should hand over their mobile phones to the Patrol Team Leader before the patrol starts.

Patrols should check in with the main vessel (launch) every 30 minutes and with the range office or base camp every 4 hours. If more than one check-in is missed, the range office or camp should summon help and a search for the patrol team should be initiated.

The patrol team should contact the Range Officer if there is any significant change from the patrolling plan including in the route or the time of return. The Range Officer or Divisional Forest Officer (DFO) should also be contacted immediately if backup is needed for a potentially dangerous enforcement situation or a hazardous event affecting the environment such as an oil spill or vessel collision.

4.6 Equipment

Before the team leaves on a patrol, the Patrol Team Leader or Deputy Team Leader should check that they have the following equipment and supplies on board:

a. Handbook, log books, forms and other documents:
    - *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh*
    - *General Log Book for SMART Patrols in the Sundarbans*
    - *Human Encounter Log Book for SMART Patrols in the Sundarbans*
    - *Offenders and seized items handover form*
    - Emergency contact numbers
    - Educational outreach materials
    - Detailed map of patrolling range
    - *Sundarbans Atlas*

b. Data recording equipment:
    - GPS with data cable
    - Extra AA batteries for GPS
    - CyberTracker equipped handheld device (smart tablet or phone) with SIM card and charging cable
    - Power bank or battery pack
    - Solar charger with cable
    - Binoculars
    - Camera battery and memory cards
    - Go-Pro body-worn video camera with batteries if available

c. Sample collection kits:
    - Wildlife mortality kit
    - Plastic jars with lids
    - Hand gloves
    - Zip-lock polythene bags
    - Polythene bags without zip-lock
    - Ice box
    - Ice

d. Communication equipment:
    - Fully charged smart mobile phone with SIM card and power bank
    - VHF hand-held radio
    - Walkie-talkie

e. Safety equipment:
    - First-aid kit
    - Powerful handheld torch light with batteries
    - Flashlight with extra batteries
    - Life jackets for all team members
    - Bullet-proof vests
    - Rain jackets for all team members
    - 2-3 safety buoys
    - Firearms and ammunition
    - Guns
    - Gun oil
    - Signal flares
    - Lighter
    - Gum boots
    - Waterproof bag for equipment

f. Stationary and supplies:
    - Pens
    - Waterproof markers
    - White board markers
    - A4 size papers
    - Seal of Patrol Team Leader
    - Stamp pad
    - Measuring tape
    - Weight measuring scale
    - Knife
    - Machete
    - Matches

g. Food and snacks:
    - Drinking water
    - Food
    - Snacks (e.g., biscuit, toast, puffed rice)

h. Boat maintenance tools and supplies:
    - Gaskets
    - Buckets for bailing water from boat
    - Cotton rags for sealing leak in the boat hull
    - Strong long rope for tying up the boat
    - Water pump belt
    - Diesel fuel

- Mobil oil
- Fuel (diesel and petrol) delivery pipes
- Tools for fixing the engine including wrench, pliers and screw drivers

Also make sure the patrol vessel is equipped with:

- Enough fuel for the planned patrol with 20% extra in case the patrol is delayed or reports are received of illegal activity outside of the planned route;
- Sharp knife for disentangling nets or ropes from the propeller;
- Long heavy duty rope for towing other vessels; and
- A small country boat for patrolling small channels.

4.7 Searching Effort

The Wildlife and Threats Monitoring Officer should be positioned on the highest deck and search with binoculars (see instructions on how to use binoculars in Appendix 16). In wide channels, one patrolling team member should keep a constant search for wildlife and forest or fishery crimes using the binoculars. This will allow patrols to detect wildlife and forest and fishery criminals much farther away before they disappear from view. While passing small creeks, observers often get a split second to look straight down the creek where small boats often hide beneath the tree branches. Team members with binoculars should anticipate this view and make sure they are ready before it passes. Otherwise, they will only see the outer mouth of the creek. Make sure to use a small boat to patrol some of these small creeks to search for wildlife, forest and fishery crimes.

4.8 Data Collection in Log Books

Signs of human activities (unattended or abandoned snares, hunting signs, illegal camps and illegal fishing gear), sightings of priority wildlife species at conservation risk (e.g., tigers, deer, dolphins, otters, crocodiles – see section 4.16.2 Wildlife Sightings below), and people with permits issued by the BFD and not committing an offence should be recorded in the *General Log Book* (Appendix 4a).

Encounters with people conducting illegal activities (e.g., illegal entry, fishing, poaching, hunting, logging or harvesting other forest resources – see Appendix 2. Summary of Laws, Rules and Regulations in the Sundarbans Mangrove Forest of Bangladesh) should be recorded in the *Human Encounter Log Book* (Appendix 4b).

Patrol log books must be stored in a safe place so that they do not get lost or damaged.

4.9 Data Collection in CyberTracker

Patrol teams using a CyberTracker equipped handheld device (see Appendix 17 and 18 for user manuals) will record all patrolling effort and observation data in CyberTracker (see Appendix 8 for detail instructions).

4.10 Law Enforcement

4.10.1 General Procedures

Enforcement activities should be conducted in a professional manner and follow the acts, rules, policies, standing orders and ordinances of the Government of Bangladesh (Appendix 2). These include:

- The Forest Act, 1927;
- Bangladesh Wildlife (Conservation and Security) Act, 2012;

- Bangladesh Biological Diversity Act, 2017;
- The Inland Shipping Ordinance, 1976;
- The Mongla Port Authority Ordinance, 1976;
- The Bangladesh Environment Conservation Act, 1995;
- The Protection and Conservation of Fish Act, 1950;
- The Marine Fisheries Rules, 1983;
- The Protection and Conservation of Fish Rules, 1985;
- Bangladesh Crab Export Policy, 1998;
- DFO Office Standing Order No. 5941/28-1, 21 June 1987;
- Standing Orders (in force since 1943) of the Directorate of Forest, Bengal, Sundarbans Division;
- Integrated Resource Management Plan for the Sundarbans (2010-2020).

4.10.2 Field Observations

The patrol team should search for direct signs of (1) wildlife poaching including dead animals or body parts and snares and traps on the shore (see section 4.18 below), (2) illegal wood cutting including cut down trees or observations of stumps (see section 4.21 below), (3) illegal fishing (see section 4.19 below), (4) camps, shelters including weapons, firearms and munitions, (5) vessel traffic at night through Sela River or vessels anchored in Wildlife Sanctuaries or Sela river (see section 4.20 below), and (6) priority wildlife as listed in the section 4.16.2 below.

Patrol team members should search for indirect signs of forest and fishery crimes such as broken branches from the passage of a boat through a small creek, abandoned camps, human footprints or trails, or pug marks of tigers. Make sure to record exactly what you see with a waypoint saved in the GPS or the CyberTracker equipped handheld device. Also, take photographs with both a wide-angle view of the environment and a close-up view of the details (see section 11 in Appendix 17). If possible, record video footage of evidence with a Go-Pro camera or smart tablet or phone.

4.10.3 Recruiting Informants and Gathering Intelligence

Resource users operating under permit from the BFD are the eyes and ears of the waterways and forest. They can be your greatest asset to obtain information on forest and fishery crimes.

Voluntary informants are people who come forward with information on their own while involuntary informants are those who have been stopped or arrested for a forest or fishery crime and offer information in return for lenient treatment. The most important factor in developing and managing an informant network is confidentiality. Senior officers should not require that field officers reveal the identity of informants and informants should never know the names of other informants.

Keep in contact with voluntary informants in a way that they suggest and feel comfortable with. With involuntary informants, you can set meetings on your terms but make sure your contact with them is not obvious so that they are exposed to retribution from criminals. Some informants may try to give you false information so treat what they tell you with caution. Be very careful about what information you share with informants so they do not use it for their own profit.

Legal resource users who are stopped and searched during patrols should be treated with respect and given printed information about laws and rules in the SMF. You can bring them on board the boat for tea

and biscuits and ask them questions in a friendly manner. Do not pressure them too hard or they might make up stories to keep you happy. There will be another chance for asking them questions next time. Building the long-term trust of voluntary informants should be the most important consideration.

4.10.4 Decision to Arrest

The decision to arrest someone for violating wildlife, forest, or fishery laws or rules should be based on the laws and rules of the Government of Bangladesh (Appendix 2), the strength of evidence pointing towards their guilt and the judgement of the Patrol Team Leader on the severity of the offense. A first-time minor fishing or fuel wood cutting infraction might be overlooked with a strong lecture and record made in the *Human Encounter Log Book* (Appendix 4b). This may be appropriate for building an informant network and avoiding the perception that the BFD is only focusing on resource users guilty of minor infractions. Arrested individuals should be treated humanely and with respect while ensuring the safety and security of the patrolling team while detaining the suspect.

4.10.5 Searching People and Vessels

Suspected criminals should be thoroughly searched. The people should be moved to a corner of the boat for safety. Make sure to check under the floor planking, in the bilge, in the fuel tank and water container, among bedding, in rice sacks and in the hapor (fish storage box submerged alongside the boat).

4.10.6 Collecting Evidence

Accurate information about the circumstances of a wildlife, forest or fishery offenses must be documented for successful prosecution. Documentation should include (1) a written record of the laws or rules violated, (2) interviews with those involved in reporting or observing the incident, (3) correct identification of the species involved, (4) a site visit to the location where the offence is alleged to have occurred, and (5) proper collection, tagging (see the *Evidence Collection Tag* in Appendix 7), holding, transportation, and storage of evidence along with accompanying statements and records.

A problem when visiting crime scenes is contamination. This means that the patrolling team should minimize disturbance of the site. Do not touch anything without need. Stand still when movement is not required. Carry everything you need and do not put it on the ground.

Make sure to collect and photograph any removable evidence such as a carcass, bones, skin, traps, fishing gears, poison, etc. Identification of whole animals or their parts should be confirmed with photographs. This is particularly important because dead animals will change their appearance rapidly after they die.

It is vital to maintain the chain of custody of evidence. This means that a witnessed, written record (Appendix 5 and 6) must be kept of all of the individuals who have maintained unbroken control over the evidence. The chain of custody establishes proof that the evidence collected at the crime scene is the same as presented in a court of law.

An extremely useful way of collecting evidence is to use a body-worn camera (Go-Pro type) which will result in much stronger documentation of evidence, increase the accountability and transparency of law enforcement actions, and help resolve any complaints brought against BFD officers by members of the public or the arrested individual.

Along with documenting encounters with wildlife, forest and fishery criminals, a video taken with a Go-Pro camera can provide a record of interrogations as well as what the patrolling team witnessed at the crime scene. Make sure to store the video data in a dedicated hard drive at the range office and data base center (GIS laboratory in the Wildlife Management and Nature Conservation Division Office in Khulna).

Do not tamper or delete any part of the recording. Otherwise, the video evidence might not be accepted in a court of law.

4.10.7 Storing Evidence

Each item of evidence for an incident needs to be preserved separately with a unique tag number for forensic testing. Decomposable evidence such as poisoned fish or meat should be packed in a plastic container or bag and preserved in ice in the field and later stored in a refrigerator at the laboratory. If ice is not available on site, perishable evidence should be dried thoroughly in the sunlight and stored in a plastic container or bag.

4.10.8 Handover of Arrested Offenders and Evidence or Seized Items

The arrested offenders and related evidence or seized items should be handed over to the nearest BFD patrol camp and the *Offender and Seized Items Handover Form* (Appendix 5) should be filled out correctly with detailed information on offenders and evidence or seized items. The *Offender and Seized Items Handover Form* should be signed by both the handing-over officer (SMART Patrol Team Leader) and recipient (Officer In Charge of the nearest BFD camp). A copy of the signed *Offender and Seized Items Handover Form* should also be submitted to the Range Officer at the end of a 12-14 day long patrol.

4.11 Wildlife Violations

If any people are found in the vicinity of a carcass, traps, snares or any signs of wildlife poaching, they should be interviewed as potential suspects. The people and their boats should be searched carefully for evidence of their involvement in wildlife crimes. Potential evidence could be a knife, axe, poison, traps, snares, nylon rope, wire for making snares or firearms (see Appendix 11 for an identification guide of traps and snares). If any violations are found, the *Human Encounter Log Book* (Appendix 4b) should be completed.

Below is a summary of wildlife violations according to the Wildlife (Conservation and Security) Act, 2012. It is prohibited to:

- Kill a tiger or possess the carcass, meat or body parts;
- Kill a crocodile, dolphin or possess the carcass, meat or body parts;
- Kill a bird or possess the carcass, meat or body parts;
- Possess a gun, trap, any arms that can be used for wildlife poaching; and
- Kill, catch, shoot or trap any wildlife in the sanctuary or outside the sanctuary without a licence from the Chief Wildlife Warden or Officer in Charge, or possess a carcass, skin, antler or any body parts of any wildlife.

As per the Forest Act, 1927, it is prohibited to:

- Hunt, shoot, or set traps or snares in the reserved forest.

4.12 Fishery Violations

First-time offenders, with the exception of fishers using poison, explosives or electricity, can be given a warning as a strategy for building an informant network. All illegal fishing gears should be seized. A record should be made in the *Human Encounter Log Book* (Appendix 4b), including a waypoint from the GPS at the location of the encounter, the number of people encountered and their violations. Fishermen using poison, explosives or electricity should be arrested, their boat and equipment seized and a case filed

with the courts. The same actions should be taken for second-time offenders who have been previously warned.

If an illegal fisher is a second time offender or poison is found on his boat, a waypoint from the GPS, the name of the creek or river, name and address of fishers, and the amount of poison found with the brand names of the poison should be recorded in the *Human Encounter Log Book* (Appendix 4b). Photographs should be taken of the boat, poison, and fishers. All poison should be seized according to the instructions for collecting evidence in section 4.10.6 above.

Fish and mud crab identifications can be made with the help of the fish and mud crab identification guide in the Appendix 10. Fishing gear identifications can be made with the help of the fishing gear identification guide in the Appendix 12.

Below is a summary of laws and rules regulating fisheries in the SMF with the full text included in Appendix 2:

As per the Forest Act, 1927, it is prohibited to:

- Catch fish without permission; and
- Poison water.

As per the Wildlife (Conservation and Security) Act, 2012, it is prohibited to:

- Catch fish inside the Wildlife Sanctuaries; and
- Carry wood cutting tools in the fishing boat.

As per the Protection and Conservation of Fish Act, 1950, it is prohibited to:

- Use monofilament gill nets, locally known as *current jal*.

As per the Marine Fisheries Rules, 1983, it is prohibited to:

- Use poison, explosives, or electricity;
- Use small mesh drift nets/drifting gillnets (*fash/chandi/bhasha/ilish/poka jal*) with mesh size below 10 cm (4 inches); and
- Use large mesh drift nets (*nakura/lakkha jal*) with mesh size below 20 cm (8 inches).

As per the Protection and Conservation of Fish Rules, 1985, it is prohibited to:

- Use set-bag nets (*behundi/badha/pekua/bingi/gara/khuti/bota/tong/bindi/chingri pona dhorar jal*) of any kind or mesh size;
- Use any nets with mesh size 4.5 cm (2 inches) or below.
- Use seine nets which are locally known as *tana/kathi/ber/moshari/chot/katha/jogot ber/vim jal* with mesh size below 1 cm (0.4 inch) during the Bengali month of *Falgun* to *Shraban* (mid-February to mid-August);
- Set nets across entire river channels or mouths;
- Use fine-mesh mosquito nets (*ponar net/baxo/thela/tana/moi jal)*;
- Catch fish by dewatering channels, swamps or ditches;
- Catch hilsha shad of any size during 3 (three) days before and 11 (eleven) days after the full moon, including the day of full moon, that is, total 15 (fifteen) days of the moon which will first

appear in the Bengali month of *Ashwin* (mid July to mid August) each year (The validity of this time closure depends upon the gazette notification each year);

- Catch hilsha shad below 25 cm (10 inches) in length between November and June;
- Catch pangas catfish below 30 cm (12 inches) in length between November and July;
- Catch carps including *catla, rui, mrigal, kalbaush* and *ghania* below 23 cm (9 inches) in length between July and December;
- Catch *silon, bhola* and *ayre* below 30 cm (12 inches) in length between February and June;
- Catch *boal* below 30 cm (12 inches) in length between April and August; and
- Catch fry of *shol, gazar* and *taki* moving in clusters or with the parent fish while guarding them between April and August.

As per the Bangladesh Crab Export Policy, 1998, it is prohibited to:

- Catch mud crabs (*Scylla serrata*) with a weight below 200 grams for males and 130 gm for females (see Appendix 10 for identification of male and female crabs); and
- Catch crabs from the wild during January-February and from Wildlife Sanctuaries year round.

As per the DFO Office Standing Order No. 5941/28-1, 21, June 1987, it is prohibited to:

- Catch fish in 18 banned creeks including Alibanda, Chandeshwar, Dasher Bharani, Katka and Kochikhali Khals in the Sharankhola Range (Figure 1); Karamjal, Jongra, Mora Passur, Jhapshi and Nandabala Khals in the Chandpai Range (Figure 2); Bhodra, Sharbatkhali, Mora-Bhodra and Haddura Khals in the Khulna Range (Figure 3); and Choto Kewakhali, Boro Kewakhali, Khalisha Bonia and Sapkhali Khals in the Burigualini Range (Figure 4).

As per Standing Order 28 (in force since 1943) of the Directorate of Forest, Bengal, Sundarbans Division, it is mandatory that:

- All permits are surrendered at the issuing station on or before the due date of surrender;
- For fishing boats, the exact stretch of water, within the range of issuing station, for which the permit is issued, is to be clearly and definitely specified;
- For the carrier boats, flats, and launches, the exact route to be followed for the onward and return journeys to and from the loading points are to be clearly and definitely specified; the permit shall be valid only for the routes specified in it; and
- No craft with a load of fish shall be detained unnecessarily anywhere under any excuse or circumstances, and such craft must be given the highest priority and past with all possible dispatch at all times of the day and, if possible, of the night as well.

As per the *Integrated Resource Management Plan for the Sundarbans* (2010-2020), it is prohibited to catch:

- Pangas catfish (*Pangasius pangasius*) and sea bass (*Lates calcarifer*) locally known as *Vetki*, *Patari, Koral* on each alternative year;
- Hilsha shad/*ilish* (*Tenualosa ilisha*) during September and October; and
- Mussel (*jhinuk*) during March to October.

4.13 Vessel Traffic Violations

Commercial vessels including oil tankers and cargo ships (Appendix 13) are strictly prohibited from anchoring in the wildlife sanctuaries or travelling through them with the exception of the Passur River. Any vessel found to be anchored in the Wildlife Sanctuaries or travelling through them, should be documented in the *Human Encounter Log Book* (Appendix 4b) including (1) a waypoint from the GPS, (2) the name of the vessel and (3) the name of the vessel captain along with his address and contact number. A photograph should also be taken of the vessel showing the name of vessel and of the certificate of the captain. The vessel should be escorted out of the sanctuaries and a case should be filed to the court under the clause 26 (1) (b) of the Forest Act, 1927.

Vessels creating large wakes or waves should be requested by VHF radio to slow down. The Patrol Team Leader should communicate information to the vessel captain and crew about the erosion caused by large waves and the potential for collisions with freshwater dolphins. The same information as mentioned above should be recorded in the *Human Encounter Log Book* (Appendix 4b).

Dumping waste or spilling oil from any vessel is prohibited under the Mongla Port Authority (Amendment) Act, 1995; the Mongla Port Authority Ordinance, 1976; Bangladesh Biological Diversity Act, 2017; and the Bangladesh Environment Conservation Act, 1995. Any vessel found to be dumping waste or spilling oil should be documented in the *Human Encounter Log Book* (Appendix 4b) with the same information recorded as for other vessel violations (see above) in addition to photographs and a detailed description of the amount and type of substance dumped or spilled. A case should be filed with the court under the above-mentioned acts.

4.14 Forest Violations

If a person is found cutting or carrying timber or wood, or found with any wood cutting tool in the vicinity of a cut/fallen tree or tree piles, or setting fire to the forest, he should be arrested. Detailed information of observations and the crime should be recorded in the *Human Encounter Log Book* (Appendix 4b) and a case should be filed in the court. If any person is found in the vicinity of a sign of wood cutting, log dragging or tree stumps, they should be interviewed as potential suspects. People and boat should be thoroughly searched for evidence. Potential evidence could be a knife, machete, axe, saw, wood chips or cutting marks on the side of the boat. Suspicious equipment should be seized and a warning given to first time offenders. Second time offenders should be arrested and a case should be filed in the court. In both cases, detailed information should be recorded in the *Human Encounter Log Book* (Appendix 4b).

According to the Forest Act, 1927, it is prohibited in the SMF to:

- Cause any damage by negligence in felling any tree or cutting or dragging any timber;
- Set a fire or leave any fire burning;
- Make a fresh clearing or remove any timber or clear or break up any land for cultivation or any other purpose [or cultivate or attempt to cultivate any land in any other manner];
- Fell, girdle, lop, tap or burn any tree or strip off the bark or leaves from or otherwise damage the same;
- Carry firearms without prior permission from the Divisional Forest Officer;
- Burn lime or make charcoal; and
- Trespass or pasture cattle, or permit cattle to trespass.

4.15 Raising Awareness on Laws and Rules

Contacts should be made with resource users to make them aware of the laws and rules that apply in the Sundarbans Reserved Forest and Wildlife Sanctuaries. Awareness raising should focus on:

- Building trust by carrying out your duty in a respectful and courteous manner;
- Listening to people's concerns and learning from resource users; and
- Sharing solutions to protect wildlife, fisheries and the mangrove forest.

Key messages should include that:

- The Sundarbans is our heritage and we have a duty to protect it for securing local livelihoods and conserving threatened wildlife including tigers and freshwater dolphins;
- Compliance with fishery regulations helps to ensure healthy fisheries;
- Harming or killing any animal in the Sundarbans, including dolphins, tigers, crocodiles, deer or birds, is a punishable offence;
- By taking a stand against illegal activities, you are supporting the ability of the Sundarbans to provide resources and protect communities from the impacts of climate change;
- The Sundarbans supports a significant number of two threatened freshwater dolphins (*shushuk* and *irraboti*), tigers, estuarine crocodiles and many other rare or threatened wildlife specie; and
- Information about illegal activities or wildlife mortalities should be shared with Range Officers and Divisional Forest Officers.

4.16 Monitoring Wildlife

4.16.1 General Searching Procedures

During patrols, one team member should search for wildlife with a pair of binoculars ahead of the boat while another team member should search by naked eye ahead and on both sides of the boat on the land, in the water and in the trees. Species can be identified using the wildlife identification guide in Appendix 9.

4.16.2 Wildlife Sightings

High priority wildlife species are based on their conservation value and conservation risk (see list below). When high priority wildlife are observed, data should be recorded in the *General Log Book* (Appendix 4a) including a waypoint from the GPS, species identification, total number of animals present, and the number of calves or juveniles present. If an animal is behaving abnormally (e.g., animal in poor condition, bird unable to fly, dolphin resting on surface and not swimming away, deer staggering or unable to rise), a detailed description of its behaviour should be recorded in the *General Log Book*.

If a carcass or body part of a high priority species is found, the incident should be thoroughly documented in Table 6 of the *Human Encounter Log Book* (Appendix 4b) with photographs taken of the top, bottom and side view of the animal or animal part. The Divisional Forest Officers, Wildlife and Nature Conservation Division, Khulna, and Sundarbans East and West Forest Divisions, and the responsible Range Officer should be immediately notified and an investigation and post-mortem examination be made. Special procedures should be followed when encountering a dolphin or porpoise carcass. These procedures are described in detail in Appendix 14 and include taking measurements and collecting biological samples including skin, blubber, muscle, teeth, and stomach.

The following wildlife species are considered high priority for monitoring:

Aquatic wildlife

Ganges River dolphin (*Platanista gangetica*)

Irrawaddy dolphin (*Orcaella brevirostris*)

Finless porpoise (*Neophocaena phocaenoides*)

Indo-Pacific hump-backed dolphin (*Sousa chinensis*) Small-

clawed otter (*Aonyx cinereus*)

Smooth coated or flat-tailed otter (*Lutrogale perspicillata*)

Estuarine crocodile (*Crocodylus porosus*)

River terrapin (*Batagur baska*)

Water monitor (*Varanus salvator*)

Terrestrial wildlife

Bengal tiger (*Panthera tigris*)

Fishing cat (*Prionailurus viverrinus*)

Leopard cat (*Prionailurus bengalensis*)

Rhesus monkey (*Macaca mulatta*)

Spotted deer (*Axis axis*)

Barking deer (*Muntiacus muntjak*)

Wild boar (*Sus scrofa*)

King cobra (*Ophiophagus hannah*)

Rock python (*Python molurus*)

Avian wildlife

Masked finfoot (*Heliopais personatus*)

Lesser adjutant (*Leptoptilos javanicus*)

White-rumped vulture (*Gyps bengalensis*)

White-bellied sea eagle (*Haliaeetus leucogaster*)

Brown-winged kingfisher (*Pelargopsis amauroptera*)

4.17 Monitoring Threats

Photographs should be taken and a waypoint recorded on the GPS for direct observations and for signs of wildlife poaching, illegal use of forest products, illegal fisheries, violations of vessel traffic rules, and pollution. Information should be recorded on the action taken (i.e., no action, verbal warning, written warning, penalty or arrest) and what was done with the evidence (seized, destroyed, left where found, etc.) in the *Human Encounter Log Book* (Appendix 4b). If no offenders are found, these observations should be documented in the *General Log Book* (Appendix 4a).

4.18 Wildlife Poaching

During patrols, the team should search for signs of possible wildlife poaching. The type of sign (trails entering the forest, abandoned camps, animal carcasses or remains connected to poaching, foot prints, axe cuts, litter, etc.) and age of the sign (fresh, recent, old, very old, or unknown) should be recorded in the *General Log Book* (Appendix 4a). If an offender is found along with these observations, information should be documented in the *Human Encounter Log Book* (Appendix 4b).

If a shelter or camp is encountered, information should be recorded on the shelter type (ground hide, tree hide, unknown), shelter capacity (small = 1 to 2 persons, medium = 3 to 5 persons, and large = > 5 persons), number of meat drying racks, and action taken (observed or destroyed).

If weapons are encountered, information should be recorded on the weapon type (automatic, semi-automatic, shotgun, muzzle loader, homemade rifle, pipe gun, bow and arrow, spear, slingshot, club, other), number of weapons and ammunition (loaded cartridges, spent cartridges, calibre). Also record the manufacturer and serial number if available.

If poisons are encountered record the type of poison, volume in litres, and any indication of how the poison is administered (e.g., live or dead animal bait, hooked bait, fruit bait). Be sure to also look for snares and traps and record the type, number and if any are active.

4.19 Illegal Fisheries

Fishing gears that entangle dolphins and other aquatic wildlife should be recorded along with a waypoint from the GPS in the *General Log Book* (Appendix 4a). These gears include mono-filament gill nets or *current jal*, drifting gill nets, fixed-floating gill nets, set-bag nets and long lines. Fishing gears and practices that are particularly destructive to the aquatic environment should also be recorded in the *General Log Book* (Appendix 4a) along with a waypoint from the GPS. These include poison fishing and the use of post-larvae set-bag nets, creek nets and long-shore nets. A guide to the common fishing gears used in the Sundarbans can be found in Appendix 12. If people are found with illegal fishing gears or engaged in illegal fishing practices, the *Human Encounter Log Book* (Appendix 4b) should be filled and the people should be arrested and a case should be filed for prosecution.

Dead fish in the rivers or creeks are a sign of poison fishing. External symptoms that a fish died from poisoning include different species of fish found floating together, mouth and operculum closed, and gills no longer separated. If dead fish are found, the amount of fish (weight in kilograms and number of individuals) should be estimated and recorded according to species (see Appendix 10 for an identification guide). At least two samples of each species should be collected in a polythene bag, tagged and preserved in ice. Suspected fishers in the vicinity should be checked for poison or evidence of their involvement in poison fishing. If any containers (bottles, packets, cans) of poison are found, they should be collected in a polythene bag and tagged with information including the date, time, brand name, name of creek or river, name of the suspect and his address (see Appendix 7 for *Evidence Collection Tag*). Poison fishers sometimes carry plastic pipes for poisoning the bottom water of creeks by pushing poison through it. If any pipes are found in the fishing boat, the fishers should be interviewed as potential suspects and the boat including pipes should be searched carefully for poison.

In small (<656 feet or <200 meters wide) and medium size creeks (<656 feet but <1312 feet or >200 meters but <400 meters wide) all fisheries should be recorded and all fishermen should be checked to see if they have the proper permission for fishing. All fishing boats should be searched for poison and wood cutting tools. Information should be included on the fishing gear type, mesh size for nets, the number of hooks for long lines, length in feet of nets and lines, and the number of gears.

4.20 Vessel Traffic

Observations should be recorded of all oil tankers, cargo ships, and coasters in channels within the Wildlife Sanctuaries except for the Passur River. For vessel traffic, observations should be recorded in the *General Log Book* (Appendix 4a) on the vessel type, estimated length in feet, estimated speed in kilometers per hour, and the height of wake in feet. An identification guide of vessels found in the Sundarbans is included in Appendix 13. If any violation is found, information should be recorded in the *Human Encounter Log Book* (Appendix 4b) as detailed in the section on vessel traffic violations above.

4.21 Illegal Harvesting of Forest Products

If wood or palm cutting tools such as an axe, machete-style knife, or saw are found, a waypoint should be recorded, photographs taken, and information documented in the *Human Encounter Log Book* (Appendix 4b) on the local name, size, and numbers of each type of tool, the cut or fallen timber species (mangrove, other), age of cut (fresh, recent, old, very old, unknown), amount in cubic feet, number of stumps, planks and bags of charcoal, and bundles or kilograms of firewood. For non-timber forest products record the type (honey, mushroom, medicinal plants, other), quantity, and units (kilogram, bags, bundles, pieces). Illegal tools and illegal forest products should be seized according to the instructions on collecting evidence given above.

4.22 Pollution

If any solid non-biodegradable waste (e.g. packets of chips or biscuits, plastic bottles, cans, disposable diapers, plastic wrapping) is thrown from any vessels, data should be recorded on the amount (small = less than a trash bin volume, medium = greater than a trash bin volume but less than a barrel volume, and large = more than a barrel volume), a waypoint should be taken and a description of the debris recorded in the *General Log Book* (Appendix 4a).

If an oil spill or floating oil is observed on the water surface, data should be recorded in the *General Log Book* (Appendix 4a) on the oil type and the estimated area (square feet) of the water surface covered by the oil. If the source of the spill is found, record a waypoint on the GPS and thoroughly document with photographs in the *Human Encounter Log Book* (Appendix 4b).

If sound pollution (e.g. loudspeakers, generator running after 10 pm) is detected, a waypoint should be recorded on the GPS, photographs taken of the vessel showing its name, the vessel captain and the evidence of a violation. The name of the vessel and the vessel captain should be recorded along with his address and phone number in the *Human Encounter Log Book* (Appendix 4b).

4.23 Land Encroachment, Grazing of Domestic Animals and Fire

Observations should be recorded in the *General Log Book* (Appendix 4a) on signs of land encroachment including the presence and number of domestic animals according to type (dog, cat, goat, cow, buffalo, other) and the size of any land clearing. The presence of burned areas from fire should also be recorded and the area size estimated in square feet. If any human is found to be involved with these activities, information should be recorded in the *Human Encounter Log Book* (Appendix 4b) as described in the Forest Violation section 4.14 above.

5. SMART Database Management and Reporting

5.1 General instruction

SMART implementation should follow the flowchart depicted in the section 12 of the *SMART OPs* (Appendix 1).

5.2 User Level Permissions and Restrictions in SMART, and Relevant Tasks

- SMART accounts have different access permissions. This allows administrators to assign an appropriate user level to employees. The SMART design is dynamic and user accounts can be updated to accommodate changes in an employee's job duties.

5.2.1 Data Entry Account

- The SMART Patrol Team Leader will have a Data Entry Account in the SMART database.
- The menu bar and icons have been customized to include only the features required for the Patrol Team Leader to enter patrol data.
- A data entry account can create, export, import patrol data, and create system backups after patrol information has been completed.
- Teams using Log Books will create a new patrol in the SMART database using the name format "Name of Team-SMF_Serial number of patrol". Example: Chandpai1-SMF_000001, Chandpai1-SMF_000002, Chandpai1-SMF_000003. Enter collected data from a new patrol in the SMART database from the *General Log Book* (Appendix 4a) and *Human Encounter Log Book* (Appendix 4b) every day after completing the patrol.
- Teams using a CyberTracker equipped handheld device will upload the patrol tracklog from the CyberTracker equipped handheld device (smart tablet or phone) and add a new patrol to the SMART database. Then rename the patrol using the same name format: "Name of Team-SMF_Serial number of patrol". Example: Chandpai1-SMF_000001, Chandpai1-SMF_000002, Chandpai1-SMF_000003.
- Export the patrol to a new folder in the computer. Then rename the folder with the name of the Team-SMF_Serial number of patrol and the date (e.g., Chandpai1-SMF_000001-20March2016).

5.2.2 Manager Account

- The SMART Data Manager will have a Manager Account in the SMART database.
- The SMART Data Manager can make changes to the patrol, query, report or planning modules.
- A manager account cannot make changes to the data model, the conservation area or the patrol parameters.
- The Data Manager will (a) import the exported patrol sent by the SMART Patrol Team Leader via Range Officer and Divisional Forest Officer in to the SMART data base with unchanged patrol ID; (b) Quality check all patrol data; (c) analyze patrol data, build and export queries and summaries, and prepare a draft SMART Patrol Report for each 12-14 day patrol using the depicted reporting format in section 7.10 of the *SMART OPs* in Appendix 1; and (d) send the draft SMART Patrol Report and exported queries to the SMART Data Coordinator.

5.2.3 Admin Account

- The SMART Data Coordinator will have an Admin Account in the SMART database.
- An admin account has full access to all functions and options in SMART.
- The SMART Data Coordinator will coordinate the overall data flow including (a) ensuring that all documents are submitted by the Patrol Team Leader to the Range Officer within one day after completion of a 12-14 day patrol and (b) ensuring that the patrol report is prepared by the SMART Data Managers within 3 working days.
- Based on exported patrol data and queries received from the SMART Data Managers, prepare a composite draft *Monthly Report on SMART Patrols* in the four ranges of the SMF using the reporting format described in section 7.10 of the *SMART OPs* (Appendix 1) and prepare a set of recommendations for patrols carried out during the next month.
- Prepare the final *Monthly Report on SMART Patrols in the Sundarbans* and patrol recommendations incorporating comments received from the monthly meeting conducted by *SMART Patrol Enforcement Committee*.
- After receiving approval from the Conservator of Forest, Khulna Circle, send the final *Monthly Report on SMART Patrols in the Sundarbans* to the Divisional Forest Officers and Range Officers for providing feedback to the SMART Patrol Team.
- Archive the *Monthly Report on SMART Patrols in the Sundarbans* and keep a second backup of all files to prevent loss of data and reports.
- Store all log books and relevant documents in a dedicated place in the GIS laboratory of Wildlife Management and Nature Conservation Division, Khulna.

Appendix 1. SMART Operating Procedures for Law Enforcement and Wildlife Monitoring Patrols in the Sundarbans Mangrove Forest of Bangladesh

The *SMART Operating Procedures* (*SMART OPs*) for Law Enforcement and Wildlife Monitoring Patrols in the Sundarbans Mangrove Forest of Bangladesh are consistent with the laws and rules of the Government of Bangladesh. They should be followed at all times by Bangladesh Forest Department (BFD) staff in the planning and execution of SMART patrols as well as for collecting and managing SMART patrolling data and generating up-to-date reports on patrolling activities including arrests of forest, fishery and wildlife criminals and sightings of wildlife prioritized according to conservation risk. Details for following the *SMART OPs* are contained in the *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh*. This handbook should be carried during all SMART patrols and used as a reference for the implementation of the *SMART OPs*.

1. SMART Patrol Objectives

1.1 Law Enforcement and Forest Offence Control - Achieve a secure environment for biodiversity in the Sundarbans by controlling forest offences through enforcement of relevant laws and rules.

1.2 Threat Monitoring - Rigorously monitor and document trends in threats including sightings of destructive fishing gears and practices (e.g., poison fishing), wildlife poaching and hunting equipment, woodcutters and signs or evidence of woodcutting, livestock grazing, illegal vessel traffic and pollution.

1.3 Wildlife Monitoring - Monitor and document wildlife sightings for providing verifiable records of presence, detecting biodiversity and ecological trends, and evaluating the effectiveness of patrols.

1.4 Awareness raising on laws and rules - Create awareness among resource users including fishers, tour operators, vessel captains and crews about compliance with the laws and rules.

2. SMART Patrol Enforcement Committee

2.1 All enforcement operations in the Sundarbans Wildlife Sanctuaries and Reserved Forest will be managed by a SMART Patrol Enforcement Committee consisting of the Conservator of Forests, Khulna Circle, as chair; Divisional Forest Officer, Sundarbans East Forest Division, Bagerhat; Divisional Forest Officer, Sundarbans West Forest Division, Khulna; Divisional Forest Officer, Wildlife Management and Nature Conservation Division, Khulna; and Range Officers of the Sarankhola, Chandpai, Khulna and Satkhira Ranges of the Sundarbans as members.

2.2 The SMART Patrol Enforcement Committee will guide the operation, reporting, budgeting, and planning of SMART patrols, ensure their logistical and financial sustainability, manage internal department coordination, and coordinate with other law enforcement agencies. Based on the decision made by this committee the Chairperson will report to the Chief Conservator of Forests. The Enforcement Committee will meet as decided by the Chairperson.

2.3 Based on the availability of skilled officers, the Conservator of Forests, Khulna Circle will assign one SMART Data Coordinator from his office or Wildlife Management and Nature Conservation Division, Khulna, and two SMART Data Managers from the Sundarbans East Forest Division, Bagerhat and Sundarbans West Forest Division, Khulna.

3. Guidelines for SMART Patrol Team Conduct

Guidelines for SMART Patrol Team Conduct will strictly be followed by all BFD staff and members of any agencies participating in SMART patrols. All conduct should particulary follow the following rules of the Government Servants (Conduct) Rules, 1979, and the Bangladesh Government Servants (Discipline and Appeal) Rules, 1985.

3.1 Rule 5 of the Government Servants (Conduct) Rules, 1979: Gift – (1) Save as otherwise provided in this rule, no Government servant shall, except with the previous sanction of the Government, accept, or permit any member of his family to accept, from any person any gift the receipt of which will place him under any form of official obligation to the donor. If the offer of a gift cannot be refused without giving undue offence, it may be accepted and delivered to the Government for decision as to its disposal. (2) If any question arises whether receipt of a gift places a Government servant under any form of official obligation to the donor, the decision of the Government thereon shall be final.

3.2 Rule 2 (f) of the Bangladesh Government Servants (Discipline and Appeal) Rules, 1985 stated: "misconduct" means conduct prejudicial to good order or service discipline or contrary to any provision of the Government Servants (Conduct) Rules, 1979, or unbecoming of an officer or gentleman and includes—

(i) disobedience to lawful orders of superior officers,

(ii) gross negligence of duty,

(iii) flouting of Government orders, circulars and directives without any lawful cause, and

(iv) submission of petitions before any authority containing wild, vexatious, false or frivolous accusation against a Government servant.

3.3 In addition, all BFD staff associated with SMART patrolling enforcement operations should:

3.3.1. Be conscientious and diligent in the performance of their duties. Staff should attend work promptly when scheduled or called for duty.

3.3.2. Wear a uniform during SMART patrols. Unless on duties which dictate otherwise, SMART patrol team members should always be well turned out, clean and tidy.

3.3.3. Not accept payment of any kind for the harvest or trade of timber or other forest products, poaching, consuming or trading wildlife or wildlife products or meat or illegal fishing in restricted areas and restricted seasons, using restricted gears or catching undersize fishes and crabs.

3.3.4. Not violate the Forest Act, 1927 (Amended in 2000); Wildlife (Conservation and Security) Act, 2012; Protection and Conservation of Fish Act, 1950; Protection and Conservation of Fish Rules, 1985; Marine Fisheries Rules, 1983; Bangladesh Crab Export Policy, 1998; Bangladesh Biological Diversity Act, 2017; Bangladesh Environment Conservation Act, 1995; any internal regulation and standing order for the Sundarbans Wildlife Sanctuaries and Reserved Forest. Violation will be reported by the Patrol Team Leader or Deputy Team Leader to the respective authority for necessary disciplinary action.

3.3.5. Treat members of the public and colleagues with courtesy and respect. Act with transparency, integrity and impartiality in all their dealings with the public and their colleagues. Avoid being improperly beholden to any person or institution and avoid all forms of harassment. Never use more force than is reasonable or abuse their authority.

3.3.6. Exercise reasonable care to prevent loss or damage to government property.

3.3.7. Keep all patrolling activities and information strictly confidential, and never use patrolling data or observations made during patrols for personal benefit or divulge information to other parties outside of the BFD.

3.3.8. Never behave in a way which is likely to bring discredit upon the BFD.

4. Patrol Planning

4.1 General Guidelines

4.1.1. Each SMART patrolling team will conduct a 12-14 days patrol session per month and 6-8 hours per day. A patrol day must involve leaving basecamp for the purposes of an inspection or field patrol, and must be represented by a GPS track log and waypoints, a *SMART Patrol Plan Approval Form* and patrolling log books, or patrol data generated by a CyberTracker equipped handheld device (smart phone or tablet). Days spent filing forms or reports, or preparation days at basecamp do not count as patrol days. Patrols should target pre-identified priorities or hotspots for illegal activities. Long patrols could be deployed in these areas, if necessary. All accessible areas of the Sundarbans should be covered by boat patrol and foot patrol. Generally 75% of all accessible areas should be covered during each patrol session. The remaining 25% should be covered during the next patrol session along with at least 50% of the area that was covered during the previous patrol session. At least 5% of patrolling coverage should be on foot walking through the forest. Problem hotspots, defined as areas where illegal activity was previously recorded at least three times by a patrol team, should be visited on a regular basis. Some patrols should be conducted in the areas along the boundary of the Sundarbans Reserved Forest adjacent to villages and used especially for intelligence gathering on forest and wildlife crime and raising awareness for improving compliance with relevant laws and rules.

4.1.2. A monthly patrol plan will be developed using the results of the previous month's patrol report, and incorporate any needed adjustments that will aid patrolling efficiency. Patrolling routes should be chosen randomly or guided by intelligence or known hotspots of illegal activity to maximize the chances of catching wildlife poachers, illegal fishers, wood cutters and dacoits.

4.1.3. Before leaving the range office or base station, all patrol teams must complete the *SMART Patrol Plan Approval Form* as depicted in the *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh* and signed off by the Range Officer. All patrols must be briefed by the Range Officer before departure.

4.2 Equipment and Resources

SMART patrolling teams should be equipped and supplied with the *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh*, the *General Log Book* and the *Human Encounter Log Book for SMART Patrols in the Sundarbans*, range maps, emergency contact numbers, GPS, CyberTracker equipped handheld device, mobile phone, Go-Pro camera, radio, hand-held VHF radio, walkie-talkie, first aid kit, food and other equipment and supplies as detailed in the *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh*.

4.3 Size and Composition of SMART Patrolling Team

SMART patrolling teams should consist of eight members: 1) Patrol Team Leader, 2) Deputy Team Leader (Communication Officer), 3) SMART Data Recorder, 4) Wildlife and Threat Monitoring Officer, and 5) Four armed Security Guards. This does not include additional support staff such as crew, cook and labor.

All team members should accompany foot patrols or small boat patrols in smaller creeks or canals except for two of the armed Security Officers who should remain on the main boat (launch). Additional crew depending on the vessel type: 1) for launch - one master, one engine driver, one cleaner, two laborers and one cook; 2) for fiberglass boat - one driver and one helper; and 3) for speed boat- one driver.

4.4 Selection of SMART Team Members

All team members should be fully trained (see training and mentoring Section 8) and capable of carrying out their designated roles in patrols including both technical (e.g., SMART data collection and use of GPS or CyberTracker equipped handheld device) and physical (e.g., carrying out foot patrols, swimming, and pursuing and arresting forest offenders) components. All staff selection should be approved by the *SMART Patrol Enforcement Committee*. Staff should have at least 5 years remaining until retirement for participating in patrols. Staff could be rotated within the SMART patrol teams at any time of the year. Additional man power for the SMART patrol teams should be selected with caution.

4.5 Security

4.5.1. During patrols, patrol team members must wear a life jacket at all times while on patrol. During night all team members on the deck or moving between boats must wear a life jacket. If a patrol member is injured or sick, he must be evacuated to medical treatment.

4.5.2. For security at night, patrol team members will work as sentry by rotation throughout the night hours.

4.5.3. Patrols will follow a SMART patrol plan. If patrol teams cannot follow the plan due to an emergency or logistical constraint, every effort will be made to communicate the change of plan to the Range Officer immediately. Patrols should camp in areas where communications can be maintained by cell phone or VHF radio unless otherwise instructed or authorized by the Range Officer.

4.5.4. There should be 4 (four) [fire]arms on board the main boat (launch) and every patrol team should carry 2 (two) arms when on board a fiberglass or speed boat or while on foot patrol.

4.5.5. During foot patrol, the team should stay together and the team members in the front and back should carry flares. Armed Security Guards should be at the front and back. If a tiger approaches, everybody should stay tight together with arms raised. Make yourself appear big, shout loudly, make loud noises and detonate flares. Retreat slowly without turning your back to the tiger.

4.5.6. If illegal camps are found, the Patrol Team Leader will assess the situation and risk. If the camp is active, the Patrol Team Leader will record the location with GPS coordinates, contact the Range Officer or Divisional Forest Officer and the patrol team waits at a safe distance for reinforcement from the Reserve Team, Rapid Action Battalion (RAB), Navy, Coast Guard or Border Guard Bangladesh (BGB).

4.5.7. Tidal conditions should be considered during patrols. Patrols should start headed downstream on an outgoing tide and then turn back upstream when incoming tide starts.

4.5.8. Weather should be considered when planning patrols. Local radio should be used for getting weather updates. Patrol team should stay in a safe place during cyclones or natural calamities.

5. Patrol Procedures

5.1 Searching Effort

5.1.1. For making observations in a wide channel, the patrol team member searching with binoculars should be positioned on the highest deck. A small boat should be used to patrol in small creeks.

5.1.2. Patrol team members should search for direct signs of wildlife poaching, illegal tree or forest products cutting, illegal fishing, illegal camps or shelters, weapons, firearms, munitions, traps, illegal vessel traffic, etc. and indirect signs such as broken branches from the passage of a boat through a small creek and human footprints leading into the forest.

5.2 Communication

5.2.1. All SMART patrol teams should be provided with a dedicated cell phone including SIM card. All communication must be conducted using the provided cell phone to secure intelligence and confidentiality. To avoid confusion, all cell phone and radio communication should be directed through the Patrol Team Leader or Deputy Team Leader.

5.2.2. All team members must handover their cell phones to the Patrol Team Leader before the beginning of the patrol. Personal cell phones will be returned at the end of the patrol.

5.2.3. Make sure the dedicated cell phone is fully charged before a patrol starts everyday.

5.2.4. Bring the phone numbers of BFD officials and staff from your patrol range office or base station as well as emergency numbers of the Range Officer, Assistant Conservator of Forests, Divisional Forest Officer, and the Command Control Centers of RAB, Navy, Coast Guard and BGB.

5.2.5. Patrols team should check-in with the range office or base station every 4 hours. If more than one check-in is missed, a search for the patrolling team should be initiated by the Range Officer.

5.2.6. Patrols using a speed boat in small creeks should check-in with the “main boat (launch)” every 30 minutes.

5.3 Gathering Informants and Intelligence

The most important factor in developing and managing an informant network is confidentiality. Legal resource users could be considerd as voluntary informants by building long-term trust with them. Some informants may try to give false information so treat the information with caution. Do not share any sensitive information with informants.

5.4 Collecting Evidence and Searching Suspects

5.4.1. All resource users who are stopped and searched during patrols should be treated with respect and asked questions in a friendly manner.

5.4.2. Before approaching any suspicious human activities, potential safety risks should be assessed. If any people are found in the vicinity of a sign or evidence of forest, fishery or wildlife crimes, they should be interviewed as potential suspects and checked carefully.

5.4.3. During searches, all suspected people should be moved from their boat or to a corner of their boat for safety. The people and vessel should be thoroughly searched.

5.4.4. Accurate information about the circumstances of the detected offence should record in detailed that include (1) a written record of the law or rule broken, (2) personal profile

of offenders and confession statement, (3) list with correct identification of the plant and animal species involved, (4) brief details after a site visit to the location where the offence occurred, if necessary, and (5) After properly seizing all evidences, make a detail seizure list with tagging and photo or video documentation, and ensure safe transportation and preservation of all evidence.

5.4.5. If necessary, evidences such as meat, bones, tooth and poison should be taken to the forensic lab and certificate should be collected on forensic tests.

5.5 Handover of Offenders and Evidence, and Filing Case

5.5.1. Arrested offenders and related evidence or seized items should be handed over to the nearest BFD station or camp and the *Offender and Seized Items Handover Form* as depicted in the *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh* should be filled out with detailed information on offenders, evidence and seized items.

5.5.2. BFD stations or patrol posts or camps will receive the offender and evidences or seized items and pursue necessary processes for prosecution. At least one SMART team member must be included as witness in the case.

5.5.3. Both the handover and the receiving officer should sign the *Offender and Seized Items Handover Form* and copies should be kept by both.

5.6 Reserve Team

A Reserve Team with similar size and composition of a SMART patrolling team should be positioned at the range office. This team will provide backup to the SMART patrol team during emergency situations or where additional manpower is needed for effectively carrying out patrolling and enforcement operations.

6. SMART Data Collection

6.1. A Global Positioning System (GPS) or CyberTracker equipped handheld device should be used in SMART patrols for navigation and data collection with the standard setup as defined in the *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh*.

6.2. All patrol activities must be recorded in the *General* [*Log Book*] and the *Human Encounter Log Book* or a CyberTracker equipped handheld device.

6.3. Signs of human offences (snares, hunting signs, illegal camps and illegal fishing gear) and sightings of priority wildlife species at conservation risk (e.g., tigers, deer, dolphins, otters, crocodiles - see *Handbook for SMART Patrols in the Sundarbans Mangrove Forest of Bangladesh* for full list) and legal human encounters (people not committing an offence) including their activities which should be recorded in the *General Log Book for SMART Patrolling in the Sundarbans*.

6.4. Illegal human encounters and their activities (e.g., illegal entry, fishing, poaching, hunting, logging or harvesting other forest resources) will be recorded in the *Human Encounter Log Book*.

7. SMART Data Management and Reporting

7.1. SMART data management will follow the flowchart depicted below in the section 12.

7.2. At the end of each day patrol, the Patrol Team Leader will create a folder in the computer and rename the folder with the name of team, GPS or CyberTracker handheld device number and

date. If a GPS is used to record a patrol, download the GPX folder (containing tracklogs and waypoints) from the GPS, photographs and video footages from the camera and Go-Pro into the same folder in the computer. Create a new patrol in the SMART database in the computer and add tracklogs and waypoints from the GPX folder, and enter all data from the *General Log Book* and the *Human Encounter Log Book for SMART Patrolling in the Sundarbans*. Export the patrol data into the same folder. If a CyberTracker equipped handheld device is used to record a patrol, the tracklog will be uploaded to SMART in a computer as soon as possible after the patrol has ended and added as a new patrol in the SMART database. Export the patrol data into the same folder in the computer.

7.3. After completion of a 12–14 days SMART patrol session, the Patrol Team Leader will prepare a SMART patrol briefing note on the overall security situation and level of threat to wildlife, forest and fishery as a directive to the next patrol team visiting the area, and submit the SMART patrol briefing notes along with the *General Log Book* and the *Human Encounter Log Book*, downloaded GPS and CyberTracker data, photographs, video footage, and exported patrol data to the Range Officer within one day after finishing the patrol session.

7.4. The Range Officer should upload data to a local version of SMART on a dedicated computer then send the *General Log Book* and the *Human Encounter Log Book*, SMART patrol briefing note, GPS or CyberTracker data, photographs, video footages and exported patrol data to the Divisional Forest Officer within 1 day after receiving them from the Patrol Team Leader.

7.5. The Divisional Forest Officer will endorse and send the *General Log Book* and the *Human Encounter Log Book*, SMART patrol briefing note, GPS or CyberTracker data, photographs, video footages and exported patrol data to the SMART Data Manager on the day of receiving them from the Range Officer.

7.6. Upon receiving the *General Log Book* and the *Human Encounter Log Book*, SMART patrol briefing note, GPS or CyberTracker data, photographs, video footages and exported patrol data from Divisional Forest Officer, the SMART Data Manager will prepare a SMART Patrol Report of the designated range and send the report along with all the documents and materials to the SMART Data Coordinator within 3 working days.

7.7. The SMART Data Coordinator will then prepare a composite draft *Monthly Report on SMART Patrols in the Sundarbans* from all four ranges in the Sundarbans, including patrol recommendations, and send it for review to the *SMART Patrol Enforcement Committee* within 2 working days. He will then safely store all received documents in GIS lab in the Wildlife Management and Nature Conservation Division, Khulna.

