



## **Traditional Resource Collection in Sundarban Tiger Reserve (STR): Practices, Knowledge and Conservation Politics**

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### **ABSTRACT**

This research paper is an attempt to find an answer to the question of viewpoints on how people harvest traditional forest resources in such a harsh environment. Traditional cultural practices frequently draw on a wide knowledge base about the behaviour of complex natural systems in their respective localities. This knowledge has been built up over many years of empirical observations that have been passed down from one generation to the next. The majority of the forests among traditional communities in the Sundarban region of west Bengal were kept according to traditional beliefs and practices. The current study focuses on the economic and sociocultural vulnerability of a community that depends on the forest and lives on the island of Satjelia, which is surrounded by the mangrove forests. Qualitative data is collected through semi-structured or detailed in-depth interviews and questionnaires using the snowball sampling technique. Local communities practiced traditional livelihoods like fishing, crab fishing, and honey from the forest. An ethnographic study describes these various forms of livelihood and documents details of the traditional knowledge system of harvesting techniques, harvesting-related rules and regulations, beliefs, marketing strategies, people's awareness and



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harvesting resources to locate any conservation knowledge, as well as every day politics during extraction.

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## 1. Introduction

Forests are critical to both environmental health and socioeconomic growth, offering numerous ecosystem services that support biodiversity, mitigate global warming, and provide essential resources (Asante et al., 2017; Talukdar et al., 2020). Beyond timber, forests provide non-timber forest products (NTFPs) like food, medicinal plants, and materials for household goods, which are widely used by communities for sustenance and cultural practices (Chopra, 1993; Singh et al., 2010). NTFPs are especially vital for rural populations in developing tropical regions, where they support livelihoods and food security (Belcher & Schreckenberg, 2007; Heubes et al., 2012). In India alone, over 50 million people rely on NTFPs daily, with an additional 200 million indirectly depending on them (Shaanker et al., 2004; Sarmah et al., 2008).

This research focuses on the traditional livelihoods of forest-dependent communities, examining how they harvest, use, and pass on knowledge of forest resources. It applies concepts from Political Ecological Knowledge (PEK) and Traditional Ecological Knowledge (TEK), which emphasize the role of indigenous knowledge and power dynamics in resource access (Mavhura et al., 2013; Boafo et al., 2016). PEK explores how political and economic power structures influence environmental access, leading to disparities in resource use (Harrison & Mdee, 2017). Political ecology is a culture ecology, which focuses on traditional ecological practices from an anthropological perspective (Forsyth, 2003). On the other hand, TEK involves generational knowledge about local ecosystems and cultural practices, which inform sustainable ways of interacting with the environment (Berkes, 1993; Gadgil et al., 1993; Charnley et al., 2007). This knowledge includes customs, folklore, taboos, and spiritual beliefs that guide resource management (Adom et al., 2016; Berkes, 2017).

The study's setting, the Sundarbans mangrove forests in India, is home to diverse NTFPs such as medicinal plants, honey, grasses, and aquatic animals like fish and crabs. Local communities employ unique techniques and knowledge to sustainably harvest these resources. However, despite their dependence on forest resources, these communities face challenges due to conservation laws that limit access and the risks posed by wildlife, particularly tiger attacks. The study investigates the resource collection practices and livelihood challenges of these communities through four key questions: 1. What types of resources are gathered, and is there a labour division or organized marketing system for these



resources? 2. What methods are used for resource harvesting, and how is this knowledge transmitted to younger generations? 3. What customs, rituals, and beliefs influence harvesting practices? 4. To what degree do locals comply with conservation laws, and how do they navigate conflicts with the forest department?

By exploring these aspects, the study highlights the importance of TEK and PEK frameworks in understanding the relationships between local communities and their environments. It underscores the need for conservation policies that consider both ecological and socioeconomic factors to support the sustainable livelihoods of forest-dependent people.

## **2. The relevance of traditional knowledge of biodiversity Sundarbans**

Traditional ecological knowledge (TEK) in the Sundarbans represents a rich, locally-adapted set of practices that connects forest-dependent communities with the natural environment. This knowledge, often intertwined with cultural beliefs and rituals, has evolved through observation, experience, and adaptation, and is a key part of how these communities interact sustainably with the forest. Unlike conventional conservation methods, TEK embodies both ancient techniques and adaptive management, passed down across generations, making it particularly relevant for forest biodiversity conservation (Gupta & Gupta, 2008). TEK isn't just technical knowledge; it reflects social attitudes, values, and beliefs about nature, often embedded in ritualized practices that show reverence for forest life (Dudgeon & Berkes, 2003; Berkes, 1993; Charnley et al., 2007).