7.8. Upon receiving the draft *Monthly Report on SMART Patrols in the Sundarbans*, the *SMART Patrol Enforcement Committee* will conduct a SMART patrol meeting for that month within the next 7 days chaired by the Conservator of Forests, Khulna Circle. All SMART Patrol Team Leaders, Data Coordinator and Data Manager will attend the meeting. In this meeting, the *Monthly Report on SMART Patrols in the Sundarbans* will be reviewed and discussed for overall SMART operation and patrol planning, and management of internal department coordination. *SMART Patrol Enforcement Committee* will use information from the *Monthly Report on SMART Patrols in the Sundarbans* to identify areas in and around the Sundarbans Sanctuaries and Reserved Forest that lack patrols and target such areas for coverage. At the discretion of the Conservator of Forests, Khulna Circle, supporting development partners and conservation agencies (if available) can participate in this meeting as observers to provide technical support, advice and inputs as needed.

7.9. Comments from the *SMART Patrol Enforcement Committee* should be incorporated in the *Monthly Report on SMART Patrols in the Sundarbans* by the SMART Data Coordinator within 1 working day. The final *Monthly Report on SMART Patrols in the Sundarbans* should then be submitted to the Conservator of Forests, Khulna Circle, for his final approval.

7.10. The *Monthly Report on SMART Patrols in the Sundarbans* should include: i) Cover page (Monthly Report on SMART Patrols in the Sundarbans , Name of Month, Name of Range or Sanctuary, Report Number, Name of Authors, Name and Logo of BFD), ii) Table of Contents, iii) Summary, iv) Introduction/Background, v) Patrol Effort, vi) Human Activities and Law Enforcement, vii) Wildlife Encounters, viii) Challenges Faced by the Team, and ix) Recommendations.

7.11. A standard set of maps will be prepared based on SMART queries and summaries, including i) total patrol area coverage in km, ii) total human encounters, iii) all human activities, iv) fishing activities, v) boats, vi) illegal camp or shelter, vii) all wildlife observation, viii) terrestrial mammal observations, ix) aquatic mammal observations, x) reptile observations, xi) bird observations and xii) signs of wildlife. All maps should have a scale, legend, north arrow, border and latitude-longitude grids value on top and right outside the border. In the map, all observation should be defined with different types of symbols rather than colors.

7.12. Recommendations should be added at the end of the *Monthly Report on SMART Patrols in the Sundarbans* based on patrol data and observations.

7.13. A list of offenders will be shared among all SMART patrol teams for identification of repeat offenders during patrols.

8. Training and Mentoring

8.1. All BFD staff participating in SMART patrols will complete a comprehensive field enforcement training and specialist on-the-job training in law enforcement monitoring techniques and other subjects relevant to the enforcement operations organized by the BFD and development partners or conservation agencies.

8.2. The Patrol Team Leader and Deputy Team Leader of the SMART patrol team must be trained on advance wildlife crime scene investigations (WCSI), evidence collection, developing informants and interrogation techniques.

8.3. At least one member of each patrol team should complete training on basic first aid.

8.4. The Patrol Team Leader and Deputy Team Leader of the SMART patrol team must complete training on data entry in a SMART database.

8.5. The SMART Data Coordinator and the SMART Data Managers should receive intensive training on data management and reporting.

8.6. SMART Security Guards and Reserve Team members should receive advanced training on firearms handling, crime scene management, and counter piracy operations.

8.7. Mentoring will be provided by qualified trainers on a regular basis so that patrol teams are empowered with understanding on how to effectively conduct law enforcement and wildlife monitoring patrols including on how to enforce laws and rules correctly, and on the collection of SMART data and entering them into the SMART database.

8.8. If possible an onboard observer should be deployed from the BFD or conservation agencies or partners to mentor the patrol team and evaluate their efficiency.

9. Roles of Forest Stations and Patrol Camps

9.1. Forest staff based at forest stations and patrol camps must continue patrols in the jurisdiction of their Patrol Camps and provide backup support as needed to the SMART patrol teams.

9.2. Both the SMART patrol team and forest stations or patrol camps will maintain communication between them about intelligence and joint enforcement operations.

9.3. The forest stations or patrol camps should accept offenders and seized items, and file the case for prosecution and safely store the evidence and send to the court.

10. Monitoring Performance and Incentives

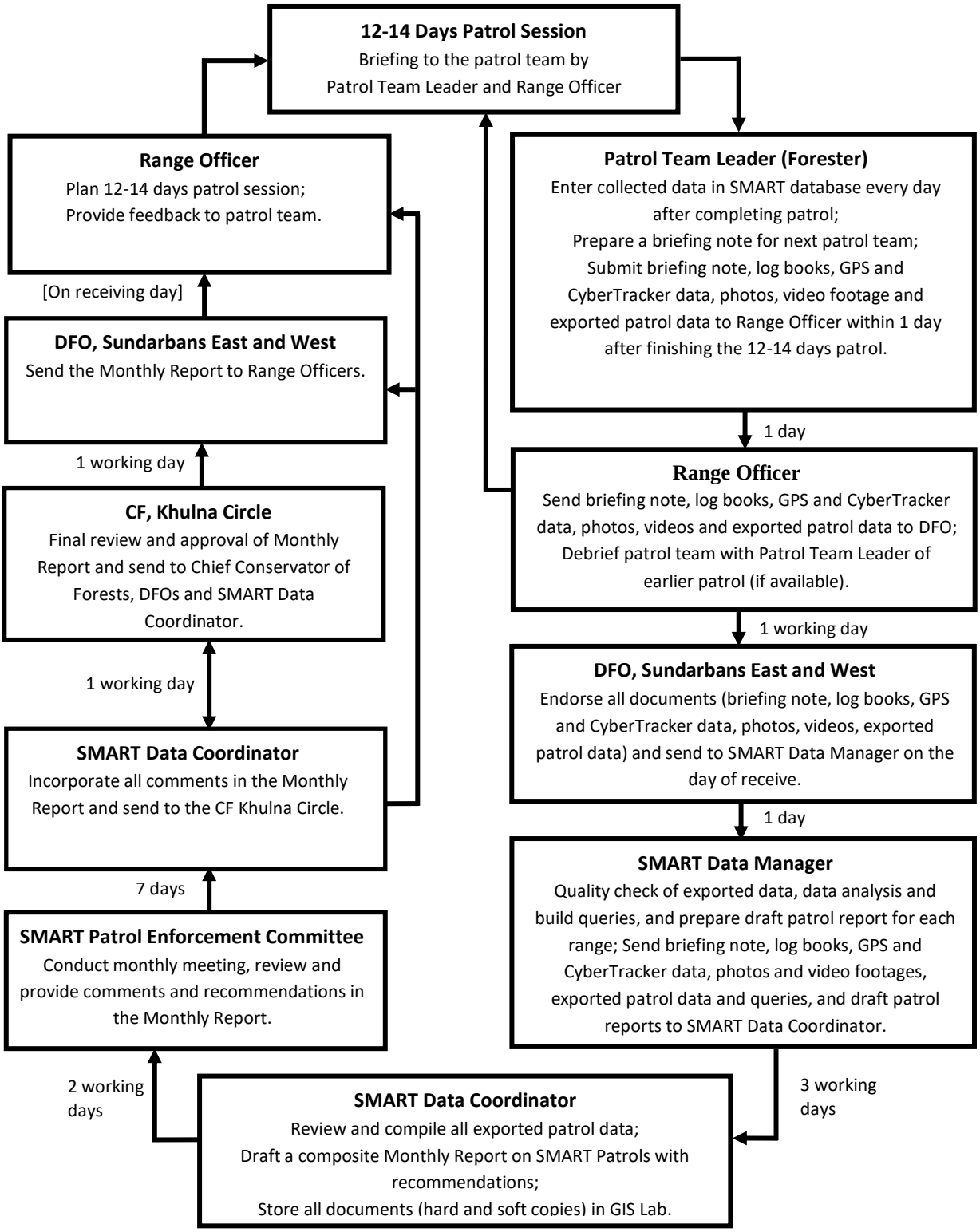
10.1. Performance of patrol teams members will be evaluated on a quarterly basis according to a standard set of indicators that will include results of field patrol efforts (e.g. total patrols hours per team, distance travelled per team, patrol coverage (%) per team, observations per team), and reports of the Range Officer and SMART Data Coordinator.

10.2. If a budget is available, a special system could be considered to reward exemplary performance. The *SMART Patrol Enforcement Committee* will take decision about this reward.

11. Compensation

Compensation against casualties, medical injuries or animal attacks for both BFD and local community members should be provided as per the Wildlife (Conservation and Security) Act, 2012 and Compensation Policy for Wildlife Victims, 2010.

12. Flow Chart of SMART Data Collection, Reporting and Management



* Day(s) means working day(s) or holiday(s).

Appendix 2. Summary of Laws, Rules and Regulations in the Sundarbans Mangrove Forest of Bangladesh

1. Wildlife and Biodiversity Laws and Rules

1.1 The Wildlife (Conservation and Security) Act, 2012 (Act No. 30 of 2012)

Definition of Wildlife Sanctuary – Clause 2

Sub-clause (1) "Wildlife Sanctuary" means an area closed to catching, killing, shooting or trapping of wild animals and managed to conserve all natural resources such as plant, land and water primarily for the safe breeding of wildlife, and that is declared as such under the Clause 13 of this act by the Government notification.

General prohibitions regarding the Wildlife Sanctuaries – Clause 14

Sub-clause (1) In the wildlife sanctuary, no person shall:

(a) do any cultivation;

(b) establish or direct any industry;

(c) harvest, destroy or collect any plant;

(d) set fire of any kind;

(e) carry any fire arms without the permission of chief warden or officer in charge;

(f) disturb or threaten any wildlife, or use chemicals, explosives or any other weapon or substances which may destroy wildlife habitat;

(g) introduce any exotic animal or plant;

(h) enter or hide any domestic animal;

(i) dump any materials detrimental to wildlife;

(j) explore or dig for extraction of minerals;

(k) cut any plant or its part except for natural breeding of plants;

(l) divert, stop or pollute watercourse; and

(m) enter any alien or invasive species of plants.

Sub-clause (2) No person or company shall establish or direct any industry or brick field within the 2 (two) kilometers of the Wildlife Sanctuaries.

Penalty for breaching prohibitions in the Wildlife Sanctuaries (Clause 14) – Clause 35

If any person breaches the Clause 14, he shall be deemed to have committed an offence and for such offence, he shall not be considered for a bail and shall be punished with imprisonment for a term not exceeding 2 (two) years or a fine of Taka not exceeding 1 (one) lac or with the both and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 5 (five) years or with a fine of Taka 4 (four) lacs or with the both.

Penalty for killing of tiger and elephant – Clause 36

Sub-clause (1) If any person, without taking license under Clause 24, kills any tiger or elephant of the Schedule 1 (Annex 1), he shall be deemed to have committed an offence and for such offence, he shall

not be considered for a bail and shall be punished with imprisonment for a term of at least 2 (two) years and not exceeding 7 (seven) years with a fine of Taka at least 1 (one) lac and not exceeding 10 (ten) lacs, and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 12 (twelve) years with a fine of Taka not exceeding 15 (fifteen) lacs.

If any person is attacked by tiger or elephant and his life comes in danger, so that he kills the tiger or elephant for saving his life, the rules of this clause will not be applicable in such case:

If any case filing issue arises for such incident, the officer in charge can file a case after consultation with the wildlife warden.

Sub-clause (2) If any person, without taking permission under Clause 10, collects, acquires or purchases or sells or transports any meat or body parts of a tiger or elephant of the Schedule 1, he shall be deemed to have committed an offence and for such offence, he shall be punished with imprisonment for a term not exceeding 3 (three) years or with a fine of Taka not exceeding 3 (three) lacs or with the both, and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 5 (five) years or with a fine of Taka 5 (five) lacs or with the both.

Penalty for killing leopard, clouded leopard, gibbon, sambar deer, crocodile, gharial, whale, dolphin, etc.– Clause 37

Sub-clause (1) If any person kills a leopard, clouded leopard, gibbon, sambar deer, crocodile, gharial, whale or dolphin of the Schedule 1 (Annex 1), he shall be deemed to have committed an offence and for such offence, he shall be punished with imprisonment for a term not exceeding 3 (three) years or with a fine of Taka not exceeding 3 (three) lacs or with the both, and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 5 (five) years or with a fine of Taka not exceeding 5 (five) lacs or with the both:

If any person is attacked by leopard or crocodile and his life comes in danger, so that he kills the leopard or crocodile for saving life, the rules of this clause will not be applicable in such case:

If a case needs to be filed for such an incident, the officer in charge can file a case after consultation with the wildlife warden.

Sub-clause (2) If any person collects, acquires or purchases or sells or transports any meat or body parts of a leopard, clouded leopard, gibbon, sambar deer, crocodile, gharial, whale or dolphin of the Schedule 1 (Annex 1), he shall be deemed to have committed an offence and for such offence, he shall be punished with imprisonment for a term not exceeding 2 (two) years or with a fine of Taka not exceeding 1 (one) lac or with the both, and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 4 (four) years or with a fine of Taka not exceeding 2 (two) lac or with the both.

Killing of birds and migratory birds etc. – Clause 38

Sub-clause (1) If any person kills any bird including migratory birds of Schedule 1 (Annex 1) and 2 (Annex 2), he shall be deemed to have committed an offence and for such offence, he shall be punished with imprisonment for a term not exceeding 1 (one) year or a fine of Taka not exceeding 1 (one) lac, or with the both, and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 2 (two) years or a fine of Taka not exceeding 2 (two) lacs or with the both.

Sub-clause (2) If any person collects, acquires or purchases or sells or transports any meat or body parts of a bird or migratory bird of Schedule 1 (Annex 1) and 2 (Annex 2), he shall be deemed to have committed

an offence and for such offence, he shall be punished with imprisonment for a term not exceeding 6 (six) months or with a fine of Taka not exceeding 30 (thirty) thousands or with the both, and in case of his repetition of the same offence, he shall be punished with imprisonment for a term not exceeding 1 (one) year or with a fine of Taka 1 (one) lac or with the both.

Seizure – Clause 32

Sub-clause (1) To take action under this Act, any officer can seize the following items, such as:

(a) without license, if any wildlife hunted, possessed or caught or animals that originated from breeding in captivity;

(b) any wildlife died in accident or found dead;

(c) any wildlife or parts of it, trophy, incomplete trophy, meat, body part or plants under Schedule 4 (Annex 3) or its part or any product of it that is not registered or taken licence under this act;

(d) any arms, object or equipment used in criminal activities;

(e) any wildlife or parts of it, trophy, incomplete trophy, meat, body part or plants under Schedule 4 (Annex 3) or its part or any product of it that can not be exported or imported as per Clause 28 and 29;

But, if any trophy, or memorial object used by minority community as traditional, heritage or part of their daily livelihood, the rules of this sub-clause will not be performed.

Sub-clause (2) All seized objects or things will be seized for the Government under Sub-clause (1).

Sub-clause (3) All objects or things that are seized under Sub-clause (1) will be quickly, and naturally decomposable objects and things will be sold, destroyed, removed or mitigated in other ways by the seizing officer with the prescribed process defined by rules.

1.2 The Biological Diversity Act, 2017 (Act No. 2 of 2017)

Any activities having adverse effect on threatened animals or biological resources are prohibited – Clause 33

Sub-clause (3) No person shall do any activity that:

(n) has or may have an adverse effect on the threatened species;

(o) has or may have an adverse effect on the ecological characteristics of the endangered or threatened ecological community;

(p) has or may have an adverse effect on the environmental and ecological characteristics of any Ramsar site.

Sub-clause (4) To fulfill the objectives of Sub-clause (3), the Government will prepare a list of activities having adverse effects.

Explanation: In this clause -

(a) “Ecological characteristics” means the ecological characters as defined in the Ramsar Convention;

(b) “Ramsar Convention” means Convention on Wetlands of International Importance, especially waterfowl habitat, held in Ramsar, Iran in 1971.

Penalties for activities having adverse effect on threatened animals and biological resources – Clause 41

If any person does any activities, that

(a) has or may have an adverse effect on threatened species;

(b) has or may have an adverse effect on the ecological characteristics of the endangered or threatened ecological community.

(c) has or may have an adverse effect on the environmental and ecological characteristics of any Ramsar site;

will be an offence commited by that person under this Act and he or she will be punished with imprisonment for a term not exceeding 5 (five) years or with a fine not exceeding 10 (ten) lacs Taka or both.

Punishment for violating the Orders or Rules of the Government or a Committee – Clause 42

The punishment for violation of any Clause that are not described in this law, or violation of Government or a Committee's Orders or Rules by any person, that are not described under this Act will be a fine of not more than 1 (one) lac Taka and for repetition of the same offence, the fine will be 2 (two) lac Taka, and in case of continuous repetition of the offence, a fine of not more than 2 (two) lac Taka per day counted from the day of occurrence of the offence.

Prosecution of Offense – Clause 45

As per this notification, no court can proceed for judgments on any offence under this Act without any specific complaint, unless

(a) a case is filed by the Government or any officer in charge; or

(b) a case is filed by any direct benefit claimer;

Within 30 days from the day of offence a notice should be sent by that person to the Government or officer in charge about filing a case against that offence.

2. Vessel Traffic and Water Pollution Laws and Rules

2.1 The Forest Act, 1927

Power to stop waterways or water courses in Reserved Forests – Article 25

The Forest-officer may, with the previous sanction of the Government or of any officer duly authorized by it in this behalf, stop any public or private waterway or water course in a reserved forest, provided that a substitute for the waterway or water course so stopped, which the Government deems to be reasonably convenient, already exists, or has been provided or constructed by the Forest-officer in lieu thereof.

Prohibited activities in the Reserved Forest – Clause 26

Sub-clause (1) Any person who, in a reserved forest-

(q) kindles, keeps or carries any fire except at such seasons as the Forest-officer may notify in this behalf;

(r) trespasses or pastures cattle, or permits cattle to trespass;

(s) causes any damage by negligence in felling any tree or cutting or dragging any timber;

(d) quarries stone, burns lime or charcoal, or collects, subjects to any manufacturing process, or removes, any forest produce other than timber; or

who enters a reserved forest with fire arms without prior permission from the Divisional Forest Officer concerned, shall be punishable with imprisonment for a term which may extend to six months and shall also be liable to fine which may extend to two thousand Taka, in addition to such compensation for damage done to the forest as the convicting Court may direct to be paid.

Sub-clause (1A) Any person who–

(a) makes any fresh clearing prohibited by section 5; or

(b) removes any timber from a Reserved Forest; or

(c) sets fire to a Reserved Forest, or, in contravention of any rules made by the Government in this behalf, kindles any fire, or leaves any fire burning, in such manner as to endanger such a forest;

or who, in a reserved forest–

(d) fells, girdles, lops, taps or burns any tree or strips off the bark or leaves from or otherwise damages, the same;

(e) clears or breaks up any land for cultivation or any other purpose [or cultivates or attempts to cultivate any land in any other manner][1];

(f) in contravention of any rules made in this behalf by the Government, hunts, shoots, fishes, poisons water or sets traps or snares; or

(g) establishes saw-pits or saw-benches or converts trees into timber without lawful authority,

shall be punishable with imprisonment for a term which may extend to five years and shall not be less than six months, and shall also be liable to fine which may extend to fifty thousand Taka and shall not be less than five thousand Taka, in addition to such compensation for damage done to the forest as the convicting Court may direct to be paid.

Sub-clause (2) Nothing in this section shall be deemed to prohibit–

(a) any act done by permission in writing of the Forest-officer, or under any rule made by the Government; or

(b) the exercise of any right continued under clause (c) of sub-section (2) of section 15, or created by grant or contract in writing made by or on behalf of the Government under section 23.

Sub-clause (3) Whenever fire is caused wilfully or by gross negligence in a Reserved Forest, the Government may (notwithstanding that any penalty has been inflicted under this section) direct that in such forest or any portion thereof the exercise of all rights of pasture or to forest-produce shall be suspended for such period as it thinks fit.

2.2 The Inland Shipping Ordinance, 1976 (Ordinance No. LXXII of 1976)

Prohibition on inland water pollution – Clause 60A[2]

Sub-clause (1) No inland ship or a facility plying or operating in or around inland waterways shall be used without registration and sanitation facilities as may be prescribed and no inland ship activity shall be conducted to cause pollution of inland water.

1 The words `or cultivates or attempts to cultivate any land in any other manner' were inserted by section 4 of the Forest (Amendment) Act, 2000 (Act No. X of 2000).

2 Section 60A was inserted by the section 18 of of the Inland Shipping (Amendment) Act, 2005 (Act no. 13 of 2005).

Sub-clause (4) The discharge of oily mixture and sewage into inland water is prohibited except when: (a) the inland ship is discharging comminuted and disinfected sewage using a system approved by the Department of Shipping; or (b) the inland ship has in operation an approved sewage treatment plant or a retention tank of adequate capacity which has been certified by the Department of Shipping; or (c) the discharging of sewage, oil or oily mixture into inland water necessary for the purpose of securing the safety of a inland ship or saving life on board; or (d) the discharge into inland water of oil, oily mixture or sewage resulting from damage to an inland ship or its equipment, provided that all reasonable precautions have been taken after the occurrence of the damage or discovery of the discharge for the purpose of preventing or minimising the discharge; or (e) the discharge for the purpose of combating specific pollution incidents in order to minimize the damage from pollution, subject to the approval of the Department of Shipping.

Explanation: In this section –

(a) "Pollution" means contamination or other alteration of the physical, chemical or biological properties of inland water, soil or air including change in their temperature, taste, odour, density, colour or any other characteristics of such water, soil or air including sound or noise level more than a prescribed limit or such discharge of any liquid, gaseous, solid substance, radioactive or other substance including non-biodegradable waste and sewage into such water, soil or air as it will, or is likely to create a nuisance or render such water, soil or air harmful, injurious, detrimental or disagreeable to public health, safety or welfare or to domestic, commercial, industrial, agricultural, recreational or other bonafide uses or to livestock, wild animal, bird, fish, plant or other form of life.

2.3 The Bangladesh Environment Conservation Act, 1995 (Act No. 1 of 1995)

(Amended by Act 12 of 2000, Act 9 of 2002 and Act 50 of 2012)

Definitions – Clause 2

(t) "hazardous substance"[3] means a substance that can cause harm to the environment due to its own physical or chemical properties or by creating poisoning, germ-contamination, burn, explosion, radiation, weathering for contacting of any waste or objects, or with other harmful actions;

(u) "pollution" means the contamination or alteration of the physical, chemical or biological properties of air, water or soil, including change in their temperature, taste, odor, density, or any other characteristics, or such other activity which, by way of discharging any liquid, gaseous, solid, radioactive or other substances into air, water or soil or any component of the environment, destroys or causes injury or harm to public health or to domestic, commercial, industrial, agricultural, recreational or other useful activity, or which by such discharge destroys or causes injury or harm to air, water, soil, livestock, wild animal, bird, fish, plant or other forms of life;

(e) "environmental pollutant" means any solid, liquid or gaseous substance which causes harmful effect to the environment and also includes heat, sound and radiation;

(l) "waste" means any solid, liquid, gaseous, radioactive substance, the discharge, disposal and dumping of which may cause harmful change to the environment.

Prohibitions on production, import, storage, loading, and transportation of hazardous waste – Clause 6

(c) To stop the losses of environment the Government, as of other rules, can control the production, import, storage, loading, transportation, disposal, dumping etc. of hazardous waste.[4]

3 Section 2(aaa) was inserted by section 2 of the Bangladesh Environment Conservation (Amendment) Act, 2010 (Act no. 50 of 2010).
4 Section 6(c) was inserted by section 4 of the Bangladesh Environment Conservation (Amendment) Act, 2010 (Act no. 50 of 2010).

Penalties for production, import, storage, loading, and transportation of hazardous waste under the Clause 6(c) – Clause 15[5]

Sub-clause (1) For violation of rules or orders or other activities mentioned in the table below, the penalty mentioned against them will be imposed:

Serial no.	Description of Offence	Imposable penalty
6.	Violation of rule or rules made under the Clause 6(c)	In case of first offence a punishment of imprisonment for a term not exceeding 2 (two) years or a fine of Taka not exceeding 2 (two) lacs or the both. In case of each of the next offence, a punishment of imprisonment for a term of at least 2 (two) years and not exceeding 10 (ten) years or a fine of Taka at least 2 (two) lacs and not exceeding 10 (ten) lacs or the both

Confiscation of materials and equipment involved in offence – Clause 15b[6]

Where a person is found guilty and sentenced under Clause 15 of this Act, all equipment or parts thereof, transport, substance or any other thing used in the commission of the offence may be confiscated or destroyed under the order of the court.

2.4 The Mongla Port Authority Ordinance, 1976 (Ordinance No. LIII of 1976)

Penalty for pollution etc. – Clause 41A[7]

Any person who throws or allows to fall into the water, shore, bank or land within the limits of the port any goods, ballast, ashes or any other thing whatsoever causing pollution of the water or environment shall be punishable with fine which may extend to one lakh Taka.

3. Fisheries Laws and Rules

3.1 The Protection and Conservation of Fish Act, 1950

Prohibition about Current Jal – Clause 4A[8]

Sub-clause (1) No person shall manufacture, fabricate, import, market, store, carry, transport, own, possess or use Current Jal.

Penalties – Clause 5[9]

Sub-clause (1) The breach of any rule made under section 3 or of any prohibition notified under section 4 shall be punishable with rigorous imprisonment for a term which shall not be less than one year and may extend to two years, or with fine which may extend to five thousand Taka, or with both.

Sub-clause (2) The breach of any prohibition, described in section 4A, in connection with-

(v) manufacture, fabrication, import, marketing or storing of Current Jal by any person shall be punishable with rigorous imprisonment for a term which shall not be less than three years and may extend to five years, and shall also be liable to fine which may extend to ten thousand Taka; and

5 Clause 15 was substituted by section 7 of the Bangladesh Environment Conservation (Amendment) Act, 2010 (Act no. 50 of 2010).
6 Section 15b was inserted by section 8 of the Bangladesh Environment Conservation (Amendment) Act, 2010 (Act no. 50 of 2010).
7 Section 41A was inserted by section 13 of the Mongla Port Authority (Amendment) Act, 1995 (Act XX of 1995).
8 Section 4A was inserted by section 4 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002).
9 Section 5 was substituted by section 5 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002).

(w)carrying, transporting, owning, possession or use of Current Jal by any person shall be punishable with rigorous imprisonment for a term which shall not be less than one year and may extend to three years, or with fine which may extend to five thousand Taka, or with both.

Power to confiscate – Clause 5A[10]

When any person is convicted of an offence punishable under this Act or the rules made under this Act, the Court, before which he is convicted, shall direct that, any article or thing used or intended to be used in the commission of such offence, be confiscated.

Arrest without warrant for offence under the Act – Clause 6

Sub-clause (1) Any person, specially empowered by the Government in this behalf (see Notification: Dacca - No. 6581 Fish - 3rd July 1950 bellow), may arrest without warrant any person committing a breach of any rule under section 3 or any prohibition notified [11] [under section 4 and 4A respectively]-

(a) if the name and address of the person are unknown to him; and

(b) if the person declines to give his name and address or if there is reason to doubt the accuracy of the name and address, if given.

Sub-clause (2) A person arrested under this section may be detained until his name and address have been correctly ascertained:

Provided that no person so arrested shall be detained longer than may be necessary for bringing him before a Magistrate or to the nearest police station according to the provisions of the Code of Criminal Procedure, 1898.

Notification: Dacca - No. 6581 Fish - 3rd July 1950

GOVERNMENT OF EAST BENGAL
DEPARTMENT OF AGRICULTURE CO-OPERATION AND RELIEF
Fisheries Branch
NOTIFICATION (1950 Act)

Dacca - No. 6581 Fish - 3rd July 1950 - In exercise of the power conferred by subsection (1) of section 6 of the East Bengal Act XVIII of 1950), the Governor is pleased to empower the persons mentioned below, to arrest without warrant in accordance with the provisions of the said section, any person committing a breach of any rule under section 3 or any prohibition notified under section 4 o' the said Act, namely:

(1)All Magistrate.

(2)All Police Officers not below the rank of Sub-Inspector of Police or Officer-in-Charge of a police station.

(3) All Forest Officers not below the rank of Deputy Ranger employed in the Sundarbans Forest Division.

(4) All Officers of the Directorate of Fisheries not below the rank of Fishery Overseer.

By order of the Governor
M.A. Majid
Joint Secretary

10 Section 5A was inserted by section 6 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002.

11 The words and figures under section 4 and 4A, respectively, were substituted for the words under section 4 by section 7 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002).

3.2 The Marine Fisheries Rules, 1983

Net mesh size restrictions – Rule 14

All licensed fishing vessels shall use nets of mesh size of the following dimensions:

(c) for large mesh drift net, the minimum mesh size shall be 200 mm (8 inches);

(d) for small mesh drift net the minimum mesh size shall be 100 mm (4 inches);

Prohibited methods of fishing – Rule 16

(a) fishing with any gear having mesh size smaller than the mesh size specified in Rule 14;

(b) fishing with any kind of explosives, poison and other noxious substances;

(c) fishing with electrocuting the marine species of any type.

3.3 The Protection and Conservation of Fish Rules, 1985

Construction of bunds, etc., Prohibited for certain purpose – Rule 4

No person shall construct bunds, weirs, dams and embankments or any other structure, whether temporary or permanent, in, on, across or over the rivers, canal or beels for any purpose other than irrigation, flood control or drainage.

Destruction of fish by explosives, etc., Prohibited – Rule 5

No person shall destroy or make any attempt to destroy any fish by explosives, gun, bow and arrow in inland waters or within coastal territorial waters.

Destruction of fish by poisoning prohibited – Rule 6

No person shall destroy or take any attempt to destroy any fish by poising of water or the depletion of fisheries by pollution, by trade effluents or otherwise in inland waters.

Catching and destruction of certain fish during certain period prohibited – Rule 7

No person shall, during the period from the 1st day of April to the 31st day of August each year, catch or cause to be caught or destroy fry of Shol, Gazar and Taki moving in clusters or the parent fish while guarding them in the rivers, canals, khals, beels or any other sheet of water which ordinarily has direct communication with any river, canal, khal or beel:

Provided that the prohibition shall be extended to the catch or destruction of the fry and the parent fish of the species named above for the purpose of the carp culture.

Prohibition on catching of shrimp, prawn and fish post-larvae – Rule 8

Sub-rule (1A) No person shall catch or cause to be caught fry or post larvae of fish, shrimp and prawns of any kind, in any form and in any way in the estuary and coastal waters of Bangladesh.[12]

Sale of fish prohibited – Rule 9

No person shall catch, carry, transport, offer, expose or possess fish of the species and sizes mentioned in columns 2 and 3 of the Second Schedule at any time during the period mentioned in column 4 thereof:

12 The Bangladesh Gazette, Extra, September 24, 2000: S.R.O No.289-Law/2000, Bangladesh Fisheries and Livestock Ministry, Fisheries Branch 5.

SECOND SCHEDULE [13]

Species of fish	Size (length)	Period
Carps, i.e., *Catla, Rui, Mrigal, Kalbaush, Ghania*.	Below 23 centimeters or 9 inches	July to December
Hilsha (popularly known as *Jatka*)	Below 25 centimeters or 10 inches	November to June
Pangas (*Pangasius pangasius*)	Below 30 centimeters or 12 inches	November to July
Bhola, and *Ayre*	Below 30 centimeters or 12 inches	*Silon,* February to June *Boal*
(*Wallago attu*)	Below 30 centimeters or 12 inches	April to August

Disposal of forfeited fish, fixed engine, fishing nets, cage, gears, trap, boats, mechanized boats, vehicles, engine and other related contrivances – Rule 10[14]

Sub Rule (1) Any fish or fixed engine, fishing net, cage, trap, gear, engine, boat, mechanized boat, vehicle, transportation tool or any other contrivances used for catching fish or destroying fish or transportation of fish, forfeited for a breach of any of these rules shall be disposed of by the following procedures:

(a) the forfeited fish shall be distributed free of cost among the poor, distressed people or to the orphanage of the locality;

(b) the forfeited traps, cage, gears, fixed engine, engine, boat, mechanized boat, vehicles or other transportation tools, etc. shall be sold by public auction:

(c) the forfeited fishing nets shall he destroyed in presence of 3 (three) witnesses.

Sub-rule (2) The auction money under clause (b) of Sub-rule (1) shall be deposited in such Head of Account of the Government as it may direct.

Prohibition on use of fishing nets and regulation of mesh thereof – Rule 12

Sub-rule (4) Following nets or 45mm (2 inches) mesh size or below this mesh size nets are prohibited for any kind of fishing.

Name of the Fishing Net		
Type of Net	Common Name	Local Names
Fash net (Gill net)	Current net	Current Net; Japanese Current Net; Fandi Net; Fash Net; Kapa Jal; Badha Jal; Kathi Jal

With the exception of use in fish cultivation, for catching fish with following gears made of cotton, nylon or any synthetic twine[15] -

(a) Use of the nets mentioned below of maximum 1 (one) centimeter breadth or length of mesh size or shape are prohibited to use during the time specified on its side:

13 The Bangladesh Gazette, Extra, June 24, 2014: S.R.O No.98-Law/2014, Bangladesh Fisheries and Livestock Ministry, Fisheries Branch 5. Notification 29/05/2014.

14 The Bangladesh Gazette, Extra, May 29, 2014: S.R.O No.98-Law/2014, Bangladesh Fisheries and Livestock Ministry, Fisheries Branch 5.

15 Notification, Bangladesh Gazette Extra, 07 April 2013, Fish-2 (Act), Sub-section, Fisheries and Animal Resource Ministry.

Net Type	Common name	Local Name	Time closure
Tana Jal; Kathi Jal	Moshari Jal; Chot Jal	Katha Jal; Ber Jal; Jogot Ber Jal; Vim Jal	Bengali month Falgun to Sravan in each year (mid February to mid August in each year)

(b) Use of the following nets of any size, type, kind or mesh size in all freshwater areas or coastal waters up to 10 meters depth at high tide in all over the country during the time specified below is prohibited:

Net Type	Common name	Local Name	Time closure
Fixed Net	Estuarine set-bag Net	Badha Jal, Pekua Jal, Bingi Jal, Gara Jal, Chingri Pona Dora Jal, Khuti/Bota JAl, Tong Jal, Bindi Jal	Year round

Catching of all kinds of fishes prohibited in certain period in particular areas – Rule 13 [16]

Sub-rule (1) Notwithstanding anything contained in this Rules, no person shall catch or cause to be caught —

(c) Hilsa fish and carry, transport, offer, sell, expose or possess of the said fish throughout the country along with the Hilsha spawning grounds mentioned in column (1) during the peak spawning period of Hilsha mentioned in column (2) of the table below:

Hilsa Spawning Ground Boundary Point	Peak Spawning Period
Mayani Point, Mirsarai, Chittagong in the northeast (91°32.15' E and 22°42.59 N) Paschim Syed Awlia Point, Tajmuddin, Bhola in the northwest (90° 40.58 E and 22°31.16N) North Kutubdia Point. Kutubdia, Cox's Bazar in the southeast (90° 52.51' E and 21° 55.19' N) Lab Chapati Point, Kalapara, Patuakhali in the southwest (90°12.59' E and 21°47.56' N)	3 (three) days before and 11 (eleven) days after the fullmoon, including the day of fullmoon. That is total 15 (fifteen) days of the moon which will be first appeared in the Bengali month of *Ashwin* [1] each year.

Sub-rule (2) Any fish caught by using any kinds of gear in contravention of Sub-rule (1) may be seized and forfeited.

Destruction or any attempt to destroy fishes by drying or dewatering of any fishery prohibited – Rule 17

Sub-rule (1) No person shall destroy or make any attempt to destroy any fish by drying or dewatering of any fishery.

Provided that the prohibition shall not apply to any fishery for the purpose of, and in connection with fish farms.

18 The Bangladesh Gazette, Extra, September 29, 2011: S.R.O. No. 170-Act/2015, Bangladesh Fisheries and Livestock Ministry, Fisheries Branch 2 and Law Sub-section. Notification 22/06/2015.

Seizing and forfit of illegal fishing gears and vessels

Sub-clause (2) Any fishing net, cage, trap, gear, engine, fixed engine, boat, vehicle or any other contrivances used or operated in contravention of Sub-rule (1) and any fish caught in the procedure of such contravention may be seized and forfeited.

3.4 The Bangladesh Crab Export Policy, 1998

Weight restrictions for crabs – Clause 4

Sub-clause (1) Crab means all crabs of Bangladesh under the Order Brachura. In case of catching mud crab (*Scylla serrata*), minimum weight should be 200 gm (7 ounces) for males and 120 gm (4 ounces) for females.

Seasonal catch restrictions for crabs – Clause 6

Sub-clause (3) It is illegal to catch crabs from natural habitat during peak breeding season, that means January-February, and all year round from Wildlife Sanctuaries.

3.5 DFO Office Standing Order No. 5941/28-1, 21 June 1987 (06 Ashar 1994), Divisional Forest Office, Sundarbans Division, Khulna

Fishing is banned in eighteen (18) small creeks/khals listed below to secure breeding of fisheries (CN = Compartment Number).

Chandpai Range		Sharankhola range		Khulna Range		Burigualini Range	
Creek Name	CN	Creek Name	CN	Creek Name	CN	Creek Name	CN
Karamjal	31	Alibanda	1	Bhodra	32	Choto Kewakhali	46
Jongra	31	Chandeshwar	15	Sharbatkhali	32	Boro Kewakhali	46
Mora Passur	30	Dasher Bharani	24	Mora-Bhodra	33	Khalisha Bonia	46
Jhapshi	29,30	Katka	4	Haddua	33	Sapkhali	46
Nandabala	26	Kochikhali	6				

3.6 Standing Orders (in force since 1943) 28 of Directorate of Forests, Bengal, Sundarbans Division

Compiled by S.N. Mitra, Deputy Conservator of Forest, Darjeeling, Bengal Government Branch Press, 1964.

Fishing Permits – Clause 17

(a) Each and every Forest Station (excepting Khulna, and Narkeldanga, which are purely checking stations) is authorised to register fishing crafts and issue fishing permits for definite localities within the Range in which the issuing station is situated.

(b) All crafts must be produced for inspection before they are given fresh permits on each occasion and at the time when the permits are surrendered.

(c) All permits are required to be surrendered at the issuing station on or before the due date of surrender. In case of the fishing boats, the permits are to be surrendered whenever they go out of the forest, although the permits may not then be due for surrender. In case of the carrier crafts, the

permits have to be produced before the officer in charge of the issuing station for his journey-order and countersignature every time such a craft goes in and out of the forest during the validity of its permit; a condition to this effect must be written down on such permits.

(d) For fishing boats, the exact stretch of water (within the Range in which the issuing station is situated) for which the permit is issued is to be clearly and definitely specified; the choice of the locality may be left to the fishermen themselves, but the different parties should be as evenly distributed as possible over the whole Range.

(e) For the carrier boats, flats and launches, the exact route to be followed for the forward and backward journeys to and from the loading points are to be clearly and definitely specified; the permit shall be valid only for the routes specified in it.

(f) Permits for both the fishing boats and fish-carriers may be issued for a maximum period of 8 weeks at a time, subject to the conditions laid down in Clause (c) above.

(g) The following condition is to be laid down in the permits of those fishermen who apply at Supoti and other stations of Bagerhat Range for permits for Hilsa fishing: –

For fishing Hilsa in the area bounded as follows: – East—

Baleswar River.

North—Supoti, Dora, Chora Betmore, Sela, Bara Siala and Jaffa. West—

Passur River.

South—Bay of Bengal.

(h) The following route is to be prescribed in the permits issued from Cobadak Station for fish-carriers plying between Hasnabad and the fisheries in Bagerhat Range: —

Shekbaria (boundary khal), Bozboza, Satbaria, Aura Sipsah, Sipsah, Kali, Cheilabogi, Passur. Charputia, Chhota Siala, Armal, Sela, Lathimara, Betmar, Chora Betmore, Dora and Supoti, and back to Cobadak via the same route.

In the station leaving certificates of such permits, the following route is to be prescribed for the journey from Cobadak to Hasnabad: —

Arpangasia, Kholpetua, Galghasia, Banstalar Khal, Kaksiali and Ichhamati.

(i) No craft with a load of fish shall be detained unnecessarily anywhere under any excuse or circumstances. Every such craft must given the highest priority and past with all possible dispatch at all times of the day and, if possible, of the night as well.

3.7 Integrated Resource Management Plans for the Sundarbans (2010-2020), Volume I (Page: XVI-XVII, 116-120 and 124)

In the Sundarbans:

- Fishing ban in the all canals during the months of July and August and in the *Beels*/*Chatals* during February-May.
- Seasonal gear ban: *Ilish jal/fash jal* during September and October.
- No fishing by dewatering, particularly in the *beels/chatals*.
- *Net jal* and *current jal* for post larvae collection of *golda* and *bagda*.
- Fishing net with mesh below 15mm/1 inch (knot to knot at stretch condition) will not be allowed for fishing.
- The maximum fishing duration against a permit will be 7 days including the day of permit issue and submission.
- Catching pangas (*Pangasius pangasius*) and sea bass (*Lates calcarifer*) ban on each alternating year.
- Catching hilsa shad (*Tenualosa ilisa*) ban in September and October.
- Harvesting mussel (*Jhinuk*) ban in March to October.
- Fishermen of Dubla not allowed to fish in the Sundarbans Mangrove Forest, except drying and storage of fish collected from the sea. Every year the fishers can go to Dubla in October and stay there until March.

3.8 Annex 1. Schedule 1 of the Wildlife (Conservation and Security) Act, 2012 for species known or believed to occur in the Sundarbans

Schedule-1

Protected Animal

Amphibians			
Order-Anura			
Family-Bufonidae			
Sl. No.	Bengali Name	English Name	Scientific Name
1	2	3	4
1	*মার্বেল কুনো ব্যাঙ*	Marbled Toad	*Bufo stomaticus* (Lütken, 1862)
Family-Dicroglossidae			
2	*সবুজ ব্যাঙ*	Green Frog	*Euphlyctis hexadactylus* (Lesson, 1834)
3	*বন ভাউয়া ব্যাঙ/সোনা ব্যাঙ/কোলা ব্যাঙ*	Jerdon's Bull Frog	*Hoplobatrachus crassus* (Jerdon, 1853)
4	*সোনা ব্যাঙ*	Indian Bull Frog	*Hoplobatrachus tigerinus* (Daudin, 1802)
Family-Microhylidae			
5	*শ্রীলংকান ভ্যাঁপু ব্যাঙ/ শ্রীলংকান সোনা ব্যাঙ*	Srilankan Painted Bull Frog	*Kaloula taprobanica (Parker, 1934)*
Reptiles			
Family-Geoemydidae			
1	*রাম কাছিম/বড় কাইট্টা*	River Terrapin	*Batagur baska* (Gray, 1831)
2	*ডিবা কাছিম / ত্রিরেখরুফ কাছিম*	Three-striped Roofed Turtle	*Batagur (Kachuga) dhongoka* (Gray, 1832)
3	*আদি কড়ি কাইট্টা*	Red-crowned Roofed Turtle	*Batagur (Kachuga) kachuga* (Gray, 1831)
4	*কড়ি কাইট্টা*	Indian Roofed Turtle	*Batagur = (Pangshura) tecta* (Gray, 1831)
5	*মাঝারি কাইট্টা*	Indian Tent Turtle	*Batagur = (Pangshura) tentoria* (Gray, 1834)
6	*কালা চিত্রা কাছিম/ নগম কাইট্টা*	Black/Spotted Pond Turtle	*Geoclemys hamiltonii* (Gray, 1831)
7	*মুকুটি নদ-কাছিম*	Crowned River Turtle	*Hardella thurjii* (Gray, 1831)
8	*হলুদ কাইট্টা*	Indian Eyed Turtle	*Morenia petersi* (Anderson, 1879)
Family-Trionychidae			
9	*খালুয়া/গঙ্গা কাছিম*	Ganges Soft-shell Turtle	*Nilssonia* = (*Aspideretes/Trionyx*) *gangeticus* (Cuvier, 1825)
10	*ধুম কাছিম*	Indian Peacock Soft-shell Turtle	*Nilssonia* = (*Aspideretes/Trionyx*) *hurum* (Gray, 1831)

11	*চিত্রা / ছিম কাছিম*	Narrow-headed Soft-shelled Turtle	*Chitra indica* (Gray, 1831)
12	*জাঁতা কাছিম*	Asian Giant Soft-shelled Turtle	*Pelochelys cantorii* (Gray, 1864)
Family-Cheloniidae			
13	*ধজ্যা কাছিম/আংটামাথা সাগর কাছিম*	Loggerhead Sea Turtle	*Caretta caretta* (Linnaeus, 1758)
14	*সবুজ সাগর-কাছিম*	Green Turtle	*Chelonia mydas* (Linnaeus, 1758)
15	*ঈগলঠুঁটি সাগর-কাছিম*	Hawksbill Sea Turtle	*Eretmochelys imbricata* (Linnaeus, 1766)
16	*জলপাইরঙা সাগর-কাছিম*	Olive Ridley Sea Turtle	*Lepidochelys olivacea* (Eschscholtz, 1829)
Family-Dermochelidae			
17	*পুরুচর্ম পৃষ্ঠ সাগর-কাছিম*	Leatherback Sea Turtle	*Dermochelys coriacea* (Vandelli, 1761)
Family-Varanidae			
18	*সোনা গুঁই*	Yellow Monitor	*Varanus flavescens* (Hardwicke and Gray, 1827)
19	*কালো গুঁই/রামগদি*	Water Monitor	*Varanus salvator* (Laurenti, 1768)
Family-Boidae			
20	*বালু বোড়া*	Common Sand Boa	*Gongylophis* (*Eryx*) *conicus* (Schneider, 1801)
21	*অজগর*	Rock Python	*Python molurus* (Linnaeus, 1758)
Family-Colubridae			
22	*লাউডগা সাপ*	Common Vine Snake	*Ahaetulla nasuta* (Lacepede, 1789)
23	*লাউডগা সাপ*	Short-nosed Vine Snake	*Ahaetulla prasina* (Boie, 1827)
24	*দাগি ঢোঁড়া মাইট্টা সাপ*	Striped Keelback	*Amphiesma stolatum* (Linnaeus, 1758)
25	*মাইট্টা সাপ*	Olive Keelback	*Atretium schistosum* (Daudin, 1803)
26	*ফণিমনসা*	Eastern Cat Snake	*Boiga gokool* (Gray, 1835)
27	*পাতি ফণিমনসা*	Common Cat Snake	*Boiga trigonata* (Schneider, 1802)
28	*জলবোড়া সাপ*	Dog-faced Water Snake	*Cerberus rhynchops* (Schneider, 1799)
29	*কালনাগিনী*	Ornate Flying Snake	*Chrysopelea ornata* (Shaw, 1802)
30	*ডোরা বেত আঁছড়া*	Painted Bronzeback Tree Snake	*Dendrelaphis pictus* (Gmelin, 1789)
31	*পাতি বেত আঁছড়া*	Common Bronzeback Tree Snake	*Dendrelaphis tristis* (Daudin, 1803)
32	*পাতি দুধরাজ*	Common Trinket Snake	*Coelognathus* (*Elaphe*) *helena* (Daudin, 1803)
33	*দুধরাজ*	Copper Head Trinket Snake	*Coelognathus radiata* (Schlegel, 1837)
34	*পাতি জলঢোঁড়া*	Common Smooth Water Snake	*Enhydris enhydris* (Schneider, 1799)

35	*পাইন্যা সাপ*	Siebold's Water Snake	*Enhydris sieboldi* (Schlegel,1837)
36	*কাকঁড়াখোর জলঢোঁড়া*	Crab-eating Water Snake	*Fordonia leucobalia* (Schlegel, 1837)
37	*মনোহারী জলঢোঁড়া*	Glossy Water Snake	*Gerarda prevostiana* (Eydoux and Gervais, 1837)
38	*পাতি নেকড়ে সাপ*	Common Wolf Snake	*Lycodon aulicus* (Linnaeus, 1758)
39	*দাগি নেকড়ে সাপ*	Banded Wolf Snake	*Lycodon fasciatus* (Anderson, 1879)
40	*হলুদ-ছাপ নেকড়ে সাপ*	Yellow-speckled Wolf Snake	*Lycodon jara* (Shaw, 1802)
41	*পাতি কুকরি সাপ*	Common Kukri Snake	*Oligodon arnensis* (Shaw, 1802)
42	*কলোদাগা কুকরি সাপ*	Black Cross-barred Kukri Snake	*Oligodon cinereus* (Günther, 1864)
43	*কেন্টরের কুকরি সাপ*	Cantor's Kukri Snake	*Oligodon cyclurus* (Cantor, 1839)
44	*বাংলার কুকরি সাপ*	Bengalese Kukri Snake	*Oligodon dorsalis* (Gray and Hardwicke, 1834)
45	*রাসেলের কুকরি সাপ*	Russell's Kukri Snake	*Oligodon taeniolatus* (Jerdon, 1853)
46	*দারাজ*	Indo-Chinese Rat Snake	*Ptyas* (*Coluber*) *korros* (Schlegel, 1837)
47	*দারাজ/দামান*	Indian Rat Snake	*Ptyas mucosus* (Linnaeus, 1758)
48	*কালোমাথা সাপ*	Black-headed Snake	*Sibynophis subpunctatus* (Dumeril Bibron and Duméril, 1854)
49	*চিত্রিত ঢোঁড়া সাপ*	Painted Keelback	*Xenochrophis cerasogaster* (Cantor, 1839)
50	*ঢোঁড়া সাপ*	Checkered Keelback	*Xenochrophis piscator* (Schneider, 1799)
Order-Crocodilia			
Family-Crocodylidae			
51	*লোনাপানির কুমির*	Saltwater Crocodile	*Crocodylus porosus* (Schneider, 1801)
Birds			
Order-Galliformes			
Family-Phasianidae			
Sl. No.	Bengali Name	English Name	Scientific Name
1	*রাজ বটেরা*	King Quail	*Coturnix chinensis* (Linnaeus, 1766)
2	*লাল বনমুরগী*	Red Junglefowl	*Gallus gallus* (Linnaeus, 1758)
Order-Anseriformes			
Family-Dendrocygnidae			
3	*রাজ সরালি*	Fulvous Whistling Duck	*Dendrocygna bicolor* (Vieillot, 1816)
4	*পাতি সরালি*	Lesser Whistling Duck	*Dendrocygna javanica* (Horsfield, 1821)

Family-Anatidae			
5	*রাজহাঁস*	Greylag Goose	*Anser anser* (Linnaeus, 1758)
6	*দাগী রাজহাঁস*	Bar-headed Goose	*Anser indicus* (Latham, 1790)
7	*খয়রা চকাচকি*	Ruddy Shelduck	*Tadorna ferruginea* (Pallas, 1764)
8	*পাতি চকাচকি*	Common Shelduck	*Tadorna tadorna* (Linnaeus, 1758)
9	*নাকতা হাঁস / ঝুঁটি হাঁস*	Comb Duck	*Sarkidiornis melanotos* (Pennant, 1769)
10	*বালিহাঁস*	Cotton Teal	*Nettapus coromandelianus* (Gmelin, 1789)
11	*লেঞ্জাহাঁস*	Pintail	*Anas acuta* (Linnaeus, 1758)
12	*উত্তুরে খুন্তেহাঁস*	Northern Shoveler	*Anas clypeata* (Linnaeus, 1758)
13	*পাতি তিলিহাঁস*	Eurasian Teal	*Anas crecca* (Linnaeus, 1758)
14	*ইউরেশিও সিঁথিহাঁস / লালশির*	Eurasian Wigeon	*Anas penelope* (Linnaeus, 1758)
15	*নীলমাথা হাঁস / নীলশির*	Mallard	*Anas platyrhynchos* (Linnaeus, 1758)
16	*তেলে ঠোঁটি হাঁস*	Indian Spot-billed Duck	*Anas poecilorhyncha* (Forster, 1781)
17	*গিরিয়া হাঁস*	Garganey	*Anas querquedula* (Linnaeus, 1758)
18	*পিয়ং হাঁস*	Gadwall	*Anas strepera* (Linnaeus, 1758)
19	*লালঝুঁটি ভুতিহাঁস*	Red-crested Pochard	*Netta rufina* (Pallas, 1773)
20	*বেয়ারের ভুতিহাঁস*	Baer's Pochard	*Aythya baeri* (Reddi, 1863)
21	*পাতি ভুতিহাঁস*	Common Pochard	*Aythya ferina* (Linnaeus, 1758)
22	*টিকি হাঁস*	Tufted Duck	*Aythya fuligula* (Linnaeus, 1758)
23	*মরচেরং ভুতিহাঁস*	Ferruginous Duck	*Aythya nyroca* (Guldenstadt, 1770)
Order-Turniciformes			
Family-Turnicidae			
24	*দাগি নাটাবটের / গুলু*	Common Buttonquail	*Turnix suscitator* (Gmelin, 1789)
Order-Piciformes			
Family-Picidae			
25	*ইউরেশিও ঋজুগ্রীবা*	Eurasian Wryneck	*Jynx torquilla* (Linnaeus, 1758)
26	*তিলা কুটিকুড়ালি*	Speckled Piculet	*Picumnus innominatus* (Burton, 1836)
27	*মেটেটুপি বাটকুড়ালি*	Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus* (Blyth, 1845)
28	*খয়রা কাঠকুড়ালি*	Rufous Woodpecker	*Celeus brachyurus* (Vieillot, 1818)
29	*মেটেমাথা কাঠকুড়ালি*	Grey-headed Woodpecker	*Picus canus* (Gmelin, 1788)
30	*ছোট হলদেকুড়ালি*	Lesser Yellownape	*Picus chlorolophus* (Vieillot, 1818)
31	*বড় হলদেকুড়ালি*	Greater Yellownape	*Picus flavinucha* (Gould, 1834)
32	*দাগিবুক কাঠকুড়ালি*	Streak-breasted Woodpecker	*Picus viridanus* (Blyth, 1843)
33	*দাগিগলা কাঠকুড়ালি*	Streak-throated Woodpecker	*Picus xanthopygaeus* (Gray and Gray, 1846)
34	*পাতি কাঠঠোকরা*	Common Goldenback	*Dinopium javanense* (Ljungh, 1797)