Communities in the Sundarbans, though not 'indigenous' by strict definitions, share a deep-rooted cultural and economic dependence on forest resources. Many local Hindus and Muslims have ancestry as migrants from Bangladesh and other nearby regions, often classified into Indian caste categories such as Scheduled Castes (SCs), Scheduled Tribes (STs), and Other Backward Castes (OBCs) (Jalais, 2004). These groups have historically relied on forest occupations like fishing, honey collection, and gathering non-timber resources such as prawns, crabs, and honey. SCs (Paundra Kshatriyas), particularly, maintain traditional links to forest-based livelihoods from their ancestors in Bangladesh (Sen & Pattanaik, 2017), while STs, known locally as '*Adivasis*' (Munda), also engage in forest work, though their knowledge is largely locality-specific and learned through direct interaction with the Sundarbans' unique ecosystem. In contrast, OBCs are often wealthier and educated, with less historical reliance on forest-based work. Meanwhile, Muslims originally arrived in the Sundarbans from various parts of the Middle East (Uddin, 2019), have adapted to local ecological and cultural practices, creating a mosaic of beliefs, practices, and



mutual understanding across faiths (Jalais, 2004 & 2010). These communities maintain their ecological knowledge through cultural adaptation, social continuity, and practical skills in resource management (Alfred & Wilmer, 1997). Their methods, developed over centuries, demonstrate sustainable forest use and conservation. For example, in the Sundarbans, the gathering of honey, crabs, and other resources is done with a mix of reverence and restraint to avoid resource depletion. TEK-based systems have important implications for conservation and sustainable management, combining scientific observation with cultural principles for harvesting forest resources while respecting wildlife and forest deities (Gupta & Gupta, 2008; Gadgil et al., 1993). However, Sundarbans communities often face challenges of socioeconomic marginalization and restricted rights due to conservation policies. This situation mirrors challenges faced by traditional communities globally, such as the Maasai in Kenya, who have faced dispossession due to alliances between international conservation agencies and local governments, prioritizing wildlife protection over local livelihood needs (Peluso, 1993). These communities' adaptive knowledge systems, however, embody resilience and balance with nature, utilizing techniques that make efficient use of ecological traits, such as species interdependence and waste recycling.

The study of TEK in the Sundarbans, particularly on Satjelia Island, highlights the significance of respecting and preserving this knowledge system. By enabling traditional communities to continue practicing their livelihoods sustainably, TEK contributes not only to cultural preservation but also to the resilience of forest ecosystems. Protecting TEK is essential for maintaining biodiversity and ensuring that forest-dependent communities can thrive in their environment despite external pressures.

### **3. Methodology**

#### **3.1. Study area**

This study is based on ethnographic research conducted in Purba Parashmani, Bidhan Colony, and Chargheri villages of Lahiripur GP (Gram Panchayat) under Gosaba Community Development Block, in South 24 Parganas, West Bengal (Figure-1). Lahiripur is located along the southeastern forest fringe near the Sundarban Tiger Reserve (STR), where forest access is strictly regulated by laws such as the Wildlife Protection Act of 1972. Many forest workers in this region are socio-economically marginalized, heavily dependent on forest resources for survival, while others use these resources to supplement their incomes to varying extents.

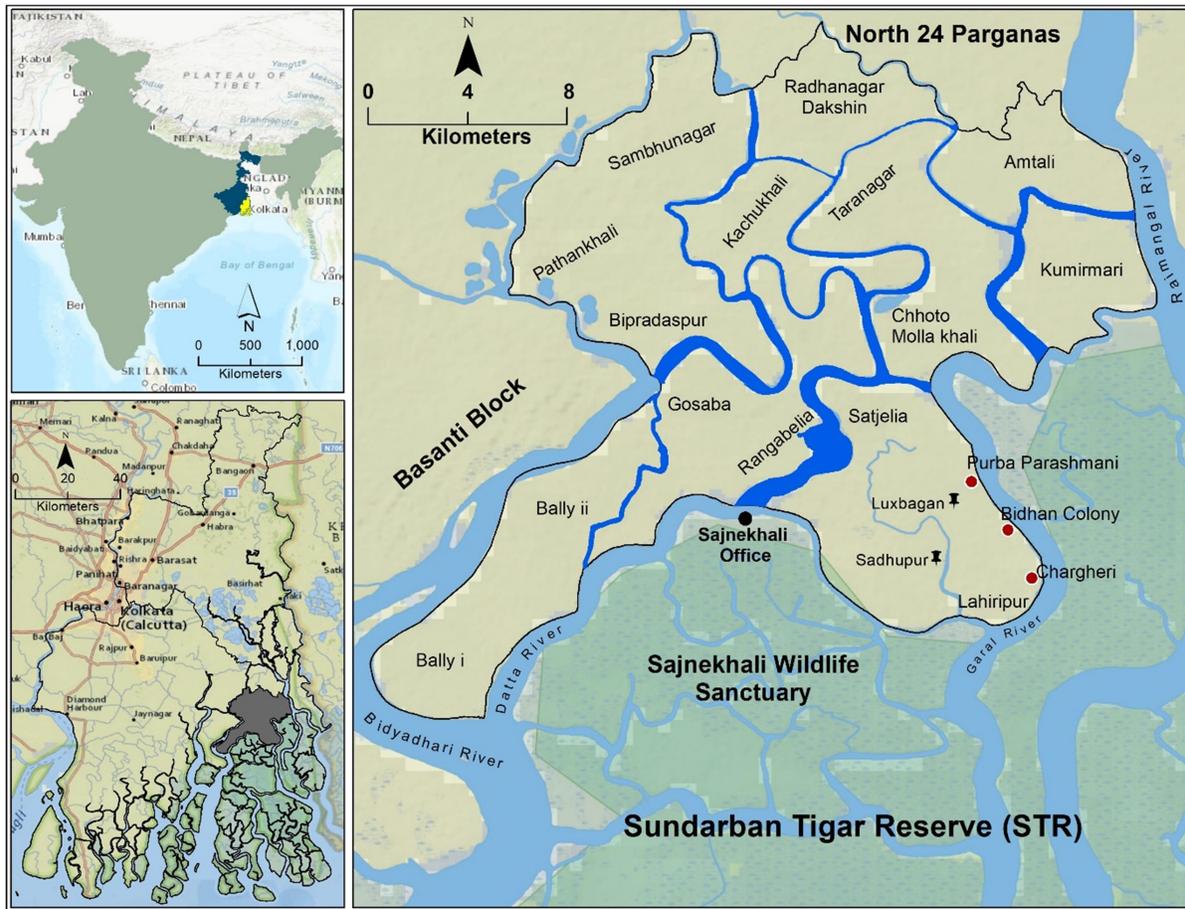


Figure-1. Location of the study area

### 3.2. Data collection process and techniques

The data collection was conducted in two stages: a preliminary survey and a detailed questionnaire survey. The initial stage involved field observations, informal discussions, and key informant interviews with fishermen, crab collectors, traders, shopkeepers, and elders to gain in-depth insights into local practices. Participant observation was conducted at key locations such as riversides, embankments, mangroves, fisheries, and shrines—where Traditional Ecological Knowledge (TEK) was practiced. Cultural events (e.g., Bonbibi Puja, Jatra performances) and livelihood activities (fishing, crab, and honey collection) were also observed. Snowball sampling was used to reach more informants, who participated in semi-structured interviews and focus group discussions lasting 25–30 minutes.

### 4. Traditional forest resources subsistence: Practices and Problems in the STR

In the Sundarban, fishing is a primary source of income after agriculture. Each year, around 35,330 people work in the Sundarban Biosphere Reserve: 24,900 in fishing, 4,580 in firewood and lumber, 1,350 in honey collection, and 4,500 in other activities (DISHA, 2009). In Gosaba, a community development blocks of South 24 Parganas, many villagers live close to the boundary of the STR, depend on the forest for fishing, crab, honey, and prawn seed collection (Ghosh, 2013). They use non-motorized boats, like *noukas* or *dinghies* (Figure-2), as motorized boats are restricted (Ghosh, 2015). However, these

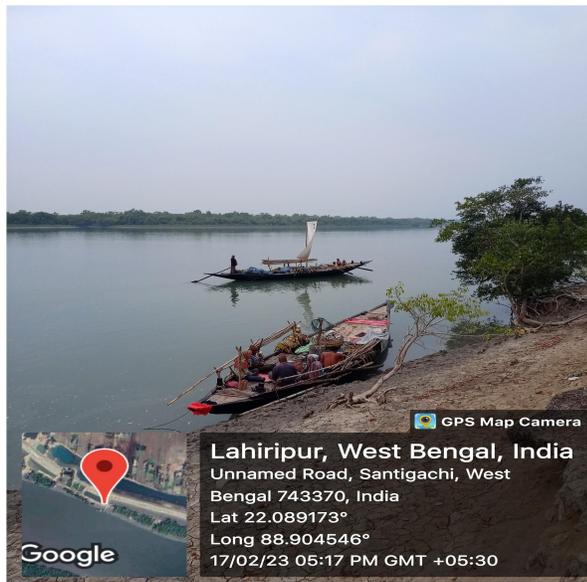


Figure-2. Non- motorized fishing Boat

subsistence activities require licensed and permitted access to the forest. A licence, especially on boat license certificates (BLCs), is essentially a gate pass that allows fishermen to access the Sundarbans buffer zone for the purpose of fishing. Without it, entry into the forest is declared illegal. The Sundarbans Forest Department has made BLC mandatory since 1980 for the purpose of controlling illegal collection of resources in the forest. However, it is seen that only a few people have BLC. Most BLCs are owned by rich agriculturalists and moneylenders, whose ancestors were fishers (Sen & Pattanaik, 2017). Except for blood relatives, BLC cannot be transferred. It can be handed down to a fisherman's sons or other relatives after his death, regardless of whether they are fishermen themselves (Mistri & Das, 2018). Poor people who make a living by catching fish and crabs in the forest have been deprived of BLC. In 1980, the total number of BLCs in the entire STR was 923 and a total of 914 BLCs have been registered. The Forest Department was no longer issuing new BLCs. At present, 709 active BLCs and 164 passive BLCs (Patel & Rajagopalan, 2009).

In the STR, fishermen face numerous challenges due to limitations on licenses, which are necessary for legal fishing. Many licenses remain inactive, and new ones are rarely issued. Consequently, a large number of fishermen are fishing in the forest without proper licenses (BLCs), leading to frequent violations and penalties (Mistri & Das, 2018). Sanat Mondal, a 44-year-old fisherman from Bidhan Colony, explained that fines start at Rs. 500 for a first-time offense and increase to Rs. 600 for a second offense, eventually reaching Rs. 1000 with repeated infractions. BLCs are typically issued and renewed at the Sajnekhali Range Office during Ashar (mid- to late June). Since 2020, BLCs valid for 45 days and if the renewal was not completed on time, a penalty was levied.