35	*বড় কাঠঠোকরা*	Greater Goldenback	*Chrysocolaptes lucidus* (Scopoli, 1786)
Family-Capitonidae			
36	*নীলগলা বসন্ত বৌরী*	Blue-throated Barbet	*Megalaima asiatica* (Lathan, 1790)
37	*দাগি বসন্ত বৌরী*	Lineated Barbet	*Megalaima lineata* (Vieillot, 1816)
Order-Upupiformes			
Family-Upupidae			
38	*পাতি হুদহুদ / মোহনচুঁড়া*	Common Hoopoe	*Upupa epops* (Linnaeus, 1758)
Order-Coraciformes			
Family-Coraciidae			
39	*নীলকণ্ঠ*	Indian Roller	*Coracias benghalensis* (Linnaeus, 1758)
40	*পাহাড়ি নীলকণ্ঠ*	Oriental Dollarbird	*Eurystomus orientalis* (Linnaeus, 1766)
Family-Alcedinidae			
41	*নীলকান মাছরাঙ্গা*	Blue-eared Kingfisher	*Alcedo meninting* (Horsfield, 1821)
Family-Dacelonidae			
42	*খয়রাপাখ মাছরাঙ্গা*	Brown-winged Kingfisher	*Pelargopsis amauroptera* (Pearson, 1841)
43	*মেঘহউ মাছরাঙ্গা/ বকচঞ্চ মাছরাঙ্গা*	Stork-billed Kingfisher	*Pelargopsis capensis* (Linnaeus, 1766)
44	*লাল মাছরাঙ্গা*	Ruddy Kingfisher	*Halcyon coromanda* (Latham, 1790)
45	*কালাটুপি মাছরাঙ্গা*	Black-capped Kingfisher	*Halcyon pileata* (Boddaert, 1783)
46	*ধলাঘাড় মাছরাঙ্গা*	Collared Kingfisher	*Todiramphus chloris* (Boddaert, 1783)
Family-Meropidae			
47	*খয়রামাথা সূঁইচোরা*	Cheastnut-headed Bee-eater	*Merops leschenaulti* (Vieillot, 1817)
48	*নীললেজ সূঁইচোরা*	Blue-tailed Bee-eater	*Merops philippinus* (Linnaeus, 1766)
Order-Cuculiformes			
Family-Cuculidae			
49	*খয়রাপাখ পাপিয়া/ লালডানা ঝুঁরিয়াল কোকিল*	Chestnut-winged Cuckoo	*Clamator coromandus* (Linnaeus, 1766)
50	*পাকড়া পাপিয়া / কালা বুলবুল*	Pied Crested Cuckoo	*Clamator jacobinus* (Boddaert, 1883)
51	*সাধারণ কোকিল*	Common Cuckoo	*Cuculus canorus* (Linnaeus, 1758)
52	*উদয়ী পাপিয়া / হিমালয় কোকিল*	Oriental Cuckoo	*Cuculus saturatus* (Blyth, 1843)
53	*মেটেপেট পাপিয়া*	Indian Plaintive Cuckoo	*Cacomantis passerinus* (Vahl, 1797)
54	*সবুজঠোঁট মালকোয়া*	Green-billed Malkoha	*Phaenicophaeus tristis* (Lesson, 1830)

Family-Centropodidae			
55	*বড় কুবো*	Greater Coucal	*Centropus sinensis* (Stephens, 1815)
Order-Psittaciformes			
Family-Psittacidae			
56	*ফুলমাথা টিয়া*	Blossom-headed Parakeet	*Psittacula roseata* (Biswas, 1951)
Order-Apodiformes			
Family-Apodidae			
57	*এশিও তালবাতাসি*	Asian Palm Swift	*Cypsiurus balasiensis* (Gray, 1829)
58	*ঘর বাতাসি*	Little Swift	*Apus affinis* (Gray, 1830)
Order-Strigiformes			
Family-Tytonidae			
59	*লক্ষ্মী পেঁচা*	Barn Owl	*Tyto alba* (Scopoli, 1769)
Family-Strigidae			
60	*কণ্ঠী নিমপেঁচা*	Collared Scops Owl	*Otus bakkamoena* (Pennant, 1769)
61	*উদয়ী নিমপেঁচা*	Oriental Scops Owl	*Otus sunia* (Hodgson, 1836)
62	*মেটে হুতোমপেঁচা*	Dusky Eagle-Owl	*Bubo coromandus* (Latham, 1790)
63	*হলদে মেছোপেঁচা*	Buffy Fish Owl	*Ketupa ketupu* (Horsfield, 1821)
64	*খয়রা মেছোপেঁচা*	Brown Fish Owl	*Ketupa zeylonensis* (Gmelin, 1788)
65	*খয়রা গাছপেঁচা*	Brown Wood Owl	*Strix leptogrammica* (Temminck, 1831)
66	*কণ্ঠী কুটিপেঁচা*	Spotted Owlet	*Athene brama* (Temminck, 1821)
67	*খয়রা শিকরেপেঁচা*	Brown Hawk-Owl	*Ninox scutulata* (Raffles, 1822)
68	*ছোটকান পেঁচা*	Short-eared Owl	*Asio flammeus* (Pontoppidan, 1763)
Family-Caprimulgidae			
69	*দেশি রাতচরা*	Indian Nightjar	*Caprimulgus asiaticus* (Latham, 1790)
70	*লেজা রাতচরা*	Large-tailed Nightjar	*Caprimulgus macrurus* (Horsfield, 1821)
Order-Columbiformes			
Family-Columbidae			
71	*গোলা পায়রা/জালালি কবুতর*	Common Pigeon	*Columba livia* (Gmelin, 1789)
72	*তিলা ঘুঘু*	Spotted Dove	*Streptopelia chinensis* (Scopoli, 1786)
73	*ইউরেশিও কণ্ঠীঘুঘু*	Eurasian Collared Dove	*Streptopelia decaocto* (Frivaldszky, 1838)
74	*উদয়ী রাজঘুঘু*	Oriental Turtle Dove	*Streptopelia orientalis* (Latham, 1790)
75	*লাল রাজঘুঘু*	Red Turtle Dove	*Streptopelia tranquebarica* (Hermann, 1804)

76	*সবুজ ঘুঘু*	Common Emerald Dove	*Chalcophaps indica* (Linnaeus, 1758)
77	*কমলাবুক হরিয়াল*	Orange-breasted Green Pigeon	*Treron bicinctus* (Jerdon, 1840)
78	*হলদেপা হরিয়াল*	Yellow-footed Green Pigeon	*Treron phoenicopterus* (Latham, 1790)
79	*পম্পাডুর হরিয়াল*	Pompadour Green Pigeon	*Treron pompadora* (Gmelin, 1789)
Family-Heliornithidae			
80	*মুখোশপরা হাঁসপদী*	Masked Finfoot	*Heliopais personata* (Gray, 1849)
Order-Ciconiiformes			
Family-Rallidae			
81	*মেটেপা ঝিলি*	Slaty-legged Crake	*Rallina eurizonoides* (Lafresnaye, 1845)
82	*মেটেবুক ঝিলি*	Slaty-breasted Rail	*Gallirallus striatus* (Linnaeus, 1766)
83	*ধলাবুক ডাহুক*	White-breasted Waterhen	*Amaurornis phoenicurus* (Pennant, 1769)
84	*লালবুক গুরগুরি*	Ruddy-breasted Crake	*Porzana fusca* (Linnaeus, 1766)
85	*কুরা / ঝিল মোরগ*	Watercock	*Gallicrex cinerea* (Gmelin, 1789)
86	*বেগুনি কালেম*	Purple Swamphen	*Porphyrio porphyrio* (Linnaeus, 1758)
87	*পাতি পানমুরগি*	Common Moorhen	*Gallinula chloropus* (Linnaeus, 1758)
88	*পাতি কূট*	Eurasian Coot	*Fulica atra* (Linnaeus, 1758)
Family-Scolopacidae			
89	*পাতি চ্যাগা*	Common Snipe	*Gallinago gallinago* (Linnaeus, 1758)
90	*সুইনহোর চ্যাগা*	Swinhoe's Snipe	*Gallinago megala* (Swinhoe, 1861)
91	*ল্যাঞ্জা চ্যাগা*	Pin-tailed Snipe	*Gallinago stenura* (Bonaparte, 1831)
92	*দাগিলেজ জৌরালি*	Bar-tailed Godwit	*Limosa lapponica* (Linnaeus, 1758)
93	*কালালেজ জৌরালি*	Black-tailed Godwit	*Limosa limosa* (Linnaeus, 1758)
94	*ইউরেশিও গুলিন্দা*	Eurasian Curlew	*Numenius arquata* (Linnaeus, 1758)
95	*নাটা গুলিন্দা*	Whimbrel	*Numenius phaeopus* (Linnaeus, 1758)
96	*পাতি সবুজপা*	Common Greenshank	*Tringa nebularia* (Gunnerus, 1767)
97	*সবুজ বাটান*	Green Sandpiper	*Tringa ochropus* (Linnaeus, 1758)
98	*বিল বাটান*	Marsh Sandpiper	*Tringa stagnatilis* (Bechstein, 1803)
99	*পাতি লালপা*	Common Redshank	*Tringa totanus* (Linnaeus, 1758)
100	*টেরেক বাটান*	Terek Sandpiper	*Xenus cinereus* (Guldenstadt, 1774)
101	*লাল নুড়িবাটান*	Ruddy Turnstone	*Arenaria interpres* (Linnaeus, 1758)

102	*এশিও ডাউইচার*	Asian Dowitcher	*Limnodromus semipalmatus* (Blyth, 1848)
103	*স্যান্ডার্লিং*	Sanderling	*Calidris alba* (Pallas, 1764)
104	*ডানলিন*	Dunlin	*Calidris alpina* (Linnaeus, 1758)
105	*লাল নথ*	Red Knot	*Calidris canutus* (Linnaeus, 1758)
106	*গুলিন্দা বাটান*	Curlew Sandpiper	*Calidris ferruginea* (Pontoppidan, 1763)
107	*ছোট চাহা*	Little Stint	*Calidris minuta* (Leisler, 1812)
108	*লালঘাড় চাহা*	Red-necked Stint	*Calidris ruficollis* (Pallas, 1776)
109	*টেমিঙ্কের চাহা*	Temminck's Stint	*Calidris temminckii* (Leisler, 1812)
110	*বড় নথ*	Great Knot	*Calidris tenuirostris* (Horsfield, 1821)
111	*মোটাঠুঁটো বাটান*	Broad-billed Sandpiper	*Limicola falcinellus* (Pontoppidan, 1763)
Family-Rostratulidae			
112	*বাংলা রাঙ্গাচ্যাগা*	Greater Painted Snipe	*Rostratula benghalensis* (Linnaeus, 1758)
Family-Jacanidae			
113	*নেউ পিপি*	Pheasant-tailed Jacana	*Hydrophasianus chirurgus* (Scopoli, 1786)
114	*দল পিপি*	Bronze-winged Jacana	*Metopidius indicus* (Latham, 1790)
Family-Burhinidae			
115	*বড় মোটাহাঁটু*	Great Stone-curlew	*Esacus recurvirostris* (Cuvier, 1829)
Family-Charadriidae			
116	*ইউরেশিও ঝিনুকমার*	Eurasian Oystercatcher	*Haematopus ostralegus* (Linnaeus, 1758)
117	*কালাপাখ ঠেঙ্গি*	Black-winged Stilt	*Himantopus himantopus* (Linnaeus, 1758)
118	*পাকড়া উল্টোঠুঁটি*	Pied Avocet	*Recurvirostra avosetta* (Linnaeus, 1758)
119	*প্রশান্ত সোনাজিরিয়া*	Pacific Golden Plover	*Pluvialis fulva* (Gmelin, 1789)
120	*মেটে জিরিয়া*	Grey Plover	*Pluvialis squatarola* (Linnaeus, 1758)
121	*কেন্টিশ জিরিয়া*	Kentish Plover	*Charadrius alexandrinus* (Linnaeus, 1758)
122	*ছোট নথজিরিয়া*	Little Ringed Plover	*Charadrius dubius* (Scopoli, 1786)
123	*পাতি নথজিরিয়া*	Common Ringed Plover	*Charadrius hiaticula* (Linnaeus, 1758)
124	*বড় ধূলজিরিয়া*	Greater Sand Plover	*Charadrius leschenaultii* (Lesson, 1826)
125	*ছোট ধূলজিরিয়া*	Lesser Sand Plover	*Charadrius mongolus* (Pallas, 1776)
126	*মেটেমাথা টিটি*	Grey-headed Lapwing	*Vanellus cinereus* (Blyth, 1842)
127	*হটটিটি*	Red-wattled Lapwing	*Vanellus indicus* (Boddaaert, 1783)
Family-Glareolidae			
128	*ছোট বাবুবাটান*	Small Pratincole	*Glareola lactea* (Temminck, 1820)
129	*উদয়ী বাবুবাটান*	Oriental Pratincole	*Glareola maldivarum* (Forster, 1795)
Family-Laridae			
130	*পরজীবী জেগার*	Parasitic Jaeger	*Stercorarius parasiticus* (Linnaeus, 1758)
131	*খয়রামাথা গাঙচিল*	Brown-headed Gull	*Larus brunnicephalus* (Jerdon, 1840)

132	*হলদেপা গাঙচিল*	Yellow-legged Gull	*Larus cachinnans* (Pallas, 1811)
133	*হিউগলিনের গাঙচিল*	Heuglin's Gull	*Larus heuglini* (Bree, 1876)
134	*পালাসি গাঙচিল*	Great Black-headed Gull	*Larus ichthyaetus* (Pallas, 1773)
135	*কালামাথা গাঙচিল*	Common Black-headed Gull	*Larus ridibundus* (Linnaeus, 1766)
136	*কালাঠোঁট পানচিল*	Gull-billed Tern	*Gelochelidon nilotica* (Gmelin, 1789)
137	*ছোট পানচিল*	Little Tern	*Sterna albifrons* (Pallas, 1764)
138	*বাংলা টিকিপানচিল*	Lesser Crested Tern	*Sterna bengalensis* (Lesson, 1831)
139	*বাতাসি পানচিল*	Swift Tern	*Sterna bergii* (Lichtenstein, 1823)
140	*কাসপিয়ান পানচিল*	Caspian Tern	*Sterna caspia* (Pallas, 1770)
141	*পাতি পানচিল*	Common Tern	*Sterna hirundo* (Linnaeus, 1758)
142	*জুলফি পানচিল*	Whiskered Tern	*Chlidonias hybrida* (Pallas, 1811)
Family-Accipitridae			
143	*মাছমুরাল*	Osprey	*Pandion haliaetus* (Linnaeus, 1758)
144	*উদয়ী মধুবাজ*	Crested Honey Buzzard	*Pernis ptilorhynchus* (Temminck, 1821)
145	*কাটুয়া চিল*	Black-winged Kite	*Elanus caeruleus* (Desfontaines, 1789)
146	*ধলাপেট সিন্ধুঈগল*	White-bellied Sea Eagle	*Haliaeetus leucogaster* (Gmelin, 1788)
147	*পালাসি কুরাঈগল*	Palls's Fish Eagle	*Haliaeetus leucoryphus* (Linnaeus, 1766)
148	*মেটেমাথা কুরাঈগল*	Grey-headed Fish Eagle	*Ichthyophaga ichthyaetus* (Horsfield, 1821)
149	*বাংলা শকুন*	White-rumped Vulture	*Gyps bengalensis* (Gmelin, 1788)
150	*খাটোআঙ্গুল সাপঈগল*	Short-toed Snake Eagle	*Circaetus gallicus* (Gmelin, 1788)
151	*তিলা নাগঈগল*	Crested Serpent Eagle	*Spilornis cheela* (Latham, 1790)
152	*পশ্চিমা পানকাপাসি*	Western Marsh Harrier	*Circus aeruginosus* (Linnaeus, 1758)
153	*পাকড়া কাপাসি*	Pied Harrier	*Circus melanoleucos* (Pennant, 1769)
154	*বসরা শিকরে*	Besra	*Accipiter virgatus* (Temminck, 1822)
155	*পাতি তিশাবাজ*	Common Buzzard	*Buteo buteo* (Linnaeus, 1758)
156	*বড় গুটিঈগল*	Greater Spotted Eagle	*Aquila clanga* (Pallas, 1811)
157	*দেশি গুটিঈগল*	Indian Spotted Eagle	*Aquila hastata* (Lesson, 1831)
158	*বুটপা ঈগল*	Booted Eagle	*Hieraaetus pennatus* (Gmelin, 1788)
159	*ঝুঁটিয়াল শিকরেঈগল*	Crested Hawk-Eagle	*Spizaetus cirrhatus* (Gmelin, 1788)
Family-Falconidae			
160	*আমুর শাহীন*	Amur Falcon	*Falco amurensis* (Radde, 1863)
161	*লালঘাড় শাহীন*	Red-necked Falcon	*Falco chicquera* (Daudin, 1800)
162	*পেরেগ্রিন শাহীন*	Peregrine Falcon	*Falco peregrinus* (Tunstall, 1771)
163	*ইউরেশিও টিকাশাহীন*	Eurasian Hobby	*Falco subbuteo* (Linnaeus, 1758)
164	*পাতি কেস্ট্রেল*	Common Kestrel	*Falco tinnunculus* (Linnaeus, 1758)
Family-Podicipedidae			
165	*ছোট ডুবুরি*	Little Grebe	*Tachybaptus ruficollis* (Pallas, 1764)

166	*বড় খোপাডুবুরি*	Great Crested Grebe	*Podiceps cristatus* (Linnaeus, 1758)
Family-Anhingidae			
167	*উদয়ী গয়ার*	Darter	*Anhinga melanogaster* (Pennant, 1769)
Family-Phalacrocoracidae			
168	*বড় পানকৌড়ি*	Great Cormorant	*Phalacrocorax carbo* (Linnaeus, 1758)
Family-Ardeidae			
169	*ধুপনি বক / ধুসর বক*	Grey Heron	*Ardea cinerea* (Linnaeus, 1758)
170	*দৈত্য বক*	Goliath Heron	*Ardea goliath* (Cretzschmar, 1827)
171	*দেশি কানিবক*	Indian Pond Heron	*Ardeola grayii* (Sykes, 1832)
172	*লালচে বক*	Purple Heron	*Ardea purpurea* (Linnaeus, 1766)
173	*ক্ষুদে বক*	Striated Heron	*Butorides striata* (Linnaeus, 1758)
174	*কালামাথা নিশিবক*	Black-crowned Night Heron	*Nycticorax nycticorax* (Linnaeus, 1758)
175	*নিশিবক*	Malayan Night Heron	*Gorsachius melanolophus* (Raffles, 1822)
176	*খয়রা বগলা / নল ঘোঙ্গা*	Cinnamon Chestnut Bittern	*Ixobrychus cinnamomeus* (Gmelin, 1789)
177	*হলদে বগলা / সোনা ঘোঙ্গা*	Yellow Bittern	*Ixobrychus sinensis* (Gmelin, 1789)
178	*কালা বগলা*	Black Bittern	*Dupetor flavicollis* (Latham, 1790)
Family-Threskiornithidae			
179	*কালামাথা কাস্তেচরা*	Black-headed Ibis	*Threskiornis melanocephalus* (Latham, 1790)
Family-Ciconiidae			
180	*এশিও শামখোল*	Asian Openbill	*Anastomus oscitans* (Boddaert, 1783)
181	*ছোট মদনটাক*	Lesser Adjutant	*Leptoptilos javanicus* (Horsfield, 1821)
Order-Passeriformes			
Family-Pittidae			
182	*দেশি শুমচা*	Indian Pitta	*Pitta brachyura* (Linnaeus, 1766)
183	*প্যারা শুমচা*	Mangrove Pitta	*Pitta megarhyncha* (Schlegel, 1863)
Family-Irenidae			
184	*সোনাকপালি হরবোলা*	Golden-fronted Leafbird	*Chloropsis aurifrons* (Temminck, 1829)
Family-Laniidae			
185	*মেটেপিঠ লাটোরা*	Grey-backed Shrike	*Lanius tephronotus* (Vigors, 1831)
Family-Corvidae			
186	*প্যারাবন শীষমার*	Mangrove Whistler	*Pachycephala grisola* (Blyth, 1843)
187	*কালাঘাড় বেনেবৌ*	Black-naped Oriole	*Oriolus chinensis* (Linnaeus, 1766)
188	*ইউরেশিও সোনাবৌ*	Eurasian Golden Oriole	*Oriolus oriolus* (Linnaeus, 1758)

189	*বড় কাবাসি*	Large Cuckooshrike	*Coracina macei* (Lesson, 1831)
190	*কালামাথা কাবাসি*	Black-headed Cuckooshrike	*Coracina melanoptera* (Ruppell, 1839)
191	*ছোট সাহেলি*	Small Minivet	*Pericrocotus cinnamomeus* (Linnaeus, 1766)
192	*সিঁদুরে সাহেলি*	Scarlet Minivet	*Pericrocotus flammeus* (Forster, 1781)
193	*দাগিপাখ চুটকিলাটোরা*	Bar-winged Flycatcher-shrike	*Hemipus picatus* (Sykes, 1832)
194	*ধলাগলা ছাতিঘুরানি*	White-throated Fantail	*Rhipidura albicollis* (Vieillot, 1818)
195	*ব্রোঞ্জ ফিঙে*	Bronzed Drongo	*Dicrurus aeneus* (Vieillot, 1817)
196	*কেশরী ফিঙে*	Hair-crested Drongo	*Dicrurus hottentottus* (Linaeus, 1766)
197	*কালচে ফিঙে*	Ashy Drongo	*Dicrurus leucophaeus* (Vieillot, 1817)
198	*বড় ভীমরাজ*	Greater Racket-tailed Drongo	*Dicrurus paradiseus* (Linnaeus, 1766)
199	*ছোট ভীমরাজ*	Lesser Racket-tailed Drongo	*Dicrurus remifer* (Temminck, 1823)
200	*কালাঘাড় রাজন*	Black-naped Monarch	*Hypothymis azurea* (Boddaert, 1783)
201	*এশিও শাবুলবুলি*	Asian Paradise Flycatcher	*Terpsiphone paradisi* (Linnaeus, 1758)
Family-Muscicapidae			
202	*নীল শীলাদামা*	Blue Rock Thrush	*Monticola solitarius* (Linnaeus, 1758)
203	*কমলা দামা*	Orange-headed Thrush	*Zoothera citrina* (Latham, 1790)
204	*আঁশটে দামা*	Scaly Thrush	*Zoothera dauma* (Latham, 1790)
205	*টিকেলের দামা*	Tickell's Thrush	*Turdus unicolor* (Tickell, 1833)
206	*এশিও খয়রাচুটকি*	Asian Brown Flycatcher	*Muscicapa dauurica* (Pallas, 1811)
207	*কালাপাশ চুটকি*	Dark-sided Flycatcher	*Muscicapa sibirica* (Gmelin, 1789)
208	*অম্বর চুটকি*	Verditer Flycatcher	*Eumyias thalassinus* (Swainson, 1838)
209	*ধলাগলা চুটকি*	Pale-chinned Blue Flycatcher	*Cyornis poliogenys* (Brooks, 1879)
210	*নীলগলা চুটকি*	Blue-throated Blue Flycatcher	*Cyornis rubeculoides* (Vigors, 1831)
211	*মেটেমাথা ক্যানারিচুটকি*	Grey-headed Canary-Flycatcher	*Culicicapa ceylonensis* (Swinson, 1820)
212	*সাইবেরিও চুনিকণ্ঠী*	Siberian Rubythroat	*Luscinia calliope* (Pallas, 1776)
213	*ধলাকোমর শামা*	White-rumped Shama	*Copsychus malabaricus* (Scopoli, 1788)
214	*কালা গির্দি*	Black Redstart	*Phoenicurus ochruros* (S.G. Gmelin, 1774)
Family-Sturnidae			
215	*গোলাপি কাঠশালিক*	Rosy Starling	*Sturnus roseus* (Linnaeus, 1758)
216	*পাতি কাঠশালিক*	Common Starling	*Sturnus vulgaris* (Linnaeus, 1758)
217	*গাঙ শালিক*	Bank Myna	*Acridotheres ginginianus* (Latham, 1790)
Family-Sittidae			
218	*খয়রাপেট বনমালি*	Chestnut-bellied Nuthatch	*Sitta castanea* (Lesson, 1830)

219	*কালাকপাল বনমালি*	Velvet-fronted Nuthatch	*Sitta frontalis* (Swainson, 1820)
Family-Paridae			
220	*বড় তিত*	Great Tit	*Parus major* (Linnaeus, 1758)
Family-Hirundinidae			
221	*খয়রাগলা নাকুটি*	Brown-throated Martin	*Riparia paludicola* (Vieillot, 1817)
222	*বালি নাকুটি*	Sand Martin	*Riparia riparia* (Linnaeus, 1758)
223	*লালকোমর আবাবিল*	Red-rumped Swallow	*Hirundo daurica* (Linnaeus, 1771)
224	*দাগিগলা আবাবিল*	Streak-throated Swallow	*Hirundo fluvicola* (Blyth, 1856)
225	*তারলেজা আবাবিল*	Wire-tailed Swallow	*Hirundo smithii* (Leach, 1818)
Family-Pycnonotidae			
226	*সিপাহী বুলবুল*	Red-whiskered Bulbul	*Pycnonotus jocosus* (Linnaeus, 1758)
Family-Cisticolidae			
227	*ভোমরা ছোটন*	Zitting Cisticola	*Cisticola juncidis* (Rafinesque, 1810)
228	*হলদেপেট প্রিনা*	Yellow-bellied Prinia	*Prinia flaviventris* (Delessert, 1840)
Family-Zosteropidae			
229	*উদয়ী ধলাচোখ*	Oriental White-eye	*Zosterops palpebrosus* (Temminck, 1824)
Family-Sylviidae			
230	*পালসি ফড়িংফুটকি*	Pallas's Grasshopper Warbler	*Locustella certhiola* (Pallas, 1811)
231	*পাতি ফড়িংফুটকি*	Common Grasshopper Warbler	*Locustella naevia* (Boddaert, 1783)
232	*বাচাল নলফুটকি*	Clamorous Reed Warbler	*Acrocephalus stentoreus* (Hemprich and Ehrenberg, 1833)
233	*টিকেলের পাতাফুটকি*	Tickell's Leaf Warbler	*Phylloscopus affinis* (Tickell, 1833)
234	*পাতি চিফচ্যাফ*	Common Chiffchaff	*Phylloscopus collybita* (Vieillot, 1817)
235	*হলদেভ্রু ফুটকি*	Yellow-browed Warbler	*Phylloscopus inornatus* (Blyth, 1842)
236	*বড়ঠোঁট ফুটকি*	Large-billed Leaf Warbler	*Phylloscopus magnirostris* (Blyth, 1843)
237	*বাইদের পাতাফুটকি*	Blyth's Leaf Warbler	*Phylloscopus reguloides* (Blyth, 1842)
238	*মেটেচান্দি ফুটকি*	Grey-crowned Warbler	*Seicercus tephrocephalus* (Anderson, 1871)
239	*অ্যাবটের ছাতারে*	Abbott's Babbler	*Malacocincla abbotti* (Blyth, 1845)
240	*ধলাভ্রু কাস্তেছাতারে*	White-browed Scimitar Babbler	*Pomatorhinus schisticeps* (Hodgson, 1836)
241	*দাগি তিতছাতারে*	Striped Tit -Babbler	*Macronous gularis* (Horsfield, 1822)
242	*দাগি ছাতারে*	Striated Babbler	*Turdoides earlei* (Blyth, 1844)
243	*বন ছাতারে*	Jungle Babbler	*Turdoides striatus* (Dumont, 1823)

Family-Alaudidae			
244	*বাংলা ঝাড়ভরত*	Bengal Bush Lark	*Mirafra assamica* (Horsfield, 1840)
245	*মেটেচান্দি চড়ুইভরত*	Ashy-crowned Sparrow-Lark	*Eremopterix griseus* (Scopoli, 1786)
246	*বালি ভরত*	Sand Lark	*Calandrella raytal* (Blyth, 1845)
Family-Nectariniidae			
247	*লালপিঠ ফুলঝুরি*	Scarlet-backed Flowerpecker	*Dicaeum cruentatum* (Linnaeus, 1758)
249	*মেটেঠোঁট ফুলঝুরি*	Pale-billed Flowerpecker	*Dicaeum erythrorhynchos* (Latham, 1790)
250	*কমলাপেট ফুলঝুরি*	Orange-bellied Flowerpecker	*Dicaeum trigonostigma* (Scopoli, 1786)
251	*চুনিমুখি মৌটুসি*	Ruby-cheeked Sunbird	*Chalcoparia singalensis* (Gmelin, 1789)
252	*বেগুনিকোমর মৌটুসি*	Purple-rumped Sunbird	*Leptocoma zeylonica* (Linnaeus, 1766)
253	*বেগুনি মৌটুসি*	Purple Sunbird	*Cinnyris asiaticus* (Latham, 1790)
254	*সিঁদুরে মৌটুসি*	Crimson Sunbird	*Aethopyga siparaja* (Raffles, 1822)
256	*ছোট মাকড়মার*	Little Spiderhunter	*Arachnothera longirostra* (Latham, 1790)
Family-Passeridae			
257	*বন খঞ্জন*	Forest Wagtail	*Dendronanthus indicus* (Gmelin, 1789)
258	*মেটে খঞ্জন*	Grey Wagtail	*Motacilla cinerea* (Tunstall, 1771)
259	*সিট্রিন খঞ্জন*	Citrine Wagtail	*Motacilla citreola* (Pallas, 1776)
260	*ধলাভ্রু খঞ্জন*	White-browed Wagtail	*Motacilla madaraspatensis* (Gmelin, 1789)
261	*জলপাইপিঠ তুলিকা*	Olive-backed Pipit	*Anthus hodgsoni* (Richmond, 1907)
262	*রিচার্ডের তুলিকা*	Richard's Pipit	*Anthus richardi* (Vieillot, 1818)
263	*গোলাপি তুলিকা*	Rosy Pipit	*Anthus roseatus* (Blyth, 1847)
264	*দেশি বাবুই*	Baya Weaver	*Ploceus philippinus* (Linnaeus, 1766)
265	*দেশি চান্দিঠোঁট*	Indian Silverbill	*Lonchura malabarica* (Linnaeus, 1758)
266	*কালামাথা মুনিয়া*	Black-headed Munia	*Lonchura malacca* (Linnaeus, 1766)
267	*তিলা মুনিয়া*	Scaly-breasted Munia	*Lonchura punctulata* (Linnaeus, 1758)
Family-Fringillidae			
268	*পাতি তুতি*	Common Rosefinch	*Carpodacus erythrinus* (Pallas, 1770)
269	*ক্ষুদে চটক*	Little Bunting	*Emberiza pusilla* (Pallas, 1776)
Mammals			
Family-Cercopithecidae			
1	*রেসাস বানর*	Rhesus Macaque	*Macaca mulatta* (Zimmermann, 1780)

Order-Rodentia			
Family-Sciuridae			
2	*ইরাভাদি কাঠবিড়ালী*	Irrawaddy Squirrel	*Callosciurus pygerythrus* (I. Geoffroy Saint Hilarie, 1831)
Family-Hystricidae			
3	*ঝুঁটিধর সজারু*	Indian Crested Porcupine	*Hystrix indica* (Kerr, 1792)
Order-Chiroptera			
Family-Pteropodidae			
4	*খর্বনাসা কলাবাদুড়*	Short-nosed Fruit Bat	*Cynopterus sphinx* (Vahl, 1797)
5	*কলাবাদুড়/ইন্ডিয়ান খেচর শিয়াল*	Indian Flying Fox	*Pteropus giganteus* (Briinnich, 1782)
6	*ধলা কলাবাদুড়/তামাটে ফলা বাদুর*	Fulvous Fruit Bat	*Rousettus leschenaultii* (Desmarest, 1820)
Family-Rhinolophidae			
7	*ব্লাইথ্স অশ্বখুর বাদুড়*	Blyth's Horseshoe Bat	*Rhinolophus lepidus* (Blyth, 1844)
Family-Hipposideridae			
8	*লেজ বিহীন পত্রনাসা বাদুড়*	Tailless Leaf-nosed Bat	*Coelops frithii* (Blyth, 1848)
9	*কেণ্টরস পত্রনাসা বাদুড়*	Cantor's Leaf-nosed Bat	*Hipposideros galeritus* (Cantor, 1846)
Family-Megadermatidae			
10	*ছদ্ম রক্তখেকো বাদুড়*	False Vampire	*Megaderma lyra* (Geoffroy, 1810)
Family-Rhinopomatidae			
11	*ছোট ইঁদুরলেজি বাদুড়*	Lesser rat-tailed Bat	*Rhinopoma hardwickii* (Gray, 1831)
Family-Emballonuridae			
12	*থলে বাদুড়*	Pouch-bearing Bat	*Saccolaimus saccolaimus* (Temminck, 1838)
13	*লম্বা-পাখ গোর-বাদুড়*	Long-winged Tomb Bat	*Taphozous longimanus* (Hardwicke, 1825)
14	*গোপা গোর-বাদুড়*	Black-bearded Tomb Bat	*Taphozous melanopogon* (Temminck, 1841)
Family-Molossidae			
15	*মুক্তলেজি বাদুড়*	Egyptian Free-tailed Bat	*Tadarida aegyptiaca* (Geoffroy, 1818)
Family-Vespertilionidae			
16	*টিকেলস্ বাদুড়*	Tickell's Bat	*Hesperoptenus tickelli* (Blyth, 1851)
17	*লোমশ বাদুড়*	Papilloswe Woolly Bat	*Kerivoula papillosa* (Temminck, 1840)
18	*চিত্রিত বাদুড়*	Painted Bat	*Kerivoula picta* (Pallas, 1767)
19	*বড় হলদে বাদুড়*	Greater Yellow Bat	*Scotophilus heathii* (Horsfield, 1731)
20	*ছোট হলদে বাদুড়*	Lesser Yellow Bat	*Scotophilus kuhlii* (Leach, 1821)
21	*চামচিকা*	Kelaart's Pipistrelle	*Pipistrellus ceylonicus* (Kelaart, 1852)

22	*চামচিকা/ইন্ডিয়ান পিপিস্ট্রিল*	Indian Pipistrelle	*Pipistrellus coromandra* (Gray, 1838)
23	*সাবি পিপিস্ট্রিল*	Least Pipistrelle	*Pipistrellus tenuis* (Temminck, 1840)
24	*ডোমার্স পিপিস্ট্রিল*	Dormer's Pipistrelle	*Scotozous dormeri* (Dobson, 1875)
Order-Carnivora			
Family-Felidae			
24	*বন বিড়াল*	Jungle Cat	*Felis chaus* (Giildenstaedt, 1776)
25	*বাঘ*	Tiger	*Panthera tigris* (Linnaeus, 1758)
26	*চিতা বিড়াল*	Leopard Cat	*Prionailurus bengalensis* (Kerr, 1792)
27	*মেছো বিড়াল*	Fishing Cat	*Prionailurus viverrinus* (Bennett, 1833)
Family-Viverridae			
28	*বড় বাগদাশ*	Large Indian Civet	*Viverra zibetha* (Linnaeus, 1758)
29	*খাটাশ/ছোট বাগদাশ*	Small Indian Civet	*Viverricula indica* (Desmarest, 1804)
30	*পাতি বাগদাশ/ গন্ধগোকুল*	Common Palm Civet	*Paradoxurus hermaphroditus* (Pallas, 1777)
Family-Herpestidae			
31	*ছোট ইন্ডিয়ান বেজি*	Small Indian Mongoose	*Herpestes auropunctatus* (Hodgson, 1836)
32	*পাতি বেজি/নেইল*	Common Mongoose	*Herpestes edwardsi* (E. Geoffroy, Saint-Hilariae,1818)
Family-Canidae			
33	*পাতি শিয়াল*	Jackal	*Canis aureus* (Linnaeus, 1758)
Family-Mustelidae			
34	*ছোটনখী ভোঁদর/উদবিড়াল*	Short-clawed Otter	*Aonyx cinerea [cinereus]* (Illiger, 1815)
35	*মসৃন ভোঁদর*	Smooth-coated Otter	*Lutrogale perspicillata* (I.Geoffroy, Saint-Hilariae, 1826)
Family-Cervidae			
36	*মায়া হরিণ*	Barking Deer	*Muntiacus muntjak* (Zimmermann, 1780)
Family-Delphinidae			
37	*ইরাবতী ডলফিন*	Irrawaddy Dolphin	*Orcaella brevirostris* (Gary, 1866)
38	*গোলাপী ডলফিন*	Indo-Pacific Humpback Dolphin	*Sousa chinensis* (Osbeck, 1765)
Family-Phocoenidae			
39	*পাখনাহীন সমুদ্র শুশুক*	Finless Porpoise	*Neophocaena phocaenoides* (Cuvier, 1829)
Family-Platanistidae			
40	*গাঙ শুশুক*	Gangetic River Dolphin	*Platanista gangetica* (Roxburgh, 1801)

3.9 Annex 2. Schedule 67 of the Wildlife (Conservation and Security) Act, 2012 for species known or believed to occur in the Sundarbans Mangrove Forest

Schedule-2

Protected Animal

Amphibians			
Sl. No.	Bengali Name	English Name	Scientific Name
Order-Anura			
Family-Dicroglossidae			
1	*ভাসা ব্যাঙ/কটকটি ব্যাঙ*	Skipping Frog	*Euphlyctis cyanophlyctis* (Schneider, 1799)
2	*ঝিঁঝিঁ ব্যাঙ*	Cricket Frog	*Fejervarya* spp
Family-Microhylidae			
3	*ছোট লাউবিচি ব্যাঙ*	Ornate Narrow-mouthed Frog	*Microhyla ornata* (Duméril and Bibron, 1841)
Family-Ranidae			
4	*পানা ব্যাঙ*	Leafing Frog	*Hylarana tytleri* (Theobald, 1868)
Family-Rhacophoridae			
5	*গেছো ব্যাঙ*	Four-lined Tree Frog	*Polypedates leucomystax* (Gravenhorst, 1829)
6	*চিতি গেছো ব্যাঙ*	Spotted Tree Frog	*Polypedates maculatus* (Gray, 1833)
Reptiles			
Order-Testudines			
Family-Trionychidae			
1	*সুন্দি / চিতি কাছিম*	Indian Flap-shelled Turtle	*Lissemys punctata* (Lacepede, 1788)
Order-Squamata (Lacertilia)			
Family-Agamidae			
2	*রক্তচোষা*	Oriental Garden Lizard	*Calotes versicolor* (Daudin, 1802)
Family-Gekkonidae			
3	*তক্ষক*	Tokay Gecko	*Gekko gecko* (Linnaeus, 1758)
4	*গুটি টিকটিকি*	Brook's House Gecko	*Hemidactylus brookii* (Gray, 1845)
5	*পাতি টিকটিকি*	Asian House Gecko	*Hemidactylus frenatus (Schlegel*, 1836)
Family-Scincidae			
6	*মুট্‌কু আঁচিলা/অঞ্জন*	Keeled Grass Skink	*Eutropis* = (*Mabuya*) *carinata* (Schneider, 1801)
Family-Varanidae			
7	*গুইসাপ*	Bengal Monitor	*Varanus bengalensis* (Daudin, 1802)

Family-Boidae			
8	*অজগর*	Rock Python	*Python molurus* (Linnacus, 1758)
Family-Typhlopidae			
9	*দুমুখা সাপ*	Brahminy Blind Snake	*Ramphotyphlops braminus* (Daudin, 1803)
10	*দুমুখা সাপ*	Diard's Blind Snake	*Typhlops diardii* (Schlegel, 1839)
11	*সরু দুমুখা সাপ*	Slender Blind Snake	*Typhlops porrectus* (Stoliczka, 1871)
Family-Acrochordidae			
12	*খসখসে সাপ*	Wart Snake	*Acrochordus granulatus* (Schneider, 1799)
Family-Elapidae			
(Including Hydrophidae)			
13	*বড়শি-নাক দজ্যা সাপ*	Hook-nosed Sea Snake	*Enhydrina schistosa* (Daudin, 1803)
14	*দজ্যা সাপ/সামুদ্রিক সাপ*	Dwarf Sea Snake	*Polyodontognathus caerulescens* (Shaw, 1802)
15	*কালো-হলুদ সামুদ্রিক সাপ*	Annulated Sea Snake	*Hydrophis cyanocinctus* (Daudin, 1803)
16	*চিতি সামুদ্রিক সাপ/ লতি সাপ*	Striped Sea Snake	*Hydrophis fasciatus* (Schneider, 1799)
17	*মোহনার সামুদ্রিক সাপ*	Estuarine Sea Snake	*Hydrophis obscurus* (Daudin, 1803)
18	*চিকনা-মাথা সামুদ্রিক সাপ*	Cantor's Narrow-headed Sea Snake	*Microcephalophis* = (*Hydrophis*) *cantoris* (Günther, 1864)
19	*সামুদ্রিক নলি সাপ*	Slander Sea Snake	*Microcephalophis gracilis* (Shaw, 1802)
20	*ডডিনের সামুদ্রিক সাপ*	Daudin's Sea Snake	*Distera* = (*Hydrophis*) *nigrocincta* (Daudin, 1803)
21	*বেঁটে সামুদ্রিক সাপ*	Short Sea Snake	*Lapemis curtus* (Shaw, 1802)
22	*রঙ্গিলা/হলুদ পেটি সামুদ্রিক সাপ*	Yellow-bellied Sea Snake	*Palamis platurus* (Linnaeus, 1799)
23	*পাতি কাল কেউটে*	Common Krait	*Bungarus caeruleus* (Schneider, 1801)
24	*শঙ্খিনি/বোটালেজ কেউটে*	Banded Krait	*Bungarus fasciatus* (Schneider, 1801)
25	*কাল কেউটে*	Black Krait	*Bungarus niger* (Wall, 1908)
26	*গোখরা*	Monocled Cobra	*Naja kaouthia* (Lesson, 1831)
27	*ফুল গোখরা*	Spectacled Cobra	*Naja naja* (Linnaeus, 1758)
28	*পদ্ম গোখরা/রাজ গোখরা*	King Cobra	*Ophiophagus hannah* (Cantor, 1836)
Family-Viperidae			
29	*চন্দ্রবোড়া/উলুবোড়া*	Russell's Viper	*Daboia (Vipera) russellii* (Shaw and Nodder, 1797)

30	*লাললেজি সবুজ বোড়া*	White-lipped Pit Viper	*Cryptelytrops (Trimeresurus) albolabris* (Grey, 1842)
31	*বাদামীলেজি সবুজ বোড়া*	Spot-tailed Pit Viper	*Cryptelytrops erythrurus* (Cantor, 1836)
Birds			
Sl. No.	Bengali Name	English Name	Scientific Name
Order-Piciformes			
Family-Picidae			
1	*বাতাবি কাঠকুড়ালি*	Fulvous-breasted Woodpecker	*Dendrocopos macei* (Vieillot, 1818)
2	*বাংলা কাঠঠোকরা*	Lesser Goldenback	*Dinopium benghalense* (Linnaeus, 1758)
Order-Coraciformes			
Family-Alcedinidae			
3	*পাতি মাছরাঙ্গা*	Common Kingfisher	*Alcedo atthis* (Linnaeus, 1758)
Family-Cerylidae			
4	*পাকড়া মাছরাঙ্গা*	Pied Kingfisher	*Ceryle rudis* (Linnaeus, 1758)
Family-Meropidae			
5	*সবুজ সূইচোরা*	Green Bee-eater	*Merops orientalis* (Latham, 1802)
Order-Cuculiformes			
Family-Cuculidae			
6	*পাতি চোখগেলো*	Common Hawk-Cuckoo	*Hierococcyx varius* (Vahl, 1797)
7	*বৌকথাকও পাপিয়া*	Indian Cuckoo	*Cuculus micropterus* (Gould, 1838)
8	*করুণ পাপিয়া*	Plaintive Cuckoo	*Cacomantis merulinus* (Scopoli, 1786)
9	*এশিও কোকিল*	Asian Koel	*Eudynamys scolopaceus* (Linnaeus, 1758)
Order-Ciconiiformes			
Family-Scolopacidae			
10	*টিয়া*	Rose-ringed Parakeet	*Psittacula krameri* (Scopoli, 1769)
11	*বন বাটান*	Wood Sandpiper	*Tringa glareola* (Linnaeus, 1758)
12	*পাতি বাটান*	Common Sandpiper	*Actitis hypoleucos* (Linnaeus, 1758)
Family-Sylviidae			
13	*পাতি টুনটুনি*	Common Tailorbird	*Orthotomus sutorius* (Pennant, 1769)
14	*কালচে ফুটকি*	Dusky Warbler	*Phylloscopus fuscatus* (Blyth, 1842)
15	*সবজে ফুটকি*	Greenish Warbler	*Phylloscopus trochiloides* (Sundevall, 1837)

Family-Alaudidae			
16	*উদয়ী অভ্রভরত*	Oriental Skylark	*Alauda gulgula* (Franklin, 1831)
Family-Passeridae			
17	*পাতি চড়ুই*	House Sparrow	*Passer domesticus* (Linnaeus, 1758)
18	*ধলা খঞ্জন*	White Wagtail	*Motacilla alba* (Linnaeus, 1758)
19	*পশ্চিমা হলদেখঞ্জন*	Western Yellow Wagtail	*Motacilla flava* (Linnaeus, 1758)
20	*ধানী তুলিকা*	Paddyfield Pipit	*Anthus rufulus* (Vieillot, 1818)
Mammals			
Family-Cervidae			
1	*চিত্রা হরিণ*	Spotted Deer	*Axis axis* (Erxleben, 1777)
2	*বন শুকর*	Wild Boar	*Sus scrofa* (Linnaeus, 1758)
Fishes			
1	*ভাঙ্গন / ভাঙ্গন বাটা*	Boga Labeo	*Labeo boga* (Hamilton,1822)
2	*কোঠা কুমিরের খিল*	Deocata Pipefish	*Microphis deocata* (Hamilton, 1822)
3	*কুইচা/কুইচা*	Gangetic Mudeel	*Monopterus cuchia* (Hamilton, 1822)
Family-Scatophagidae			
4	*বিষতারা*	Spotted Scat	*Seatophagus argus* (Linnaeus, 1766)
Order-Siluriformes			
Family-Plotosidae			
5	*গাঙ মাগুর/কান মাগুর*	Canine Catfish	*Plotosus canius* (Hamilton, 1822)
Family-Schilbcidae			
6	*শিলং মাছ*	Silondia Vacha	*Silonia silondia* (Buchanan, 1822) [Hamilton, 1822]
Arthropods			
Crustacea (Crabs & Lobster)			
Family-Portunidae			
1	*শীলা কাঁকড়া*	Coral Crab	*Charybdis feriatus* (Linnaeus, 1758)
2	*বড় কাঁকড়া/ হাবা কাঁকড়া*	Giant Mud Crab/ Mangrove Crab	*Scylla serrata* (Forskal, 1775)

3.10 Annex 3. Schedule 71 of the Wildlife (Conservation and Security) Act, 2012 for species known or believed to occur in the Sundarbans Mangrove Forest

Schedule-4

Protected Plants

Sl. No.	Bengali Name	English Name	Scientific Name
1	*আমুর*	Amur	*Amoora* [*Aglaia*] *cucullata* (Roxb.) [Roxburgh, 1819]
2	*কির্পা*	Khirpa	*Lumnitzera racemosa* Willd. [1803]
3	*খলশী*	Khalshi	*Aegiceras corniculatum* Blanco [1837] [Linnaeus]
4	*সিংড়া*	Shingra	*Cynometra ramiflora* [Linnaeus, 1753]
5	*সমুন্দর ফল*	Samundarphal	*Barringtonia racemosa* [Linnaeus; Sprengel, 1826]
6	*পশুর*	Passur	*Xylocarpus mekongensis* [*moluccensis*] Piere. [Lamarck, 1846]
Orchid			
1	*বালভো পাইলাম*	Bulbo phyllum	*Bulbophyllum roxburghii*(Reich.) [Reichenbach, 1864]

Appendix 3. SMART Patrol Plan Approval Form

This form is to be completed by the SMART Patrol Team Leader and approved and signed by the Range Officer before starting the patrol.			
Name of Patrol Team:		Patrol Plan Number:	
Name of Range:			
Start date of patrol:		Start time of patrol:	
End date of patrol:		End time of patrol:	
Team Composition	Name	Phone Number(s)	Signature
Patrol Team Leader			
Deputy Team Leader			
Wildlife and Threat Monitoring Officer			
Data Recorder			
Security Guard 1			
Security Guard 2			
Security Guard 3			
Security Guard 4			
Launch Master (Pilot)			
Driver			
Cleaner			
Cook			
Labour			
Fiberglass Boat Driver			
Helper			
Speed Boat Driver			
ID Number of each firearm:	GPS number:	Tablet Number:	Log book number:
Emergency Contact Numbers			
Patrol Mandate (tick √ one)	■ Law Enforcement and Wildlife Monitoring; ■ Law Enforcement; ■ Wildlife Monitoring		
Name and Designation of Patrol Approval Officer			

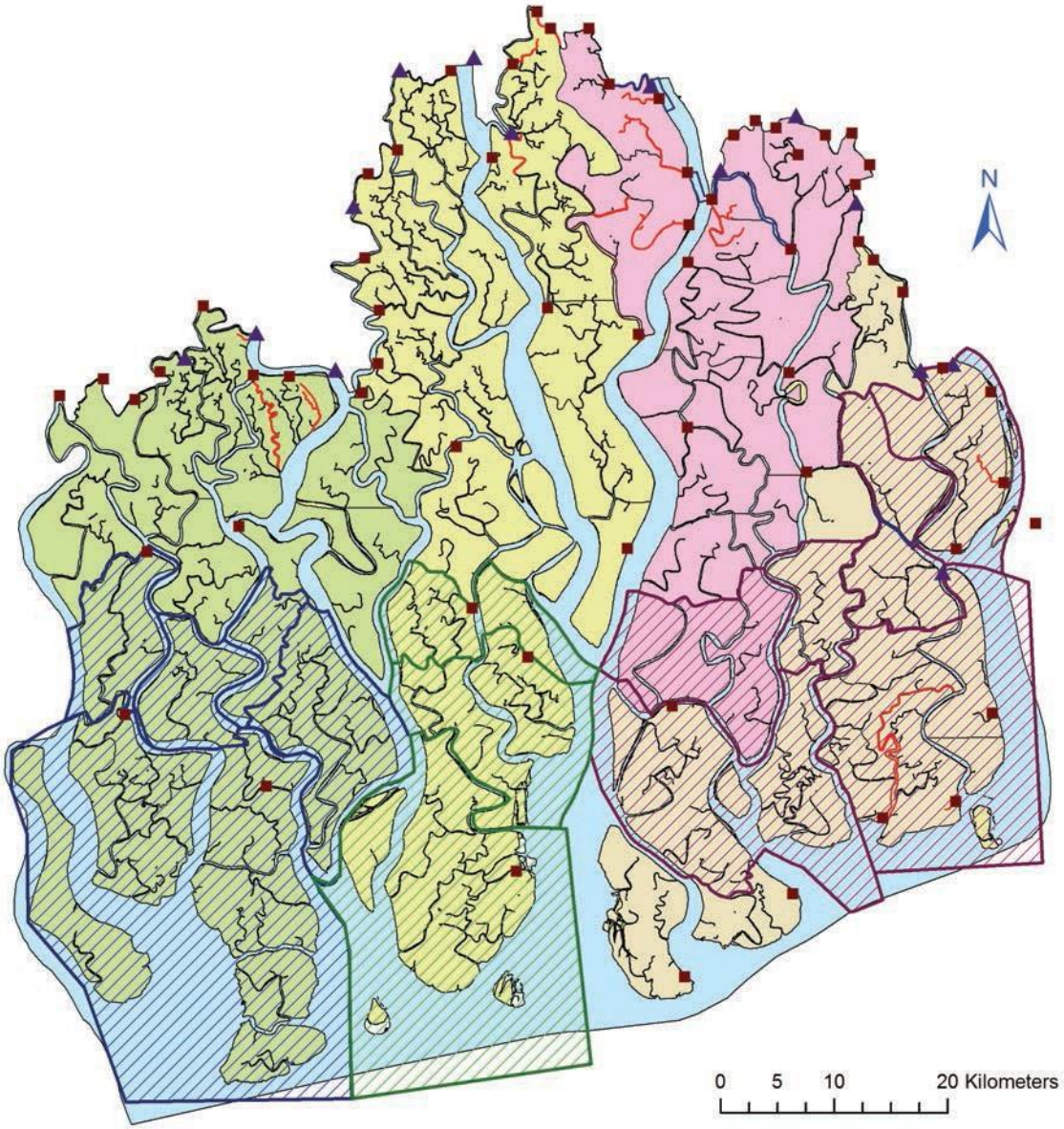
Checklist of equipment and supplies for patrol

- ☐ Handbook for SMART Patrols in the Sundarbans
- ☐ General Log Book
- ☐ Human Encounter Log Book
- ☐ Offenders and Seized Items Handover Form
- ☐ Sundarbans Atlas
- ☐ The Forest Act, 1927 (Amended in 2000)
- ☐ Educational Outreach materials
- ☐ GPS with data cable
- ☐ Extra AA batteries for GPS
- ☐ CyberTracker smart tablet or phone with charging cable
- ☐ Power bank with cable
- ☐ Solar charger with cable
- ☐ Binoculars
- ☐ Camera, battery and memory cards
- ☐ Go-Pro Camera with fully charged batteries
- ☐ Wildlife mortality monitoring kit
- ☐ Salt for sample preservation
- ☐ Plastic jars with lids
- ☐ Hand gloves
- ☐ Zip-lock polythene bags
- ☐ Polythene bags without ziplock
- ☐ Ice box
- ☐ Ice
- ☐ Mobile phone, fully charged, with extra battery and SIM cards
- ☐ VHF hand-held radio
- ☐ Walkie-talkie
- ☐ First-aid kit
- ☐ Powerful torchlight with extra batteries
- ☐ Firearms and ammunition
- ☐ Guns
- ☐ Gun oil
- ☐ Flute
- ☐ Lighter
- ☐ Gum boots
- ☐ Waterproof bag for equipment
- ☐ Pen
- ☐ Waterproof marker
- ☐ White board market
- ☐ Water pump belt
- ☐ A4 size papers
- ☐ Seal of Team Leader
- ☐ Stamp pad (Seal pad)
- ☐ Measuring Tape
- ☐ Measuring Scale
- ☐ Knife
- ☐ Curving machete
- ☐ Axe
- ☐ Matches
- ☐ Gasket
- ☐ Bucket for removal of water from boat
- ☐ Cotton rags for removing water from boat
- ☐ Signal flares
- ☐ Strong long-thick rope for tying boat;
- ☐ Water pump belt
- ☐ Fuel (diesel and patrol) delivery pipe
- ☐ Tools for fixing the engine, including wrench, pliers and screw drivers
- ☐ Drinking water
- ☐ Snacks (toast, biscuits, puffed rice etc.)
- ☐ Food

Patrol Target (Patrol route should be marked on the SMART Patrol Route Map below:	

SMART Patrol Route Map

(Source: Bangladesh Forest Department)



Appendix 4a. General Log Book for SMART Patrolling in the Sundarbans

Name of Range:

This section will be completed by SMART Data Coordinator	
Log Book Number	
Issuing Date (Day/Month/Year)	
Issuing Officer (Name, Designation)	
Team/Post Name (for which the book is issued)	

This section will be completed by Patrol Team Leader during submission of this log book to the Range Officer			
Start date of book used		End date of book used	
Name, Designation			
Signature			
Date of Submission			

This section will be completed by Range Officer when receiving the log book	
Name	
Signature	
Receiving Date	

This section will be completed by SMART Data Coordinator when receiving the log book	
Name	
Signature	
Receiving Date	

AT START OF PATROL

1) Keep one copy of the emergency contact numbers in a location on your boat where all patrol team members can see it; 2) Turn on GPS, clear the current track line, and hang the GPS around your neck or clip it on your waist belt, 3) Save start waypoint and time in GPS and record these in log book; 4) Fix Go-Pro with harness to your chest; 5) Hang binoculars around your neck; 6) All patrol team members take assigned positions on deck of the patrol boat; 7) Make sure that all log books are in a safe location and do not fly with the wind into the water.

DURING PATROL

1) Take a waypoint and record time during law enforcement events or wildlife sightings, 2) Record number, gender, behavior, habitat in Observation and Action Taken column, 3) Write down name of creek where the event occurred or wildlife is sighted in Creek Name column, 4) If you see any animal on the river bank, in the water or on land, take a way point when the boat comes to a perpendicular position to the observed animal and then estimate the distance of the animal from your position. Write down the estimated distance in Distance column.

AT END OF PATROL

1) Take an end waypoint and time; 2) Save the track line in GPS, clear the current track and turn off GPS; 3) Store the log books in a safe location; 4) Download the GPS and Go-Pro files and rename files with the name of the team and the date; 5) Create a new patrol in the SMART data base. Rename it as Chandpai-SMF_000001 or Sarankhola1-SMF_000001 or Khulna1-SMF_000001 or Satkhira1-SMF_000001……2, 3; 6) Import the track lines and waypoints in the newly created patrol file from the GPS and enter all data from the log books; 7) Export the created patrol and rename exported patrol folder by adding the date at the end of the patrol name (e.g., Chandpai1-SMF_000001-15June2016.zip). Send the patrol folder to the Range Officer or Data Manager by e-mail or in a pen-drive; 8) Clean and safely store the GPS, Go-Pro, binoculars, log books and all other equipment.

WILDLIFE (Live animals and signs)

Record observations of the following key species:

CATS	DEER & PIGS	BIRDS	REPTILES	Type of observation
1. Bengal tiger 2. Fishing Cat 3. Leopard Cat	1. Spotted Deer 2. Barking Deer 3. Wild Boar 4. Rhesus Monkey	1. Masked Finfoot 2. Lesser Adjutant 3. White-rumped Vulture 4. White-bellied Sea Eagle 5. Brown-winged Kingfisher	1. River Terrapin (Batagur) 2. Estuarine Crocodile 3. Water Monitor 4. King Cobra 5. Rock Python	1. Direct sighting 2. Scrape on ground 3. Dung 4. Feeding sign 5. Scratch tree 6. Footprint 7. Scent mark
DOLPHINS	OTTERS			
1. Ganges River Dolphin 2. Irrawaddy Dolphin 3. Finless Porpoise	1. Small-clawed Otter 2. Smooth coated Otter			

Day		Month		Year		Armed	☐Yes ☐No	Name of Team	
Patrol Area	☐Inside Sanctuary ☐Outside Sanctuary ☐Locality Outside Sundarbans			Name of Pilot:					

GPS #		Camera#		Go-Pro#		Boat type	
Tide at Patrol Start	☐Rising ☐Falling ☐High ☐Low			Tide at Patrol End		☐Rising ☐Falling ☐High ☐Low	
Team Leader				Deputy Team Leader			
Wildlife and Threat Monitoring Officer				Data Recorder			
Security 1				Security 3			
Security 2				Security 4			

TIME	WayPoint	Photo#	OBSERVATION and ACTION TAKEN (Number, Gender, Behaviour, Habitat)	Creek Name	Distance (Meter)

Appendix 4b: Human Encounter Log Book for SMART Patrols in the Sundarbans

(For forest, fishery and wildlife crime, and wildlife carcass or body part examination)

Name of Range:

This section will be completed by SMART Data Coordinator	
Log Book Number	
Issuing Date (Day/Month/Year)	
Issuing Officer (Name, Designation)	
Team/Post Name (for which the book is issued)	

This section will be completed by Patrol Team Leader during submission of this log book to the Range Officer			
Start date of book used:		End date of book used:	
Name, Designation			
Signature			
Date of Submission			

This section will be completed by Range Officer when receiving the log book	
Name	
Signature	
Receiving Date	

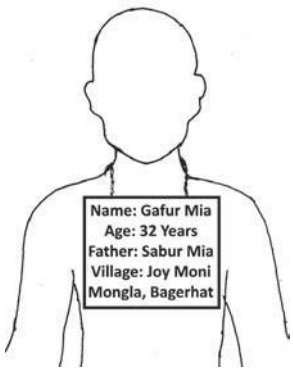
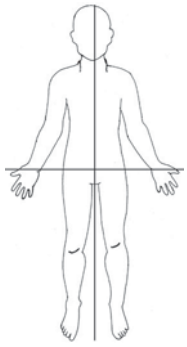
This section will be completed by SMART Data Coordinator when receiving the log book	
Name	
Signature	
Receiving Date	

STOP AND SEARCH PROTOCOL

When encountering people during a patrol, the following guidelines will help to minimize the risks to you and your team while improving the effectiveness of your information capture.

(1) Assess risk of situation; (2) Turn on Go-Pro; (3) Be aware of yourself, your team and your surroundings; (4) Ensure professional and courteous behavior of all team members at all times; (5) State reasons for stopping the suspected person; (6) Separate and search the suspected persons; (7) Search the area for discarded evidence; (8) Record contact details of all persons and take photographs and video footage; (9) Seize prohibited items; (10) Arrest/Release individual(s); (11) Ensure that suspects are handled properly at all times; (13) Fill out all relevant sections in the log book.

INFORMATION COLLECTION

<table>
<tr>
<td> 
</td>
<td colspan="2">1) SUSPECT DETAILS
Take a clear photograph of an individual for identification.
The suspect should hold a sheet of paper with his name, date, time and location of the incidence on it.
• Head and shoulder photo (as pictured on left)
• Full body length photo
2) PHYSICAL DESCRIPTION
As in Table 1.1-1.2 People</td>
</tr>
<tr>
<td>  </td>
<td colspan="2">3) SEARCH PERSON FOR WEAPONS, WILDLIFE, SNARES
Make a list of the items which were found and seized, give clear descriptions, take photographs of each item and report numbers/ amounts.</td>
</tr>
<tr>
<td> </td>
<td>4) BOAT DETAILS
• Describe the boat and include a photograph.
• State name and distinguishing marks of the boat.
• Before searching the boat, re move all people or move them to the far end of the boat.</td>
<td>5) ACTION TAKEN
State what happened to the person stopped and searched. Educate people about laws and rules and give them educational documents.</td>
</tr>
</table>

HUMAN, FOREST, WILDLIFE AND FISHERIES CRIME, AND WILDLIFE CARCASS OR BODY PART EXAMINATION

(NOTE: This form only needs to be completed if a human/forest/fisheries/wildlife crime is observed or a wildlife carcass or body part is examined.)

Date		Patrol No. (To be completed by Patrol Team Leader)	
GPS No.		Station/Camp	
CyberTracker Device No.		Go-Pro No.	
Patrol start waypoint		Patrol end waypoint	
Patrol start time		Patrol end time	

Table 1. People			
Waypoint		Number of people	

Violations (additional boxes that must be completed including Table 1.1 and 1.2)

- Wildlife poaching/trafficking (Table 2 & 6)
- Camp or shelter (Table 3)
- Fishing, wood cutting, fire, NTFP, cattle grazing, land encroachment, agriculture, pollution, vessel traffic (Table 4)
- Weapons, munition, traps (Table 5)
- Wildlife carcass or body parts examination (Table 6)

Table 1.1 People's Detail	Person 1	Person 2
Name		
Father's name		
Profession		
Address		
Sex	□Male □Female	□Male □Female
Age		
Date of birth		
Height		
Body colour	□Light Brown □Brown □Black	□Light Brown □Brown □Black
Eye colour	□Brown □Black □Green	□Brown □I □Green
Clothing		
NID number		
Mobile#		
Photo # head-shoulder		
Photo # full Body		
Left thumb print		
Right thumb print		
Infraction		
Armed	□Yes □No	□Yes □No
Permit No.		
Book No.		
Permit holder		
Station that issued permit		
Action taken	□Arrested, □Prosecution Offence Report (POR) □Compound Offence Report (COR) □Undetected Offence Report (UDOR), □Written alert, □Verbal alert □Handed over to nearest camp, Name of camp: …….	
Additional details:		

Table 1.2 People's Detail	Person 3		Person 4	
Name				
Father's name				
Profession				
Address				
Sex	□Male □Female		□Male □Female	
Age				
Date of birth				
Height				
Body colour	□Light Brown □Brown □Black		□Light Brown □Brown □Black	
Eye colour	□Brown □Black □Green		□Brown □Black □Green	
Clothing				
NID number				
Mobile#				
Photo # head-shoulder				
Photo # full body				
Left thumb print				
Right thumb Print				
Infraction				
Armed	□Yes □No		□Yes □No	
Permit No.				
Book No.				
Permit holder				
Station that issued permit				
Action taken	□Arrested, □Prosecution Offence Report (POR), □Compound Offence Report (COR), □Undetected Offence Report (UDOR), □Written alert, □Verbal Alert, □Handed over to nearest Camp, Name of Camp:……			
Additional details:				

Table 2. Wildlife Poaching/Trafficking	
Observation	□Direct observation, □Sound of gunfire, □Carcass or body parts, □Weapons or traps, □Intelligence or witness
Wildlife status	□Live-healthy, □Alive but injured, □Fresh, □Rotten, □Dried, □Smoked, □Frozen
Details on carcass or body parts	□Full animal, □Meat, □Skin, □Teeth, □Claw, □Antler, □Bone, □Fat/Oil, □Internal organs, □Feathers Amount in kg…….. Total # of pieces……..
Species	
Observation details:	
Action wildlife product	■ Seized, □ Carried to station, □ Burnt, □ Buried, □ Left at scene
Action details:	
Photo#s	
Video#s	

Table 3. Camp or Shelter	
State	□Occupied, □Abandoned, □Unknown
Camp function	□Fishing, □Hunting, □Timber, □Fuel wood, □NTFP, □Agriculture, □Dacoits, □Other
Camp capacity	□Small (1-2 people), □Medium (3-5 people), □Large (> 5 people)
Structures	□Hut#_____□Tent#_____□Platform_____□Drying racks#_____
Action taken	□Destroyed, □Collected evidence, □None
Photo#s	
Video#s	
Notes on details	

Table 4. Fishing, Wood Cutting, NTFP, Cattle Grazing, Fire, Agriculture, Pollution, Vessel Traffic	
Observation	□Drifting gillnet, □Fixed-floating gillnet, □Set-bag net, □Long-shore net, □Creek net, □Long line, □Post-larvae net, □Crab trap, □Other…… Net length(m) ……, Net width(m) ……, Mesh(mm) ……. Number of hooks……., Number of traps…… □Honey collection, □Poison fishing: Amount in liters…… kg…….. Brand of poison…… □Jatka Ilish during November-June (less than 10"), □Pangas of <12" during November-July, □Bhola, Silon, Ayer of <12" during February-June, □Boal of <12" during April-August, □Catla, Kalibaus, Rui, Mrigel or Ghania of <12" during July to December, □Mother fish with fry of Shol, Gazar or Taki during April-August, □Crab during January-February, □Male Crab <200gm, □Female Crab <130gm, □Cattle grazing: Amount in Number…… □Wood Log, □Stump, □Plank, □Charcoal, □Fire wood collection: Species…… Amount in cubic feet……, kg……, bags…… number logs…… Status of wood cutting: □Fresh, □Recent, □Old, □Very old □Fire, □Agriculture, □Oil spil: Area (sq meter)…… □Garbage amount: □Less than trash-bin, □>Trash bin but <Barrel, □>Barrel □Cargo, □Coaster, □Oil-tanker, □Dinghy, □Trawler (open), □Trawler (covered): Name……Length(m)……Width(m)……Draft(m)……
Observation details	
Action	□Arrested, □Seized gear, □Seized boat, □ Seized product,□Released, □Educated, □Escorted and taken out, □Issued citation, □Destroyed, □Handed over to nearest camp (Name of camp)……
Action details	
Photo#s	
Video#s	

Table 5. Weapons, Munitions, Traps			
Weapon type: Rifle, Shotgun, Handgun, Automatic rifle, Musket loader, Assault weapon, Bow and arrow, Spear, Axe, Machete, Curving knife, Saw	Number of weapons of each type	Name of manufacturer, locally bought, or homemade	Serial no. on firearms
Trap type: Whip trap-stick trigger, Whip trap-string trigger, Pit-whip trap, Leg-neck snare, Neck snare, Poison bait, Fruit bait, Hook bait, Animal bait, Box or Cage	Number of traps of each type	Materials: Wire, rope, bamboo, wooden pole	Bait (□ Y /□ N) If yes, Type?
Caliber of munition: Caliber_____# live_____# spent _____ Caliber_____# live_____# spent _____ Caliber_____# live_____# spent _____		Action taken: □Destroyed □Collected as evidence □None	
Notes:			

Photo#s	
Video#s	

Table 6. Wildlife carcass or body part examination				
Patrol No.	Date	GPS No.	Waypoint	Time
Location	Wildlife type	Species name	Age/status of carcass	
	□Mammal, □Bird, □Reptile, □Amphibian		□Fresh, □Partly decomposed, □Fully decomposed, □Dried	
Sex	Age	Where found?	Photo #s	
□Male □Female □Unknown	□Adult, □Sub-adult; □Calf □Unknown	□Land above high tide, □Shore below high tide, ■ Floating, □ Village	Top view:	
			Bottom view:	
			Side view:	
			Close ups:	

Total weight (kg)	Total length (cm)	Head length (cm)	Tail length (cm)	Beak length (cm)	Fluke width (cm)
Dolphin dorsal fin height (cm)	Girth at anterior point of dorsal fin (cm)	Flipper length (cm)	Flipper width (cm)	# teeth on upper jaw	# of teeth on lower jaw

Missing body parts:	
Suspected cause of death: □Shooting, □Poisoning, □Trapping, □Illness, □Fishing gear, □Vessel collision, □Predator/ tiger attack, □Injury, □Old age, □Unknown	Evidence of human cause: □Local report, □Visible wound, □Hunting equipment with carcass, □Fishing gear with carcass, □Other: ……
Details on suspected cause of death and evidence of human interactions:	

Action taken with carcass or body parts: □Buried, □Burned, □Collected, □None	Collected parts: □Whole body, □Skin, □Muscle, □Bones, □Teeth, □Antlers, □Skull, □Skeleton, □Claw, □Internal organs (Specify): ……	Dolphin skin sample bag number: ……	Fishing gear type if entangled: ……
Additional details:			

Photo#s	
Video#s	

Appendix 5. Offender and Seized Items Handover Form

Date of handover:	Time:
Name of Range:	
Name of Station:	
Jurisdiction Camp/Station:	
Name of Offence Area/Creek/River where incidence occurred:	
Offence Type:	
Waypoint of Incident:	Waypoint of Seizure:
Latitude (N)	Latitude (N):
Longitude (E)	Longitude (E):
List of Seized Items (use back side of this page if required):	
1. 2. 3. 4. 5. 6.	7. 8. 9. 10. 11. 12.

List of Arrested Offenders:

SL#	Name	Father's Name	Village	Union	Thana	District
1						
2						
3						
4						
5						

Permission number:	Date Permission taken:
Boat Reg. number:	

…… ……

Signature of officer handing over offender and/or seized items

Name of SMART Team:

Seal with name, designation

Signature of officer receiving offender and/or seized items

Seal with name, designation

Appendix 6. Bangladesh Form No.- 1648 [Property Seizure Letter]

Number: ……..……

To the Magistrate of……

Date: ……

Sir,

This is to state that according to the Section …… of the Forest Act, 1927 for committing punishable offence in Government's Reserved/Protected forest, today I have seized the following property of ……..…… son of ……, Village:……..……, Thana: ……..……..

1.

2.

3.

I have made a report of the circumstances to the Divisional Forest Officer.

2. The accused person is willing to compound the case and I am waiting for the order of the Divisional/Range Officer on how much value/money he has to pay as compensation for the compounding.

Sincerely Yours,

……

…… Ranger/Forester

Place: ……

..…… Range

Copy of this letter with enclosed Report No: ……. Date …….. is submitted to the Divisional Forest Officer.

Place:……

……

Ranger / Forester

Date: ……

Appendix 7. Evidence Collection Tag

Incidence Number:	Tag/Item Number:
Date (dd/mm/yyyy):	Time:
Waypoint Number:	
Lat (N):	Long (E):
Name of Creek/River:	Collected By:
Preserved By:	Photographed By:
Name of Suspect(s):	Address of Suspect(s):
Items Description:	

Appendix 8. Field Manual for Data Collection Using CyberTracker

(Adapted from <www.cybertracker.org/downloads/software/Training-Manual-SMART-3.0.1.pdf>)

1. CyberTracker

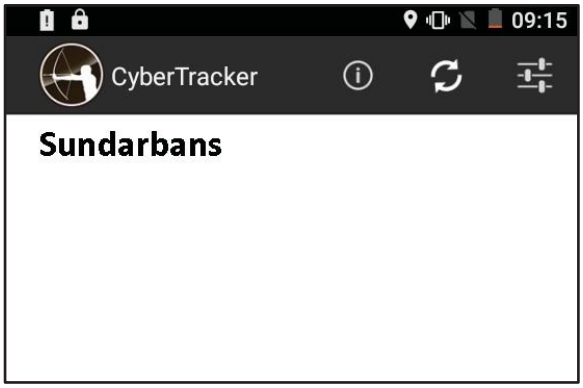
CyberTracker is a software application for GPS for the collection of field data and visualization. You can use CyberTracker on a smart phone or mobile device to record any type of observation using a configured data model of your local SMART data model (see section 9 below for the data model of Sundarbans).

SMART-CyberTracker collects GPS data and observation data in a single unit. After downloading the track log from the CyberTracker equipped handheld device (smart tablet or phone) into the SMART database on a computer, the GPS and observation data is transferred to SMART in a semi-automated process (see details in section 5 below).

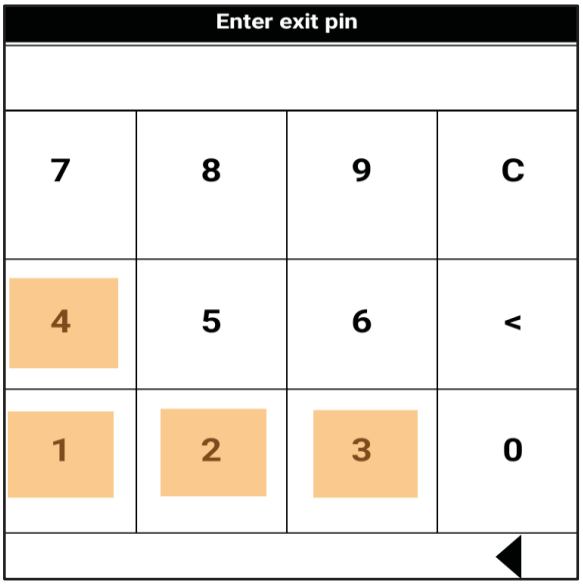
2. Recording Data on a Smart Tablet or Phone

To begin the process of recording data:

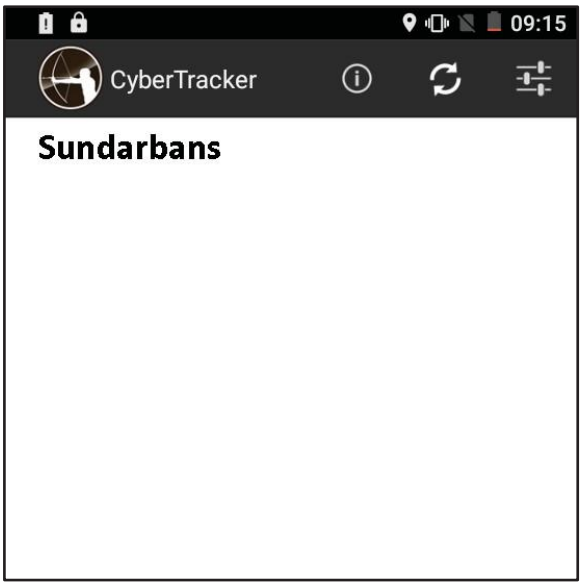
- Turn on the GPS on the CyberTracker equipped smart tablet or phone.
- Start the CyberTracker application by tapping on the CyberTracker icon on your home screen. You will see the screen on right side.
- Tap on the data model "**Sundarbans**".



If CyberTracker starts with the screen as shown on right side, enter exit pin code "**1234**".

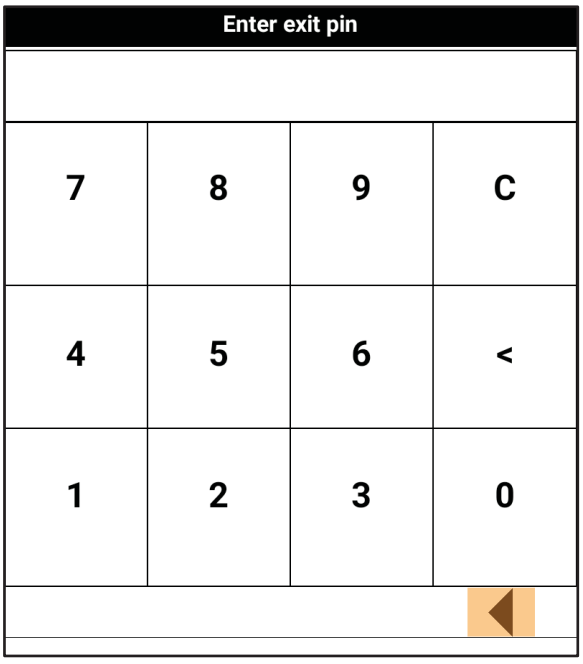


- Now you will see the screen on right side.
- Tap on “**Sundarbans**” .



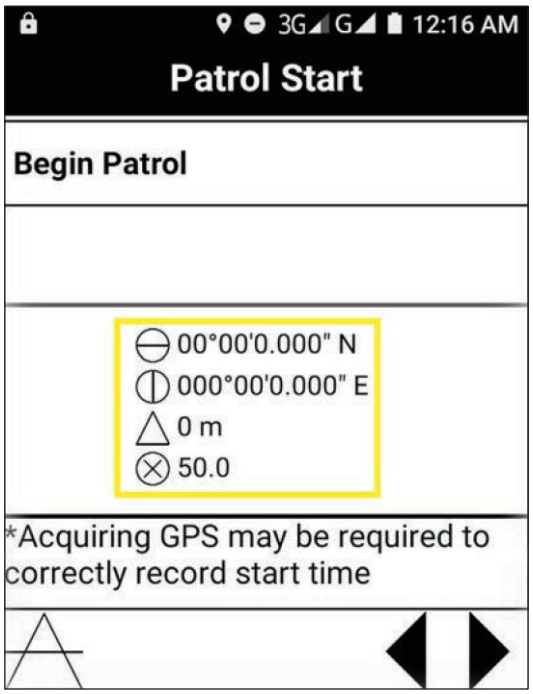
You may see one of the two screens below (NOTE: To begin a CyberTracker patrol you will need to see the 2nd screen right side below):

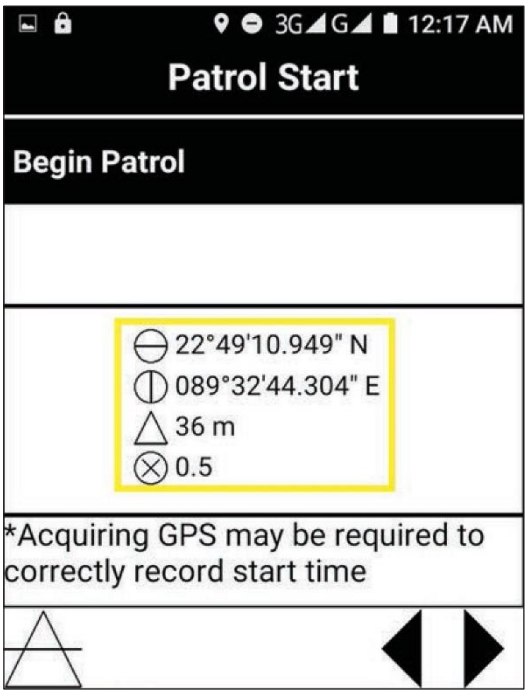
If the 1st screen appears, tap on **back arrow** ◀ on the bottom of the screen. The 2nd screen will appear.



- Tap on **Start New Patrol** to begin patrol and tap on **Forward** icon ▶ at the bottom right corner of the screen**.**
- Wait for the GPS signal to Begin Patrol (See yellow highlights in the display screen below).

NOTE: You need to see the GPS coordinates like shown on the right screen below.



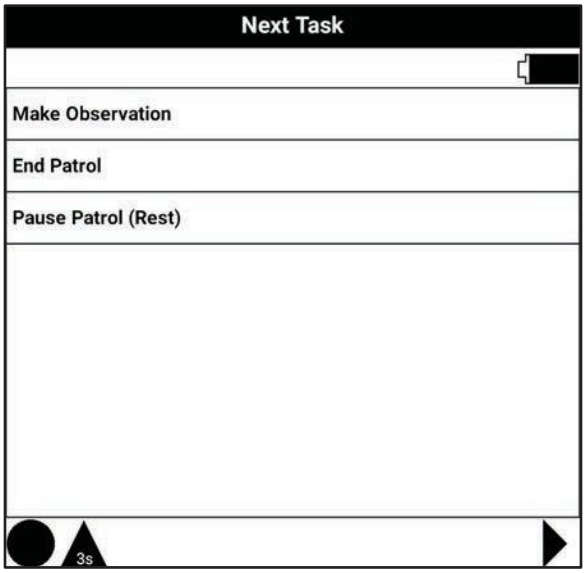


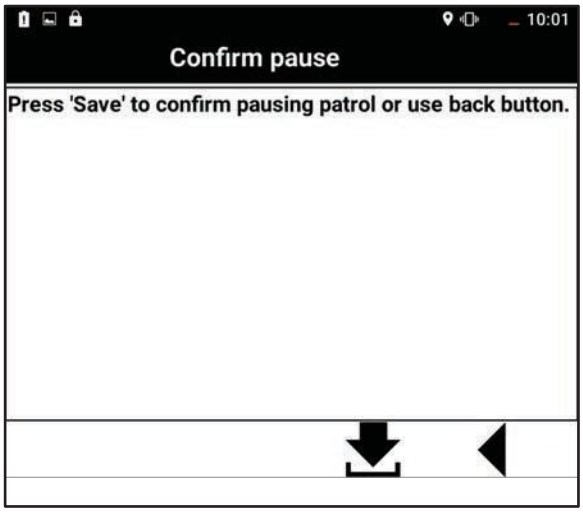
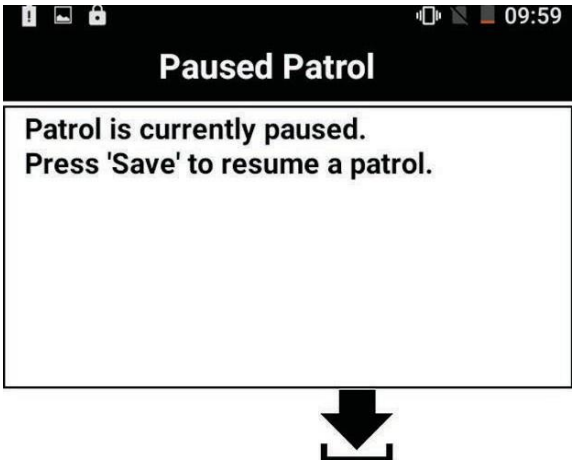
- Complete the Patrol Configuration screens to define the Patrol characteristics (see section 4 below for Detail Steps for Recording Observation in CyberTracker).

NOTE: By tapping on the **forward arrow** ▶ at the bottom right corner of the screen you can skip the options sections.

3. Recording Observations Using CyberTracker on Smart Tablet or Phone

After the Patrol Configuration options are entered you are now able to collect data using your CyberTracker in your smart tablet or phone.

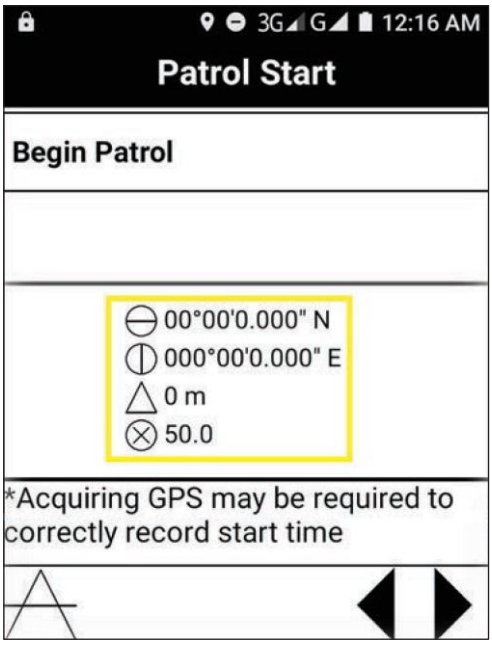


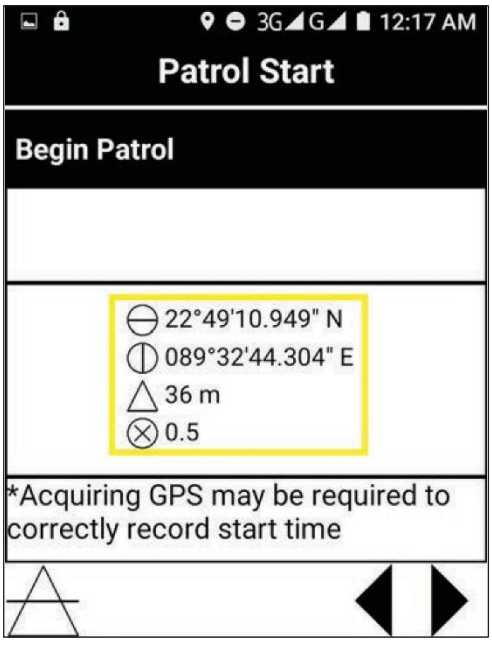
Make Observation	Load the configured data model **"Sundarbans"** to allow entry of observations.
End Patrol	Ends the Patrol.
Pause Patrol (Rest)	Stops recording track information during extended rest periods to avoid having the track information accumulate. This option should only be used during extended rest periods. After tapped on **Pause Patrol (Rest)**, you have to tap on **Save** icon to confirm Pausing Patrol. 
Resume Patrol	All **Paused Patrols** should be resumed by tapping on **Save** icon to start recording track information and collecting data. Once resumed, the track information will resume from the last recorded position. **CAUTION:** If you do not Resume Patrol before restarting a patrol, the GPS track will not be recorded. 
	Opens up the Options screen.

	Displays the **time interval** when GPS track points are collected. If there is no number visible in the triangle, then the device will not record track information. So, check this icon after installation of CyberTracker with a test patrol and make the necessary changes in the CyberTracker Properties in the SMART software in your computer - GPS tab (track timer) and re-export the patrol to the smart tablet or phone.
	Back arrow to return to previous screen.
	Forward arrow to advance to next screen.
	Saves the observation.
Skip GPS	If no GPS signal is available, you will be prompted to skip GPS collection and advance to the next screen. This will create a waypoint without location coordinates. During patrols never skip GPS.
Save As New Waypoint	Creates a new GPS waypoint location and assigns the observation to the new waypoint.
Add To Last Waypoint	Assigns the observation to the previous waypoint. This should be used when multiple observations are recorded at a single location.

4. Detail Steps for Recording Observation in CyberTracker

- Tap on Data Model "**Sundarbans**" at the top of the screen. Then tap on **Forward** icon ▶ at the bottom right corner of your screen.
- Tap on **Start New Patrol** at the top of the screen and wait for GPS signal (see **yellow** highlights below). Once the GPS signal appears, tap on Forward icon .



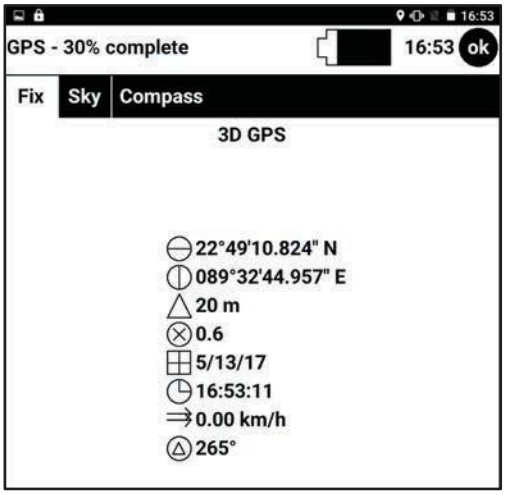


- Tap on **Begin Patrol** then on **Forward** icon ▶.
- Tap on "**Water**" then on **Forward** icon ▶.
- Tap on "**Boat Type**" then on **Forward** icon ▶.
- Tap on "**Yes or No**" for arms then on **Forward** icon ▶.
- Tap on a "**Team**" then on **Forward** icon ▶ .
- Tap on a "**Station**" then on **Forward** icon ▶.
- Tap on a "**Mandate**" then on **Forward** icon ▶.
- Tap on **Forward** icon ▶ to skip **Objective**.
- Tap on **Forward** icon ▶ again to skip **Comments**.

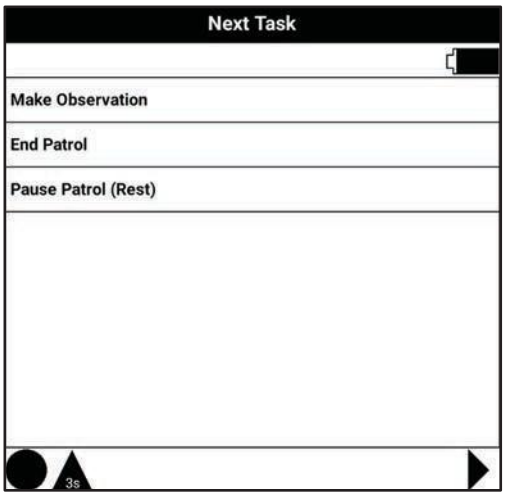
NOTE: You can tap on an empty part of the screen to bring up the keyboard so you can type in Objectives or Comments.

- Select "**Team Members**" then tap on **Forward** icon ▶.
- Select "**Team Leader**" then tap on **Forward** icon ▶.
- Select "**Pilot**" then tap on **Forward** icon ▶.
- Select "**Make Observation**" then tap on **Forward** icon ▶.
- Select **"Position"** then tap on **Forward** icon ▶.
- Select "**Patrol Start**" then tap on **Forward** icon ▶.
- Select "**Tidal Condition**" then tap on **Forward** icon ▶.
- Select **"Save As New Waypoint**" then tap on **Forward** icon ▶.
- Tap on "**Save**" icon (the Arrow pointing down into a box) on the left side of **Forward** icon ▶ to capture your GPS location and save your data.

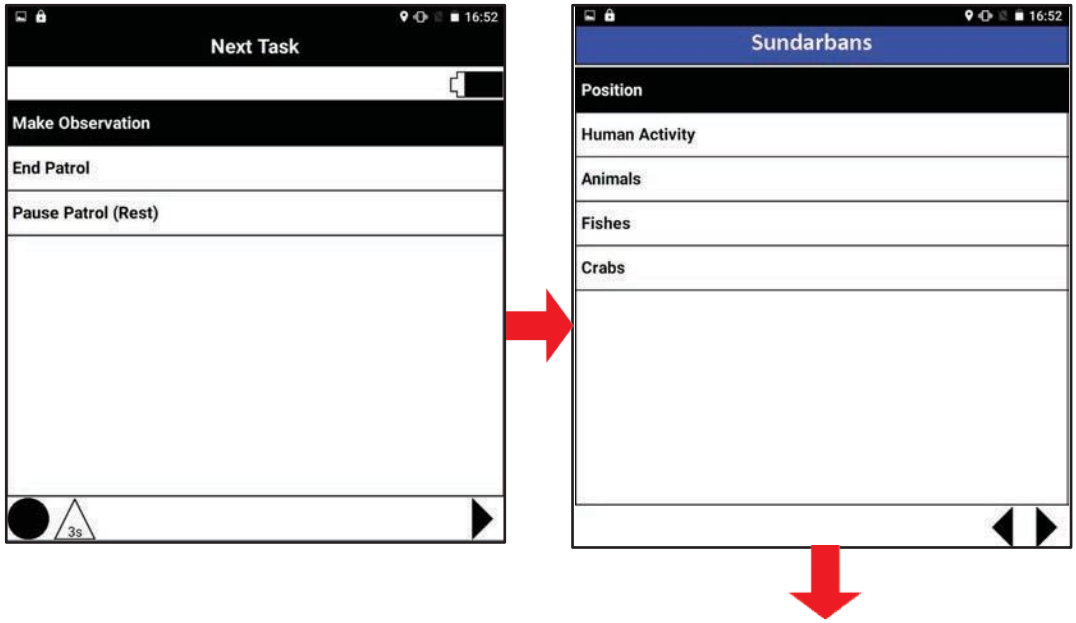
♦ Wait for the GPS coordinate to be 100% completed (see the figure to the right).



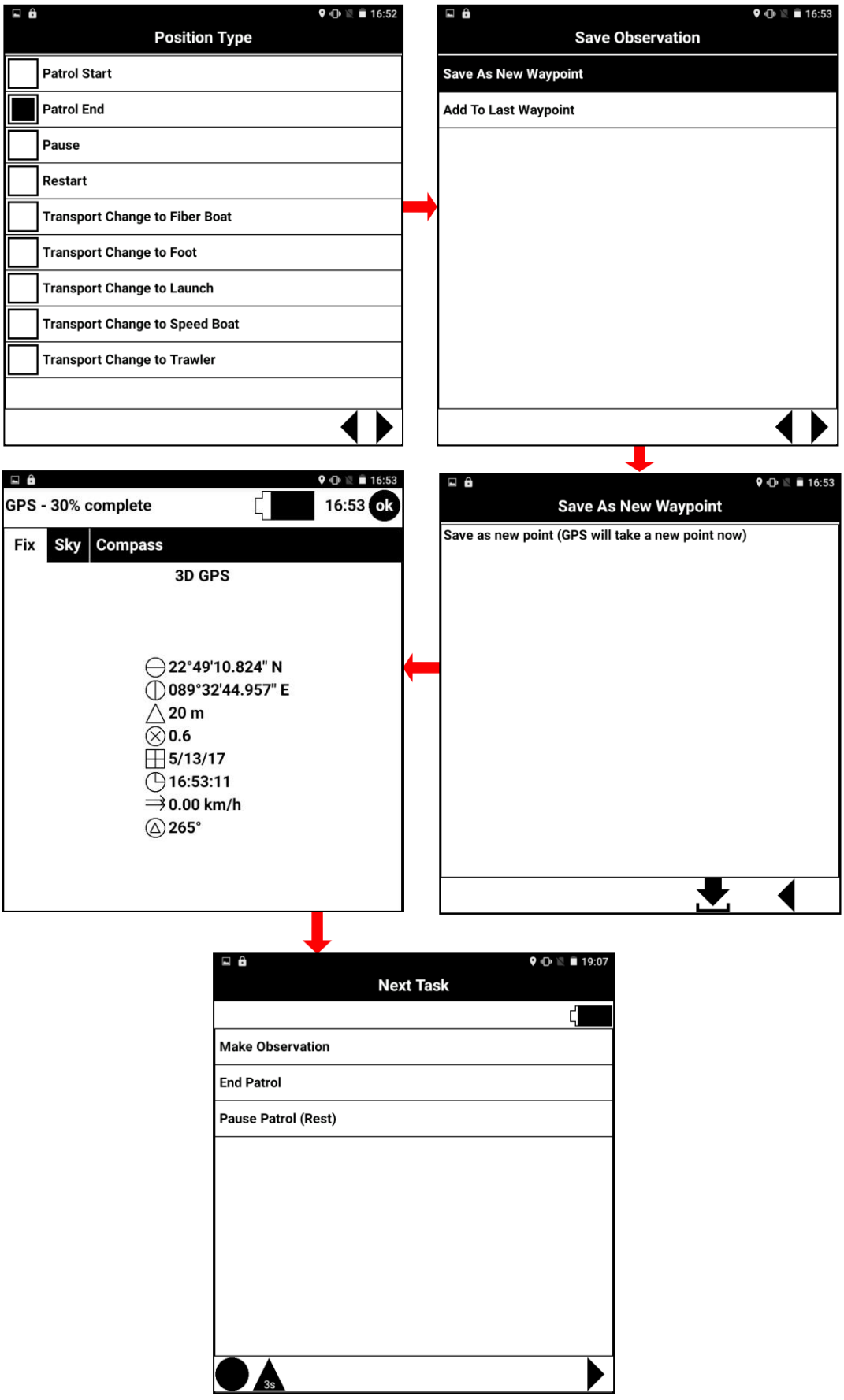
- Now the “Next Task” screen appears, and you are ready to record another observation(see the figure to the right).



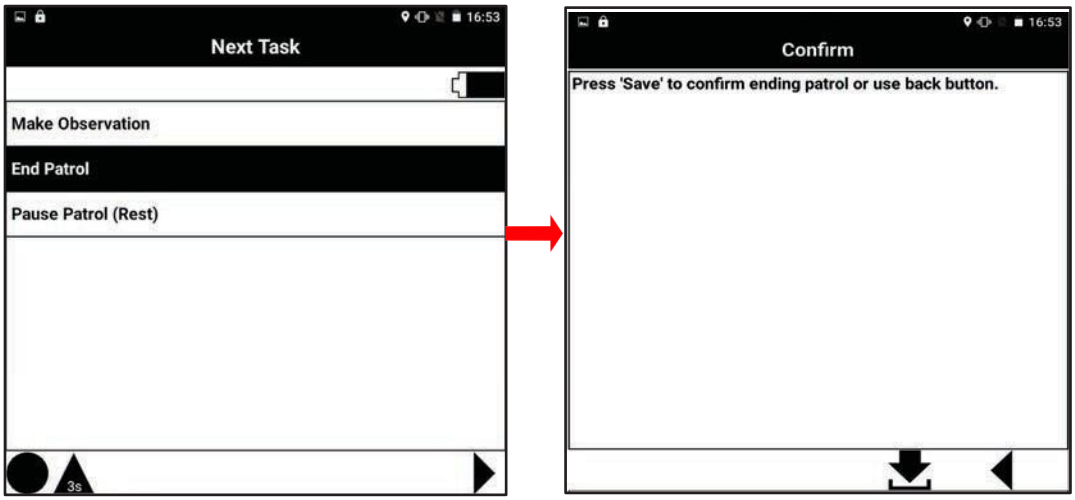
- To end the patrol you have to take a **Patrol End Waypoint**. For this, tap on **Make Observation**> tap on **Forward** icon ▶> tap on **Position**> tap on **Forward** icon ▶ > tap on **Patrol End**> tap on **Forward** icon ▶ > tap on **Save as New Waypoint**> tap on **Forward** icon ▶ > tap on **Save** icon and wait for GPS to be completed 100%. At the end you will see the last screen below.



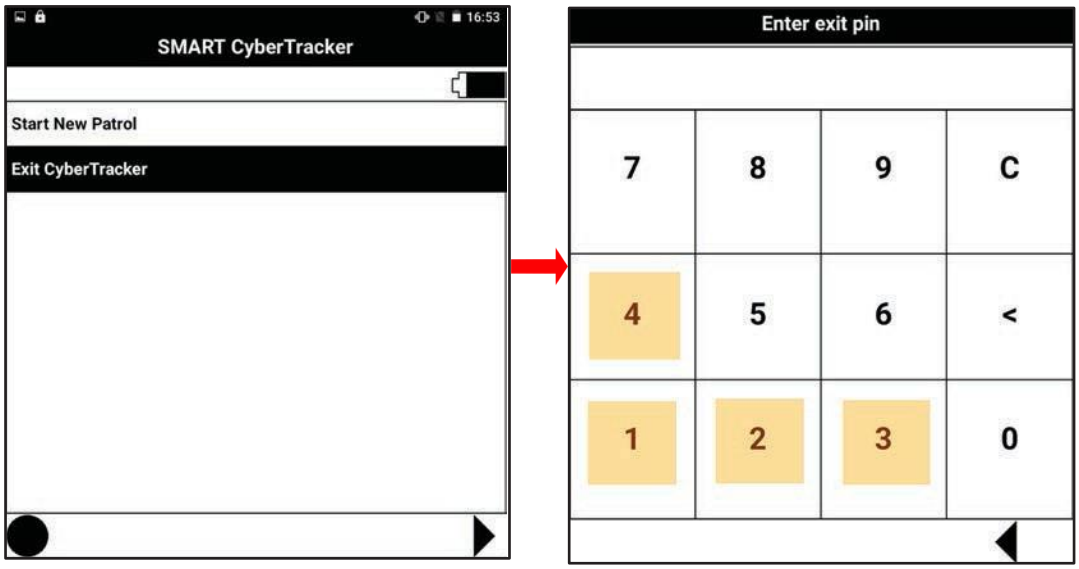
Continue to the next page


16:52
Position Type
Patrol Start
Patrol End
Pause
Restart
Transport Change to Fiber Boat
Transport Change to Foot
Transport Change to Launch
Transport Change to Speed Boat
Transport Change to Trawler
16:53
Save Observation
Save As New Waypoint
Add To Last Waypoint
16:53
Save As New Waypoint
Save as new point (GPS will take a new point now)
16:53
GPS - 30% complete
16:53
ok
Fix
Sky
Compass
3D GPS
22°49'10.824" N
089°32'44.957" E
20 m
0.6
5/13/17
16:53:11
0.00 km/h
265°
19:07
Next Task
Make Observation
End Patrol
Pause Patrol (Rest)
3s

- Now tap on **End Patrol** on the display screen and then on **Save** icon to capture your GPS location and save your data. Wait until GPS is completed to 100%.



- To exit from the CyberTracker application, select "Exit CyberTracker" then tap on the Forward icon ▶ and enter 1234 (if numeric pad appeared).



- Press the **power button** ⏻ to turn off the tablet to save battery power.

NOTE: For recording data you need to select the observation type on the top of the screen every time, then tap on the Forward icon ▶.

- To take a photo, you will need to tap on the screen with the tip of your finger when it asked **Tap to Capture**, then face the **camera** to the subject you want to take a photo and tap on the **display screen** to capture and tap on the **Forward** icon ▶ to save the photo. If you want to take more photos then tap **Yes** and repeat the process, otherwise tap on **No**. Then tap on **End Observation Group**> tap on **Forward** icon ▶ and then on **Save** icon.
- When asked to **Type in Text**, tap on an empty part of the **screen** to bring up the **keyboard**.
- If you want to go back one step, tap on the **Back** icon ◀.

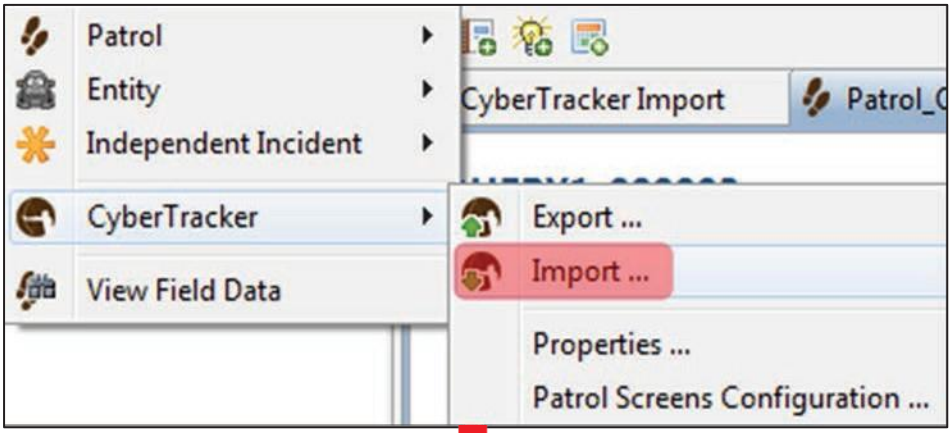
NOTE: For recording, multiple observations at a single waypoint follow the instruction below-

- Start making a single observation about a **live animal sighting** (e.g., Spotted Deer).
- Tap on **Make Observation**.
- Tap on **Animal** and the **Forward** icon ▶ .
- Tap on **Live Animal** and the **Forward** icon ▶.
- Select Species "**Spotted Deer**" and tap on the **Forward** icon ▶ . Then follow next steps one by one as appear on the screen.
- Take a **photo** of the observed animal, face the camera to the animal and tap on the screen when prompted.
- Tap on **Save As New Waypoint**.
- Tap on the **Save** icon to Save the Observation.
- For recording another observation (e.g., live **Wild Boar**) under the same waypoint, tap on **Make Observation** and repeat the process and at the end tap on **Add To The Last Waypoint.**
- Tap on the **Save** icon to Save the Observation.

5. Importing CyberTracker Patrols into SMART Software

After completing the data collection on each day patrol, you have to import the recorded patrol information into SMART Software in your computer from the smart tablet or phone. A CyberTracker smart tablet or phone import will bring the GPS tracks and waypoints, and all the associated observations with those waypoints.

- Connect the CyberTracker smart tablet or phone with the computer using a USB cable.
- Open the SMART software.
- From the menu on the top of your computer screen select **Field Data**, click on **CyberTracker** and then click on **Import** (see below), then **Import From Device**.