During a preliminary survey found that around 85 percent of the households lacked BLCs. The poor fishermen borrow it from the owner, who is relatively rich and does not need to catch fish during the year. Thus, over time, BLCs has become a 'leasable property' for fishermen (Patel & Rajagopalan, 2009). Montu Kayal, a 48-year-old crab collector from Chargheri village, shared that a BLC rents for Rs. 60,000 per year.

Fishing and crab collection are the primary sources of livelihood for these communities, carried out along forested creeks and rivers of the STR. Fish are generally found in larger rivers, while crabs are collected from smaller, narrow creeks within the dense forest, which flood at high tide and dry out at low tide.

#### **4.1. Fish collection**

In the study area, local fishers have developed traditional practices for sustainable fishing, deeply informed by knowledge of fish behaviour and ecological patterns. From mid-March to mid-June, corresponding to the Bengali months of *Chaitra*, *Baisakh*, and *Jaistho*, fishing is largely restricted to protect breeding fish populations. This period is vital for the reproduction of many fish species, which is essential for sustaining fish populations. For the remaining nine months, fishing is permitted, but with regulations to ensure sustainable practices and the preservation of fish populations. The STR enforces specific guidelines for fish collection. To protect juvenile fish and maintain biodiversity, collecting small fish is restricted within the STR boundaries. Only medium and large-sized fish can be legally harvested. Additionally, certain types of fishing nets are banned in these areas, such as mosquito nets or any nets with very dense knots, as these can indiscriminately capture small fish and other aquatic life.

Fishers often locate fish in tidal creeks and channels (*Jhora or Nala*) where tidal waters ebb and flow, with fish swarming in these areas, particularly around *Golpata* (*Nypa fruticans*) forests, which are popular fishing spots. The fish species commonly found in these habitats include 'parse' (*Mugil cephalus* Linnaeus), 'topse' (*Polynemus paradiseus*), 'payra' (*Scatophagus argus*), 'vangon' (*Labeo boga*), 'vetki' (*Lates calcarifer*), 'dyatne' (*Pomadasyus hasta*), 'tangra' (*Pimelodus cenia*), and variety of shrimps (Figure-3). Local residents employ traditional knowledge and experience to determine the best fishing spots and times. For example, Amal Mondal, a 49-year-old fish and crab collector with 25 years of experience, explains his process: he selects a fishing area based on observations of the environment, water colour, and depth. He notes that fish are more likely to be found in muddy water than clear water, while greenish water during monsoon seasons signals the presence of Hilsa fish. He also finds that large fish are commonly found near eroded riverbanks and along bay shores. Another experienced collector, Jogonath Dhali, age 56, describes how his understanding of seasonal variations and his ability to assess



the environment help him locate fish efficiently. According to him, fish are more abundant in summer than in winter. He has also found that cloudy or rainy days, as well as dark nights, are preferable for fishing compared to sunny or moonlit conditions. Additionally, fish are more likely to be found during spring tides (*Bharani*) rather than neap tides (*Marani*), and both large and small fish tend to gather in creeks where water flows downstream. This intricate body of knowledge, passed down through generations, allows these fishers to adapt to ecological cycles, ensuring sustainable practices that align with natural rhythms in the Sundarbans ecosystem.