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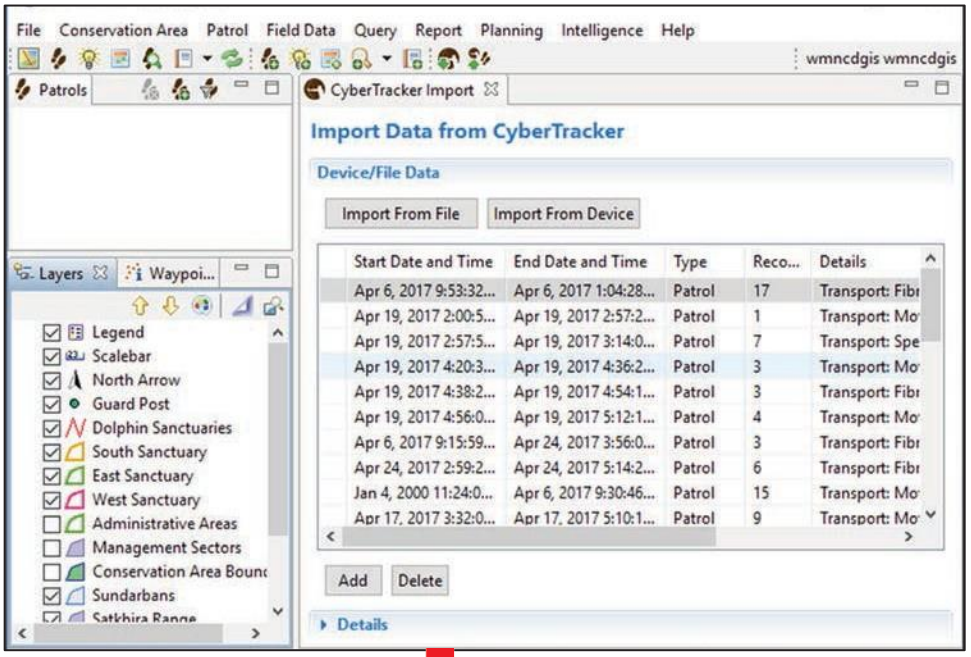
NOTE: **Import From Device** – Click on **Import from Device** to import patrol data or from CyberTracker smart tablet or phone to the computer. Use of this function on the first import, it will directly import the patrols data from the CyberTracker smart tablet or phone to the SMART database in the computer.

Add As New Patrol - Creates new SMART patrols from the selected CyberTracker patrols.

- Select a single patrol, then click on Add, then on Add as new patrol. Click on OK (see figures below).



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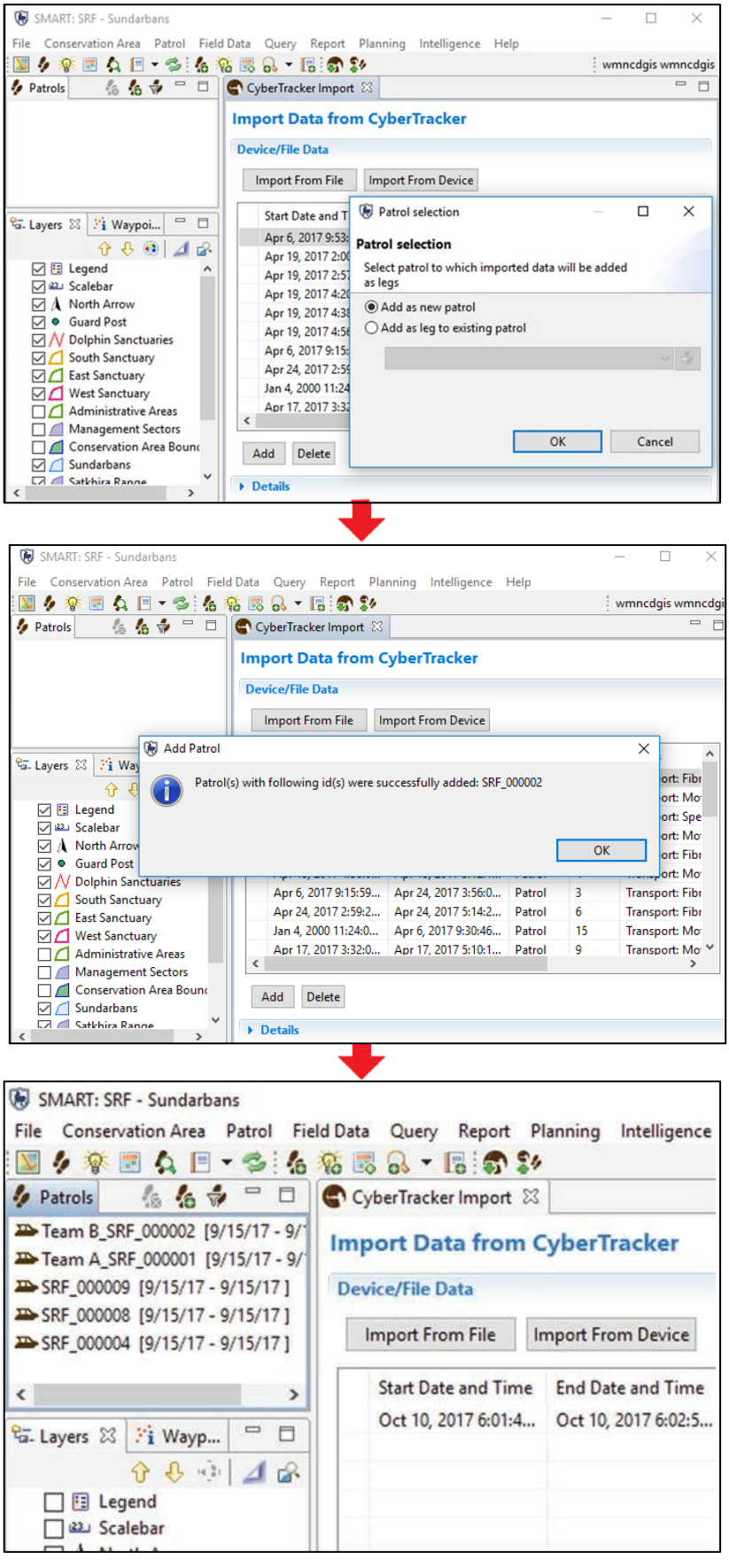

SMART: SRF - Sundarbans
File Conservation Area Patrol Field Data Query Report Planning Intelligence Help
wmncdgis wmncdgis
Patrols
CyberTracker Import
Import Data from CyberTracker
Device/File Data
Import From File
Import From Device
Start Date and T
Apr 6, 2017 9:53:
Apr 19, 2017 2:0
Apr 19, 2017 2:5
Apr 19, 2017 4:2
Apr 19, 2017 4:3
Apr 19, 2017 4:5
Apr 6, 2017 9:15:
Apr 24, 2017 2:5
Jan 4, 2000 11:24
Apr 17, 2017 3:32
Add
Delete
Details
Patrol selection
Patrol selection
Select patrol to which imported data will be added as legs
Add as new patrol
Add as leg to existing patrol
OK
Cancel
Layers
Waypoi...
Legend
Scalebar
North Arrow
Guard Post
Dolphin Sanctuaries
South Sanctuary
East Sanctuary
West Sanctuary
Administrative Areas
Management Sectors
Conservation Area Bound
Sundarbans
Satkhira Range
Add Patrol
Patrol(s) with following id(s) were successfully added: SRF_000002
OK
Apr 6, 2017 9:15:59...
Apr 24, 2017 3:56:0...
Patrol
3
Transport: Fibr
Apr 24, 2017 2:59:2...
Apr 24, 2017 5:14:2...
Patrol
6
Transport: Fibr
Jan 4, 2000 11:24:0...
Apr 6, 2017 9:30:46...
Patrol
15
Transport: Mo
Apr 17, 2017 3:32:0...
Apr 17, 2017 5:10:1...
Patrol
9
Transport: Mo
Team B_SRF_000002 [9/15/17 - 9/
Team A_SRF_000001 [9/15/17 - 9/
SRF_000009 [9/15/17 - 9/15/17]
SRF_000008 [9/15/17 - 9/15/17]
SRF_000004 [9/15/17 - 9/15/17]
Start Date and Time
End Date and Time
Oct 10, 2017 6:01:4...
Oct 10, 2017 6:02:5...

- **Import From File** - If the CyberTracker patrols were not assigned in SMART after import and disconnecting the device, the files are located in the file store for that particular Conservation Area. If you select this option, SMART will access the file store automatically and allow you to assign these patrols.
- **Delete** - Deletes the selected imported CyberTracker patrols.

NOTE: You do not need to delete anything.

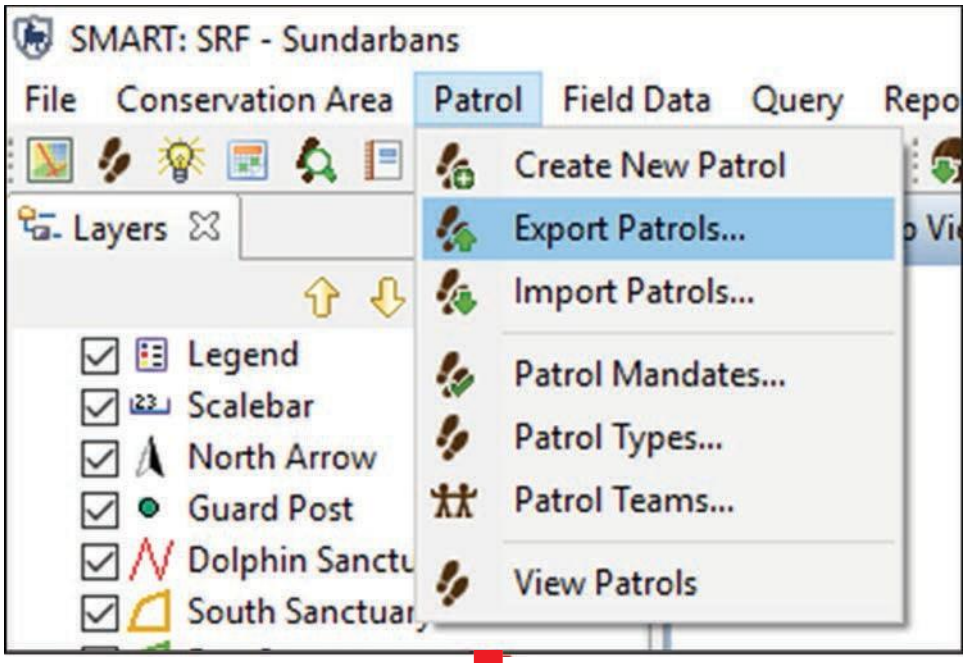
NOTE: You can review the patrols and observations by double clicking on the patrols from the patrol list on the left side in the window. Then you can see the summary of your patrol effort and map of your patrol route.

6. Save Patrol in a Computer Folder

After downloading the patrol from CyberTracker to the SMART software in the computer you have to save the patrol in a separate folder in your computer:

1) Create a New folder in your computer with the name of your team-CyberTracker equipped smart tablet or phone number-date of patrol. Example: Chandpai1-CT7G1-21April2017.

2) Open the SMART software > click on **Patrol** on menu bar > click on **Export Patrols** > select the **Patrol** or **Multiple Patrols** you want to export from the drop-down list by clicking on them (a tick mark will appear in front of the selected patrol) > click on **Browse** > Select the folder you created (Example: Chandpai1-CT7G1-21April2017) > Click on **OK** > > click on **Export**.



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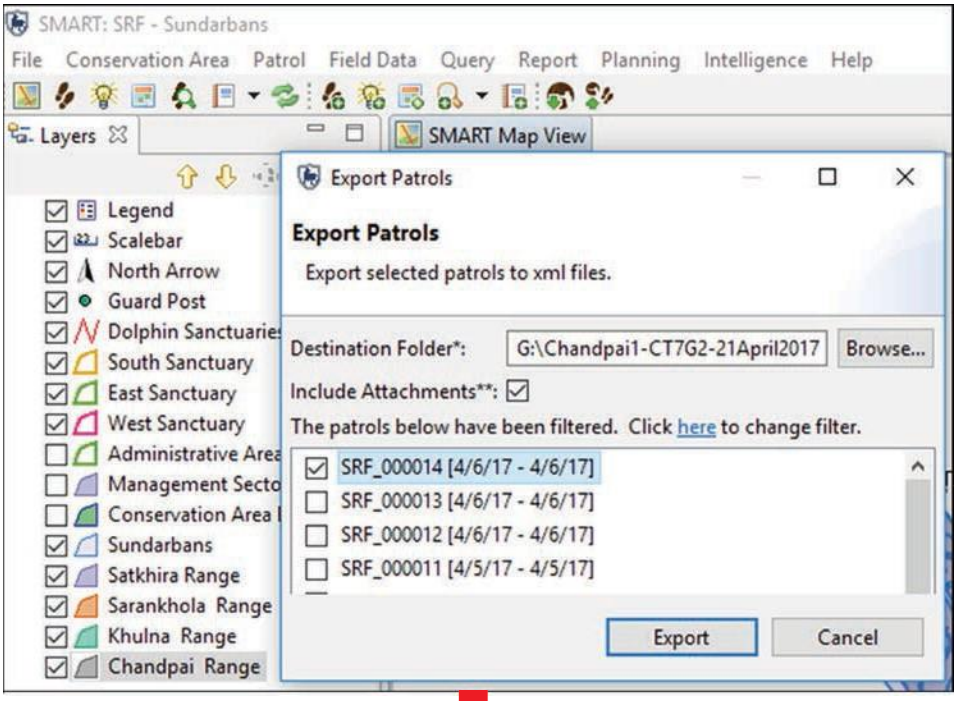

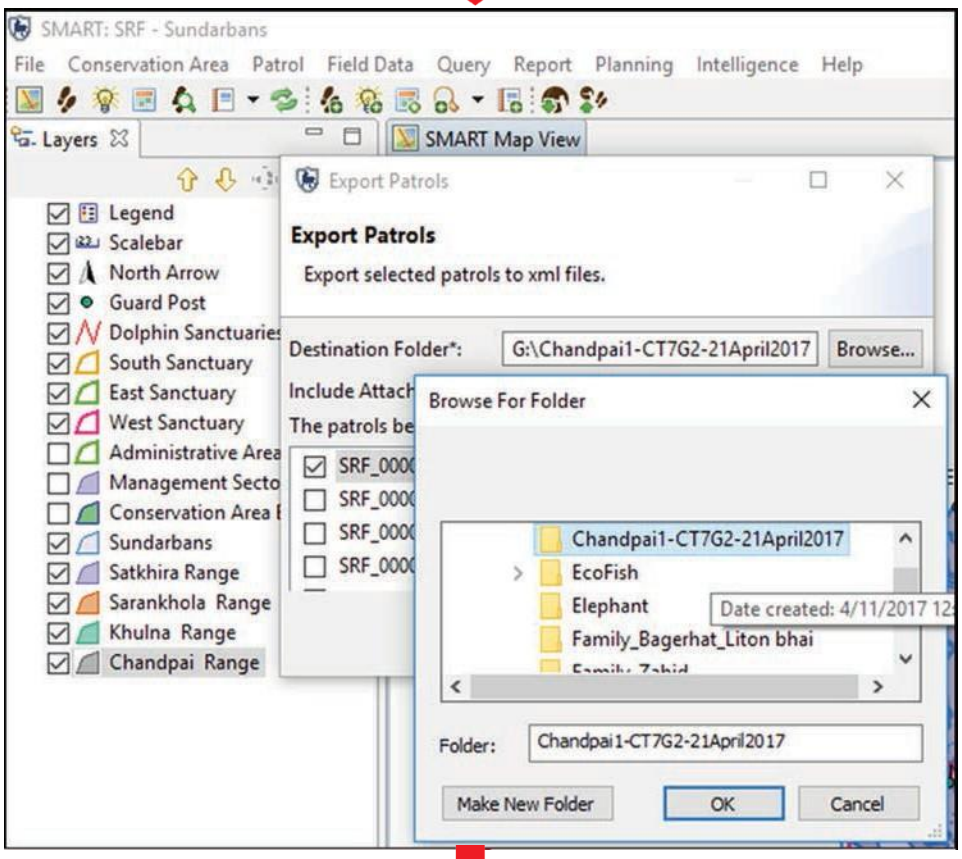

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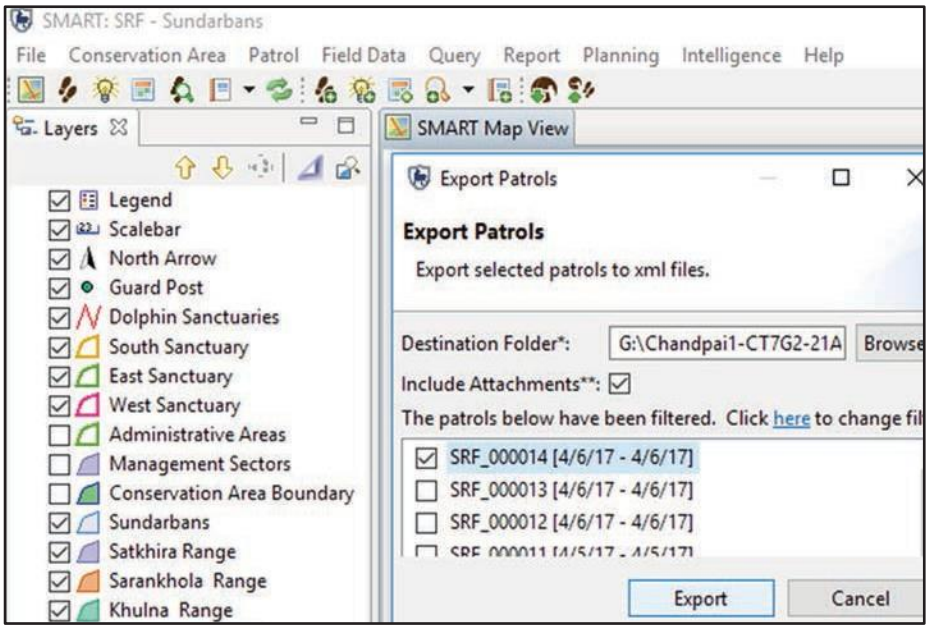
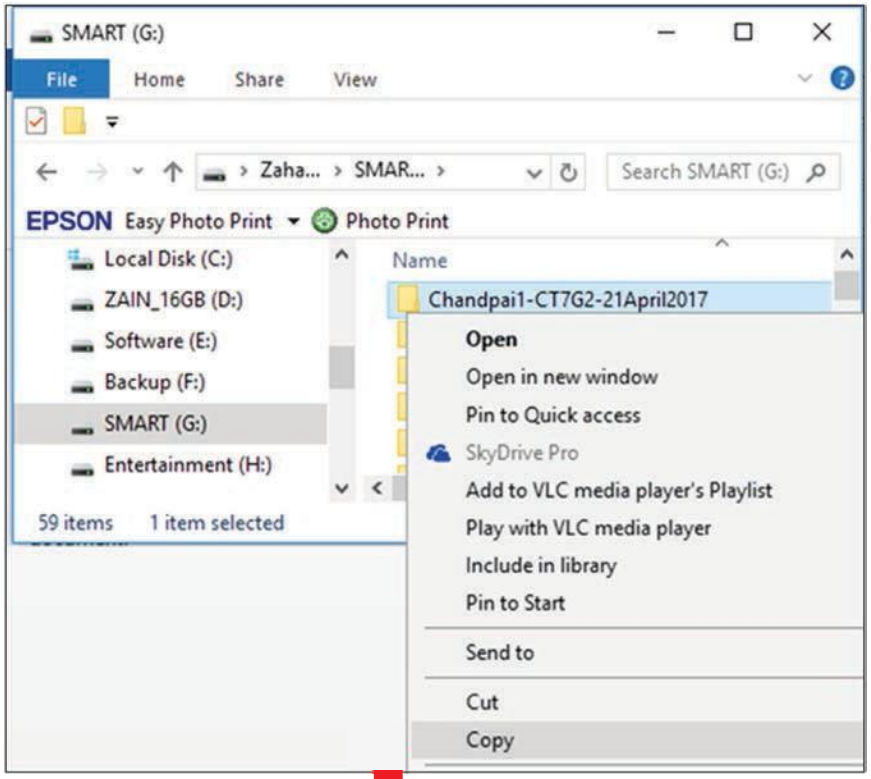


7. Copy the Patrol from the Computer to the Smart Tablet (CT7G) or Smart Phone (CT5)

(a) Put the mouse pointer on the exported patrol folder in your computer that you want to send via email, then right click on the mouse and copy; (b) Connect the CT7G with Computer> Open the CT7G from My Computer>open the folder Document>paste the copied patrol folder with a right click on the mouse on the empty screen.



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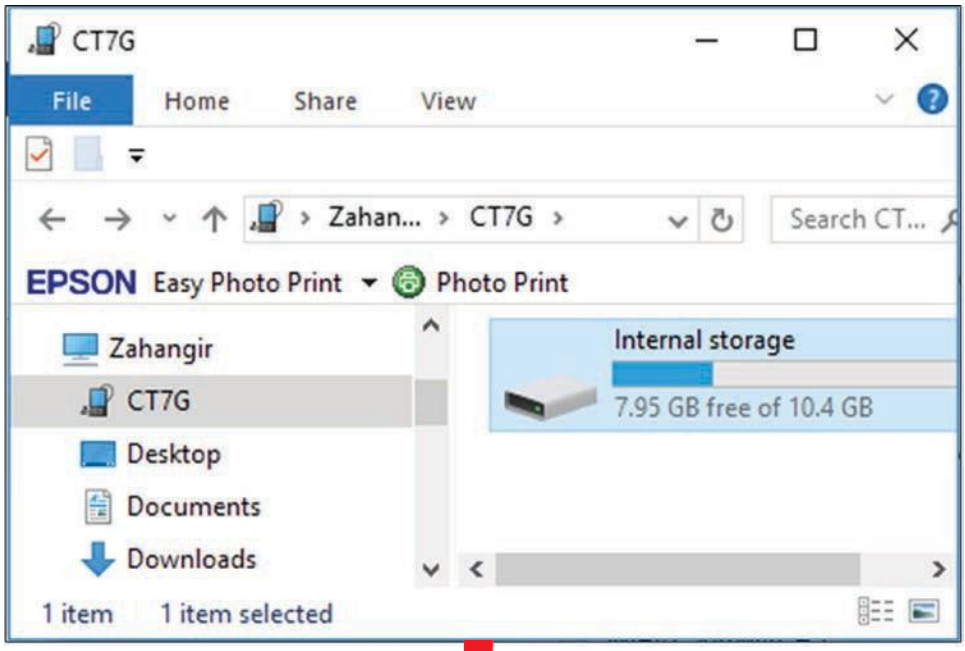

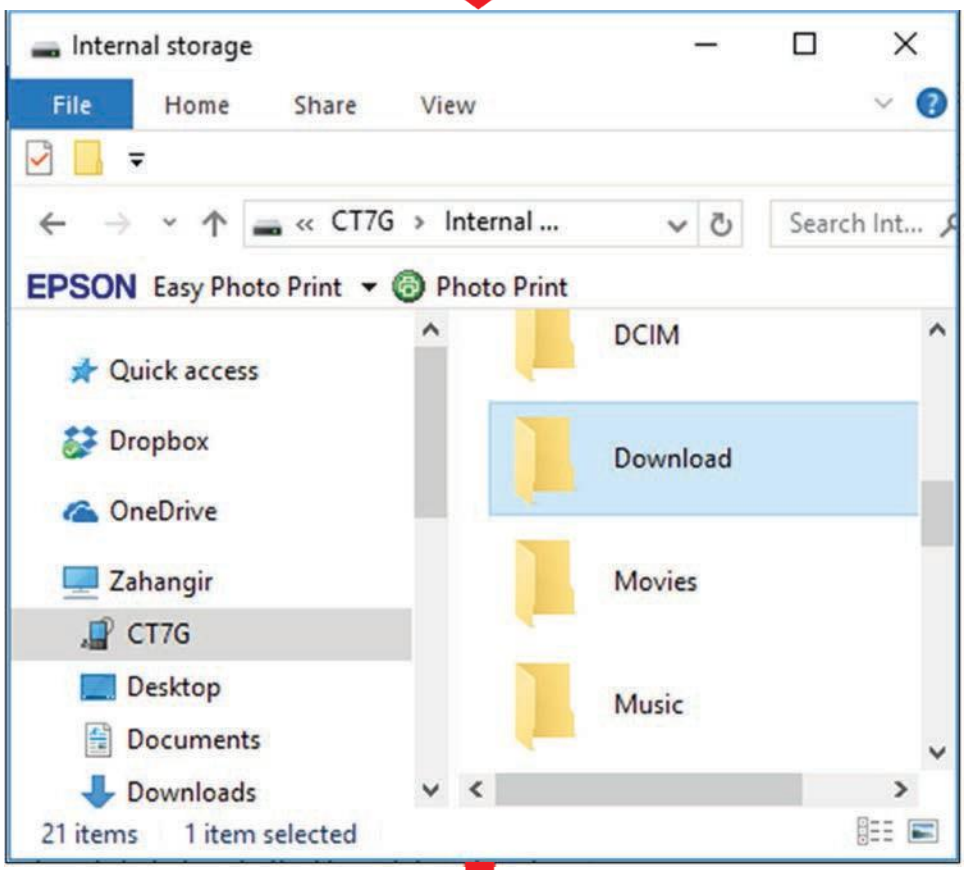

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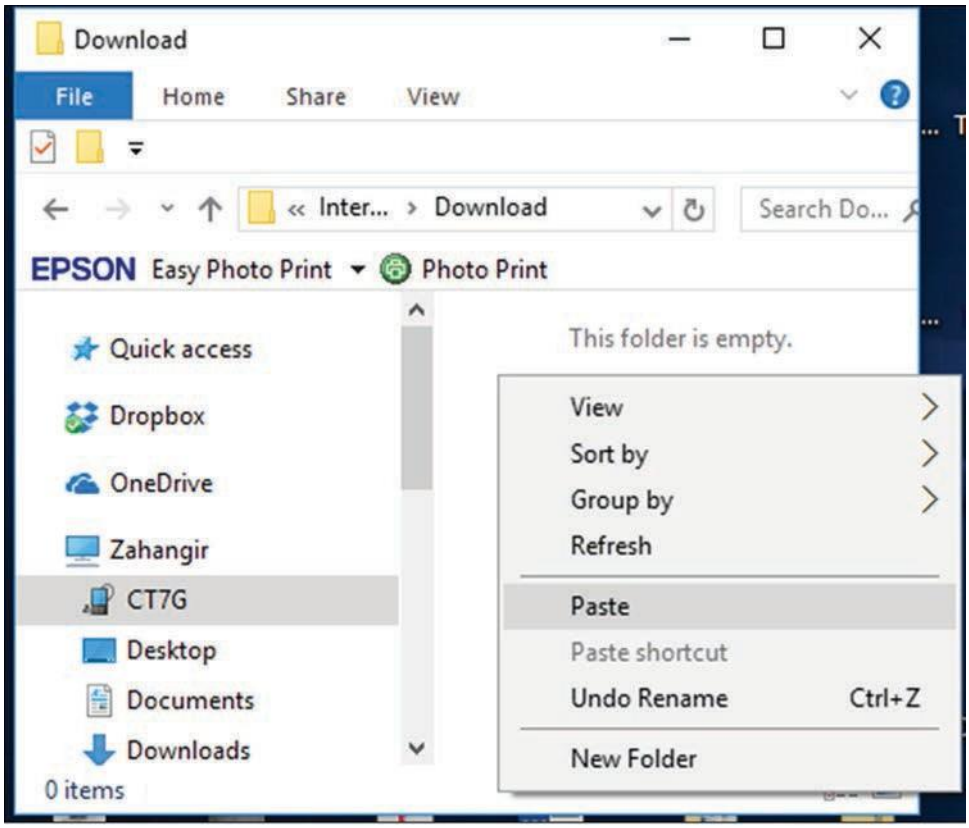
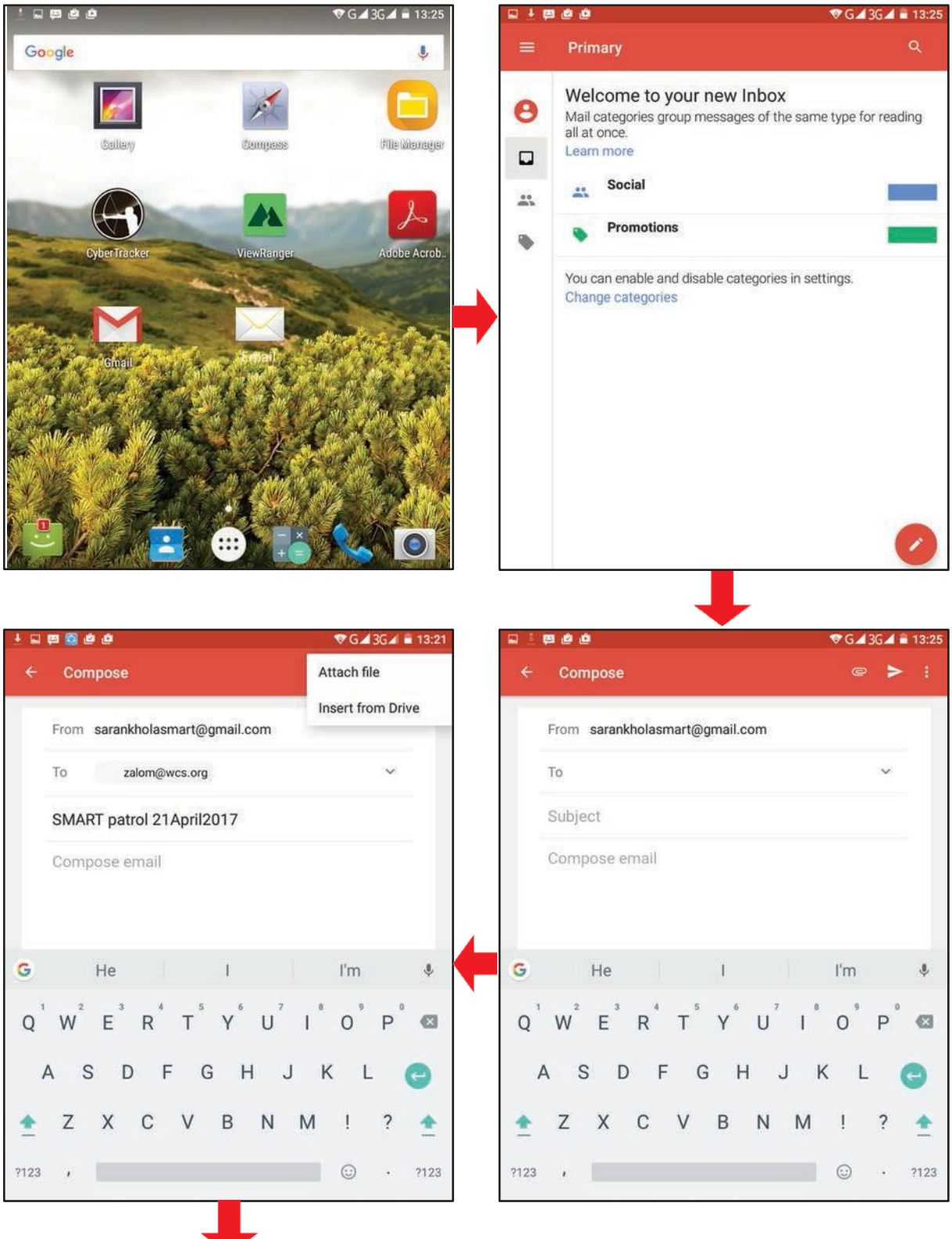


8. Sending Exported Patrol via Email or Gmail

To send the patrol files via Email, you need to have a good network connection. You are likely to have the best connection when standing on the top deck of your boat. Make sure you hold the smart tablet in a safe position to avoid it from falling.

If you have good **network** signal (indicated in top right corner of the display screen), click on the **gmail** icon or **email** icon on the home screen of your tablet or phone. Then tap on the **Pen** icon . Type the correct e-mail address of the receiving person next to the **To** icon. Type 'the folder name' in the space next to **Subject**. Click on the **Attachment** icon on top right corner of the screen and then click on the **Attach file** option. Select the file(s) you want to send from the **File Manager** by clicking on them. When you have selected the file(s), click on the **Send** icon on the top right corner of the screen and wait until the **sending message** disappeared.



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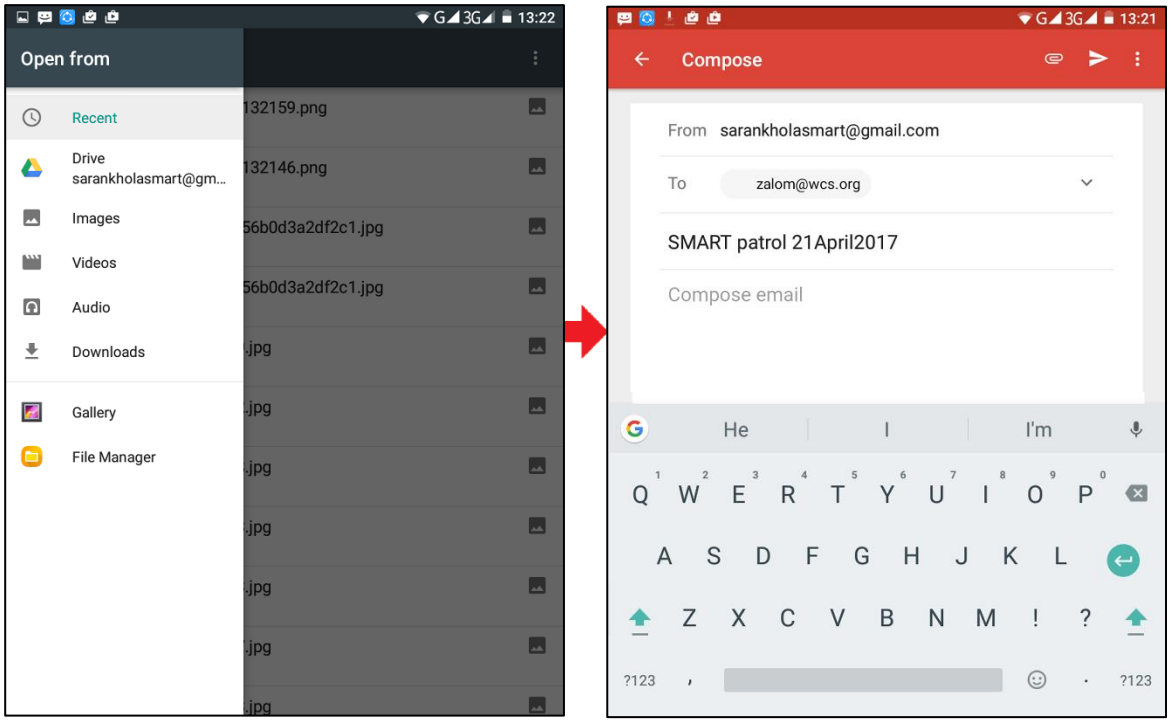
13:22
Open from
Recent
Drive
sarankholasmart@gm...
Images
Videos
Audio
Downloads
Gallery
File Manager
132159.png
132146.png
56b0d3a2df2c1.jpg
56b0d3a2df2c1.jpg
.jpg
.jpg
.jpg
.jpg
.jpg
.jpg
.jpg
13:21
Compose
From sarankholasmart@gmail.com
To zalom@wcs.org
SMART patrol 21April2017
Compose email
He
I
I'm
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M ! ?
?123
?123

9. SMART Data Model for the Sundarbans

Categories and Attributes
1. Position
1.1 Position Type • Patrol Start (start) • Patrol End (end) • Pause (stop) • Restart (restart)
1.2 Tidal Condition • High Tide • Low Tide • Rising/Incoming Tide (Juar) • Falling/Outgoing Tide (Bhata)
2. Human Activity
2.1 Human Legal
2.1.1 Activities • Ilish Net (Small Mesh Drifting Gillnet for Hilsha) • Charpata Jal (Long Shore Net) • Modhu (Honey) • Golpata (Nypa Leaf) • Vetki Jal (Fixed Floating Gillnet) • Don Dori (Crabline) • Dori Borshi (Longline with many Hooks) • Dhaira Jal (Otter-fishing Lift Net) • Dhang Jal • Poka Jal (Small Mesh Drifting Gillnet) • NTFP (Non Timber Forest Product)
2.2 Human Offender
2.2.1 First Name
2.2.2 Fathers Name
2.2.3 Occupation • Dacoit • Fisherman • Golpata Collector • Honey Collector • Poacher • Wood Cutter • Others
2.2.4 Village
2.2.5 Union
2.2.6 Thana/Upazila
2.2.7 District • Bagerhat • Bandarban • Barguna • Barisal • Bhola • Bogra • Brahmanbaria • Chandpur • Chapainawabganj • Chittagong • Chuadanga • Comilla • Cox's Bazar • Dhaka • Dinajpur • Faridpur • Feni • Gazipur • Gopalganj • Habiganj • Jamalpur • Jessore • Jhalokati • Jhenaidah • Joypurhat • Khagrachari • Khulna • Kishoreganj

- Kurigram
- Kushtia
- Lakshmipur
- Lalmonirhat
- Madaripur
- Magura
- Manikganj
- Meherpur
- Moulvibazar
- Munshiganj
- Mymensingh
- Naogaon
- Narail
- Narayanganj
- Narsingdi
- Natore
- Netrakona
- Nilphamari
- Noakhali
- Pabna
- Panchagarh
- Patuakhali
- Pirojpur
- Rajbari
- Rajshahi
- Rangamati
- Rangpur
- Satkhira
- Shariatpur
- Sherpur
- Sirajganj
- Sunamganj
- Sylhet
- Tangail
- Thakurgaon

2.2.8 Country

- Bangladesh
- China
- India
- Nepal
- Japan
- Myanmar
- Sri Lanka
- Indonesia
- Malaysia
- South Korea
- Philippine
- Thailand

2.2.9 Gender

- Female
- Male
- Unknown

2.2.10 Age

2.2.11 Birth Date

2.2.12 National ID Number

2.2.13 Mobile Number

2.2.14 People Armed

- Armed
- Unarmed
- Unknown

2.2.15 Offence Committed

- Catching Undersize Fish/Crab
- Fishing in Ban Creeks
- Fishing in Wildlife Sanctuary
- Harassment of Wildlife
- Hunting Wildlife
- Illegal Entry
- Illegal Fishing Gear
- Possession of Firearms
- Possession of Wildlife

- Possession of Wildlife Trophy
- Resources Collection in Wildlife Sanctuary
- None

2.2.16 Action Taken 1

- Observed Only
- Permit Checked
- Unsuccessful Pursuit
- None

2.2.17 Action Taken 2

- Arrested
- Education and Awareness Conduct
- Verbal Warning
- Written Warning
- None

2.2.18 Action Taken 3

- COR
- FIR
- GD
- Handed over to nearest Camp
- POR
- UDOR
- None

2.2.19 Handover Camp Name

- Adachai
- Amurbunia
- Andharmanik
- Baidyamari
- Baniakhali Station
- Bhodra
- Bhola
- Bhomorkhali
- Bogi Station
- Bojbaja
- Boroitala
- Burigoalini Station
- Chandesshar
- Chandpai Station
- Charaputia
- Charkhali
- Chunkuri
- Daserbharani
- Dhangmari Station
- Dhansagor
- Dhansagor Station
- Dingimari
- Dobeki
- Dubla
- Dudhmukhi
- Dumuria
- Gewakhali
- Ghagramari
- Gyanpara Mobile Camp
- Gulishakhali
- Hadda
- Haddora
- Haldibunia
- Harbaria
- Harintana
- Hayat Khali
- Hongsho Raj
- Jalla
- Jheodhara Station
- Jongra
- Kadamtala Station
- Kailasgonj
- Kalabogi Station
- Kalagasia
- Kalomteji
- Karamjal
- Kasiabad Station

- Katakhali
- Kateswar
- Katka Sanctuary Center
- Kagadobeki
- Khasitana
- Khulna Sadar
- Kobadak Station
- Kochikhali Sanctuary Center
- Koikhali Station
- Kokilmoni
- Koyra 4No.
- Koyra
- Laudob
- Mandarbaria
- Mirgamari
- Morabhola
- Morabogi
- Morapassur
- Morgan
- Munshigong
- Nalian Station
- Nandabala
- Nanghli
- Nilkamol Sanctuary Center
- Notabeki Sanctuary Center
- Pashakhali
- Patakata
- Patkosta
- Puspokathi Sanctuary Center
- Saluarkhali
- Sannasi
- Saronkhola Station
- Shankbaria
- Shapla
- Shekhbaria
- Shelar Char
- Sibsa
- Sorbothkhali
- Suarmara
- Supoti
- Sutarkhali Station
- Tambulbunia
- Tearchar
- Tengrakhali
- Terabeka

2.2.20 Permit Holder

2.2.21 Permit Number

2.2.22 Permit Issued Date

2.2.23 Book Number

2.2.24 Permit Issuing Station

- Dubla
- Baniakhali Station
- Burigoalini Station
- Kadamtala Station
- Kalabogi
- Kashiabad Station
- Kobadak Station
- Koikhali Station
- Nolian Station
- Sutarkhali Station

2.3 Human Sign

2.3.1 Type of Human Sign

- Footprint
- Hide Out
- Litterw
- Trail
- Kocha (Fishing Net Pole)
- Floating Drum
- Behundir ghat (drying place for Set-bag net)
- Others

2.3.2 Age of Human Sign

- Fresh
- Recent
- Old
- Very Old
- Unknown

2.4 Camp/Shelter/Mooring/Hide

2.4.1 Status

- Abandoned
- Active
- Inactive
- Unknown

2.4.2 Shelter/Camp Purpose

- Agriculture
- Dacoity
- Fishing
- Fuel Wood
- Non Timber Product
- Others
- Poaching
- Wood Cutting

2.4.3 Shelter/Camp Capacity

- Small (1-2 persons)
- Medium (3-5 persons)
- Large (above 5 persons)

2.4.4 Shelter/Camp Type

- Boat Mooring Point
- Camp
- Cooking Spot
- Machan (Stage/Platform)
- Tent/Chaoni (on ground)
- Tong/Tower (Tree Hide Shelter)

2.4.5 Shelter/Camp Number

2.4.6 Making Materials

2.4.7 Number of Drying Rack

2.4.8 Action Taken

- Observed Only
- Destroyed
- None

2.5 Weapons/Equipment/Fishing/Traps/Poison

2.5.1 Traps/Snares

2.5.1.1 Type of Trap/Snare

- Bish Toop (Poison Bait)
- Borshi Trap/Kola Fash (Hook Trap)
- Gola Fash/Hata Fash (Rope Neck Snare)
- Jal Fad (Net Trap)
- Sotta Kol (Jaw Trap)
- Payer Fash (Rope Leg Snare)
- Pit Sitka Kol (Pit Whip Leg Snare)
- Sitka Kol (Whip Leg Snare)
- Others

2.5.1.2 Is Active

2.5.1.3 Target Species

- Bird (Pakhi)
- Crocodile (Kumir)
- Deer (Horin)
- Monkey (Banor)
- Snake (Sap)
- Tiger (Bagh)
- Wild Boar (Shukor)
- Others

2.5.1.4 Time since trap set up

- Less than 1 week old
- 1-2 weeks old
- 2 weeks to 1 month old
- Over 1 month old

2.5.1.5 Bait Materials

- Live Animal
- Dead Animal

- Banana (Poison)
- Keora Leaves
- Meat (Poison)
- Stink Bomb (Offal)
- Water (Poison)
- Dry Food (Poison)
- Others

2.5.2 Guns & Ammunition

2.5.2.1 Firearms

2.5.2.1.1 Manufacturer

2.5.2.1.2 Serial Number

2.5.2.1.3 Type of Firearms

- Pipe Gun
- Rifles
- Shotgun/Pistol/Revolver
- Shot Gun

2.5.2.2 Ammunition

2.5.2.2.1 Type of Ammunition

- Empty Cartridges
- Full Cartridges

2.5.2.2.2 Number of Ammunition

2.5.2.3 Caliber

- 5 56
- 7 62
- 12 gauge
- .303
- 32mm
- Others

2.5.3 Cutting Tools (Knives/Axes/Daa/ Ramda)

2.5.3.1 Type of Cutting Tools

- Axe (Kuthar)
- Carpenter Saw (Sootarer Korat)
- Chainsaw
- Chopper/Kopa Daa
- Curving knife/Daa
- Handsaw
- Knife
- Machete/Ramda
- Others

2.5.3.2 Shelter Number

2.5.4 Fishing Tools/Crab Collection Tools

2.5.4.1 Type of Fishing Equipment

- Aracall (hook)
- Atol / Kakradhorar Baxo (Crab Trap/Crab Box)
- Behundi Jal/Badha Jal/Bendi Jal (Set-bag Net)
- Ber Jal/ Kathi Jal (Seine Net or Beach Seine)
- Box Jal (Post-larvae Box Net)
- Chai/Chaar (Fish Trap)
- Chandi/Illish/Fash/Bhasa Jal (Small Mesh Drifting Gillnet for Hilsha)
- Chorpata Jal (Long Shore Net)
- Current Jal (Monofilament Gillnet)
- Daire Jal/Bhodar Jal (Otter-fishing lift net)
- Don Dori (Crabline)
- Doriborshi (Longline with many hooks)
- Kakrar Jhuri (Crab Carrying Box)
- Khalpata/Khalgora Jal (Creek Net)
- Khepla/Toire/Jhaki/Chatki/ Pheka/Dhundi/Mooth Jal (Cast Net)
- Khorulla Jal/Shari Jal (Post-larvae Flat Mosquito Net)
- Koral/Vetki/Dhora Jal (Fixed Floating Gillnet)
- Moi Jal (Drag Net)
- Net Jal (Post-larvae Set-bag Nets)
- Poka Jal/Jhatka Ilish Jal (Small mesh Drifting Gill Net)

- Ponar Ber Jal/Kathi Jal (Post-larvae Seine Net)
- Ponar Moi Jal (Post-larvae Drag Net)
- Ponar Thela Jal/Tin kona Jal (Post-larvae Hand-push Net)
- Rocket Jal (Post-larvae Boat Net)
- Chip Borshi (Hook and Rod)
- Tana Baxo Jal (Post-larvae Hand-drag Net)
- Thela Jal (Hand-push Net)
- Vesali Jal (Large Lift Net)

2.5.4.2 Mesh Size

2.5.4.3 Length of Net meters

2.5.4.4 Number of Hooks

2.5.4.5 Number of Traps

2.5.4.6 Width of Net meters

2.5.5 Others Equipment

2.5.5.1 Type of Other Equipment

- Anchor
- Basket
- Bucket
- Container
- Cooking Pot
- Drum
- Plastic Bottle
- Rope
- Scooping Net (Heicha)
- Tarpaulin
- Tents
- Wire
- Others

2.5.6 Poison

2.5.6.1 Type of Poison

- Chemical
- Natural
- Pesticide
- Unknown
- Others

2.5.6.2 Brand of Poison

- Furadon
  - Rotanol
  - Others

2.5.6.3 Volume of Poison (Liters)

2.5.6.4 Target Species

- Birds (Pakhi)
- Crocodiles (Kumir)
- Deer (Horin)
- Fish (Mach)
- Monkey (Banor)
- Shrimp/Prawn (Chingri)
- Tiger (Bagh)
- Wild Boar (Shukor)
- Others

2.5.6.5 Other Detail

2.5.6.6 Number of Bottles

2.5.6.7 Weight kg

2.5.7 Number of Weapons and Equipment

2.5.8 Action Taken

- Collected
- Destroyed
- Driven Out
- Heard Only
- Observed Only
- Searched
- Seized
- Removed
- Warned and Educated
- None

2.6 Boats/Transportation

2.6.1 Type of Transportation

- Crab Collector Boat

- Coaster (Lighter Vessel)
- Dinghy
- Golpata Boat (Goina Nouka)
- International Ship
- Jaali Boat
- Metal Cargo Boat
- Oil Tanker
- Salt Trawler (Loboner Trawler)
- Sampan Trawler (Covered Wooden Boat)
- Sea Going Fishing Trawler (Fishing Trawler)
- Speed Boat
- Tourist Boat
- Trawler/ Launch Body
- Udla Fishing Trawler (1CC Open Fishing Boat)
- Wooden Cargo Boat
- Others

2.6.2 Number of Transportation

2.6.3 Name of Vessel

2.6.4 Length of Vessel (Meter)

2.6.5 Width of Vessel (Meter)

2.6.6 Depth of Vessel (Meter)

2.6.7 Action Taken

- Destroyed
- Driven Out/Escorted and taken out from Sanctuary
- Heard Only
- Observed Only
- Searched
- Seized and Handed over to nearest Camp
- Warned and Educated (Radio Contact)
- None

2.7 Wood

2.7.1 Logs

2.7.1.1 Number of Logs

2.7.1.2 Volume of Logs (CFT)

2.7.2 Firewood

2.7.2.1 Number of Bundles

2.7.2.2 Volume of Firewood (CFT)

2.7.3 Stump

2.7.3.1 Number of Stumps

2.7.4 Branch Cutting

2.7.4.1 Number of Branch Cutting

2.7.5 Tree Species

- Badam
- Bain
- Dhundol
- Gewa
- Goran
- Jam
- Kakra
- Keora
- Other Mangrove
- Pashur
- Sundari
- Unknown

2.7.6 Age of Wood

- Fresh
- Recent
- Old
- Very Old
- Unknown

2.7.7 Action Taken 1

- Destroyed
- Observed Only
- Searched
- Seized and Handed over to Nearest Camp
- Warned and Educated
- None

2.8 Non-timber Forest Product

2.8.1 Type of Forest Product

- Nipa Fruit (Gol Fol)

- Nipa Leaves (Golpata)
- Grass
- Honey
- Keora Fruit (Keora Fol)
- Keora Leaves (Keora Pata)
- Medicinal Plants
- Mushroom
- Sundari Seed (Sundari Fol)
- Others

2.8.2 Units

- m3
- kg
- meter
- bags
- bundles
- pieces

2.8.3 Quantity

2.8.4 Action Taken 1

- Destroyed
- Observed Only
- Seized
- Warned and Educated
- None

2.9 Domestic Animals

2.9.1 Type of Domestic Animals

- Buffalo
- Cow
- Goat
- Other
- Pig
- Sheep

2.9.2 Number of Domestic Animals

2.9.3 Action Taken 1

- Driven Out
- Observed Only
- Seized
- Warned and Educated
- None

2.10 Fire

2.10.1 Area Burned (hectare)

2.10.2 Mangrove Species Burne

2.10.3 Action Taken 1

- Observed Only
- Searched
- Seized
- Others

2.11 Pollution

2.11.1 Type of Pollution

- Chemical
- Garbage
- Leather (Chamra)
- Oil
- Plastic Bottle
- Poisoning
- Polythene
- Tin (Can)
- Fertilizer
- Coal
- Fly ash
- Unknown

2.11.2 Type of Oiling

- Tar
- Residue
- Slick
- Mat
- Diesel
- Furnace Oil
- Petrol
- Kerosene

2.11.3 Size of Area

- Spot
- Small Patch

- Large Patch
- Small Slick
- Medium Slick
- Large Slick

2.11.4 Location
- Golpata
- Mangrove roots
- Sediment
- Shoreline grass
- River/Creek surface/ Water surface

2.11.5 Source of Garbage
- Household
- Tourism
- Commercial Ship
- Industrial
- Fishing Boat

2.11.6 Amount of Garbage
- Less than a Trash Bin
- Greater than a Trash Bin but less than an Oil Barrel
- More than an Oil Barrel

2.11.7 Action Taken 1
- Collected
- Destroyed
- Observed Only
- Warned and Educated
- None

2.12 Photo File Name and Number

2.13 Comments

3. Animals

3.1 Live Animals

3.1.1 Action Taken – Live Animals
- Observed Only
- Released
- None

3.1.2 Number of Total Individual

3.1.3 Number of Adult Males

3.1.4 Number of Adult Females

3.1.5 Number of Young

3.1.6 Number of Age or Sex Unknown

3.1.7 Behaviour
- Basking
- Chasing/Fighting
- Fishing
- Grazing/Eating
- Leaping/Jumping
- Mating
- Perching
- Resting/Sitting/Sleeping
- Roaring
- Running
- Slow surfacing
- Soaring/Flying
- Stalking
- Vigorous surfacing
- Walking

3.1.8 Where Found (Habitat)
- Edge of Forest in the River
- Grass Land
- Inside Forest
- On Tree
- River bank or shore line
- River Confluence
- River Meander
- Straight Channel
- Sky

3.2 Sign of Animals

3.2.1 Track/Pugmark

3.2.1.1 Pad Width (cm)

3.2.1.2 Pad Length (cm)

3.2.2 Droppings/Dung/Scat/Pellet √ yes × no

3.2.3 Sound √ yes × no

3.2.4 Den/Nest √ yes × no

3.2.5 Feeding √ yes × no
3.2.6 Scrape √ yes × no
3.2.7 Scent √ yes × no
3.2.8 Prey Kill √ yes × no
3.2.9 Grazing Area √ yes × no
3.2.10 Age of Sign • Fresh • Recent • Old • Very Old • Unknown
3.2.11 Where Found (Habitat) • Edge of Forest in the River • Grass land • Inside Forest • On Tree • River Bank or Shore Line • River Confluence • River Meander • Straight Channel • Sky
3.3 Carcass
3.3.1 Number of Carcasses
3.3.2 Age of Animal Carcass • Fresh • Recent
• Old • Very old • Unknown
3.3.3 Gender
• Male • Female • Unknown
3.3.4 Age of Animal • Adult • Sub-Adult

• Juvenile • Unknown
3.3.5 Where Found (Habitat) • Edge of Forest in the River • Grass Land • Inside Forest • On Tree • River Bank or Shore Line • River Confluence • River Meander • Straight Channel
3.3.6 Cause of Death
3.3.6.1 Accidental/Entanglement • Caught in Chandi/Ilish/Fash/ Poka jal (Small Mesh Gill Net) • Caught in Vetki/Koral jal (Large Mesh Gill Net) • Caught in Behundi/Badha jal (Set-bag Net) • Caught in Charpata jal (Long Shore Net) • Caught in Don Dori (Crab Line) • Caught in Dori Borshi (Long Line) • Drowned (Dube Mora) • Entanglement in other Fishing Gears • Oil • Propeller Cut/Boat Strike
3.3.6.2 Illegal Act • Beaten to death (Pitiye mara) • Gunshot • Killed by harpoon (Koch/Kucha) • Oiling
• Poisoning • Traditional Weapons • Trapping
3.3.6.3 Natural

- Disease
- Old Age
- Predation
- Stranding (Chore atka)

3.3.6.4 Unknown

3.3.7 Action Taken – Carcass
- Buried
- Full body collected
- Examined and Sample collected
- Left at Scene
- Seized
- None

3.3.8 Part Missing 1
- Bones
- Fin
- Horn or Antler
- Meat
- Paws
- Skin
- Teeth
- Others
- None

3.3.9 Part Missing 2
- Fin
- Horn or Antler
- Meat
- Skin
- Tusk
- Others
- None

3.3.10 Part Missing 3
- Fin
- Horn or Antler
- Meat
- Skin
- Tusk
- Others
- None

3.3.11 Evidence of Human Caused Injury
- Fishing Tools with Carcass
- Harpoon
- Knife Cut
- Local Report
- Visible Wound
- Weapons with Carcass
- Others
- None

3.4 Animal Parts and Bushmeat

3.4.1 Name of Animal Parts or Bushmeat Seen

3.4.1.1 Whole Animal
- Smoked
- Frozen/Fresh

3.4.1.2 Meat
- Cooked/Smoked
- Decomposed
- Frozen/Fresh

3.4.1.3 Dolphin oil √ yes × no

3.4.1.4 Horns or Antlers √ yes × no

3.4.1.5 Bones √ yes × no

3.4.1.6 Gall Bladder √ yes × no

3.4.1.7 Paw/Claw √ yes × no

3.4.1.8 Skin √ yes × no

3.4.1.9 Skull √ yes × no

3.4.1.10 Stomach √ yes × no

3.4.1.11 Tooth √ yes × no

3.4.1.12 Tusks or Canines √ yes × no

3.4.1.13 None

3.4.2 Number of Animal Parts or Pieces of Bushmeat Seen

3.4.3 Weight kg

3.4.4 Action Taken Carcass

- Buried
- Collected
- Examined and Sample Collected
- Left at Scene
- Seized
- None

3.4.5 Where Found (Habitat)

- Edge of Forest in the River
- Grass Land
- Inside Forest
- On Tree
- River Bank or Shore line
- River Confluence
- River Meander
- Straight Channel

3.4.6 Name of Collected Body Part 1

- Antler
- Bones
- Full Body
- Liver
- Meat
- Skin
- Skull
- Stomach
- Tooth
- Tusk

3.4.7 Name of Collected Body Part 2

- Antler
- Bones
- Full Body
- Horn
- Liver
- Meat
- Skin
- Skull
- Stomach
- Tooth
- Tusk

3.4.8 Name of Collected Body Part 3

- Antler
- Bones
- Full Body
- Horn
- Liver
- Meat
- Skin
- Skull
- Stomach
- Tooth
- Tusk

3.4.9 Number of Collected Body Parts

3.5 Detailed Carcass Examination

3.5.1 Sample Collected

3.5.1.1 Blubber √ yes × no

3.5.1.2 Muscle √ yes × no

3.5.1.3 Liver √ yes × no

3.5.1.4 Skin √ yes × no

3.5.1.5 Skull √ yes × no

3.5.1.6 Stomach √ yes × no

3.5.1.7 Tooth √ yes × no

3.5.1.8 Dolphin/Animal samples vial no./ Polythene bag no. with name

3.5.2 Total Linear Body Length (cm)

3.5.3 Height of Dorsal Fin (cm)

3.5.4 Beak Length (cm)

3.5.5 Fluke Length (cm)

3.5.6 Girth at Anterior Insertion (cm)

3.5.7 Distance Between Genital and Anal openings (cm)

3.5.8 Female Lactating √ yes × no

3.5.9 Female with Fetus √ yes × no

3.5.10 Other Details

3.6 Photographs Taken √ yes × no

3.7 Species

- *Panthera tigris* (Bengal Tiger/Bagh)
- *Aonyx cinerea* (Asian Small-clawed Otter, Oriental small- clawed Otter, Small Clawed Otter, Bhodor, Vudor, Daire)
- *Lutrogale perspicillata* (Smooth-coated Otter, Cheptaleji Bhodar, Vudor)
- *Axis axis* (Chital, Spotted Deer, Chitra Horin, Horin)
- *Muntiacus muntjak* (Red Muntjak, Barking Deer, Indian Muntjac, Chagol/ Sagol Harin, Horeen)
- *Sus scrofa* (Eurasian Wild Pig, Wild Boar, Shukar, Bonno Sucor)
- *Orcaella brevirostris* (Irrawaddy Dolphin, Iraboti)
- *Platanista gangetica* (Ganges Dolphin, Ganges River Dolphin, Ganges Susu, Shushuk)
- *Neophocaena phocaenoides* (Finless Porpoise, Pakhnahin Porpoise)
- *Sousa chinensis* (Indo-Pacific Hump-back dolphin, Golapi)
- *Crocodylus porosus* (Estuarine Crocodile, Salt-water Crocodile)
- *Batagur baska* (Batagur, Common Batagur, Four-toed Terrapin, River Terrapin)
- *Prionailurus viverrinus* (Fishing Cat/ Mecho Bagh)
- *Ophiophagus hannah* (King Cobra, Raj Gokhra)
- *Python molurus* (Asiatic Rock Python, Burmese Python, Tiger Python, Ajogor, Ojogor)

- *Heliopais personatus* (Masked Finfoot, Hans Pakhi)
- *Leptoptilos javanicus* (Lesser Adjutant, Adjutant Stork, Modontak, Madantak)
- *Gyps bengalensis* (White-rumped Vulture, Shakun, Bangla Shokun, Sokun)
- *Varanus salvator* (Water monitor, Ringed Lizard, Kalo Gui)
- *Prionailurus bengalensis* (Leopard Cat)
- *Macaca mulatta* (Rhesus Monkey, Rhesus Macaque)
- *Haliaeetus leucogaster* (White-bellied Sea Eagle, Sindhu, Shindu Eagle)
- *Pelargopsis amauroptera* (Brown-winged Kingfisher, Badami-pakh Machranga)

3.8 Comments

4. Fish

4.1 Species of Fish

- Ilish (*Tenualosa ilish*a)
- Bhola (*Macrospinosa cuja*)
- Sol/Shol (*Channa orientalis*)
- Gojar/Gojal/Gajar (*Channa marullus*)
- Taki/Goroi (*Channa punctatu*s)
- Pangas/Pungas (*Pangasius pangasius*)
- Silon/Shilon (*Silonia silondia*)
- Ayer/Aire (*Sperata aor*)
- Boal/Bual (*Wallago attu*)
- Rui/Rohu (*Labeo rohita*)
- Kalibaus/Kalbaous (*Labeo calbasu*)
- Ghonia/Ghoinna/Goneri/Kurchi (*Labeo gonius*)
- Catla/Katla (*Catla catla*)

4.2 Length of Fish (cm)

4.3 Number of Fish

4.4 Weight of Fish (kg)

4.5 Fish Infraction 1

- Boal below 12 inch (30 cm) April to August
- Carp fishes below 9 inch (23 cm) During July to December
- Fry of Shol/Gojar/Taki During April to August
- Ilish below 10 inch (25 cm) During November to June

- Ilish during 1st full moon of Bengali month Ashwin including 3 days before and 11 days after
- Mother fish of Shol/Gojar/Taki During April to August
- Pangas below 12 inch (30 cm) During November to July
- Post-larvae of Shrimp/Prawn at any time of the year

- Silon/Bhola/Ayer below 12 inch (30 cm) February to June
- None

4.6 Fish Infraction 2

- Boal below 12 inch (30 cm) April to August
- Carp fishes below 9 inch (23 cm) During July to December
- Fry of Shol/Gojar/Taki During April to August
- Ilish below 10 inch (25 cm) During November to June
- Ilish during 1st full moon of Bengali month Ashwin including 3 days before and 11 days after
- Mother fish of Shol/Gojar/Taki During April to August
- Pangas below 12 inch (30 cm) During November to July
- Post-larvae of Shrimp/Prawn at any time of the year
- Silon/Bhola/Ayer below 12 inch (30 cm) February to June
- None

4.7 Action Taken 1

- Collected
- Destroyed
- Driven Out
- Heard only
- Observed Only
- Searched
- Seized
- Removed
- Warned and Educated
- None

4.8 Photographs Taken √ yes × no

4.9 Comments

5. Crabs

5.1 Species of Crabs

- Scylla olivesia (Orange Mud Crab/Shila Kakra)
- Scylla serrata (Giant Mud Crab/Shila Kakra)

5.2 Number of Crabs

5.3 Weight of Crabs (kg)

5.4 Sex

- Male
- Female

5.5 Crab Infraction 1

- Catching crabs during January to February
- Catching crabs in Sanctuary
- Female crabs below 130 grams
- Male crabs below 200 grams
- None

5.6 Crab Infraction 2

- Catching crabs during January to February
- Catching crabs in Sanctuary
- Female crabs below 130 grams
- Male crabs below 200 grams
- None

5.7 Action Taken 1

- Collected
- Destroyed
- Driven Out
- Heard Only
- Observed Only
- Searched
- Seized
- Removed
- Warned and Educated
- None

5.8 Photographs Taken √ yes × no

5.9 Comments

6. Features

6.1 Comments

Appendix 9. Field Guide for the Identification of Wildlife in the Sundarbans

1.1 Aquatic Wildlife

1.1.1 Ganges River dolphin

Scientific Name: *Platanista gangetica*

Local name: Shushuk, Shisu, Shush, Hoosh, Hurchum

Length: 212-252 cm (83-99 in)

Description: Ganges River dolphins have a flexible and robust body that becomes narrower behind the dorsal fin to the tailstock. Their extremely long beak has many sharply pointed teeth. These freshwater dolphins have a gray body that turns blotchy with age. The underside can appear pink. The dorsal fin is a low triangular hump with a slight knob at the top. The flippers are very large.

Habits: Ganges River dolphins occur mostly alone or in mother-calf/young pairs. Groups are found in deep pools at river confluences or meanders, but few interactions between dolphins are observed.

1.1.2 Irrawaddy dolphin

Scientific Name: *Orcaella brevirostris*

Local name: Iraboti

Length: 232-275 cm (91-108 in)

Description: Irrawaddy dolphins have a blunt head with no visible beak. The dorsal fin is small, triangular to slightly curved with a rounded tip, and positioned slightly behind the mid-back. The neck is flexible and a neck crease may be visible. The flippers are large, with curved leading edges and blunt tips. The animals are gray overall with a generally lighter abdomen.

Habits: These freshwater dependent dolphins are social animals that generally occur in small groups of 3-5 dolphins, but sometimes also in larger numbers.

1.1.3 Finless porpoise

Scientific Name: *Neophocaena phocaenoides*

Local name: Porpoise

Length: 155-200 cm (61-79 in)

Description: Finless porpoises are slightly smaller than Irrawaddy dolphins and, as the name implies, have no dorsal fin. The body is dark gray, slender and torpedo-shaped, with a rounded head and no beak. The tailstock is narrow and the flukes are curved inward. The pectoral fins are relatively large with rounded tips.

Habits: Finless porpoises occur in small groups. Their varied diet includes fish, shrimp, squid, cuttle fish and octopus.

1.1.4 Indo-Pacific humpback dolphin

Scientific Name: *Sousa chinensis*

Local name: Golapi

Length: 249-279 cm (98-110 in)

Description: Indo-Pacific humpback dolphins have a robust body and well-defined beak. The dorsal fin sits on a small hump in the middle of the animal's back. The colour pattern varies with age but is generally gray to light cream or pink.

Habits: These generally coastal animals venture into the Sundarbans waterways when salinity levels are high. They occur in groups of less than 10 individuals but have also been observed in larger numbers.

1.1.5 Small-clawed otter

Scientific Name: *Aonyx cinereus*

Local name: Daire, Bhodar, Udbiral

Length: Head-body 40-64 cm (14-24 in), tail 24-35 cm (10-15 in).

Description: Smallest otter with very short claws and narrow feet that are not fully webbed. The tail is tapered but slightly round at the end. Throat much lighter and sharply separated from dark brown on the upper body. Upper border of pink nose pad curves outwards and is peaked in the middle.

Voice: Vocalizations include squeaks and squeals.

Habits: Generally live in groups foraging and grooming together. They deposit spraint or feces in communal toilet sites on the dry ground near water.

Fore Limb Hind Limb Nose

1.1.6 Smooth-coated or Flat-tailed otter

Scientific Name: Lutrogale perspicillata

Local name: Daire, Bhodar

Length: Head-body length: 65-79 cm (25-31 in), tail length: 40-50 cm (16-20 in)

Description: It has a large head and the last half of its tail is flattened. Its short fur gives it a smooth, velvety appearance.

Voice: Uses voice to communicate with chirps, whistles, and wails.

Habits: Lives in large lowland rivers, lakes, swamps and mangrove forests. Follows fish during the monsoon. Can travel long distances over land to find suitable habitat. Communicates to other animals by scent as well as by voice. Domesticated smooth-coated otters assist fishermen with fishing in the Sundarbans and nearby areas.

Fore Limb Hind Limb Nose

1.1.7 Estuarine or Saltwater crocodile

Scientific Name: Cro*codylus porosus*

Local name: Nona panir kumir, Kumir

Length: Male 427-518 cm (168-204 in); Female 229-335 cm (90-132 in).

Description: Strongly built body, limbs and laterally flattened tail. Olive-brown or dark upper parts with yellow and pale underparts. Bony armor covers the entire body.

Voice: Silent.

Habits: Generally found alone. Often basks on river banks, particularly during winter mornings gliding into the water when disturbed. Swims and runs fast.

1.1.8 River terrapin

Scientific Name: Batagur baska

Local name: Batagur, Kasim, Kossop

Length: Maximum carapace length 60 cm (23 in)

Description: Moderately flat and smooth large shell. Head small and snout pointed. Limbs with enlarged scales. The upper surface of the shell and soft parts olive-brown. Lower surface yellow.

Habits: Lives in highly silted rivers. Migrates to sand banks to lay eggs.

1.1.9 Water monitor

Scientific Name: *Varanus salvator*

Local name: Kalo guishap

Length: 250 cm (98 in)

Description: A large lizard with a long, slender and muscular body, a narrow, elongated head, and a very long neck. Well-developed legs with long toes and claws. Drab gray, dark brown or olive colouration with yellow or white spots arranged in bands across their backs.

Voice: Hisss-ss-ss

Habits: Water monitors are excellent swimmers and often seen perching on the branches of trees overhanging small creeks.

1.2 Terrestrial Wildlife

1.2.1 Bengal tiger

Scientific Name: *Panthera tigris*

Local Name: Bagh, Mama, Boroshial, Borosaab

Length: Head-body 140-280 cm (55-110 in), tail 60-100 cm (23-40 in).

Description: The tiger is the largest of all wild cats. It is strongly built with especially strong forepaws. It has a golden or orange coat with broad black stripes on most of the body and white under parts with black stripes. The ears are black with a prominent white spot on the back. It has a long tail with black bands. Males are much larger than females.

Voice: Very loud and deep aaowm-oaawm-aaawm-aawm, particularly during the mating period.

Habits: Solitary hunter active during night and day, more nocturnal in disturbed areas. Prefer to hunt deer or wild boar but also prey on macaques, large birds, large fish, and rarely humans. Territorial with several females living within the territory of a single male.

1.2.2 Fishing cat

Scientific Name: *Prionailurus viverrinus*

Local name: Mecho bagh, Mecho biral

Length: Head-body 57-78 cm (22-31 in), tail 20-30 cm (8-12 in)

Description: Medium-sized wild cat with a stocky body and relatively short legs. Coarse fur is greenish-grey with dark streaks and spots running along the length of the body, face, and tail. Relatively long face with a flat nose.

Voice: Usually silent.

Habits: Found alone and generally active at night. Feeds mostly on rodents, birds, and fish. Can swim long distances.

1.2.3 Leopard cat

Scientific Name: *Prionailurus bengalensis*

Local name: Chita biral

Length: Head-body 63 cm (25 in), tail 29 cm (12 in)

Description: A small wild cat with comparatively longer limbs than other lesser cats. Brownish-grey coat with leopard-like dark patches covering the body. At shoulders, these patches merge into two streaks. Dark ears have a central white spot on the back.

Voice: Usually silent

Habits: Generally nocturnal, but also active at dawn and dusk. Prefers tree holes for sleeping and is able to climb and swim. Feeds on rodents, small mammals and fish as well as carrion.

1.2.4 Rhesus monkey

Scientific Name: *Macaca mulatta*

Local name: Bandor, Banor, Kota banor

Length: Head-body 56 cm (22 in), tail 25 cm (10 in)

Description: Robust body with reddish brown coat and reddish rump. Medium-sized tail held partially erect.

Voice: Voices a harsh coughing 'khok' when alarmed and it often screeches while fighting.

Habits: Active during the day, spends time on land as well as in the trees. Lives in large groups of 20 to 200 animals.

1.2.5 Spotted deer

Scientific Name: *Axis axis*

Local name: Chittal, Chitra harin, Gaus, Gonal

Length: Head-body 125 cm (48 in), tail 20 cm (7 in)

Description: Males bigger, with long antlers and three tines on each end during the breeding season. Dark golden-brown coat with white spots. The throat and end of their legs are white. The colour at the base of the neck is slightly darker in aged males, but overall their colour pattern is similar.

Voice: Sharp and repeated touh for communication or as an alarm. Stags make a loud harsh noise in rutting season.

Habits: Occurs mostly in groups of 10-50 individuals. Finds shelter in the forest for safety and to avoid strong sunlight. Come into the open area in lines headed by a large male for grazing in the morning and afternoon.

1.2.6 Barking deer

Scientific Name: *Muntiacus muntjak*

Local name: Maya harin, Ruru, Chagla harin, Kutta harin

Length: Head-body 95 cm (37 in), tail 18 cm (6 in)

Description: Reddish-brown deer with a prominent V-shaped bony ridge on the forehead, often with dark lines along the ridges. Forelimbs are longer than hind limbs. Stags have short antlers with two tines on each.

Voice: Loud, harsh bark 'khaoo' similar to that of a dog.

Habits: Active during day and night. Generally solitary, but also occurs in pairs.

1.2.7 Wild boar

Scientific Name: *Sus scrofa*

Local name: Buno shukar, Shuar, Ghandor

Length: Head-body 135 cm (53 in), tail 25 cm (10 in)

Description: Brownish or blackish. Piglets light brown with pale stripes. Long snout ends in a disc made of cartilage that helps pigs dig. Large head but thin legs. Small tail with no hair. Boars have larger tusks than sows.

Voice: Low grunts, especially while feeding.

Habits: Active during day and night. Occurs alone or in pairs or in family groups. Are known to attack people.

1.2.8 King cobra

Scientific Name: *Ophiophagus hannah*

Local name: Raj gokhra

Length: 475 cm (187 in)

Description: World's longest venomous snake. Head broader than the neck, expandable hood long but narrow. Olive-green, tan, or black skin with faint, pale yellow cross-bands down the length of the body. Chevron-pattern on the back of neck.

The belly is cream or pale yellow. Young king cobras are shiny black with narrow yellow bands, looking a bit like a banded krait, but easily identified by the expandable hood.

Voice: Hisses loudly with open mouth and expanded hood when excited.

Habits: Solitary, hunts during the day and night, mainly active at dusk and dawn. This fast and agile predator feeds on other snakes and occasionally on monitor lizards, rodents or birds. Can be highly aggressive, but generally attempts to escape and avoid confrontation.

1.2.9 Rock python

Scientific Name: *Python molurus*

Local name: Ajagar, Moyal

Length: 762 cm (300 in)

Description: The long and bulky body is brownish with irregular dark brown blotches with black edges. Underparts are whitish or yellowish. Pupils of the eyes are vertical.

Voice: Silent.

Habits: Active at night and in dark places during the day. Mostly found alone. During the winter seen basking on a tree in sunlight.

1.3 Avian Wildlife

1.3.1 Masked finfoot

Scientific Name: *Heliopais personatus*

Local name: Hans pakhi, Para hans, Golboner hans, Baila hans

Length: 56 cm (22 in)

Description: Brown plumage with black throat in males and white and black in females, bordered by narrow white lines in both males and females. Yellow bill and greenish-yellow legs.

Voice: Usually silent, but sometimes voices a harsh keek-keek-keek when in flight.

Habit: Forages in shady creeks at low tide during day and dusk. Occurs alone or in pairs. Runs for cover when alarmed. Flies short distances just above the water surface. Reaches nest built in trees overhanging water by walking up the tree stem.

1.3.2 Lesser adjutant

Scientific Name: *Leptoptilos javanicus*

Local name: Modontak

Length: 87-93 cm (34-37 in)

Description: A very large stork with scattered hair-like feathers on nearly bare head and neck. The upper plumage is uniformly dark or almost black. Belly and under-tail are white.

Habits: Generally found standing upright or feeding on exposed mudflats alone, but forms groups during breeding season from November to May. The nest is a large, flat platform of sticks stuck between tree branches.

1.3.3 White-rumped vulture

Scientific Name: Gyps bengalensis
Local name: Shakun, Shokun

Length: 75 - 85 cm (30 - 33 in)

Description: Plumage is dark brown or blackish, neck-ruff is white, under-wing coverts are white. Head is dark in colour. Neck bright, long and heavy, bill is silver.

Voice: Croaks, grunts, hisses and squeals in nest colonies.

Habits: Generally found on upper tree trunks, flying in the sky or sitting on rivers edge or open field. Feeds on carcasses of animals.

1.3.4 White-bellied sea eagle

Scientific Name: *Haliaeetus leucogaster,*

Local name: Sindhu eagle, Sagar eagle

Length: 70 cm (26 in)

Description: White head, neck, and underparts. Gray upperparts and black flight feathers. It's short, wedge-shaped tail starts black and fades into white. Juveniles have brownish colouration on wing covers and underparts.

Voice: Loud, goose-like honking ank-ank-ank.

Habits: Active during the day. Occurs alone or in pairs; mates for life and re-uses nest for multiple years. Hunts by plunge-diving.

1.3.5 Brown-winged kingfisher

Scientific Name: *Pelargopsis amauroptera*

Local name: Badami machranga

Length: 36 cm (14 in)

Description: A large kingfisher with a huge red bill, brown mantle, wings, and tail which contrast strongly with a turquoise rump and lower back. Females and males look alike.

Voice: cha-cha-cha-cha.

Habits: Inhabits north and eastern coasts of the Bay of Bengal, mainly found in the Sundarbans. Movements are slow when perched, flies swiftly and low close to the water surface.

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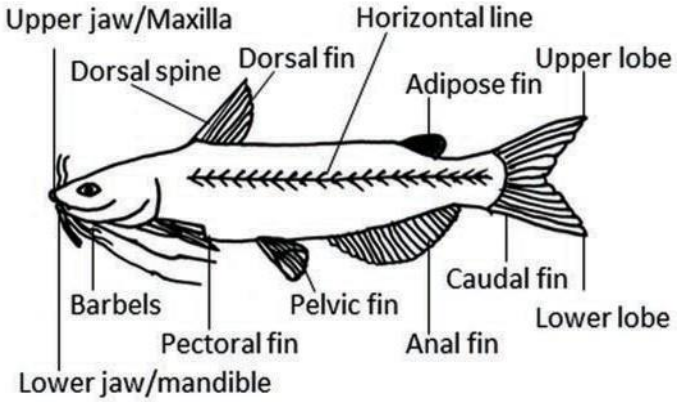
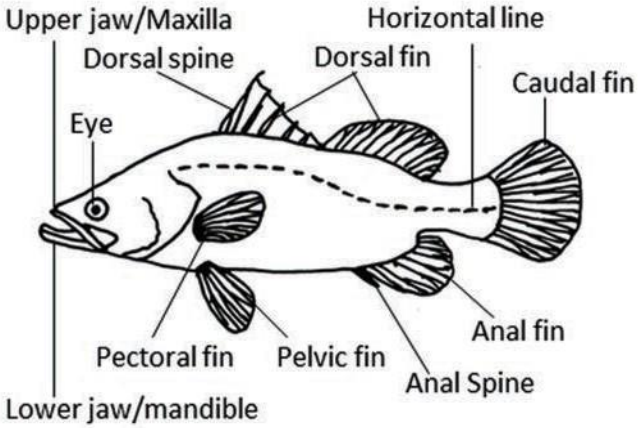
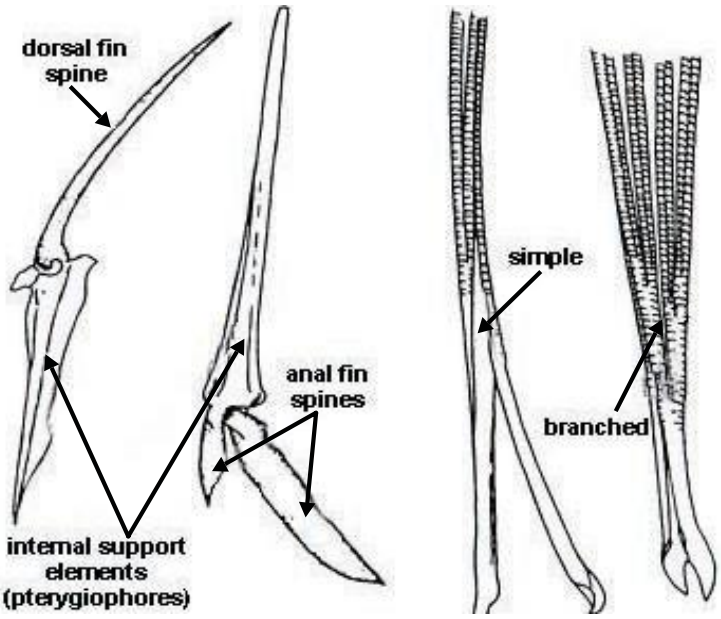
Appendix 10. Field Guide for the Identification of Important Fishes and Mud Crabs in the Sundarbans

1. External Body Parts of Bony Fish







Adopted from http://www.flmnh.ufl.edu/fish/Education/Diagrams/FishFins.html

2. Hilsha shad

Scientific Name: *Tenualosa Ilisha*

Local name: Ilish, Ilsha

Description: Body compressed on the sides and rounded equally on the top and bottom. The fish is silver or golden-white with a glossy appearance. A notch is present in the middle of the upper jaw. 45–47 scales are present in a horizontal line running along the middle of the fish. Edges of scales have narrow ridges like the teeth of a comb.

Number of hard fin spines and soft fin rays: Dorsal=17–19 rays with the first 3 unbranched; Pectoral =14–16 rays; Pelvic=8 rays with the first 1 unbranched; Anal=18–23 with the first 2–3 unbranched; Caudal=19 rays.

3. Cuja croaker

Scientific Name: *Macrospinosa cuja*
Local name: Bhola, Java bhol, Cuizza bhol, Cuizza poa
Description: The body is compressed on the sides. The strongly arched top of the fish drops down in a slight U–shape with a rounded front. The upper part is greenish brown and the lower part is silvery white. The bottom of the fish is straight but the belly slightly rounded. The top of the head is slightly concave. The first section of dorsal fin is strong and has sharp spines. Tips of dorsal fins are black. The spine of the second anal fin is heavy and strong. A series of about 51 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=10 hard spines in the front with the first one very short and 27 unbranched rays at the back; Pectoral=18 rays; Pelvic=1 spine in front and 6 rays in the back; Anal=2 spines in front and 7 rays in the back; Caudal=18 rays.

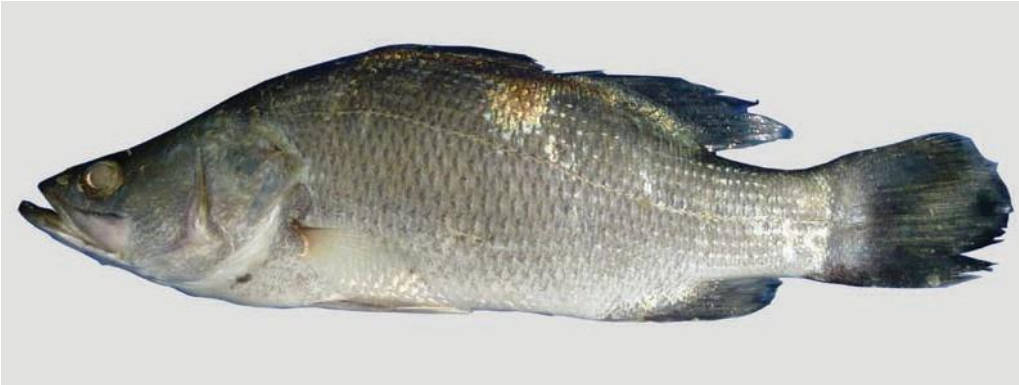
4. Sea pearch or Sea bas

Scientific Name: *Lates calcarifer*

Local name: Vetki, Koral, Patari

Description: The body is elongated and compressed on the sides. Lower jaw extends past the upper jaw. The back is greenish and the sides and abdomen are silvery white. The top of the head is slightly concave and narrowed down to the tip. Both the third dorsal and anal spines are the longest and strong. Pectoral fins are shorter than pelvic fins. Caudal fin is rounded. The spine at the front of the anal fin is heavy and strong.

Number of hard fin spines and soft fin rays: Dorsal=8 hard spines at the front with the first one short and 11–12 unbranched rays at the back; Pectoral=16–17 rays; Pelvic=1 spine in front and 6 rays in the back; Anal=3 spines in front and 8–9 rays in the back.



5. Pangas catfish or Yellowtail catfish

Scientific Name: Pangasius pangasius

Local name: Pangas

Description: The lower part of the heavy body is glossy-white and the upper part is greenish. Spines on the dorsal and pectoral fins are strong and similar in length. The fish has two pairs of barbels: One from the upper jaw reaches past the base of the pectoral fins and another one from the lower jaw only reaches slightly past the gill opening.

Number of hard fin spines and soft fin rays: Dorsal=8 rays with the first 1 unbranched; Pectoral=13 rays with the first 1 unbranched; Pelvic=6 rays; Anal=29–33 rays with the first 3–4 unbranched.

6. Silond catfish

Scientific Name: *Silonia silondia*

Local name: Shillong, Silon

Description: The upper part of the relatively slender body is bluish, while the sides and belly are silvery. Fins are grayish. Margins of jaws are reddish. The base of the pelvic fins and anal and caudal fins are yellowish. Circles around the eyes are white. Dorsal spines are soft and flexible in the front. Pectoral spines are hard. The tip of the caudal fin is blackish.

Number of hard fin spines and soft fin rays: Dorsal=8 rays with the first 1 unbranched; Pectoral=13 rays with the first 1 unbranched; Pelvic=6 rays; Anal=41–46 rays.

7. Long-whiskered catfish

Scientific Name: *Sperata aor*

Local name: Ayre

Description: The upper body part is bluish and the lower part is white. The snout is long and round. Barbels on the upper jaw are very long and reach to the end of the anal fin and sometimes extend past the base of the caudal fin. Barbels on the lower jaw sometimes reach as far as the pectoral fin. Barbels on the nose extend to the mid eye. The length of the dorsal spine is equal to the length of the head. The spine on the pectoral fin is strong and has a row of sharp, tooth–like projections in the front. There is a prominent black spot on the back end of the adipose fin. The length of the dorsal spine, the adipose fin, and the head are equal. The fins are yellowish with dark edges. When folded down, the dorsal spine reaches the adipose fin.

Number of hard fin spines and soft fin rays: Dorsal=1 spine in front and 7 rays the back; Pectoral=1 spine in front and 9–10 rays the back; Pelvic=6 rays with the first 1 unbranched; Anal=12–13 rays.

8. Wallago catfish

Scientific Name: *Wallago attu*

Local name: Boal

Description: The body is compressed on the sides with an elongated head that is flat on the top. The upper part of the fish is olive or grayish and the lower part is whitish. A pair of barbels on the upper jaw extends beyond half of the body length. A pair of barbells on the lower jaw is equal to the length of the snout. The lower jaw is longer than the upper jaw. There is no spine on the dorsal fins. The anal fin starts from behind the pectoral fin and reaches almost to the caudal fin. The upper lobe of the caudal fin is longer than the lower lobe.

Number of hard fin spines and soft fin rays: Dorsal=5 rays; Pectoral=14–15 rays with the first 1 unbranched; Pelvic=10 rays; Anal=85–89 rays.

9. Catla

Scientific Name: *Catla catla*

Local name: Catla, Katal

Description: The body is short, heavy and compressed. The top of the fish is more convex than the bottom. The upper part of the body is deep gray. The lower part of the body and sides are silvery or whitish. The upper jaw is shorter than the lower jaw. 40–43 scales are present in a horizontal line that runs along the middle of the fish. There are no barbels.

Number of hard fin spines and soft fin rays: Dorsal=17–18 rays with the first 2 unbranched; Pectoral=18–20 rays; Pelvic=9 rays; Anal=8 rays with the first 3 unbranched.

10. Orange-fin labeo

Scientific Name: *Labeo calbasu*

Local name: Kalbaush, Kalibaus, Baus, Kalia

Description: The top of the fish is more convex than the bottom. The upper part is gray or black. The lower part is lighter and yellowish beneath the head. Barbels on the upper jaw are shorter than barbells on the lower jaw. 40–42 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=17–18 rays with the first 3 unbranched; Pectoral=16–18 rays; Pelvic=9 rays with the first 1 unbranched; Anal=7 rays with the first 2 unbranched.

11. Rohu, Roho labeo or Rui

Scientific Name: *Labeo rohita*

Local name: Rui, Rohu, Ruhit

Description: The body is narrow and slightly rounded. The upper part is brownish. Bottom and sides are silvery. The upper jaw is longer than the lower jaw. Cartilage covers the lips. It has only a single pair of short barbels on the upper jaw. The center of the scales is red and the margins are black. Dorsal and caudal fins are gray, and pectoral, pelvic and anal fins are slightly reddish. 41–42 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=15–16 rays with the first 3 unbranched; Pectoral=16–17 rays; Pelvic=9 rays; Anal=7 rays with the first 2 unbranched.

12. Mrigal carp or White carp

Scientific Name: *Cirrhinus cirrhosus*

Local name: Mrigal, Mirkal, Mirka

Description: The body is slightly fat and equally convex on the top and the bottom. The upper part of the body is grayish. The sides and lower parts are whitish or silvery. Pectoral, pelvic and anal fins are slightly orange. The head is narrow and small with a rounded snout. It has no barbels. 40–43 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=10–12 rays with the first 2–3 unbranched; Pectoral=16 rays; Pelvic=9 rays; Anal=8 rays with the first 3 unbranched.

13. Kuria labeo

Scientific Name: *Labeo gonius*

Local name: Ghonia, Goneri, Ghoinna, Goni, Kurchi

Description: The compressed body is more curved on top than on the belly. The upper part is greenish, the sides are lighter and the abdomen is whitish. The small scales have dark margins. A blunt snout covers the upper lip. It has two pairs of short barbels. 73–80 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=16–17 rays with the first 3 unbranched; Pectoral=15–16 rays; Pelvic=9 rays with the first 1 unbranched; Anal=7 rays with the first 2 unbranched.

14. Striated snakehead or Snakehead murrel

Scientific Name: *Channa striatus*

Local name: Shol

Description: The body is round towards the base of the head and compressed towards the tail. Scales on the head are large and plate–like. The body colour changes with age and habitat type. The fish is generally blackish on the upper part with a zigzag pattern on the sides and belly. The belly has yellowish to whitish background. The caudal fins are rounded. 54–60 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=42–46 rays; Pectoral=15–17 rays; Pelvic=6 rays; Anal=24–27 rays.

15. Great snakehead

Scientific Name: *Channa marulius*

Local name: Gazar, Gajal

Description: The body is rounded towards the front and compressed towards the tail. Large round scales are present on the head. The body colour varies with age and habitat type. Young fish have a bright orange band along the midline on the side. In a mature fish, there are 4–5 large black blotches with white dots along the sides below the horizontal line. The caudal fin has a slightly pointed tip with a distinct black spot with yellow margins on the upper base. 54–65 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=49–55 rays; Pectoral=17–19 rays; Pelvic=6 rays; Anal=28–35 rays.

16. Spotted snakehead

Scientific Name: *Channa punctatus*

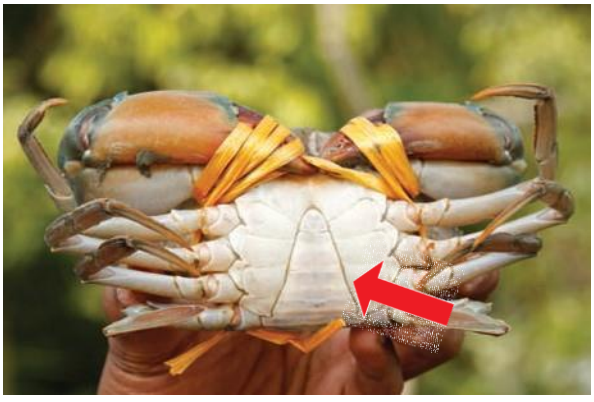
Local name: Taki, Lati

Description: The body is rounded on the front towards the head and compressed horizontally towards the tail. Large round scales are present on the head. The body colour varies with age, but the upper body is normally dark gray, the lower part lighter. Above and beneath the middle line there are 8–9 vertical dark bands. Some scales have black spots. The caudal fin is rounded. 40–41 scales are present in a horizontal line that runs along the middle of the fish.

Number of hard fin spines and soft fin rays: Dorsal=29–32rays; Pectoral=15–18 rays; Pelvic=6 rays; Anal=20–22 rays.

17. Orange mud crab or Brown mud crab
Scientific Name: *Scylla olivacea*
Local name: Komola or Badami shila kakra

Description: A series of bumps or spines are present along the front of the oval or slightly triangular body. This relatively large light brown, greenish and orange coloured crab has 2 strong clawed legs (chelipeds), 3 pairs of walking legs and one additional pair of legs at the back with paddles at the end for swimming. The underside of a male crab has a narrow triangular flap of shell covering the belly (see photo of the male crab left below). A female mud crab has a wider and rounder flap of shell covering the belly (see photo of the female crab right below).



Male crab with long-narrow abdominal cover

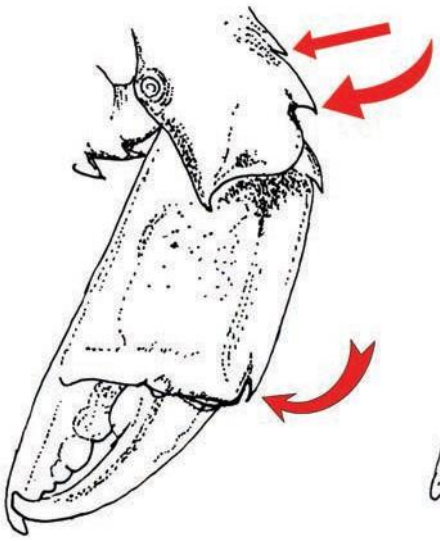
Female crab with broad-wide abdominal cover

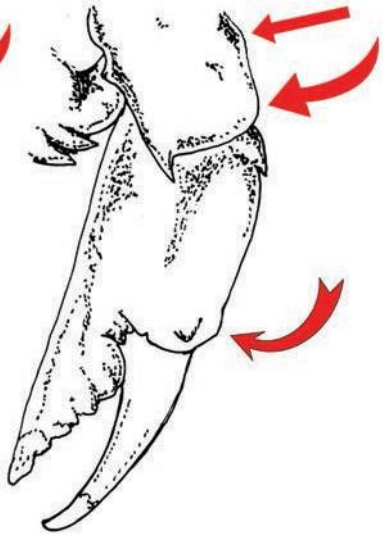
18. Green mud crab, Giant mud crab or Mangrove crab

Scientific Name: *Scylla serratta*

Local name: Sabuj shila kakra

Description: The body shape and size of the green mud crab is the same as for the orange mud crab. But the green mud crab has a darker brown to mottled green body colour and a smooth upper shell. There are two spines on the middle segment of the large clawed legs or chelipeds.





Green mud crab (*Scylla Serratta*) Orange mud crab (*Scylla olivacea*)

One way to differentiate between orange and green mud crabs is by looking at the shape of the spines on their large clawed legs or chelipeds (indicated with arrows).

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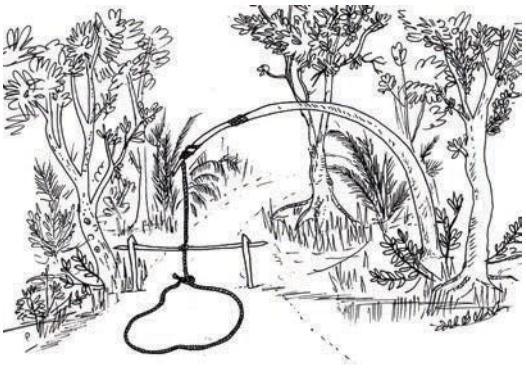
Appendix 11. Field Guide for the Identification of Traps and Snares used for Wildlife Poaching in the Sundarbans

1. Whip trap-stick trigger (sitka fad)

(Commonly used for catching deer)

The whip trap is a spring snare commonly used for catching deer. It consists of a cross bar held at about one foot above ground by two sticks. A simple rope loop is attached to the stick trigger near the ground and held under tension by a flexible tree (strong and young sapling). The animal trips the trap by knocking the stick trigger. This causes the rope loop to close around the animal's leg and it is pulled tightly by the flexible tree.



2. Whip snare-string trigger (*sitka fad*)

(Commonly used for catching deer)

A whip snare is tied to a strong but flexible tree with a strong nylon rope. The tree is bent to the ground with the snaring rope so that the tree functions like a spring. At the end of the rope a loop is placed on the ground tied with a triggering stick that is held on the ground with two pegs and a tensioned string. If a deer passes through the string, the stick is extricated from the pegs and the snare loop will entangle the leg of deer.

3. Pit-whip trap (*pit sitka kol*)

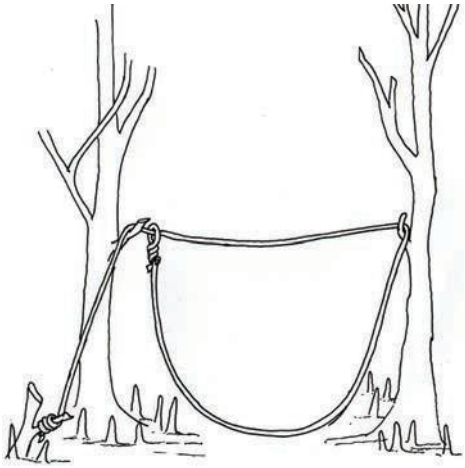
(Commonly used for catching deer and wild boar)

A pit-whip trap is tied to a strong but flexible young tree with a strong nylon rope. The tree is bent and functions like a spring. The triggering part with the rope loop of the trap is set and held in a pit in the ground by a stick that functions as the trigger mechanism and is camouflaged with leaves. If a deer steps in the pit, the stick becomes dislodged and the loop entangles the deer.

4. Leg snare (*payer fash*)

(Commonly used for catching deer and wild boar)

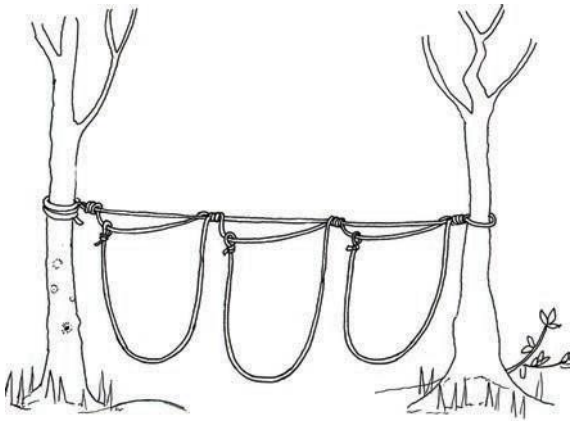
This is the simplest snare to catch deer and pig. One end of a thick-strong nylon rope is tied to a branch of a tree and the other end has a loop hanging between two trees on both sides of a walking trail circling a bush or a tree branch. When a deer walks along the trail, the loop gets tangled in the legs and tightens with every movement of the animal.



5. Neck snare or walking trap (*gola fash/hata fash*)

(Commonly used for catching deer)

A neck snare or walking trap has a series of snares tied to each other with a ladder rope between trees. A group of deer are driven towards the snares by the poachers so that the deer get their heads or legs entangled in the snares.



6. Fruit baited hook and/or poison (*fol toop*)

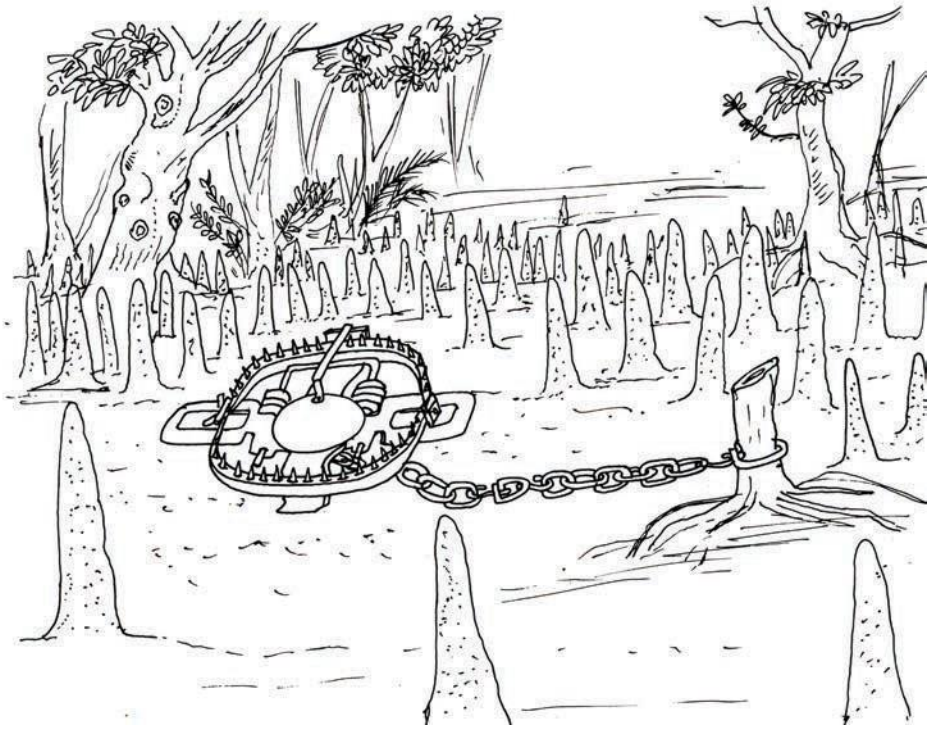
(Used for attracting, catching and killing wildlife)

A fruit bait, often bananas, with a fishing-hook hidden inside is hung with a strong nylon line to attract and catch or kill deer. If a deer eats the banana, it gets hooked in its mouth or throat. As the deer jerks or tries to move away, the hook gets further embedded. Sometimes poachers insert sleeping pills into the fruit. After eating the fruit with sleeping pills the deer becomes senseless or dazed so that the poachers are able to catch the deer easily. Sometimes poachers also use pesticides mixed with Keora (*Sonneratia apetala*) leaves or fruits to kill deer.

7. Jaw trap (*sotta kol/chapa kol*)

(Used for catching deer, tiger and wild boar)

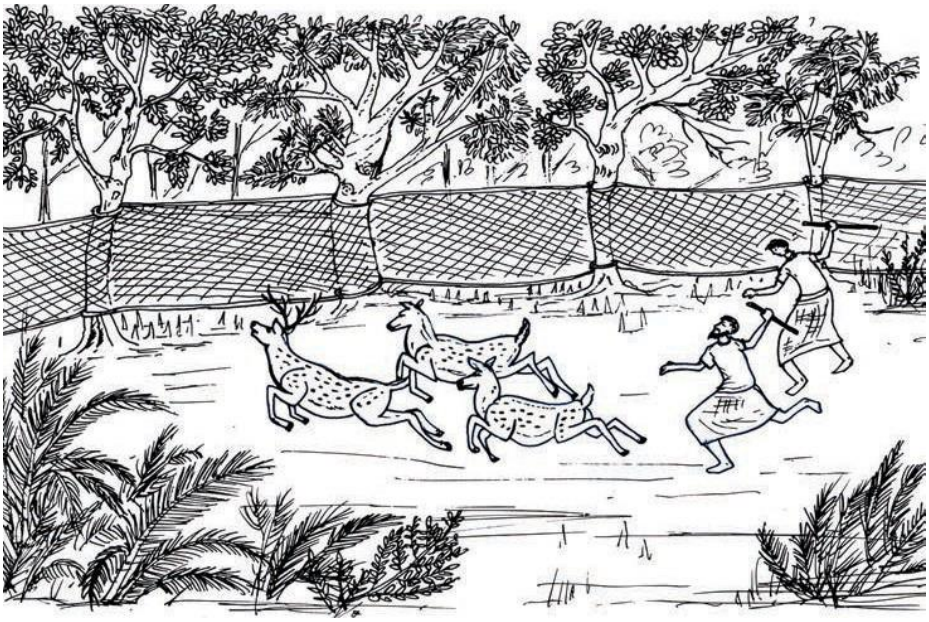
The jaw trap is set on the walking trail of the animals and tied to a tree by a strong metal chain. The trap is camouflaged with leaves.



8. Fishing net trap (*Jaal fash*)

(Commonly used for catching deer)

Sometimes poachers hang fishing nets in a line of trees or bushes and chase a herd of deer towards the net to get them entangled.



9. Gun shoot

(Commonly used for killing deer and also tiger)

Poachers climb up a tree and sit on a suitable branch to shoot deer. Poachers offer tree leaves or fruits to attract deer in shooting range.

Appendix 12. Field Guide for the Identification of Fishing Gears in the Sundarbans

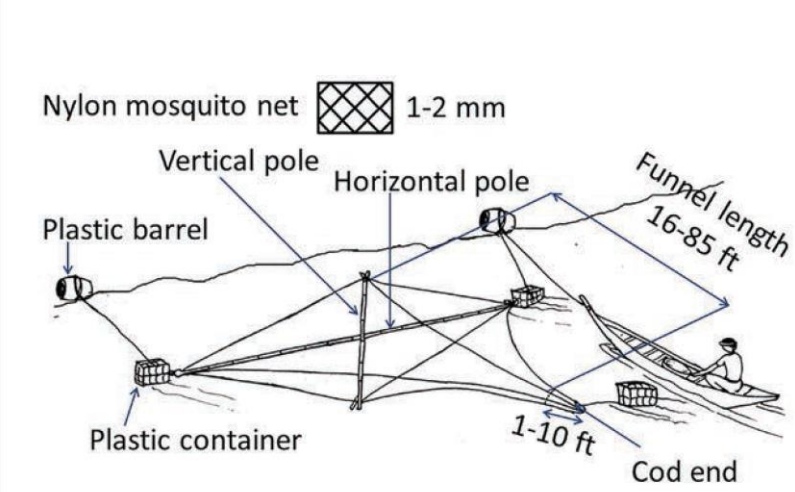
The two major types of fishing gears are found in the Sundarbans: (1) shrimp and prawn post-larvae or fry collection mosquito nets and (2) edible fish harvesting gears.

1. Post-larvae Collection Nets

All post-larvae collection nets are made of fine mesh nylon mosquito net (usually bright blue). Mesh size is 0.04 to 0.08 inches (1 to 2 mm). Use of all mosquito nets has been banned since 2000, but eight gear types are commonly found in the Sundarbans. Use of these nets is also prohibited as per the Protection and Conservation of Fish Rules, 1985.

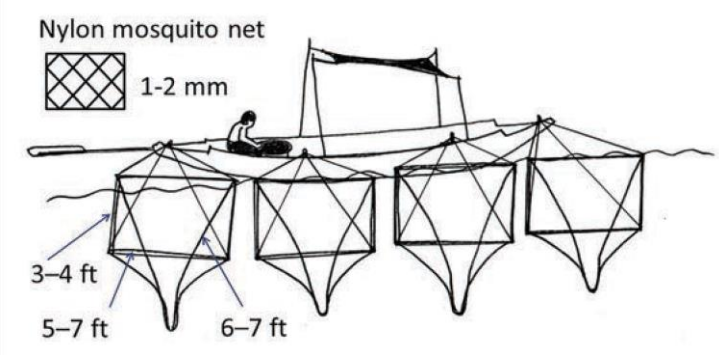
1.1 Post-larvae set-bag net (*net jal*)

A funnel-shaped mosquito net with a rectangular mouth held open by wooden poles. The funnel length is 16 to 85 feet (5 to 26 meters) with a mouth circumference of 33 to 90 feet (10 to 27 meters) held open by vertical and horizontal wooden or bamboo poles and attached to a cod end where the shrimp and prawn fries are collected. Big plastic drums (120 liters) and containers (30 to 55 liters) are used as floats. These nets are generally found year round except during August to October and up to 15 miles (25 kilometers) inside the Eastern Sundarbans.