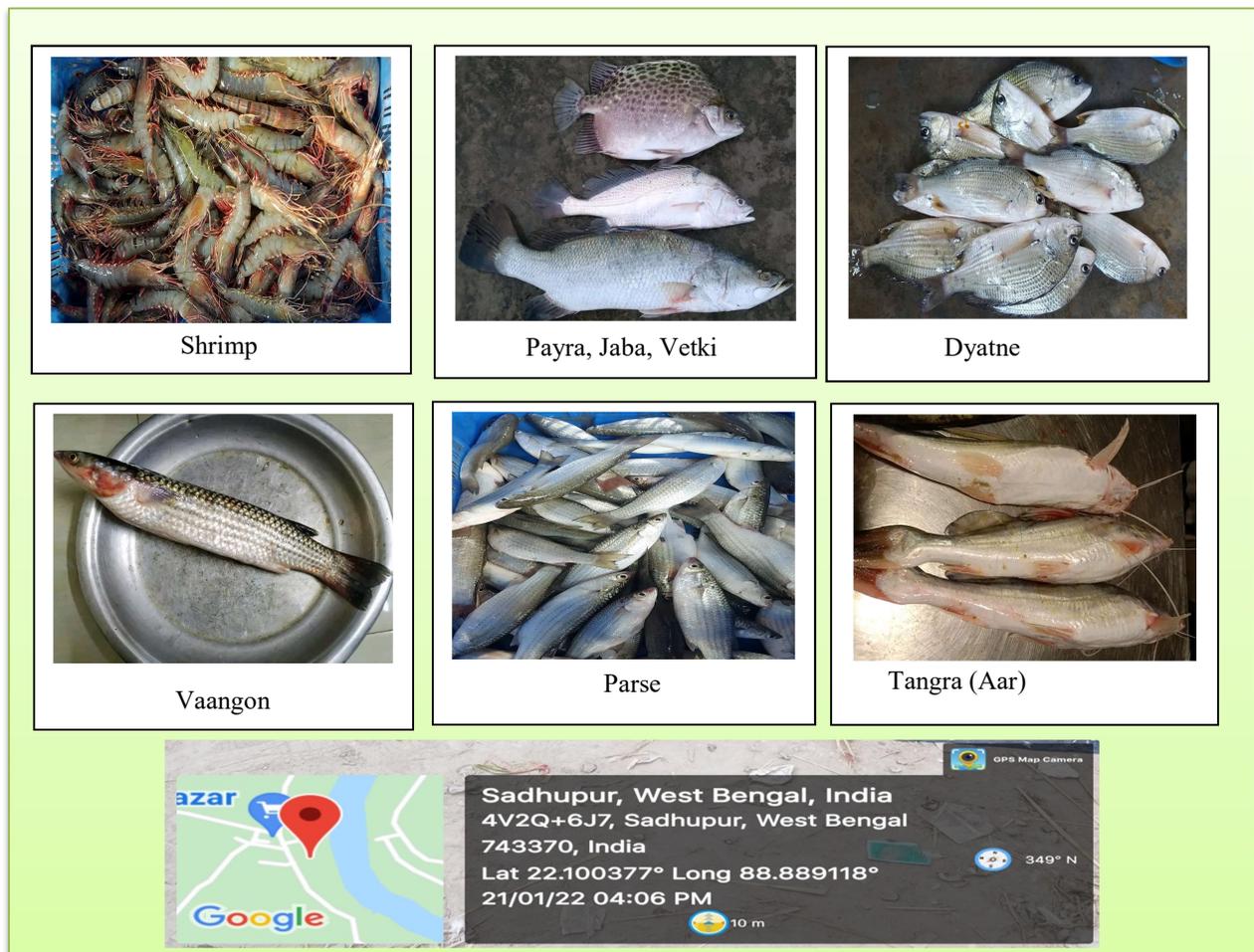


Figure-3. Variety of fish in Sundarbans

Local residents traditionally use various fishing techniques without favouring any specific one, employing tools like nets for fishing (Figure-4). For example, *Khepla Jal* (Cast Net): This vertically



conical net is designed to catch various fish types in reservoirs. It measures about 4 meters in length with a circular bottom diameter of 6-9 meters. The net features holes ranging from 0.6 cm to 7.5 cm, allowing for the capture of both small and large fish. *Benchi Jal*: This net has its two ends anchored with heavy wooden weights, placed apart to secure it in the mud. A floating drum keeps the net's mouth open, supported by two vertical bamboo poles, each 5 meters long. Its design, with a wide mouth that narrows towards the back, makes it particularly effective for catching prawns and fish. *Charpata Jal* (Shore Stake Net): Measuring 100 meters long and 4 meters wide, this net is anchored to the riverbank where tidal waters fluctuate. It is secured with thick ropes and buried in mud to remain stable during high tides. Bamboo roots are also placed vertically at intervals to further stabilize the setup. *Fansh Jal* (Seine Net): Constructed from nylon or monofilament thread, this net is typically used in rivers, ponds, and canals. It has floating drums at the top and weighted bricks at the bottom to ensure part of it remains submerged, allowing effective fishing. In addition to these main types, other methods such as *Ber Jal* (drag shore seine), *Khalpata Jal* (stake net), and *Borshi done* (Fishing hook) are also employed, highlighting the community's diverse fishing practices. This fishing equipment and boat maintenance are costly. Constructing a new fishing boat costs around Rs. 40,000 to Rs. 50,000. The *Benchi Jal* fishing net costs Rs. 60,000 to Rs. 70,000, while other nets like *Charpata Jal* cost Rs. 40,000 and *Chip Benchi Jal* ranges from Rs. 20,000 to Rs. 25,000.



Khepla Jal



Charpata Jal



Fansh Jal



Khalpata Jal

Figure-4. Different fishing harvesting techniques. Photo sources: Authors

The fishermen community of the Sundarbans, a delicate and dangerous ecosystem, observes traditional rituals before venturing into the forest to fish. These rituals, deeply rooted in their beliefs, are thought to protect them from potential hazards. For instance, Sachin Mondal, an experienced fisherman, explains that they avoid harming any animals in the forest and perform prayers for protection. Hindu fishermen worship *Makal Thakur* (God of fishes) along the riverbanks and pray to *Ganga Debi* (goddess of sharks) (Figure-5) on their boats. Similarly, Muslim fishermen invoke *Badarpir* as their guardian by saying ‘panch pir badar badar’ before setting out. These shared beliefs foster a mutual respect for each other’s customs, uniting the community in their relationship with the forest.