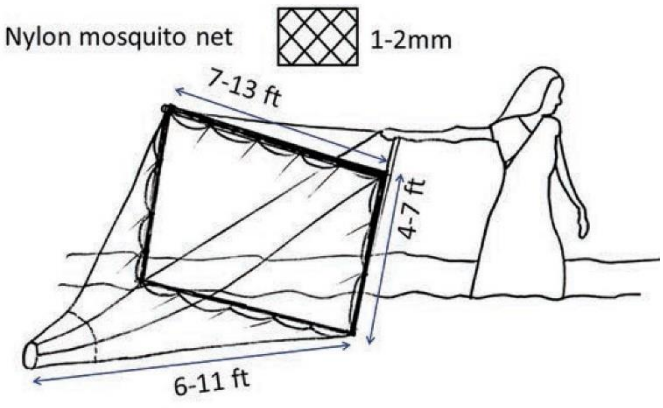
1.2 Post-larvae box net (*baxo jal*)

A small mosquito bag net mounted on a rectangular wooden frame tied with long ropes to a small rowing boat in the mid part of the river facing the incoming tide and operated by 1 or 2 fishermen. The frame size is 3 to 4 feet (1.0 to 1.3 meters) high and 5 to 7 feet (1.7 to 2.0 meters) wide. Funnel length varies from 6 to 7 feet (1.8 to 2.1 meters). Typically 3 to 4 nets are set in lines. These nets were only found during October to March.



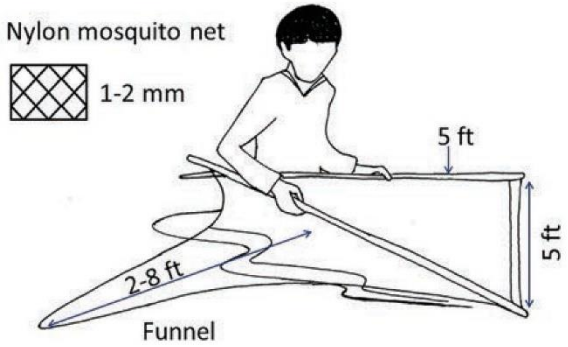
1.3 Post-larvae hand-drag net (*tana jal*)

This net is similar to the box net but it is dragged through shallow water by a person walking ahead of the net along the edge of the river. The mouth opening is 4 to 7 feet (1.4 to 2.0 meters) high and 7 to 13 feet (2.0 to 4.0 meters) wide. Funnel length varies from 6 to 11 feet (1.8 to 3.5 meters).



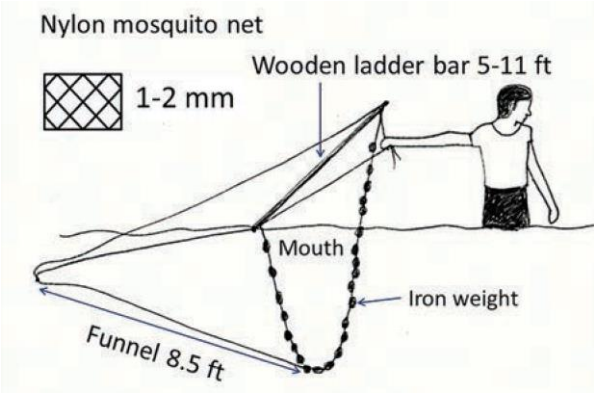
1.4 Post-larvae hand push net (*ponar thela jal*)

A small mosquito bag net mounted on a triangular wooden or bamboo frame. Funnel length varies from 2 to 8 feet (0.5 to 2.5 meters). The frame is made of a 5 foot (1.5 meters) long equilateral triangle. The net is generally pushed or scooped before a person walking in shallow water. These nets are found mostly during April to May.



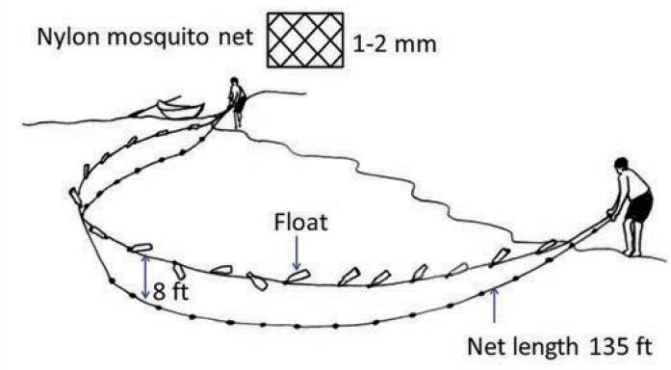
1.5 Post-larvae drag net (*ponar moi jal*)

A mosquito bag net with single or multiple mouth opening attached to a 5 to 11 (1.5 to 3.4 meters) foot long horizontal wooden ladder bar at the upper part to help it float while dragged against the tide by a person pulling a 5 to 12 foot (1.5 to 3.7 meters) long rope tied to both ends of the bar. The ladder bar and funnel length are about 8 feet (2.5 meters) each. This net has occasionally been found in the mid-eastern part of the Sundarbans.



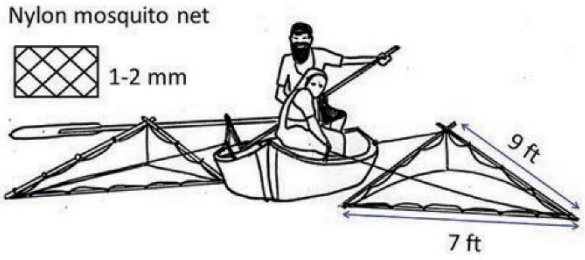
1.6 Post-larvae seine net (*parse ponar jal*)

About 135 feet (41 meters) long and 8 feet (2.5 meters) wide, slightly folded sack like mosquito net with plastic bottles or small floats on the top rope and lead weights on the bottom rope. The net is set from a vessel on the side of the river to a depth of about 7 feet (2.0 meters), both ends of which are pulled to shore by 5 to 6 fishermen standing on the bank holding both the bottom and top rope. This is a comparatively new fishing gear found during December to March in the Passur River.



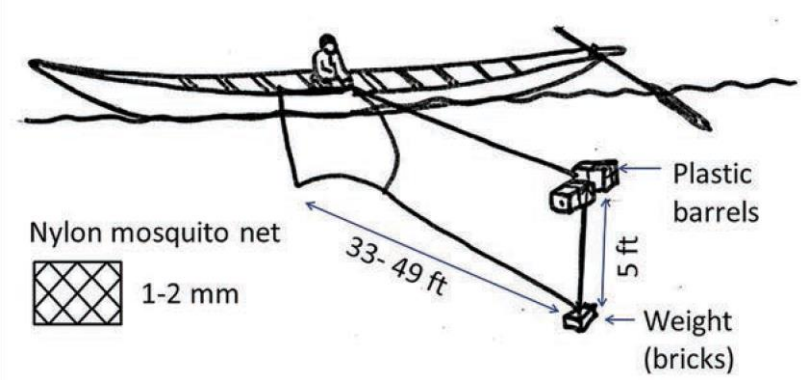
1.7 Boat net (*rocket jal*)

A small pair of triangular or rectangular mosquito net bags mounted on either side of a rowing boat close to the water surface. The boat is anchored and the nets filter the incoming tidal water to catch shrimp fry. This net is commonly seen in the western Sundarbans.



1.8 Flat mosquito net (*khorulla jal*)

A 33 to 49 foot (10 to 15 meters) long and 5 foot (1.5 meters) wide mosquito net fixed to the ground with a weight at one end and the other end attached to a boat making a fold towards the incoming tide.

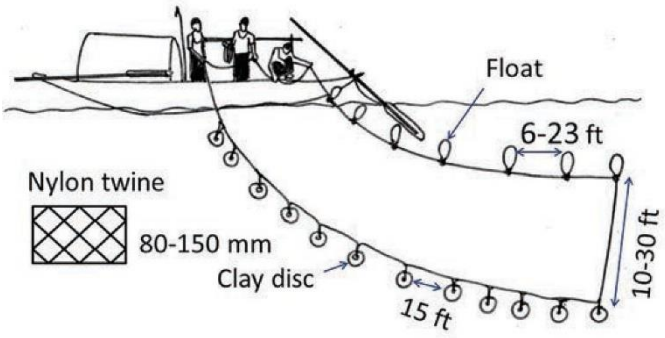


2. Edible Fish Harvesting Nets

There are 17 types of fishing gears recorded from Sundarbans to harvest edible fishes and crustacean.

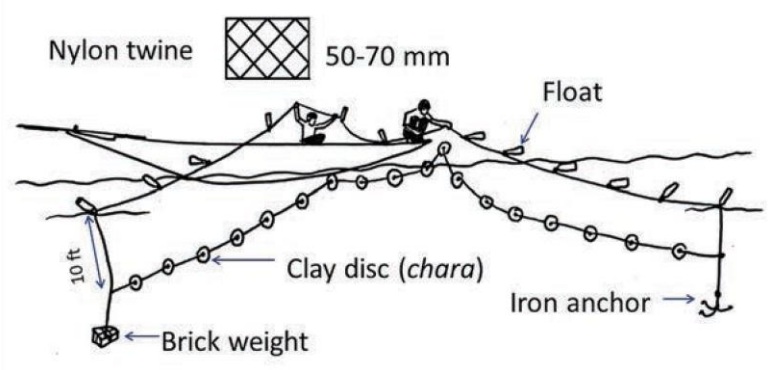
2.1 Small-mesh drifting gill net for hilsha (mesh size <25cm or 10 inch) (*fash/chandi/bhasha/ilish jal*)

A 500 to 5,000 foot (150 to 1,500 meters) long and 10 to 30 foot (3 to 9 meters) wide gill net with 2 or 4 number multi-filament fine nylon twine, mesh size 3 to 6 inches (80 to 150 mm), with floats attached to the top rope to keep it near the surface and brick or clay disks (*chara*) attached to the bottom rope. Sometimes heavy metal anchors (up to 15 kg/anchor) are used as sinkers. This net is normally operated by 2 to 5 fishermen from one small non-mechanized or mechanized wooden boat. Target species is adult hilsha (*Tenualosa ilisha*) and bycatch includes other small and medium size fishes, crabs, shrimp, dolphins, turtles, and snakes. This net is known to be harmful to dolphins; many entanglements have been recorded. This net is primarily used from June to September.



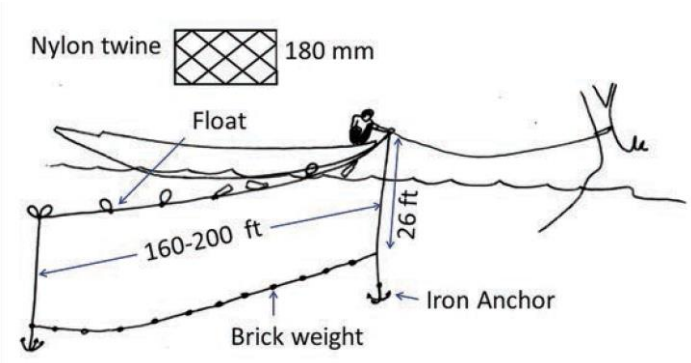
2.2 Small-mesh drifting gill net for jatka hilsha (mesh size <25cm or 10 inch) (*poka jal*)

A 500 foot (152 meters) long and 10 foot (3 meters) wide gill net made from double-filament nylon twine with small mesh size 2.0 to 2.4 inch (50 to 70 mm) is fixed to the river bottom by heavy weights (brick or iron anchors) attached to the bottom rope. Clay disks (*chara*) are used as a sinker on the bottom rope. This net is set during incoming and outgoing tides, normally operated by two fishermen, and deployed in big rivers during June to September. This net is illegal as per the Marine Fisheries Rules, 1983, and the Protection and Conservation of Fish Rules, 1985.



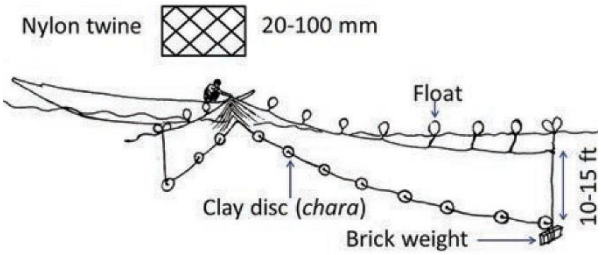
2.3 Fixed floating gill net (*dhora/vetki/koral jal*)

A 160 to 200 foot (50 to 60 meters) long and about 26 foot (8 meters) wide gill net with a mesh size of about 7.0 inches (180 mm) and thick multi-filament synthetic twine. The net is fixed to the river bottom at meanders or confluences by heavy weights (iron anchors and bricks) attached to the bottom rope. Generally, one end of this net is tied to a tree on the riverbank. This net is used year round and is set for a full 6-day cycle at spring tide. Sometimes it is set across the creek mouth to block the whole stream, which is illegal as per the Protection and Conservation of Fish Rule, 1985.



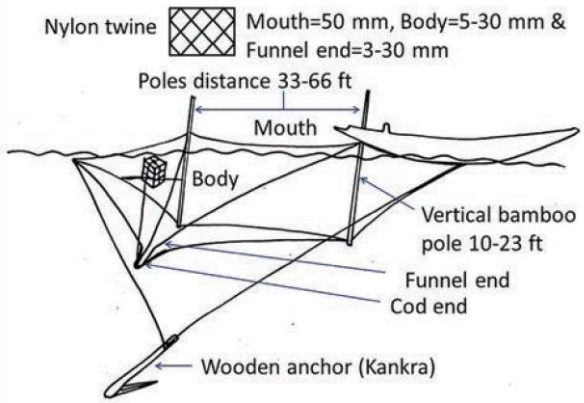
2.4 Mono-filament gill net (*current jal*)

This net is similar to the drifting gill net, but the twine is mono-filament nylon. It is set drifting in creeks or sometimes fixed with wooden or bamboo poles in non-flowing water bodies. Mesh size is 0.8 to 4.0 inches (20 to 100 mm). This net is very harmful to dolphins and fisheries in general, and its use is strictly illegal as per the Protection and Conservation of Fish Act, 1950.



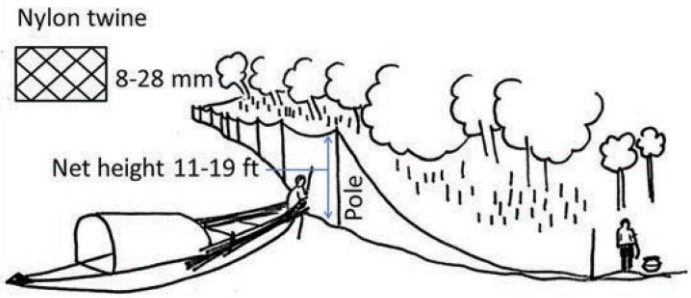
2.5 Set-bag net (*behundi/badha jal*)

A funnel shaped net made from thick nylon twine with a mouth circumference of 115 to 256 feet (35 to 78 meters) held open vertically by two 10 to 23 feet (3 to 7 meters) long wooden or bamboo poles. The poles are set in the middle part of the mouth. The 'wings' from the pole to the end of both sides guide fish and crustaceans into the funnel. Mesh size decreases gradually from the mouth to the end from 2.0 to 0.1 inches (50 to 3 mm). This net is harmful to fisheries. Despite being strictly prohibited in the Sundarbans, it is found year round.



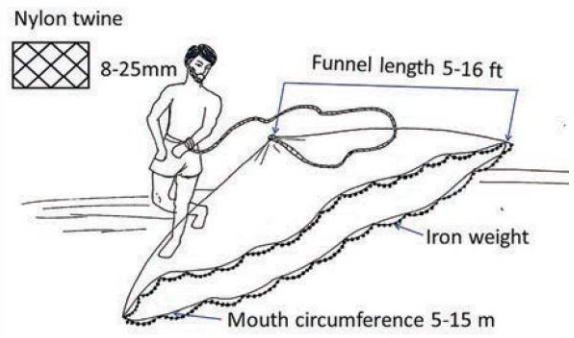
2.6 Long shore net (*charpata jal*)

A long net made of multi-filament nylon twine with a mesh size of 0.3 to 1.1 inch (8 to 28 mm), which is attached to vertical wooden poles stuck in the mud along riverbanks. The net varies in length from 330 to 2,600 feet (100 to 800 meters) and in height between 11 to 19 feet (3.4 to 5.8 meters). During low tide, the net is fixed at the bottom of the poles and covered with mud. When the tide is high, the top part of the net is fixed to the top of the poles. The long shore net is a major threat to the masked finfoot (*Heliopais personatus*), small-clawed (*Aonyx cinereus*) and smooth-coated otters (*Lutrogale perspicillata*), the estuarine crocodile (*Crocodylus porosus*) and other wildlife, that gets trapped behind the net as the high tide recedes. Found year round in the Sundarbans.



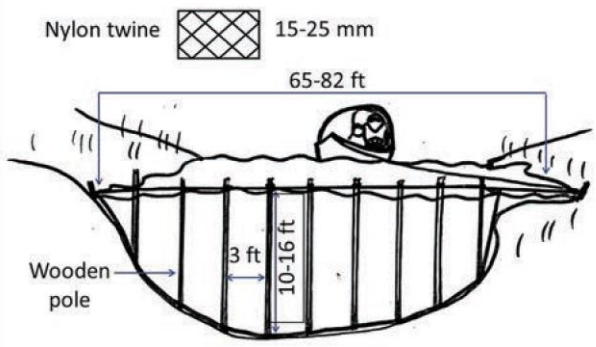
2.7 Cast net (*khepla/toire/jhaki/chatki/pheka/dhundi/mootth jal*)

A circular and funnel shaped net with pockets and metal weights (iron) around the mouth circumference and a tether in the center. Normally cast from the river's edge, but sometimes also dragged by two people along the shore. Commonly used for subsistence fishing by local communities and found in use year round in the Sundarbans.



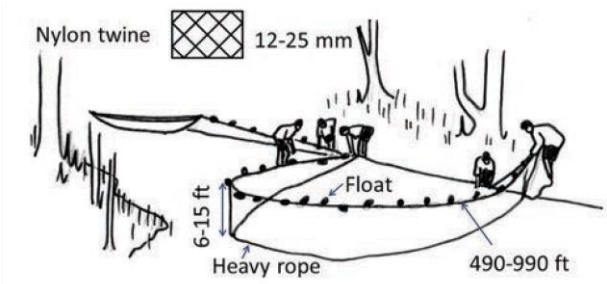
2.8 Creek net (*khalpata/khalgora jal*)

A small net that looks similar to the long shore net, but is set with a series of vertical wooden poles across the mouth inside of small creeks during high tide. Mesh size varies from 0.6 to 1.0 inches (15 to 25 mm). The twine used for this net is multi-filament nylon. It is usually 66 to 82 feet (20 to 25 meters) long and 10 to 16 feet (3 to 5 meters) high. This net is banned in small creeks inside the entire Sundarbans. Creek net fishermen operate year round and often carry poison for harvesting fish and crustaceans, which is also strictly prohibited.



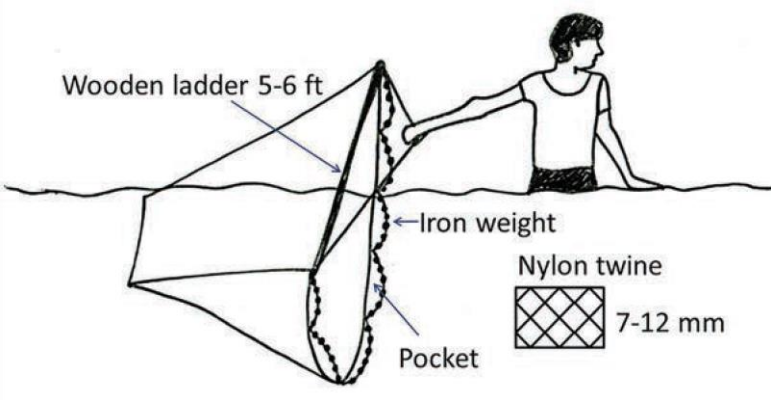
2.9 Seine net or beach seine (*kathi/ber jal*)

A 500 to 1,000 foot (150 to 300 meters) long and 6 to 15 foot (1.8 to 4.5 meters) wide net set from a vessel in an arc (U shape), both ends of which are pulled to shore by fishermen standing on the bank. This net is made of multi-filament nylon twine with a mesh size of 0.5 to 1.0 inches (12 to 25 mm) and operated by 5 to 6 fishermen mostly in small rivers or creeks during the outgoing tide. Found mostly during December to May in the Sundarbans.



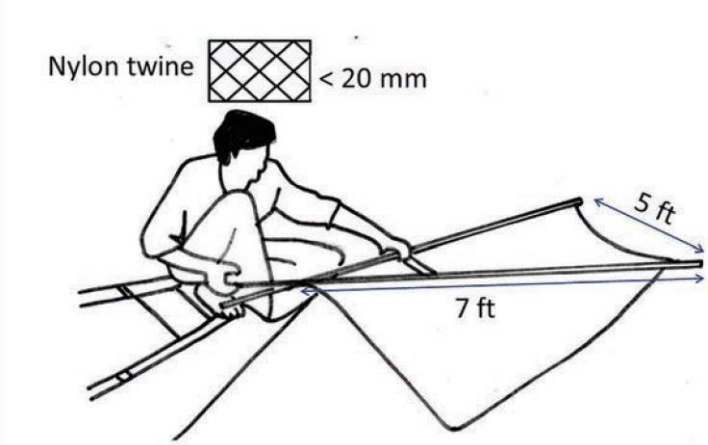
2.10 Drag net (*moi jal*)

A funnel shaped net attached to a 5 to 6 feet (1.5 to 2 meters) ladder bar similar to the post-larvae drag net, but with the mouth divided into 4 to 15 pocket-like openings (size of each opening is 8 to 20 cm high and 14 to 30 cm wide). Lead weights along the bottom rope keep the mouth open when dragging it against the tide. Mesh size varies from 0.3 to 0.5 inch (7 to 12 mm) with nylon twine similar to that of cast nets. This net is normally used to catch shrimp from shallow river banks for subsistence fishing.



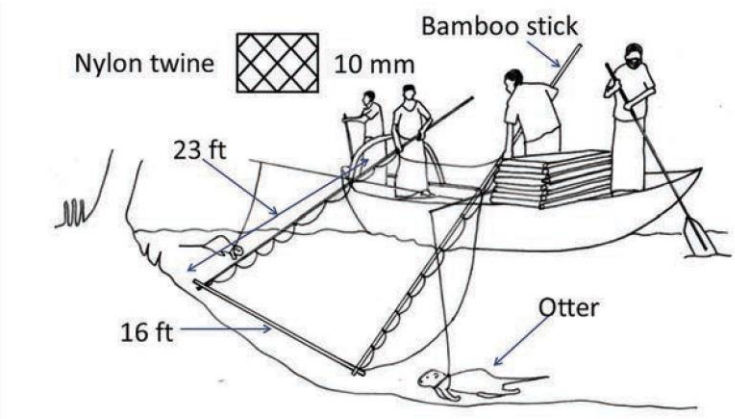
2.11 Hand push net (*khuchon jal/thela jal*)

A triangular net made of nylon twine with 0.8 inches (20 mm) mesh size attached to two poles crossed where the net ends. A person sits in the bow of the boat and scoops water. The net is typically used for catching small crabs from among floating water hyacinths. Found during December to March on the Passur River.



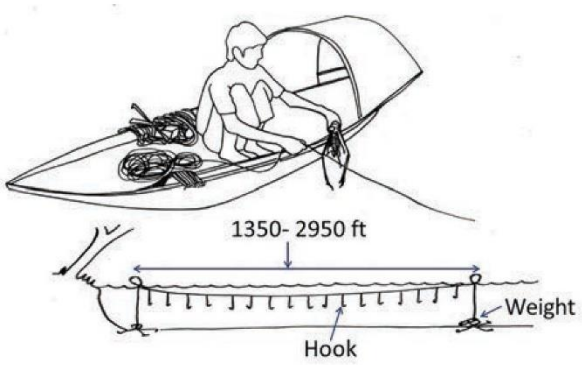
2.12 Otter-fishing lift net (*dhaire/tar jal*)

A square or rectangular shaped scoop or lift net usually 23×16 feet (7×5 meters) in size, used with three bamboo sticks; one at the top or mouth (23 feet or ~ 7 meters long) and one on each side of the net (16 feet or 5 meters in length). Mesh size of the thick nylon twine (6–9 number) is less than 0.4 inch (10 mm). The net is operated by four fishermen from a rowing boat positioned parallel to the shore at a distance of 13 to 16 feet (4 to 5 meters) from the shore. Two men maneuver the boat (one at the bow, one at the stern), while the other two men work the net and direct the two to three smooth-coated otters (*Lutra perspicillata*) that chase fish and crustaceans from under vegetation and roots towards the net. These otters wear a simple rope harness that is attached to a separate pole held and controlled by the fisherman's foot. This technique is globally unique. Only fishermen from the Narail and Khulna Districts of Bangladesh engage in otter fishing. Found year round in the Sundarbans.



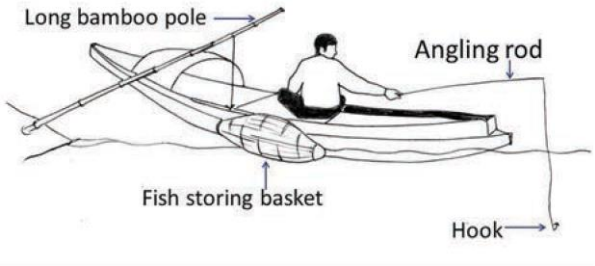
2.13 Longline with many hooks (*doriborshi/donborshi/tana borshi*)

A long sturdy leader line 1,400 to 3,000 feet (400 to 900 meters) long is anchored to the bottom at both ends with weights and suspended in the water with the help of floats on the water surface. 400 to 900 short drop lines (13 to 20 inches or 34 to 50 cm long) with baited hooks (0.7 to 1.9 inch or 1.8 to 4.9 cm curved length) at the end are attached to the ladder line at an interval of about 3 feet or 1 meter. Generally small shrimps, land slugs (shell-less gastropod mollusc) and eel fish are used as bait. Target species are giant freshwater prawn (*Macrobrachium rosenbergii*), giant tiger shrimp (*Penaeus monodon*) and cat fishes. Found year round in the Sundarbans.



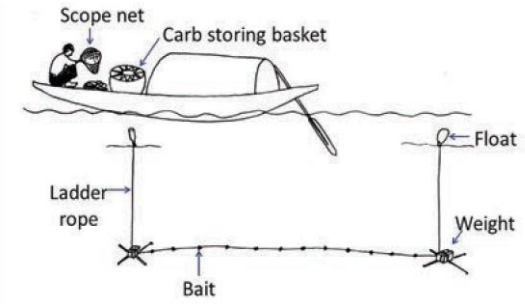
2.14 Hook and rod (*chhip-borshi*)

Conventional angling bamboo or wooden stick with one baited hook at the tip of a mono-filament thread. A metal weight (usually a nail) is attached close to the hook to sink the line. Hooks are made from 1.1 to 2.0 inch (3 to 5 cm) long needles. Typically deployed from a small, narrow boat and manned by one fisherman using multiple rods. The boat is held in position with a long bamboo pole stuck horizontally into the mud bank. Normally small shrimp are used as bait. Target species are giant freshwater prawn (*Macrobrachium rosenbergii*) and giant tiger shrimp (*Penaeus monodon*). Found year round in the Sundarbans.



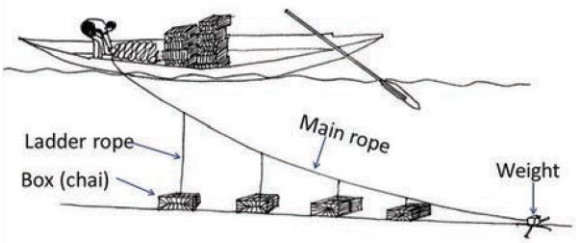
2.15 Crab line (*dundori*)

A 500 to 2,300 foot (150 to 700 meters) long jute or nylon rope acts as the ladder line. Bricks attached to small wooden sticks are used to anchor both ends of the gear to the ground. Plastic floats, usually bottles or Styrofoam pieces are tied with a thin rope to the anchors to indicate the location of the crab line. Unlike with the conventional longline, the bait is tied directly to the ladder line at an interval of about 39 inch or 1 meter with metal wires or plastic fibers. The use of this gear is strictly prohibited from January to February but commonly found during this period.



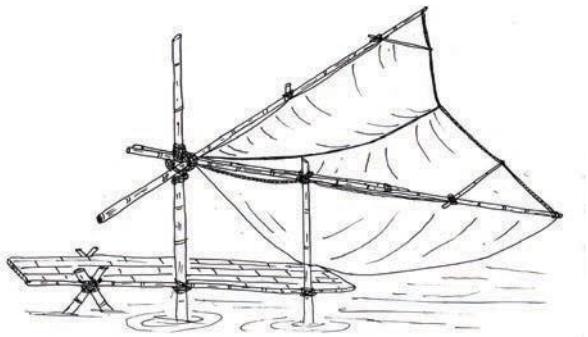
2.16 Crab trap (*chai/charo*)

Box traps made from thin bamboo are used for catching crabs. The mouth of the 13 to 16 inch (32 to 40 cm) long, 7 to 12 inch (18 to 31 cm) wide and 6 to 9 inch (14 to 20 cm) high box is made in such way that crabs can enter but not come out. Eel or other fish are tied as bait with a string inside the box. About 32 to 60 boxes are attached to a leader rope with a drop line at an interval of 33 to 49 feet (10 to 15 meters). Mud crabs (*Scylla serratta* and *S. olivacea*) are the target species. This gear was introduced to the Sundarbans in 2009 and is mostly found from December to March.



2.17 Large fixed lift net (*veshal/vel/tak/khora jal*)

A rectangular nylon net of 40-60 feet (13-18 meter) long and 30-45 feet (9-14 meter) wide in dimension tied to a triangular frame of bamboo and strong nylon rope. Mesh size varies between 05 to 40 mm or 0.2 to 1.5 inch. Two long bamboo poles are vertically fixed to the ground and the triangular bamboo-frame of the net horizontally tied with these poles above water surface at a point one-third from the tail end. At the tail end of the frame, a third bamboo pole is fixed to the ground vertically which makes a platform with one of the middle bamboo poles using some bamboos sticks tied parallel to the water surface to help the fisher to handle the net. Two cross bamboo poles (about 10-16 feet or 3-5 meter long) set at both front corner of the triangle between bamboo and mouth rope to keep the net open, and two bricks used as weight are tied to both the front corners of the triangle to sink the front part of the net in the water to the bottom of river or creek. The net operates from the tail end and a fisher stand on the bamboo to lift the net and collect the catch. Target species are carps, prawns and shrimps, barbs, potasi, ailia, eels, razorbelly, snakeheads, goby, bacha, catfishes, loach etc.



2.18 Poison fishing (*bish diye mach mara*)

Poison fishing has been identified as one of the most important causes of the decline in fisheries in the Sundarbans. Cast and creek net fishermen often carry pesticides. During the outgoing tide, nets are set across small creeks and canals inside the forest and a variety of locally available poisons are thrown into the upstream water to increase the catch of shrimp and fish, particularly in the eastern Sundarbans. Monitoring is required to quantify the extent, distribution, drivers and impacts of poison fishing.

Appendix 13. Field Guide for the Identification of Vessels in the Sundarbans

1. Shipping vessels

Name of boats	Photograph of boats
1.1 Oil tanker (*Teler tanker*)	
1.2 Inland water cargo boat (*Cargo*)	
1.3 Coaster (*Coaster*)	
1.4 International ship (*Bideshi jahaj/ ship*)	
1.5 Salt trawler (*Laban trawler*)	

2. Non-shipping vessels

Name of boats	Photograph of boats
1.6 Bangladesh Coast Guard ship (*Coast guarder jahaj*)	
1.7 Bangladesh Navy ship (*Navy jahaj*)	
1.8 Bangladesh Forest Department ship (*Ban bivager jahaj*)	
1.9 Overnight tourism ship (*Tourist jahaj/ boat*)	

Name of boats	Photograph of boats
1.10 Sea-going fishing boat (*Fishing trawler*)	
1.11 Speed boat and cabin cruiser	
1.12 Port Authority pilot boat (*Porter pilot boat*)	
1.13 Bangladesh Forest Department patrol boat (*Bonbivager patrol boat*)	
1.14 Fiberglass boat (*Jali boat*)	

Name of boats	Photograph of boats
1.15 Tug boat	
1.16 Launch body trawler (*Launch body/ kaath body*)	
1.17 Sampan trawler (*Sampan*)	
1.18 Open fishing trawler (*Udla fishing trawler*)	

Name of boats	Photograph of boats
1.19 Barge (*Golpata/goina nouka*)	
1.20 Dinghy (*Dingi/deshi nouka*)	

Appendix 14. Field Guide for Examining Dolphin Carcasses

1. Introduction

This protocol provides instructions on cetacean carcass examination and biological sample collection procedures. These procedures should be followed carefully and any deviations thoroughly explained in the box of additional details in Table 6 of the Appendix 4b (also see the Section 7 below).

2. Data Collection

For all carcasses or body parts, the patrol team will record, as possible, the (1) location, date and time; (2) species description and identification; (3) photographs of the carcass; (4) condition of the carcass; (5) evidence of the cause of death according to net, hook or propeller marks, contusions, lacerations, or internal hemorrhaging; (6) standard external measurements and tooth counts; and (7) determination of sex.

2.1 Location, Date and Time

Patrol team members will record the exact location from where the carcass was recovered with date and time (GPS position and name of the place). If the location where the carcass is examined is not the same as the one from where it was collected (e.g., you recover a carcass from the river and bring it back to your station), information on both of these locations (place names and GPS positions), dates and times of recovery and examination will be recorded.

2.2 Species Identification

It is vital to thoroughly document and photograph the diagnostic features of each cetacean carcass. Under no circumstances should patrol team members guess at species identifications. Diagnostic features including the size and shape of the body, dorsal fin, flukes, flippers and rostrum or beak, and details on the overall colouration (note that carcasses quickly lose their colour and become uniformly dark shortly after death) and colour patterns (blazes, stripes, cape, contrasts) should be recorded. Drawings should be made regardless of whether the species can be identified or not. The drawings do not need to be artistic. Simple figures showing the diagnostic features are sufficient. Do not hesitate to record the specimen as unidentified if you cannot eliminate other possibilities.

The small cetacean species observed in the Sundarbans include the Ganges River dolphin *Platanista gangetica*, Irrawaddy dolphin *Orcaella brevirostris*, finless porpoise *Neophocaena phocaenoides*, and occasionally the Indo-Pacific humpback dolphin *Sousa chinensis* (see Appendix 9 for the species identification guide).

2.3 Photographs

Photographs of recovered carcasses and body parts are essential. Place a measuring tape or scale next to the carcass or body part when taking photographs. Always take a wide-angle image first to allow the viewer to place close-up photographs into context.

Photographs should be taken of the dorsal, ventral, and both lateral sides of the entire carcass (see section 8 for pictorial instructions). Close-up shots should be taken of distinctive marks, whether or not human caused. Photographs should also be taken of the head, including the mouth and teeth, as well as of any unusual marks, scrapes, scars, wounds, skin lesions or natural external features. All photographs should be downloaded in a computer folder and the folder renamed with the initials of the photographers name, species id and date of photo taken (e.g., Sultan-Shushuk1-20May2017).

2.4 Carcass Condition

The condition of the carcass should be described on the data form. The carcass condition is influenced by factors such as temperature, time since death occured and body size. Six condition categories can be used (see section 9 for images of different carcass conditions):

Condition 1: Fresh

- Animal found alive but subsequently died
- Little or no bloating
- Skin not sloughed
- Flippers not stiffened vertically
- Internal organs intact

Condition 2: Partly decomposed

- Slight bloating, due to general tissue decomposition
- Some skin sloughing or stiffening of flippers
- All internal organs intact

Condition 3: Fully decomposed

- Usually bloated, due to general tissue decomposition
- Missing patches of skin, with flippers stiffened vertically
- Internal organs, particularly the liver, show loss of integrity

Condition 4: Dried

- Mummified carcass (skin holding bones)
- Disarticulated bones (no soft tissue remaining)

2.5 Cause of Death

Conduct an external examination. Note the general condition of the animal. Describe and draw scars, lesions, parasites, and fluid discharges. Check carefully for signs of human related injury such as propeller scars, net entanglement marks, missing flippers, deep puncture wounds, and lesions encircling the flippers and flukes. Document marks carefully, including the dimensions of cross-hatching caused by nets, the spacing of cuts or linear scars from propellers, and the size of grooves made by ropes. Look for signs of emaciation and check for the presence of food in the stomach.

Question local people or fishermen operating in the area if they have any information about the cause of death or if they observed any unusual behavior exhibited by the animal(s). If the carcass was transported from a different location from where it is being examined, find out details on how it was moved to determine if some marks may have been made postmortem (e.g., pulling carcass with help of a rope).

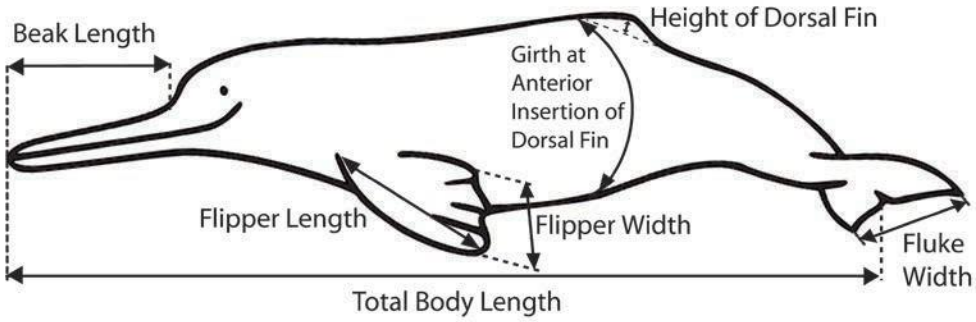
When determining the cause of death, it is very important to document both the potential cause and circumstances. For example, a dolphin may have died of suffocation, but was found dead in a gill net, which caused the forced submersion. So the cause of death was drowning, while the circumstance was gill net entanglement. In some instances, signs of human interaction will include evidence from gear or debris removed from the animal. This evidence should be carefully documented, photographed and collected if possible.

The most conservative diagnosis is “could not be determined”. If the animal is thoroughly examined and no evidence of human interactions is found, then the diagnosis is “no known interactions”. If certain factors compromise your ability to evaluate the carcass properly (e.g., decomposition, scavenger damage, predation, inexperience in conducting carcass examinations, large animals that cannot be moved to examine both sides, etc.), then the finding should be unknown.

2.6 External Measurements

A series of standardized measurements should be recorded for all carcasses. For consistency, all measurements should be recorded in centimeters (cm). The measurements required are (1) total linear body length, measured from the tip of the lower jaw to the notch between the flukes, (2) height of dorsal fin, (3) beak or snout length, (4) flipper length, (5) fluke width, (6) girth at anterior insertion of dorsal fin or, if the species has no dorsal fin, at the mid-length of the individual. All measurements, except for the girth, should be taken straight to the side of the animal rather than following carcass contours (see section 10 for pictorial instructions).

Measurements are subject to distortion (especially around girth) and are accurate only if taken from fresh carcasses where bloating has not occurred. Measurements, except total body length, do not need to be taken on decomposed specimens.

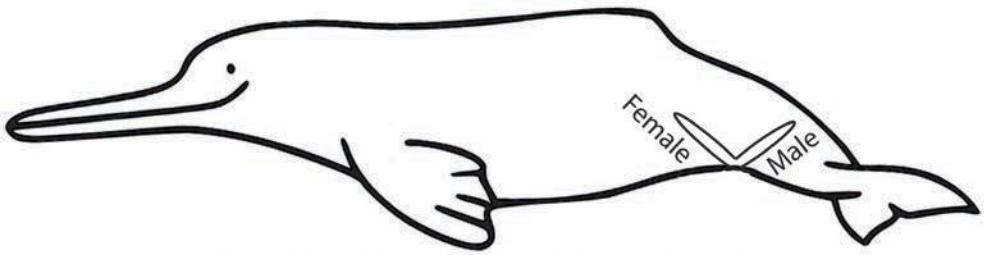


2.7Tooth Counts

Tooth counts should be made of the upper and lower right jaws independently. If teeth are missing, record the actual count and note the estimated number of missing teeth in parentheses.

2.8 Determination of Sex

The sex of a cetacean carcass can be determined by examining the space between the genital and anal openings and the direction of a pencil. In male cetaceans, there will be a relatively wide space between the genital and anal openings, and a pencil inserted into the genital opening will be point towards the tail or flukes. In female cetaceans, there will be a much smaller space between the genital and anal openings, and a pencil inserted into the opening will point towards the head. The mammary gland can be observed in both sexes, but are generally more pronounced in females, especially when they are lactating.



Pencil inserted in genital opening will point towards the head in females and towards the tail in males

3. Biological Sample Collection

The patrol team will collect biological samples from each carcass or body part. The highest priority for all species is to obtain a small piece of skin, dry under sunlight and store it in a polythene bag with identity number for genetic analysis. Additional biological samples should be collected as possible. These include (1) muscle tissue for isotope analysis (stored dried/salted), (2) skull for taxonomic analysis and education (stored dry), and (3) teeth for age determination and isotope analysis (stored dry). All samples should be collected with sterilized instruments provided in the cetacean carcass sampling kit.

All samples should be tagged with information on the date collected, the initials of the collector(s), and the carcass or body part identification number. Labels should be written with a permanent marker (e.g., pencil or fine point on good quality paper). This information should match the data recorded in Table 6 of the Appendix 4b. For collected cetacean body parts, mark the boxes in Table 6 of the Appendix 4b.

3.1 Collection, Preservation and Labeling of Skin

Collecting a piece of skin is the most important biological sample to collect. Three small samples (3cm × 3cm) of skin (epidermis, which appears as a thin gray layer) should be collected from the dorsal mid-thoracic area for analyses of genetics, heavy metals, and stable isotopes. The samples should also include a small amount of fat (thick white layer underneath) to ensure that the entire skin depth has been sampled. Skin samples should be collected with an unused razor blade. Safely dispose of the razor blade after taking each sample to avoid contamination.

The skin samples should be preserved salted or dried in a polythene bag. Label the bag (see section 3.2 below) before storing it.

3.2 Labeling

It is very important to record the identification number of the polythene bag, date of collection, the local name of the species, carcass number and the descriptive name of the sample/body part. So, label the sample containing a bag with the collection date, the local name of the species, carcass number and sample name. For example, 2010-Dec-04-Shushuk1-Skin1 means that the sample was collected on 04 December 2010 from Shushuk (*Platanista gangetica*) specimen and that it is the first one collected. Mark the box for 'skin' in Table 6 of the Appendix 4b. Be sure to always clearly indicate which samples have been collected for genetics and stored in ethanol and which have been collected for heavy metal and isotope analysis.

3.3 Collection, Preservation and Labeling of Muscle, Skull and Teeth

If possible it is also helpful to collect and preserve samples of muscle, liver, stomach, skull, and teeth.

3.3.1 Muscle

Muscle samples are collected for studies of stable isotopes, which provide information about diet and habitat of animals, and heavy metal contamination. To collect a muscle sample, make a deep incision through the skin and the blubber in the dorsal mid-thoracic area of the animal. Extract a 3cm × 3cm cube from the underlying red muscle tissue. For both stable isotopes and heavy metals place the sample in a zip-lock bag and label the bag as instructed above (e.g., 2010-Dec-04-Shushuk1-Muscle1). Store the sample in a handful of salt and stored in a polythene bag. Mark the box of 'muscle' in Table 6 of the Appendix 4b.

3.3.2 Skull

Collecting the skull is important for taking detailed measurements which are used for better understanding the taxonomy of the species and for educational purposes. To obtain the skull bury the carcass and record GPS location of the buried place in Table 6 of the Appendix 4b. Extract the skull after the soft tissue has completely decomposed. The skull should be cleaned, and the main bones labeled with a permanent marker.

3.3.3 Teeth

Teeth are collected for the age determination. Extracting teeth from the jaws of dead animals can be done in the field with a knife or pliers. When animals are decomposed and only limited sampling is possible, it may be simplest to remove all or part of the jaw if time does not permit the removal of individual teeth. Remove five to ten teeth and place them in a zip lock bag. Label the bag of teeth as instructed above (e.g., 2010-Dec-04-Shushuk1-Teeth). Store the samples in a dry place. Mark the box of 'teeth' in Table 6 of the Appendix 4b.

3.3.4 Skeleton

If the carcass is buried for later retrieval of the skeleton, mark the box 'skeleton' and record the exact location (GPS coordinates and descriptive landmark).

4. Cetacean Carcass Sampling Kits

Cetacean carcass sampling kits will be provided to all stranding response team members. These kits include: (1) 10 pairs of plastic gloves, (2) measuring tape, (3) 10 razor blades, (4) 10 small zip-lock bags or polythene bags for skin sample preservation, (5) 10 large zip-lock bags or polythene bags, (6) one pair of pliers for tooth extractions, (7) one polyethylene tarp for wrapping carcass, (8) 10 pieces of aluminum foil for wrapping blubber and liver samples, (9) pencils, erasers, sharpeners, and a permanent marker, (10) cotton string for tying off stomach, (11) disinfectant, (12) a sharp knife for opening carcass or extracting organs, (13) one cool box for storing and transporting specimens, (14) two kilogram salt for sample preservation and (15) one pair forceps.

5. Personal Safety

It is important to always wear gloves and to wash your hands thoroughly with warm water and soap after handling a cetacean carcass or body parts.

6. Educational Opportunities

Cetacean mortalities offer unique educational opportunities. Onlookers can be 'educated' about cetaceans, the threats they face and ongoing conservation efforts. Please ensure that you carry several copies of educational materials to distribute among key persons when patrolling.

7. Cetacean Carcass Data Form (Copied from Table 6 of Appendix 4b)

Patrol No.	Date	GPS No.	Waypoint	Time

Location	Wildlife type	Species name	Age/status of carcass
	□Mammal □Bird, □Reptile □Amphibian		□Fresh, □Partly decomposed □Fully decomposed, □Dried

Sex	Age	Where found?	Photo#s	
□Male □Female □Unknown	□Adult □Sub-adult □Calf □Unknown	□Land above high tide □Shore below high tide □Floating, □Village	Top view	
			Bottom view	
			Side view	
			Close ups	

Total weight (kg)	Total length (cm)	Head length (cm)	Tail length (cm)	Beak length (cm)	Fluke width (cm)

Dolphin dorsal fin height (cm)	Girth at anterior point of dorsal fin (cm)	Flipper length (cm)	Flipper width (cm)	# teeth on upper jaw	# of teeth on lower jaw

Missing body parts:

Suspected cause of death:	~~Evidence of human cause~~:
□Shooting, □Poisoning, □Trapping, □Illness □Fishing gear, □Vessel collision, □Predator/ tiger attack, □Injury, □Old age, □Unknown	□Local report, □Visible wound, □Hunting equipment with carcass, □Fishing gear with carcass, □Other: ……

Details on suspected cause of death and evidence of human interactions:

Action taken with ~~carcass or body parts~~:	Collected parts:	~~Dolphin skin sample bag number~~:	~~Fishing gear type if entangled~~:
□Burried, □Burned □Collected, □None	□Whole body, □Skin, □Muscle □Bones, □Teeth, □Antlers □Skull, □Skeleton, □Claw □Internal organs (Specify): ……	……	……

Additional details:

Photo#s	
Video#s	

8. Taking Photographs of a Cetacean Carcass

8.1 Top view

8.2 Close up-blow hole

8.3 Bottom view

8.4 Close up-Marks

8.5 Side view

8.6 Teeth and Head

9. Cetacean Carcass Body Condition Codes

9.1 Carcass Condition 1: Fresh

9.2 Carcass Condition 2: Partly decomposed

9.3 Carcass Condition 3: Fully decomposed

9.4 Carcass Condition 4: Dried

10. Measuring Body Parts of a Cetacean

10.1 Total length of the body

10.2 Snout Length

10.3 Height of dorsal fin

10.4 Girth at anterior insertion point of dorsal fin

10.5 Width of flipper

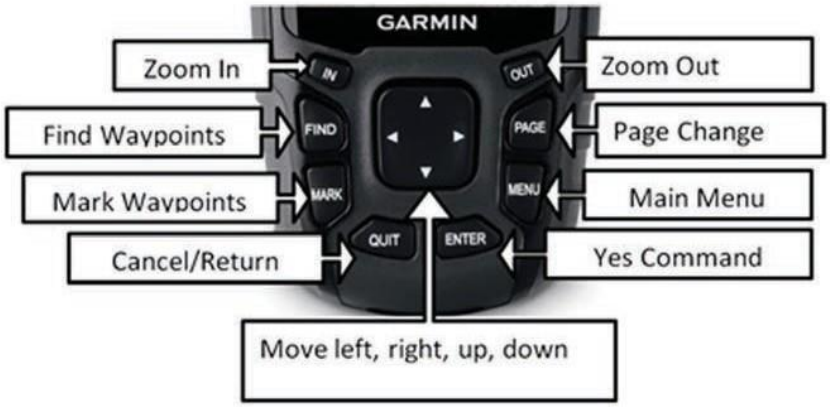
10.6 Length of the flipper (front)

10.7 Fluke width

Appendix 15. GPS 62sc Manual for Bangladesh Forest Department Staff

1. GPS Overview

1. Antenna
2. Screen
3. Rocker
4. Power button
5. USB port
6. Camera lens
7. Antenna connection
8. Memory card slot
9. Battery case



2. Function of GPS Buttons

QUIT	Press QUIT to cancel or return to the previous menu or page.
ENTER	Press ENTER to select option and acknowledge message.
MENU	Press MENU to open the option menu for the page that is currently open. Press MENU twice to open the main menu (from any page).
PAGE	Press PAGE to scroll through the main pages (page 5).
ROCKER	Press up, down, right and left to select menu options and to move the map cursor.
IN	Press IN to zoom in on the map.
OUT	Press OUT to zoom out on the map

	Press and hold to turn the device on and off. Quickly press to open the backlight status page.
FIND	Press FIND to open the search menu
MARK	Press MARK to save your current location as a waypoint.

3. Understanding Navigation and GPS Operation

Navigation has three parts:

10. Your present location,
11. Your destination, and
12. A route to reach your destination

A Global Positioning System or GPS uses information from satellites to show you your current location on a map, where you have been (track), and your current heading (compass). Important locations are recorded using waypoints, which are given numbers that should be recorded in your patrol data sheets.

The GPS must receive a clear signal from the satellite. This means you must avoid blocking its view of the sky by taking the GPS into the cabin while it is turned on.

4. Taking Care of the GPS 62SC

Your GPS 62SC is semi-waterproof. If it falls into the water or gets wet, immediately wipe the GPS with a dry cloth and no harm should come to it. If the GPS remains wet for a longer period it will be damaged. Normal raindrops should not harm this GPS. After use keep it in a cool, dry place. During daytime make sure that it is not in direct sunlight. Never let it come into contact with acid, oil or other chemicals.

5. Changing the Batteries

To change the battery, first turn off the GPS. To open the battery cover, spin the ring at the back of the cover to the left.

Remove the cover and place the batteries matching the + and – signs. Place the cover and spin the ring to the right to lock it.

CAUTION: Make sure that the GPS is properly locked before use.

6. Turning the GPS On and Off

Press the On/Off button ⏻ on the right with your thumb holding the GPS in your right hand. To turn it off press ⏻ button and hold it until the screen clears.

7. Increasing or Decreasing the Brightness of the Screen

To decrease the brightness press the ⏻ on/off button once while the GPS is switched on. Then press the right arrow on the rocker in the middle of the GPS to increase brightness and press the left arrow to decrease brightness of the screen.

8. Taking a Waypoint

1. When the GPS in on, press the **MARK** button. The number on the top of the screen (**017**) is the **waypoint** number.
2. Press the **ENTER** button to save the **waypoint**.

Remember: Without pressing ENTER, the waypoint will not be saved.

9. Finding Waypoints

- Press **FIND** Button.
- Select **Waypoints** option using right arrow on the **ROCKER** and press **ENTER**.
- Use the **ROCKER** to select your desired waypoint. To go up press the UP arrow and to go down press **DOWN arrow**.
- The **Waypoint** will be shown on your Map.
- Press **QUIT** to cancel.

10. Taking Photographs

To take a picture, press the MENU twice and then press ENTER. Make sure that the lens is not covered. Hold the carabiner lock downward and point the GPS towards the object, steady your hand and press ENTER and then release the button. When you press the ENTER it focuses the camera and when you release the ENTER it saves the picture.

11. Finding Photographs

- Press **MENU** button twice.
- Select photo viewer using **down arrow** on **ROCKER**.
- Press **ENTER**.
- Press **QUIT** when you are done.

12. Map Page

In the lower part of this page, you will find a ▲ mark in the middle part of the screen. This shows your current location. There is a half-inch line in the upper middle part of this page. It has a number on top of it. This is the scale which allows you to understand the distance covered on the map as shown below.

On the top of this picture you can see two boxes. The left one is the speedometer, which shows the speed of your boat, and the right one indicates the time.

The 3km scale means that if you see a location such as the Karamjal Patrol Post from your current position on the GPS (large ▲ triangle in the middle of the screen) the distance between Karamjal and you is the same as the scale length for about 3km.

You can change the scale of the map by pressing the zoom IN button for a closer or smaller area view and the zoom OUT button to get a further or larger area view.

13. Trackline

On the map page, you can find the track line (Green). This line shows your travel route to the place from where you came.