Fishing is a significant source of income in the Sundarbans, with high demand and market value for locally caught fish. Fishermen like Sanat Mondal, a 45-year-old professional fish collector, navigate this complex market. Sanat owns a boat, BLC, and various fishing nets like Fash Jal. He typically sells his catch to a local storekeeper (*arataaar*) in Canning, who buys in cash and provides a modest profit margin of Rs. 4 per kilogram. Market prices for some fish varieties are notably high. For instance, the big ‘*Jaba*’ fish (*Acanthopagrus* species) sells for around Rs. 25,000 to Rs. 26,000 per kilogram, and ‘*Slet*’ fish ranges between Rs. 500 to Rs. 700 per kg. ‘*Vetki*’ sells between Rs. 300 and Rs. 500 per kg. Among them, the ‘*Telia Bhola*’ fish (*Nibea soldado*) is the most valuable, with prices ranging from Rs. 26,000 to Rs. 40,000 per kilogram, and large specimens exceeding one lakh rupees.

Fishing in the Sundarbans is scheduled according to lunar days, called ‘*tithis*’ in Bengali. Fishermen like Sanat typically start their journey on the day of Prathama (the day after full or new moons), fishing from the *Dwitiya* (second lunar day) to *Dashami* (tenth lunar day), and returning on *Ekadashi* (eleventh day). Each month, fishermen spend about 20 days in the forest during high tides (full moon and new moon), divided into two fishing trips. This cycle is both a livelihood routine and a reflection of traditional knowledge aligned with the lunar calendar.



Figure-5. Sharks of the Ganga idol, traditional painting and worship, Ganga is striking a balance between human and shark conflicts in the Sundarban. Photo source: Authors

#### 4.2. Crabs' collection

Mud crab harvesting is a key aspect of the indigenous knowledge of local communities. This practice spans nine months, from July to March, with a ban from April to June to protect crabs during their breeding season. The monsoon months, July to September, yield the best catch. Crab availability peaks around five days before and after the new moon (*Amavasya*) and full moon (*Purnima*), when high tides (*Bharani*) flood the creeks. Collectors work this time, venturing into the forest for nine days, including two days for travel, totalling 11 days per phase. In one lunar month, collectors undertake two 15-day phases, spending about 22 days in the forest. However, during the middle of the lunar cycle, when tides are weaker (*Marani*), crab numbers drop, and collectors prepare for the next active period. This cycle reflects a deep understanding of natural rhythms, allowing sustainable harvesting.



Figure-6. Done. Photo source: Mehtta, 2021

For collecting crabs, villagers use various traditional knowledge. A local crab collector named Achin Mandal shares his insights on crab habitats based on traditional knowledge. He explains that crabs are more commonly found in deep, narrow canals lined with *Hental bushes* (*Phoenix paludosa*) and featuring numerous holes along the riverbanks. In contrast, shallow and wide canals tend to have fewer crabs. Mandal notes that the availability of crabs is closely tied to seasonal changes. During the monsoon season, increased rainfall reduces the salinity of river water and raises tidal levels, which strengthens upstream

currents. This prompts crabs to leave their burrows in search of food, leading to higher catch rates. At this time, crabs are generally lighter and have thinner shells. Conversely, crabs are less abundant during the winter months (December to February). The colder temperatures increase the water's density, causing crabs to retreat into their burrows. Additionally, the lower river velocity and tidal heights during winter coincide with the mating season for crabs, and females lay their eggs during this period. This understanding of crab behaviour and habitat preferences highlights the significance of traditional ecological knowledge in sustainable crab harvesting practices.

Local crab fishers use traditional methods like the *done* and *thopa* to catch crabs. The *done* is a long rope with short ropes tied at intervals (Figure-6). A loop is made at the end where bait (called *chara*) is placed to attract crabs. At every five arms' length, heavy objects like bricks (*dulo*) are tied to help the rope sink to the bottom of the water. A brick or similar weight is also attached at the very end to keep the *done* in place. Floating markers are tied to the ends to show where the *done* is in the water. Making a *done* requires skill, and only experienced people can do it. When using the *done*, someone sits at the front of a *dinghy* and slowly pulls up the rope. They hold a small spoon-shaped net (*jalati*) in one hand. If a crab is caught, it will tug at the rope.

The fisher gently pulls the rope closer, and when the crab is visible, they use the *jalti* to scoop it from the water. The crabs are then placed in the *Dora* (middle section of dinghy). This process is repeated 6–7 times a day but not during low or high tide. This method is mostly used by men in deep forest areas during regular crab collection periods. On the other hand, the *thopa* is a simpler method. It uses a single baited line and requires a 6–8-foot stick (wood or bamboo), a 10–12-foot nylon rope, and a 200–250-gram *dulo* tied above the *chara*. One end of the rope is tied to the top of the stick, with *chara* attached at the other end. During high tide, the stick is planted firmly in shallow water, and the baited rope is thrown into the river. Several *thopas* are placed 20–25 arms' lengths apart. When the rope starts pulling, it means a crab is caught. The fisher slowly pulls the rope with their left hand, and with a *jalti* in their right hand, they scoop the crab from the water. This technique is often used by women and children (Figure-7). Other indigenous crab-catching tools include bent iron rods (*sik*) and loop nets.