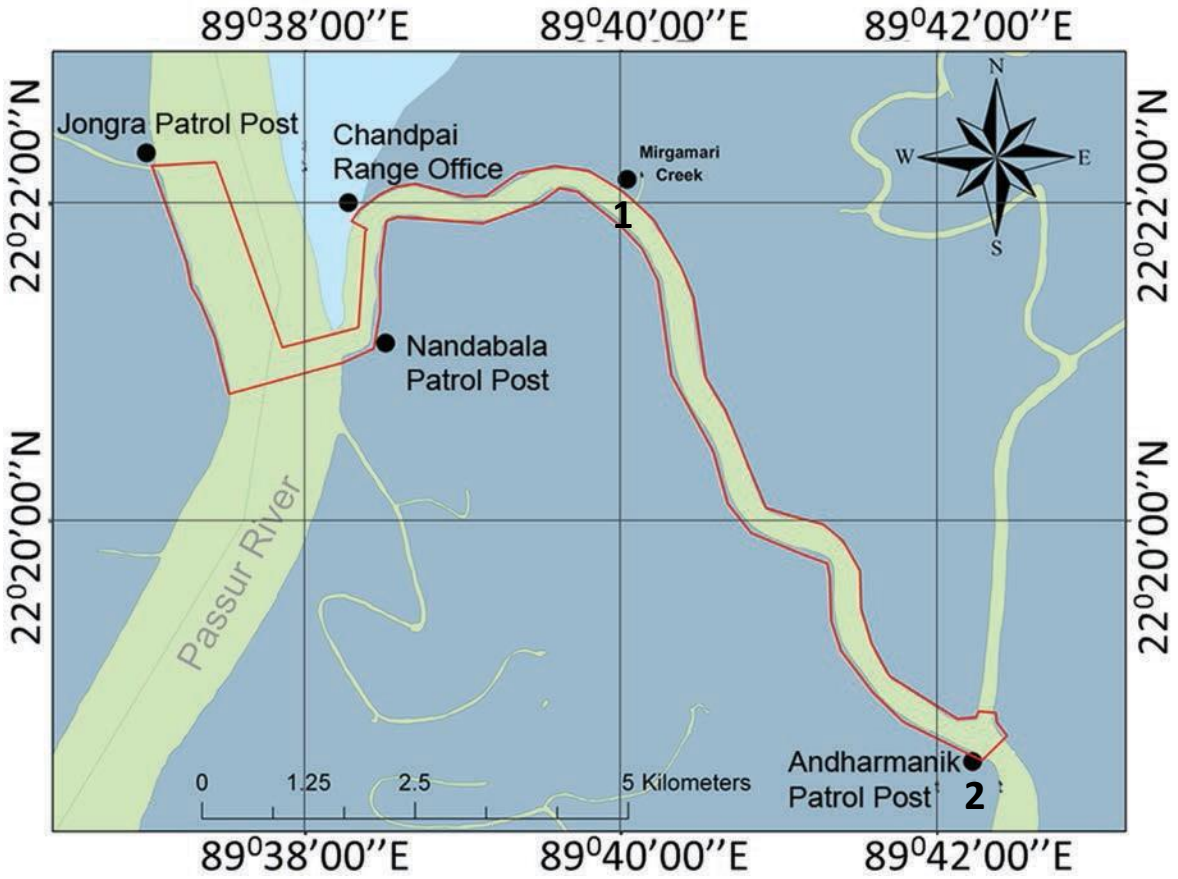
14. Understanding Latitude and Longitude

If you look at the map below, you will find three parallel vertical lines (from top to bottom) and two parallel horizontal lines (from left to right).

The horizontal lines have a number on both ends (right and left) that indicates the north and south position called latitude. On the map, the bottom line is labeled $22^0 20'00''$N and the top line is $22^0 22'00''$N. Bangledesh is in the northern hemisphere. When you travel from south to north in the northern hemisphere latitude increases and if you travel from north to south latitude decreases. For example, if you go from Andharmanik to Chandpai then the latitude will increase and if you go from Chandpai to Andharmanik the latitude will decrease.

In the same way, the vertical lines also have a number on both ends (top and bottom) that indicate the east and west position called the longitude. For example, 89˚38'00''E is written on both ends of the left line, 89˚40'00''E on the middle line, and 89˚42'00''E on the right line. If you travel from west to east the longitude will increase and if you travel from east to west the longitude will decrease. Look at the map. Andharmanik is located east of Chandpai so the longitude is increased.

You can use the latitude and longitude markings on the map to find your position. For example, if you take a waypoint and your GPS says N $22^0 21'59''$ and E $89^0 40'02''$ your location is at the mouth of Mirgamari Khal (1 on the map), which is east of Chandpai. If you take a waypoint and see N $22^0 18'28''$ and E $89^0 42'10''$ on your GPS, then your location is the Andharmanik Patrol Post (2 on the map) south-east from the Chandpai range office jetty.



15. Compass Page

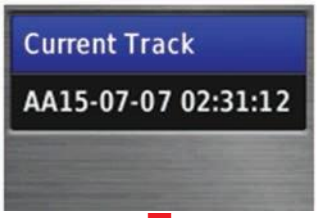
On this page, you will find a compass that shows the direction you are headed. This is called the bearing. The compass will only work while you are moving.

On the upper part of the page, you will find the speed, heading, the distance to the destination and the estimated time at which you will reach your destination. The latter two will only work if you use the Go To Function of the GPS.

16. Starting Tracback

The Tracback function allows you to follow the same route to where you started your journey

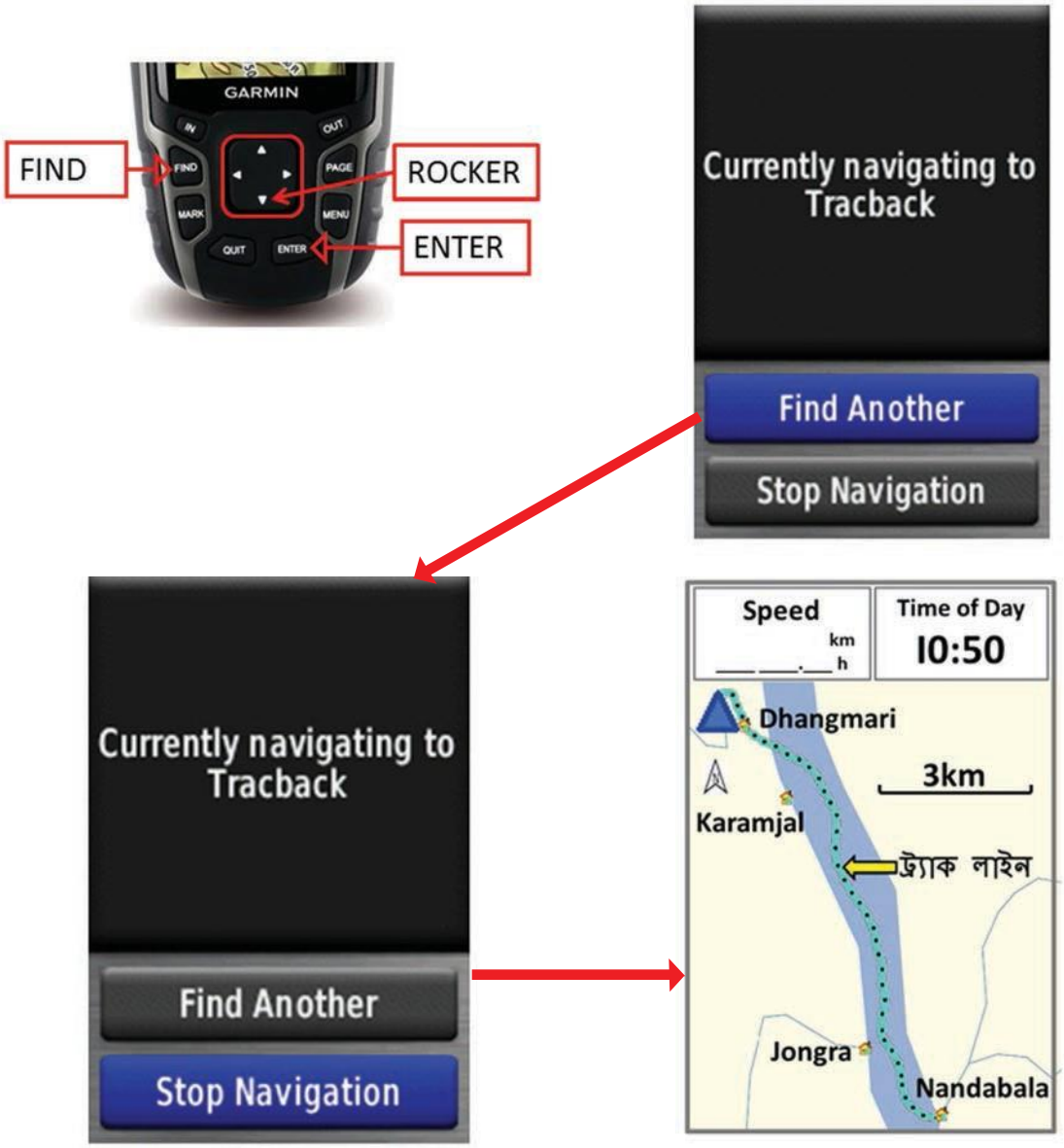
Press **FIND** Button. Then use the right arrow on **ROCKER** to select **Tracks** icon (highlighted in blue). Press **ENTER** again; **current track** page will appear.



Press **ENTER** to view **current track** on map page (green). Then press **ENTER** again to select **Tracback** option at bottom of screen. Now you will see a Red Trackline on screen which is the way to go back to your starting place. Press **PAGE** to go to **Compass Page** to see the direction of your path if necessary.

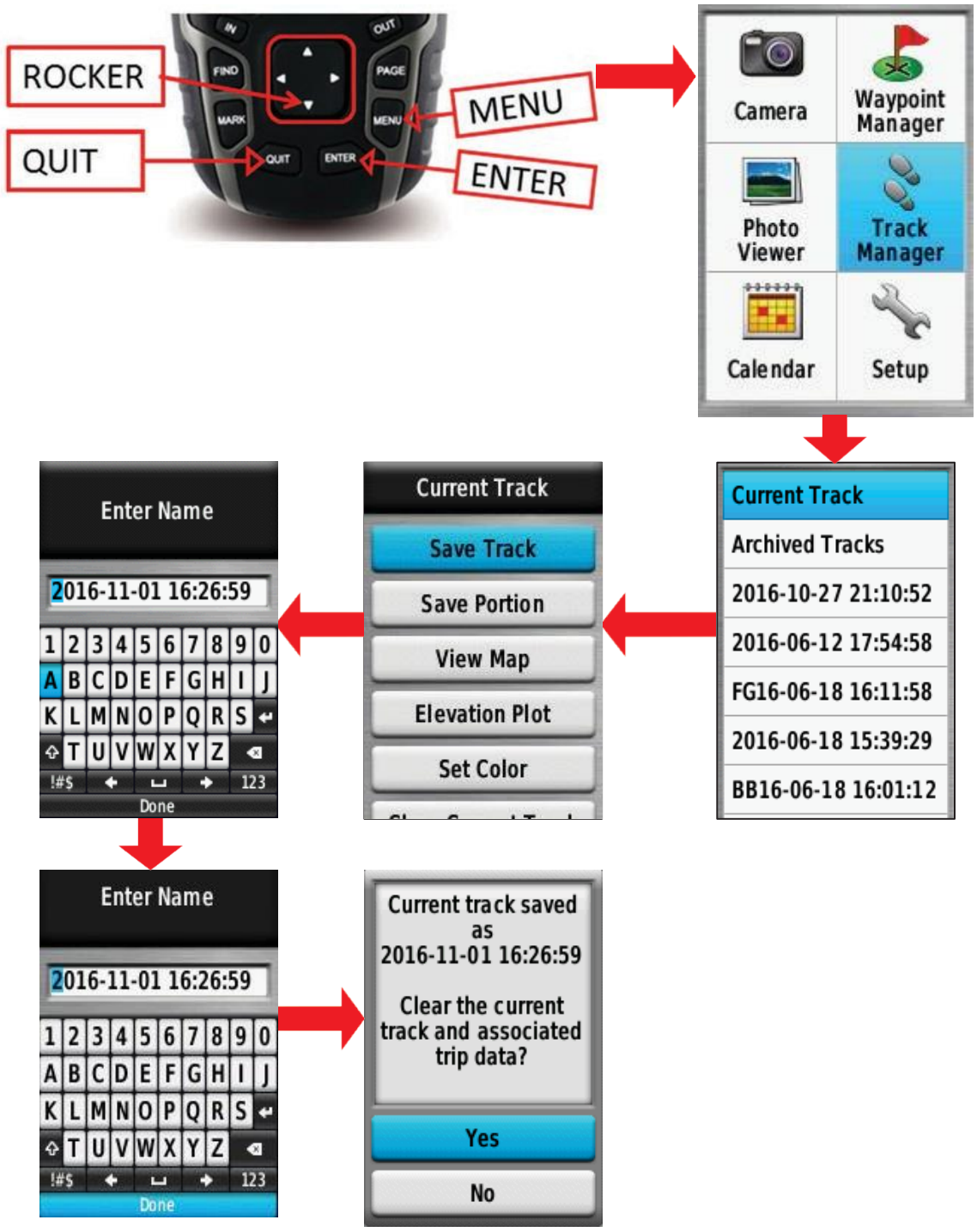
17. Stopping Tracback

To stop Tracback press the **FIND** button. On the screen "**Find Another**" will appear highlighted in blue. Use **down arrow** on **ROCKER** to select "**Stop Navigation**" then Press **ENTER**. You are now back to the normal view of the **map page**.



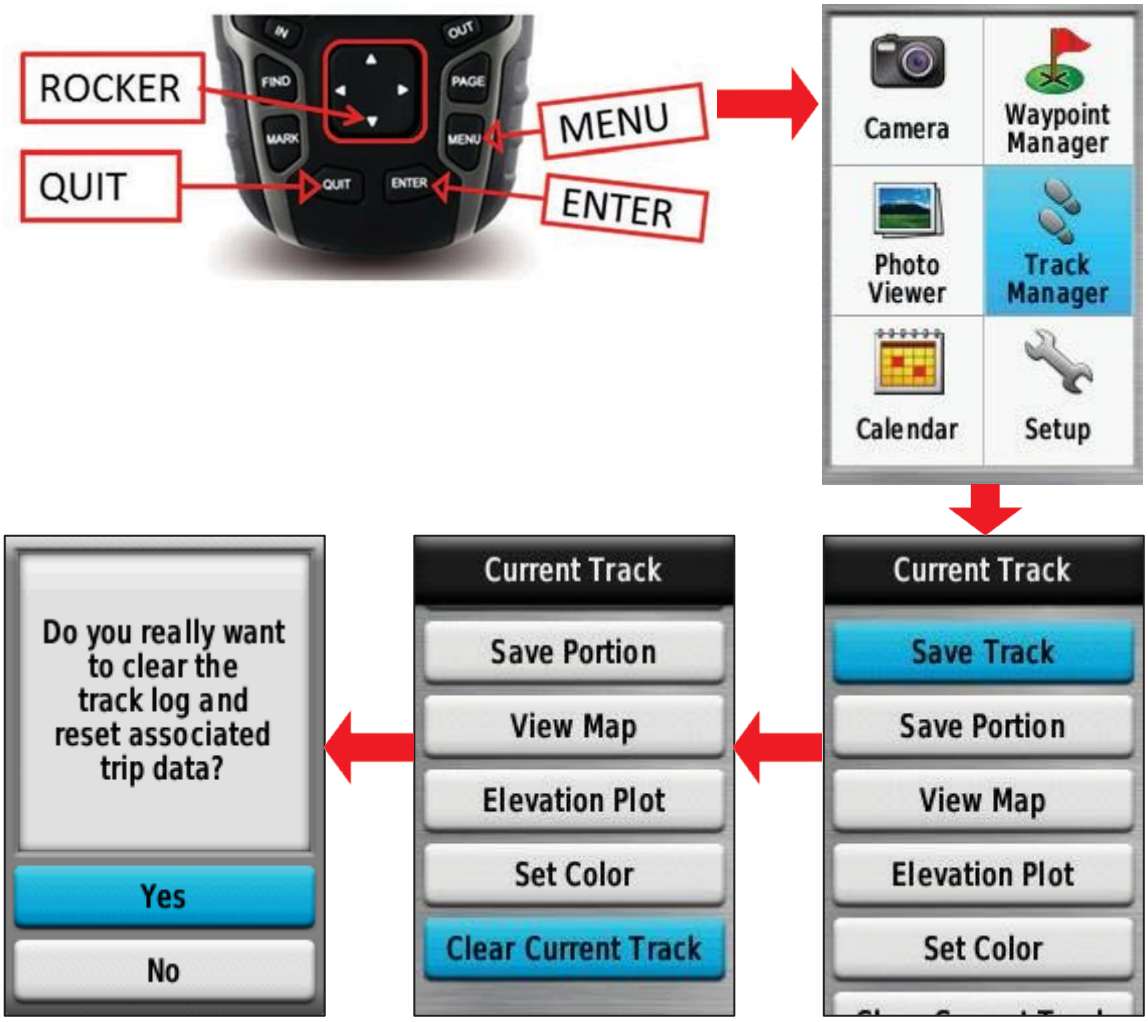
18. Saving and Clearing Track

To save the current track, press the **Menu** button two times. Select the **Track Manager** icon using the **ROCKER** button and press **Enter**. The **Current Track** page will appear. Press **Enter** button again and **Save Track** will appear. Press **Enter** again and **Enter Name** will appear. Do not change the name. Use **ROCKER** to scroll down on the screen, select **Done** and press **Enter.** The Current Track Save page will appear. Select **Yes** by using up arrow on **ROCKER** and press **Enter**. The current track will be saved with default name as well as cleared from the screen.



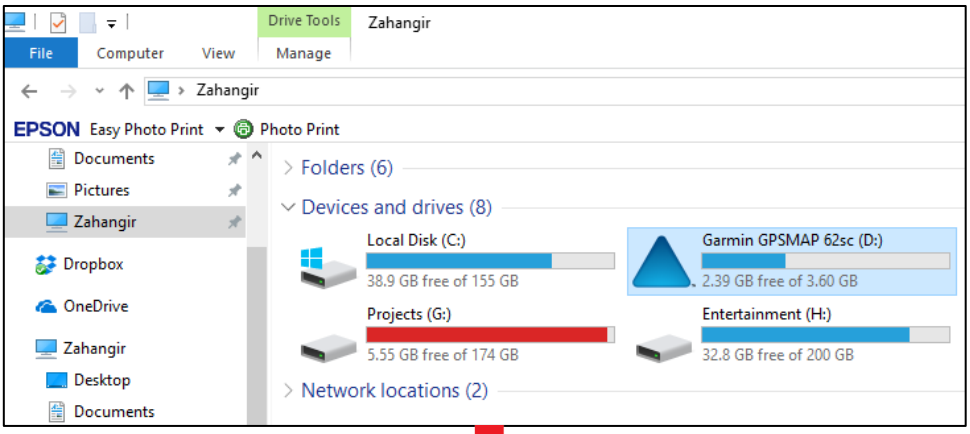
19. Clearing Current Track

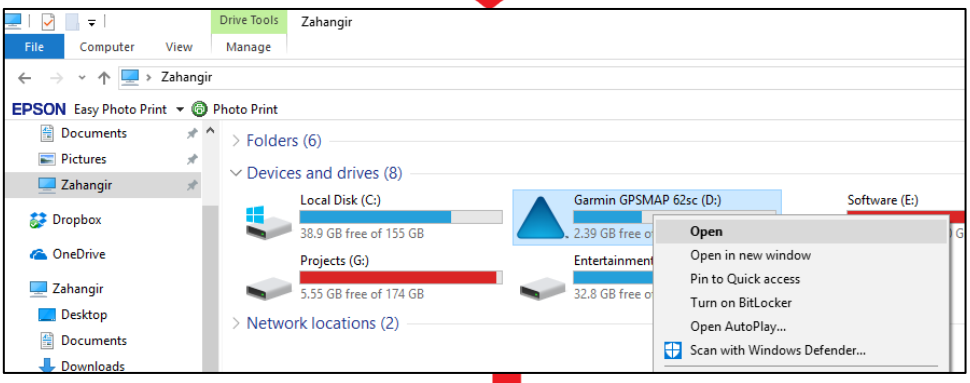
To clear the current track, press the **Menu** button two times. Select the **Track Manager** icon by using the **ROCKER** button. Press **Enter** and the **Current Track** page will appear. Press **Enter** again and scroll down using the **down arrow** on **ROCKER** and select **Clear Current Track**. Press **Enter.** Use **up arrow** on **ROCKER** and select **Yes**. Press **Enter**. The current track will be cleared from the screen.

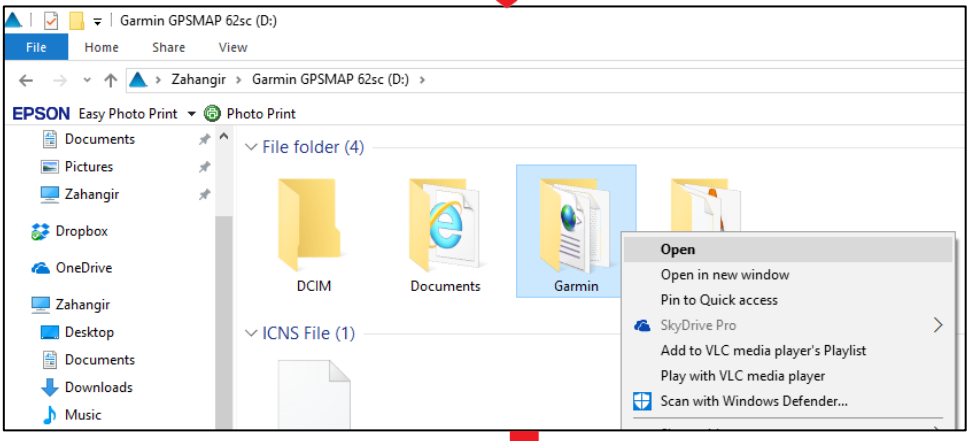


20. Downloading GPX file (.gpx) from GPS to Computer Step 1

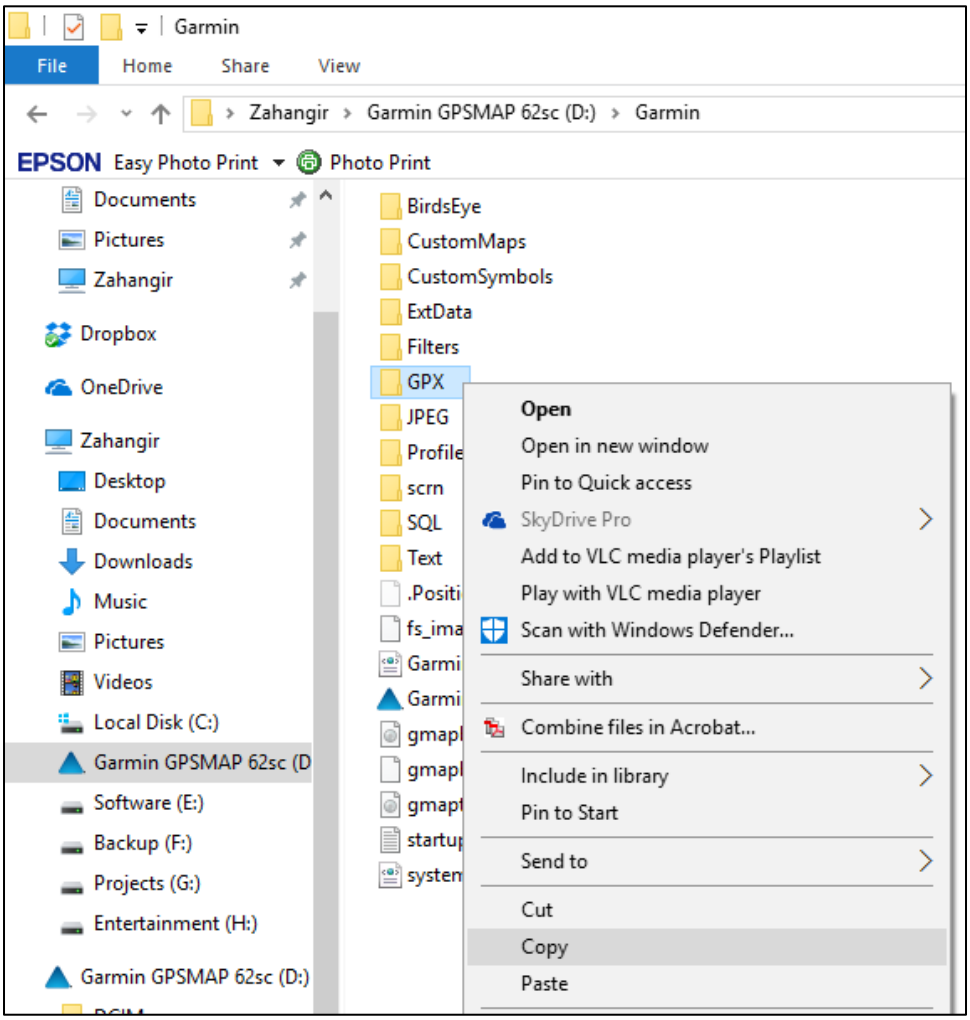
- Connect your **GPS** to a computer with a USB cable.
- Open **My Computer**>
- Open **Garmin GPSMAP 62sc**>
- Open **Garmin** folder>
- Copy **GPX** folder (select the **GPX**, right click on mouse> and select **copy**).







Continue to the next page


Garmin
File
Home
Share
View
Zahangir › Garmin GPSMAP 62sc (D:) › Garmin
EPSON Easy Photo Print
Photo Print
Documents
Pictures
Zahangir
Dropbox
OneDrive
Zahangir
Desktop
Documents
Downloads
Music
Pictures
Videos
Local Disk (C:)
Garmin GPSMAP 62sc (D
Software (E:)
Backup (F:)
Projects (G:)
Entertainment (H:)
Garmin GPSMAP 62sc (D:)
BirdsEye
CustomMaps
CustomSymbols
ExtData
Filters
GPX
JPEG
Profile
scrn
SQL
Text
Open
Open in new window
Pin to Quick access
SkyDrive Pro
Add to VLC media player's Playlist
Play with VLC media player
Scan with Windows Defender...
Share with
Combine files in Acrobat...
Include in library
Pin to Start
Send to
Cut
Copy
Paste

Step 2

- Click **Start** menu on the bottom left corner of your computer screen>
- Open **My Computer**>
- Chose a folder (**C,D,E** or **F**) that you will use for SMART>
- Open the Folder>
- Create a new folder by right click on your mouse on the screen, select New, select Folder and rename as "**SMART data Sarankhola** or **Chandpai** or **Khulna** or **Satkhira Range**"
- Open the created Folder (**SMART data Sarankhola** or **Chandpai** or **Khulna** or **Satkhira Range**), create a New Folder again inside it as a sub-folder and rename with the **Team Name-GPS number-Date** (e.g., Chandpai1- GPS1-01Mar2017)>
- Open the created sub-folder and paste the **GPX** folder inside it.

21. Setting of Garmin GPS 62 and 64

All GPSs of SMART patrol teams must use the following settings:

21.1 System

a. Satellite = GPS + GLONASS
b. Language = English
c. WAAS = OFF
d. Interface = Garmin Serial
e. AA battery type = Alkaline

21.2 Display

f. Backlight timeout = 30 Seconds
g. Battery save = ON
h. Main, Setup, Find style = Grid (6 items)

21.3 Map

i. Orientation = Track up
j. Guidance text = when navigating
k. Data fields = 2 small (Speed, Time of Day)
l. Map information = Worldwide DEM enabled
m. Advanced map setup
    I. Auto zoom = ON
    II. Detail = Normal
    III. Shaded relief = Auto

21.4 Tracks

n. Track log = Record, show on map
o. Record method = Time
p. Recording interval = 5 seconds
q. Auto archive = Daily

21.5 Heading

r. Display = numeric degrees
s. North reference = True
t. Goto line = Bearing (small)
u. Compass = Auto
v. Calibrate compass

21.6 Position format

w. Position format = hddd.ddddd°
x. Map datum = WGS 84
y. Map spheroid = WGS 84

21.7 Units

z. Distance and speed = Metric
aa. Elevation = Meters (m/min)
bb. Temperature = Celsius

21.8 Time

cc. Time format = 24 – hour
dd. Time zone = Automatic

22. Short-Cuts for GPS

22.1To create a waypoint

- From any page, press **MARK** once.
- Press **ENTER** to save the waypoint.

22.2 Main pages

The information needed to operate this GPS is found on the following pages: map, compass, and trip computer.

22.2.1 Map

The ▲ position icon represents your location on the map. As you travel, the position icon moves and leaves a track log (trail). Waypoint names and symbol also appear on the map.

22.2.2 Compass

When navigating to a destination, the bearing pointer points to your destination, regardless of the direction you are moving in. When the bearing pointer points to the top of the electronic compass, you are traveling directly towards your destination. If it points in any other direction, turn towards that direction until the arrow is pointing towards the top of the compass.

22.2.3 Trip Computer

The trip computer displays your current speed, average speed, maximum speed, trip odometer and other helpful statistics.

22.3 Taking photos:

- From the main MENU, select **Camera**
- Press **IN** or **OUT** to zoom in or out.
- Press and hold the **ENTER** button to focus the camera on the object.
- Release the **ENTER** button to take a photo.

Appendix 16. Manual on the Use of Binoculars during Patrols

1. Introduction

All SMART patrol teams should have a pair of binoculars on board for monitoring wildlife and threats. The Fujinon 7x50 WPC-XL Mariner Binoculars are a good choice for this type of monitoring because it is waterproof and equipped with a compass. The cushioned strap is comfortable to wear around your neck and it allows the binocular to float if dropped in water. Each side of the binoculars is called an ocular.

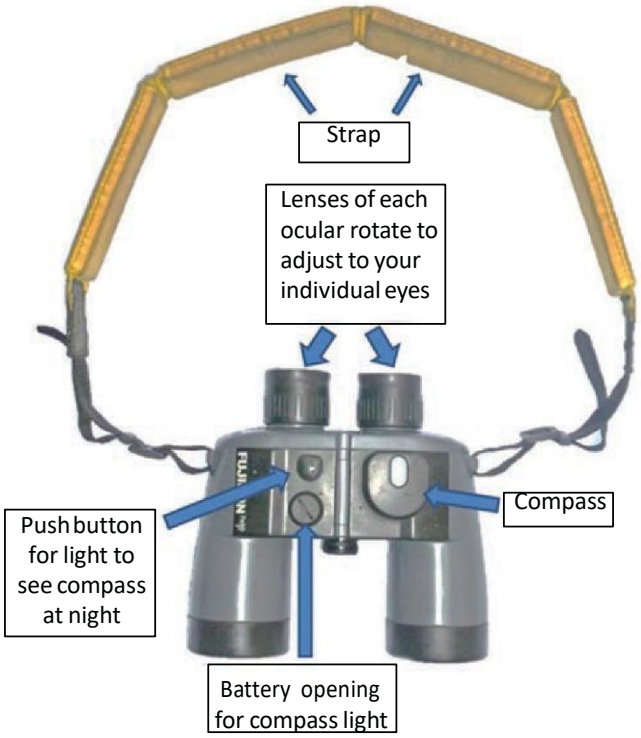


Figure 1. Parts of the binoculars.

2. Taking Care of inoculars

The greatest danger for binoculars is getting bumped. If the binoculars get bumped, the lenses can go out of alignment. This means your view through the binoculars will not be clear. Place the binoculars down carefully, especially on a hard surface, and be careful not to bump them on a boat railing or any other hard object.

Fujinon 7x50 WPC-XL Mariner Binoculars are waterproof, which means you can wash them in fresh water. After washing them, use a soft, clean and dry cotton cloth to clean the front and back lenses. Do not clean the lenses without first washing or at least blowing and carefully examining them for any dirt or sand on the glass. A grain of dirt or sand beneath a cloth will scratch the lens. Always rub the glass gently and never touch it with your fingers.

After use put the binoculars in a dry bag and keep them in a cool place. During the daytime make sure that they do not get too hot from direct sunlight. Never let the binoculars come into contact with acid, oil or other chemicals.

3. Adjusting the Binoculars

Before the patrol begins, all team members who will use the binoculars should adjust the focal settings on both oculars to achieve the best focus for their individual eyes. Close your left eye and turn the focus ring of the right ocular until an object about 500 m (1,600 feet) distant is clearly in focus. Repeat the same for your left eye by closing your right eye and adjusting the focus ring of the left ocular. Remember your individual settings with the help of the plus and minus markings on each ocular, so that you can quickly adjust each ocular to its proper position before looking through the binoculars.

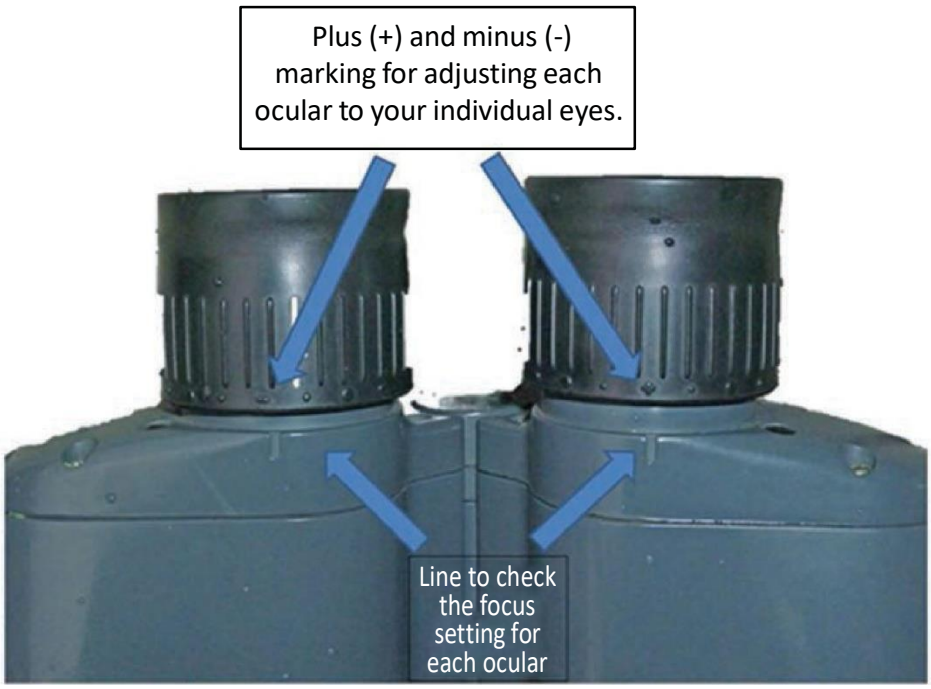


Figure 2. Underside of the oculars showing the plus (+) and minus (–) settings for adjusting each ocular.

If you are patrolling in a small creek, you can re-adjust the ocular towards the minus (-) direction to focus on objects at a closer distance. Remember to adjust the ocular back to your normal setting when you are back on the big river.

You should also adjust the binoculars to the distance between your eyes. Spread or retract the oculars closer and farther apart in a horizontal direction. The setting is correct when the image is clear while looking through both openings at the same time.

4. Understanding the Compass

These binoculars come equipped with a compass, which can be seen when looking through the binoculars and directing your eyes downward. If you change the direction where you are pointing the binoculars, the compass bearing will change on the dial.

At the top of the binoculars on the right-hand side there is a button for a light, which allows you to see the compass in the dark. Do not cover the white plastic part directly on top of your left eye. It is the opening for light to illuminate the compass bearing scale.

You can also find the course of the boat from the bearing on the compass if you point the binoculars straight ahead in the same direction that the boat is moving. This can be very helpful for navigation,

especially in winding small channels where it is easy to get disoriented. Like all compasses, the bearing can range from 0 to 360 degrees. 0 degree to 90 degrees cover north to east; 90 degrees to 180 degrees cover east to south; 180 degrees to 270 degrees cover south to west, and 270 degrees to 360 degrees cover west to north.

If another member of the patrolling team has a pair of binoculars with a compass, you can easily direct them to an object you are looking at by telling them the compass bearing.

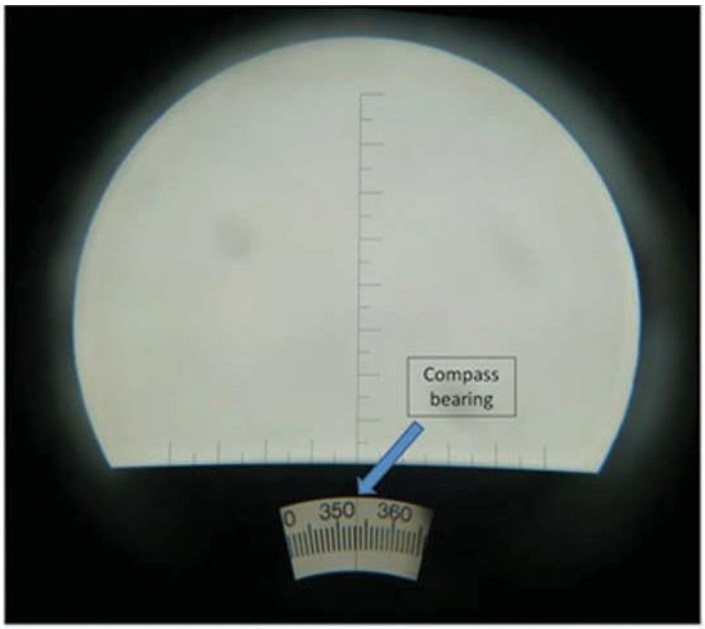


Figure 3. View of the compass through binoculars. The compass bearing in this picture is 353 degrees north.

5. Using Binoculars during Patrols

One observer should use the binoculars to search in front of the vessel for forest and fisheries crime and wildlife including freshwater dolphins. You will be surprised how much more you will see by looking ahead with the binoculars before wildlife or criminals can flee. For best observation, the team member searching with binoculars should be positioned on the highest deck.

While passing small creeks, observers often get a split second to look straight down the creek where small boats often hide beneath the tree branches. Team members with binoculars should anticipate this view and make sure they are ready before it passes. Otherwise, the searching team members only see the outer mouth.

Appendix 17. Quick Start Manual for CyberTracker Equipped Smart Tablet (Cedar CT7)

(Adapted from <www.junipersys.com/content/download/13176/203125/.../1 /.../Cedar-CT7G-QSG.pdf>)

1. Product Key or Icons

1. Power Button
2. Top Cover hiding Earphone Connector
3. Front-Facing Camera
4. Speaker
5. Ambient Light Sensor
6. LED Indicator
7. Microphone
8. Menu
9. Home
10. Back
11. Bottom Cover hiding USB Connector
12. Volume Up
13. Volume Down

Back Side

14. Compartment Door
15. Camera Flash
16. Rear-Facing Camera
17. Hand Strap Mount
18. Rear Speaker

Top Port Cover

Bottom Port Cover

WARNING: The top and bottom port covers must be clean and securely sealed before exposing the tablet to water. Failure to perform this step could lead to water damage of the tablet.

2. Icons Introduction

Icon	Name	Function
	Power	To turn on and off the tablet
	Short Menu	List of opened Applications (Apps)
	Home	Back to main screen
	Back	Back to previous screen
	Application	View all installed applications/main menu
	CyberTracker	Data collection application used for SMART patrols
	Capture	Taking a photo with the camera
	Video	Taking video with the camera

3. Indicators

Bluetooth

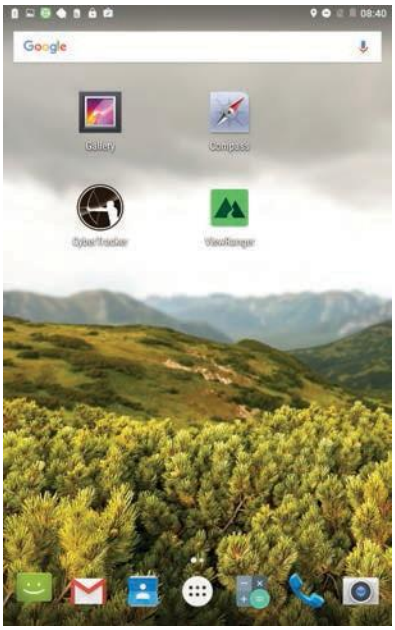
Full Battery

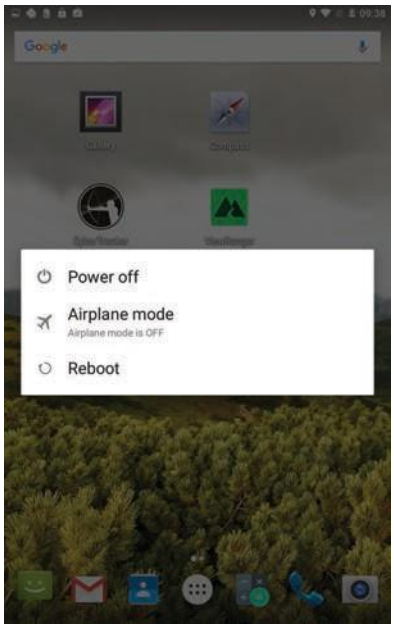
Network Cell

Network WiFi

4. Turning the Smart Tablet On and Off

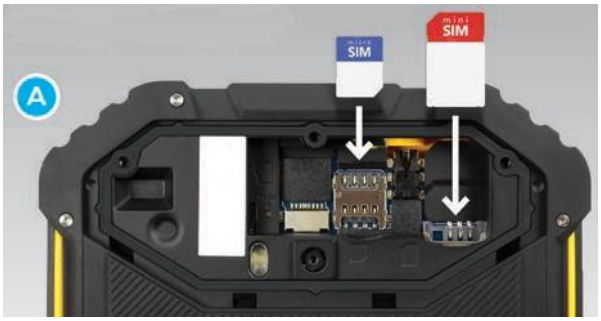
- Press the **power button** on the left side of the tablet with your **thumb** and hold for a few seconds. The tablet will turn on.
- Press and hold the **power button** with your **thumb** until the option **power off** appears on the screen. Tap **power off** and then tap **OK**. The tablet will shut off.
- If the display screen is locked, **swipe** over the screen with any one finger to unlock the screen.





5. Installing a SIM Card or SD Card

- If the tablet is turned on, you have to turn it off by pressing and holding the **power button** until the option **Power off** appears on the display screen.
- Tap **Power off** and then tap **OK**. Allow the tablet time to turn off.
- Use a Phillips screwdriver to loosen the three screws that secure the cover over the camera on the back of the tablet, and remove the cover.



NOTE: The CT7G provides a mini SIM slot on the right side and a micro SIM slot in the center (see the figure above).

- Orient the SIM card so that the contacts are facing away from you (see the figure above).
    a. For the mini SIM, orient the SIM card so that the cut corner is on the top left (see the figure above).
    b. For the micro SIM, orient the SIM card so that the cut corner is on the bottom right (see the figure above).
- Gently push the SIM card into the corresponding slot (mini SIM in the right slot, micro SIM in the middle as shown in the figure above).

WARNING: Do not force SIM card into the slot as it may damage the tablet. If the SIM card does not fit properly, check the positioning of the SIM card and try again.

- To remove the SIM card, gently press on the flat surface of the SIM card with the tip of your finger and slide it out towards the top of the tablet.

NOTE: If you cannot remove the SIM card with the tip of your finger, try using a piece of sticky tape to slide the SIM card out of the tablet.

- The micro SD card slot is located on the left side of the compartment. Insert the micro SD card with connectors facing down.
- Place the SIM card in the compartment so that you can slide it into the correct slot.
- Gently press on the flat surface of the SIM card with the tip of your finger as you slide it into the correct slot.

NOTE: Only the narrow portion of the microSD card slides into the slot.

WARNING: Do not force the SIM card into the slot as it may damage the tablet. If the SIM card does not fit properly, check the positioning of the SIM card and try again.

NOTE: The CT7G only accepts microSD cards.

- Carefully place the cover over the compartment opening and tighten the three screws with a Phillips screwdriver.

WARNING: The connector must be properly placed and secured before exposing the tablet to water. Failure to perform this step could lead to water damage of the tablet.

6. Accessing CyberTracker or Other Applications

- Tap the **Home** icon .
- Tap the **Application** icon at the bottom of the Home screen to see all installed Applications.
- Tap and hold the **CyberTracker** icon and drag it on to the **Home screen** to create a shortcut.
- Tap and hold the **icon** for any application to create a shortcut on the **Home screen**.
- Tap **play store** to find and install new applications.

7. Accessing Widgets

- Tap the **Home** icon .
- Tap and hold a blank spot on the **Home screen**.
- Icons for **Wallpapers, Widgets,** and **Settings** are shown at the bottom of the screen.

- Tap **Widgets**.
- Tap and hold the icon for any widget to install it on the **Home screen**.

8. Connecting to Wi-Fi (Wireless LAN)

- Tap the **Application** icon or swipe down from the top of the screen.
- Tap System Settings .
- Tap **OFF** on the Wi-Fi line to turn Wi-Fi on . The Wi-Fi indicator will appear at the top of the screen and Wi-Fi will read **ON**.
- Tap **Wi-Fi** to view the list of nearby networks and connect to a specific network.
- Tap on the **network** you want to access. A box will appear for Password.
- Type the **Password** for Wi-Fi connection.

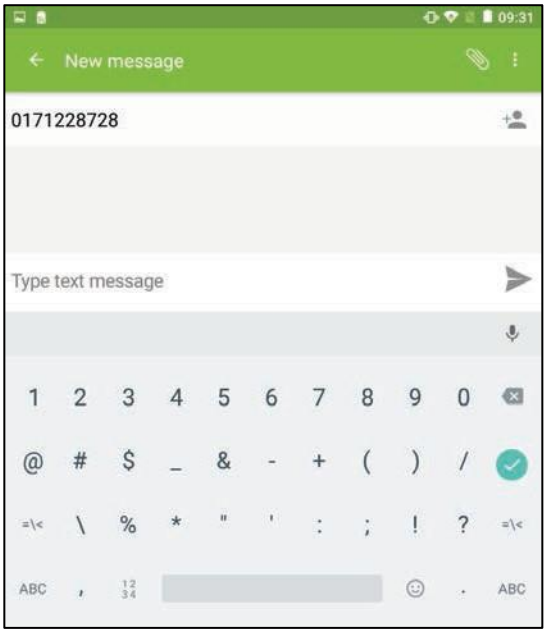
9. Connecting a Bluetooth Smart Tablet or Device

- Tap the **Application** icon or swipe down from the top of the screen.
- Tap system Settings .
- Tap **OFF** on the Bluetooth line to turn Bluetooth on . The Bluetooth indicator will appear at the top of the screen and Bluetooth will read **ON**.
- With Bluetooth on, this screen shows a list of nearby Bluetooth devices.
- Tap on the **devices** you want to access.

NOTE: While the Bluetooth settings page is open, the CT7Gtablet is discoverable, allowing other devices to connect to the CT7G tablet via Bluetooth.

10. Sending a Text Message

- Tap the **Home** icon .
- Tap on the Messaging icon on the Home Screen.
- Tap on the **New Message** icon at the top of the screen.
- Enter the phone number of the person you are texting.
- Type the text message.
- To send the text message, tap the **send** icon at the middle right.



11. Operating the Camera

- Tap **Home** >> tap **Applications** >> tap **Camera** .
- Tap the **Capture** icon to take a picture.
- Compose the photo using the pinch-to-zoom gesture on the screen.
- Tap the **Camera** icon on the bottom right of the screen to use the front facing camera.
- Tap other icons on the left side of the screen for other options such as **Flash** .
- Tap the **Gear** icon in the bottom left corner of the screen for additional camera options.
- You can capture video footage with sound by tapping the **Video** icon .

Appendix 18. Quick Start Manual for CyberTracker Equipped Smart Phone (Cedar CT5)

(Adapted from < www.gadgetsandgear.net/Data%20Sheets/JR%20data%20sheets/ CT5%20 support/Cedar-CT5-QSG.pdffile; Downloaded on 19 July 2017)

1. Product Key and Icons

1. Power Button
2. Top Cover hiding Earphone Connector
3. Front Camera
4. Speaker
5. Ambient Light Sensor
6. LED Indicator
7. Microphone
8. Menu
9. Home
10. Back
11. Bottom Cover hiding USB Connector
12. Volume Up
13. Volume Down
14. Camera Button

Back Side

15. Compartment Door
16. Rear Camera
17. Camera Flash
18. Rear Speaker

Top Port Cover

Bottom Port Cover

WARNING: The top and bottom port covers must be clean and securely sealed before exposing the phone to water. Failure to perform this step could lead to water damage of the phone.

2. Icons Introduction

Icon	Name	Function
	Power	To turn on and off the smart phone
	Short Menu	List of opened Applications (Apps)
	Home	Back to main screen
	Back	Back to previous screen
	CyberTracker	Data collection Application used for SMART patrols
	Capture	Taking a photo with the camera
	Video	Taking video footage with the camera

3. Indicators

Bluetooth

Full Battery

Network Cell

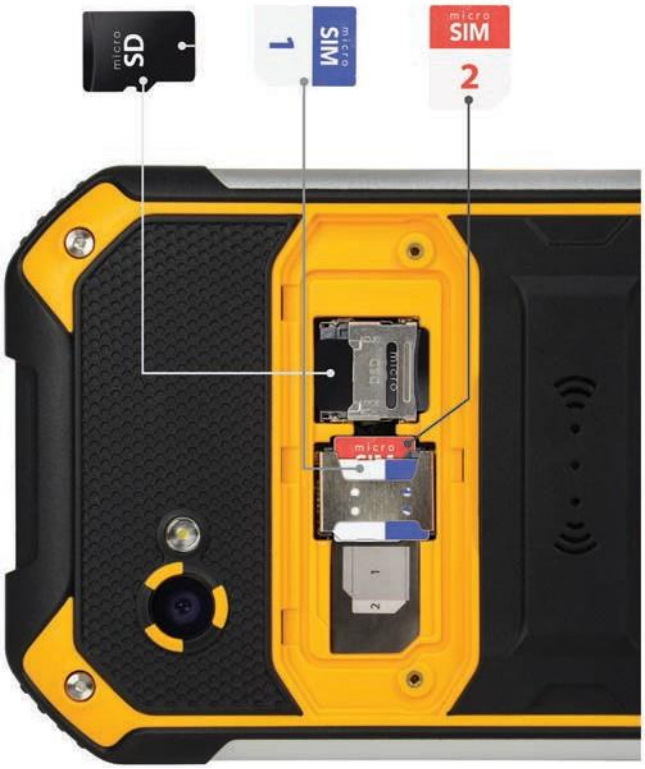
Network WiFi

4. Turning the Smart Phone On and Off

See section 4 of Appendix 17 for detailed instruction.

5. Installing a SIM Card or SD Card

- If the phone is turned on, you have to turn it off by pressing and holding the **power button** until the option **Power off** appears on the display screen.
- Tap **Power off** and then tap **OK**. Allow the phone time to turn off.
- Use a Phillips screwdriver to loosen the two screws that secure the cover on the back of the phone and remove the rear port cover and the rubber pad carefully.



NOTE: The Cedar CT5 provides two micro SIM slots on the left side with a front SIM slot and a back SIM slot (see the figure above).

- For the SIM1, orient the SIM card so that the cut corner is on the top left (see figure above).
- For the SIM2, orient the SIM card so that the cut corner is on the bottom left (see figure above).
- Gently push the SIM card into the corresponding slot (SIM1 in the front slot and SIM2 in the back slot underneath the SIM1 slot diagonally as shown in the figure above).

WARNING: Do not force the SIM card into the slot as it may damage the phone. If the SIM card does not fit properly, check the positioning of the SIM card and try again.

- To remove the SIM card, gently press on the flat surface of the SIM card with the tip of your finger and slide it out towards the left side of the phone.
- The micro SD card slot is located on the right side of the compartment.
- Open the micro SD connector door by gently pressing and sliding the door toward the top of the device (refer to the arrows printed on the metal door). The door will easily swing open.
- Carefully align and place the micro SD card on the connector.

- Gently press the SD card down to make sure it sits correctly in the connector.
- Close the metal door of the connector, gently press down and slide the door to the locked position.

NOTE: The micro SD connector is under a small metal door. Arrows printed on the door indicate the direction to slide the door to open or lock it.

WARNING: The micro SD connector and door are fragile so, be careful while you are opening and closing the door.

NOTE: The Cedar CT5 only accepts micro SD cards.

- Carefully place the rubber pad and the rear port cover over the compartment opening and tighten the two screws with a screwdriver.

6. Accessing CyberTracker or Other Applications

- Tap the **Home** icon .
- **Swipe left or right** on the **Home screen** to display different pages that show the applications installed on the device.
- Tap and hold the **CyberTracker** icon and drag it on to the Home screen to create a shortcut.
- Tap, **hold and drag** the icon for any application to create a shortcut on the **Home screen**.
- Tap play store to find and install new applications.

7. Accessing Widgets

See section 7 of Appendix 17 for detailed instruction.

8. Connecting to Wi-Fi (Wireless LAN)

- Swipe down from the top of the screen or go to **Home screen**.
- Tap **System Settings** .
- Tap **OFF** on the Wi-Fi line to turn Wi-Fi on . The Wi-Fi indicator will appear at the top of the screen and Wi-Fi will read **ON**.
- A List of nearby networks will appear.
- Tap on the **network** you want to access. A box will appear for Password.
- Type the **Password** for Wi-Fi connection.
- Tap **Connect**.

9. Connecting a Bluetooth Smart Phone or Device

See section 9 of Appendix 17 for detailed instruction.

10. Sending a Text Message

See section 10 of Appendix 17 for detailed instruction.

11. Operating the Camera

See section 11 of Appendix 17 for detailed instruction.

END