Figure-7. Thopa



Crab collectors adhere to a set of customary norms and rituals that they believe protect them from the forest's dangers, particularly tiger attacks. Srimanta Sardar, a 64-year-old illiterate from Chargheri village, illustrates this practice. Every Friday evening, while out in the forest, he and his fellow collectors perform rituals, worshipping several deities, including *Bonbibi* (Deity of forest), *Gazi Saheb* (a Muslim saint) (Figure-9), *Dakshin Rai* (Tiger god), and *Kashtho Debi* (Wood Goddess) (Figure-8), who is associated with their boats. They follow specific guidelines, such as refraining from using soap for washing themselves or their clothes while in the forest, and they avoid eating crabs during their time there. These practices are deeply rooted in their beliefs, with Bonbibi being seen as their protector, providing a sense of security against the inherent risks of the forest environment. Such rituals highlight the interplay between cultural traditions and the need for safety in a challenging and often perilous habitat.



Figure-8. Kashtho Debi

Sundarbans crabs have greater demand in local, national, and international markets. Exporters set crab prices based on export market trends, and crab fishers sell them by kilogram or quintal (100 kg). Local *aratdaars* (agents) and middlemen typically buy crabs in bulk by quintal, acting as intermediaries in the supply chain. According to Khagen Mistri, a 57-year-old crab collector from Chargheri village, crabs under 100 grams are considered rejected, while those above 100 grams are graded for sale. Aratdaars pay crab fishers in cash and resell the crabs in urban fish markets at higher prices. Crabs are classified into two categories for sale: larger crabs (over 100 grams) sell for around ₹450–500 per kg, and smaller crabs (under 100 grams) sell for ₹100–150 per kg. Prices fluctuate by season for crabs sold per quintal, ranging from ₹70,000 to ₹80,000 during the monsoon season and rising to ₹90,000–110,000 in winter.

The narrative highlights the challenges faced by crab collectors in the Sundarbans, who often lack licenses (BLC) to legally enter the forest for fishing. Restricted to the buffer zone (*khola-bada*) of the Sundarbans Tiger Reserve, many still venture into the prohibited core zone (*bandho-bada*) due to economic necessity. These fishermen risk heavy fines, confiscation of equipment, and even verbal abuse from forest guards when caught without proper permits. To cope with this situation, a complex



relationship has evolved between the fishermen and forest guards. Through informal negotiations, fishermen often offer a portion of their catch—sometimes free or at a reduced rate—to appease the guards and avoid penalties. This interaction illustrates an adaptive strategy that fishermen have developed, balancing their livelihood needs with the risks imposed by strict regulations in the Sundarbans.

### 4.3. *Honey collection*

In the Sundarbans mangrove forest, honey collection is an essential source of income, especially for the local communities in areas like Gosaba, Hingalganj, and Basanti. The honey from Sundarbans is well-known for its purity and is in high demand both in India and abroad. However, gathering honey here is challenging and risky due to the threat of attacks by Bengal tigers. The honey collectors, known as *moulis*, go deep into the dense forest to gather honey (Figure-10). For those in places like Lahiripur, the entire honey collection process, from start to finish, is called the ‘*Mahal*.’ Each year, the STR grants the honey collection season only one month, split into two 15-day periods with separate permits. The first permit is valid from April 1 to April 15, and the second is from April 16 to April 30. Although the permits are free, the Forest Department mandates that most of the honey collected be sold to them at a fixed price. Each permit is given to a team, which must include at least seven and up to twelve people. This team consists of a leader (*sajandar*) and a tiger charmer (*bable*), whose role is to protect the team from tiger attacks. Most of the team members are older, typically between 40 and 65 years of age.

The *moulis* gather honey using ecological knowledge (EK) rather than scientific methods. To find a beehive, locations are determined by monitoring wind speed and the presence of bees. Hive can usually be found by looking at bee excrement or bee movement on tree leaves, placing of sweet water pot in the forest, or by behavioural study of Rhesus macaque (*Macaca mulatta*). To ensure a safe return from the *Mahal*, the *moulis* follow specific rituals and revere the forest deity *Bonbibi* (Figure-9). They do not use rude language. Nobody fights or quarrels among themselves as long as they are in the forest. While collecting honey from the forest, they do not discriminate against anyone for their caste or religion, both Hindus and Muslims worship *Bonbibi*. *Moulis* respects the forest and avoids spitting, urinating, and defecating on it because they believe it to be sacred. In the absence of their husbands, the wives of honey collectors perform certain rituals for their safe return. Mrinal Mondal a resident of Purba Parashmani village, said that when a male member of a family goes to the *mahal*, his wife must follow some rituals. For example, the household does not wash clothes with soap or detergent during that period of time. The household finishes their cooking before the sun rises and does not cook a single thing during the daytime.

In the time of mahal, the wives do not keep her hair open, does not comb her hair, or do not do any hairdressing; do not shut the doors; do not use vermilion during the day. Should not visit any crematory until their husbands return from the forest.



Figure-9. Traditional Bonbibi worship on the 1<sup>st</sup> of *Magh* (Bengali month) of the year, Bonbibi embodies the balance between human-tiger conflicts.

In the forest, *mouli*s searches for beehives (*chak*) using traditional methods. Each *mouli* wears a new shirt and shorts, with a towel (*gamchha*) on their head for protection. They carry sticks, while some also carry tools like sickles or small axes. One of them carries an aluminum pot (*aari*) for collecting honey. One member stays on the *dinghy* to guard it and cook food, while the boatman rows the *dinghy* alongside the group, following their movements. In the forest, the *mouli*s keep a safe distance of about 30 hand-lengths from each other as they search for beehives. When someone spots a hive, they make a ‘*Hoon*’ or ‘*Koo*’ sound to signal the others. Once they find a *chak* on a tree, they gather materials like *Hental* and *Golpata* leaves, along with some dry branches, to make a torch called *bullen* or *mashal*. The heavy smoke from these torches drives the bees away from the *chak*. After this, one of the *mouli*s climbs the tree to cut down the *chak*, while other stands below holding the *aari* to catch the honeycombs as they fall (Figure-10). After they’ve collected all the honey from one *chak*, they signal to each other with a ‘*hooon*’ sound and then start looking for the next hive. This traditional honey collection process continues as they move through the forest, gathering honey from one hive to another.



Figure-10. A group of honey collectors, moulis pray to the forest deity before venturing into the forest and finally honey collection from hive. Photo source: Dhritiman Mukherjee

*Moulis* who gather honey from the forest are required to sell their honey to the Forest Department at a fixed price that is lower than that of the open market. In 2025, *moulis* sell the honey to the forest department for Rs. 225 per kilogram. It was previously Rs 150, Rs 180, Rs 190, and Rs 200 (from 2020 to 2024). The *moulis* same honey could be sold in the open market for an additional Rs. 400–450 per kilogram. However, the forest division purchases honey from *moulis* each year for a predetermined low cost. As a result, there was a strong disagreement over the sale and purchase of honey between *moulis* and the staff members of the forest department. Learning a lesson from the past year, the *moulis* go on *mahal* with the pass and do illegal things in hope of some profit. They hide some of the collected honey, mix some adulterants with the remainder, and sell it to the forest department.

### ***5. Discussion, policy implications, and conclusions***

Provisioning ecosystem services from the nearby reserve forest and the strategies for accessing them, along with related rules, regulations, and local conservation ethics, are discussed in detail. Key livelihood resources—such as crabs, fish, and honey—are documented, and it is noted that specific zones within the Sundarban Tiger Reserve are designated for regulated use. The wildlife sanctuary area is primarily allocated for tourism, the buffer zone permits controlled resource extraction, and the core area, notified as a national park, is strictly reserved for biodiversity conservation. Each zone operates under distinct regulatory frameworks. Local experiences of resource extraction—particularly from core and sanctuary areas—include accounts of penalties, seizure of BLCs, and confiscation of catch and fishing gear (Ghosh, 2014).

A dynamic system governs resource harvesting in the region. Some elderly people have withdrawn from collection activities due to tiger attacks, while others have newly entered the sector. Traditional practices



of accessing forest resources vary across households, and ecological knowledge remains deeply embedded in cultural heritage. Cultural identity shapes community claim-making (Karthik & Menon, 2016), as people articulate indigenous identities through political struggles to secure livelihoods and resist arbitrary state control (Li, 2000). At the same time, beliefs and practices influencing ecological processes are linked to broader symbolic systems (Lanzano, 2013).

People living near the Sundarbans Tiger Reserve closely associate themselves with forest resources through specialized harvesting skills, rituals, and customary practices. This study examines how these communities survive and manage their environment using Traditional Ecological Knowledge (TEK). Although local perceptions of the forest are mixed, they largely value it for sustaining livelihoods. TEK continues to guide sustainable resource management and is transmitted across generations. Strengthening its continuity requires engaging community knowledge holders—such as traditional fishermen and village elders—who play a central role in conserving and sharing this knowledge (Sinthumule & Mashau, 2020).

The people of the Sundarbans maintain a distinctive worldview toward water, forests, wildlife, and reptiles, where subsistence claims are legitimized through the mythology of Bonbibbi rather than resource overuse (Sen & Pattanaik, 2017). Tiger charmers traditionally regulate forest entry, fixing specific times and ensuring adherence to customary norms—such as cleanliness and restrained extraction—to maintain balance between human and non-human needs (Jalais, 2010). Historically, local communities coexisted with the forest through sustainable resource use and customary management practices. However, the western exclusionary conservation model, institutionalized through the creation of Protected Areas (PAs), often prioritizes territorial control over local socio-political realities (Wilshusen et al., 2002). This has generated resentment, conflict, and at times sabotage, particularly in tiger reserves across India (Roy & Jackson, 1993; Mukherjee et al., 2014; Gadgil & Guha, 1995). In the Sundarbans, restrictions on resource access have led to illegal entry into core areas, undermining conservation efforts. Strict regulatory frameworks may also foster corruption, as everyday political negotiations—such as bribing local forest officials—become mechanisms through which communities secure livelihood access, ultimately affecting biodiversity within PAs.

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