Endangered Fishing Cat *Prionailurus viverrinus*: Status, Distribution and Conservation in Assam, India.

2017

Project Investigator:
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Supported by:
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Summary

The Fishing cat (*Prionailurus viverrinus*), an endangered species, has a patchy distribution across its range and predominantly found in human dominated floodplains of Assam. However, little information exists on its distribution in Assam. We conducted a survey to estimate the distribution of fishing cats in five districts of Assam in the floodplains of the Brahmaputra River, with most promising habitats. We first acquired information about wetlands from remote-sensed GIS data and the occurrence of fishing from published literature and consultation with the local experts on wildlife and other naturalists. We then divided the study area into 5 sq km grids and surveyed them to record the occurrence of fishing cat and the threats to their existence.

Questionnaire survey was conducted by interviewing knowledgeable person about the fishing cat and their habitats that included villagers, officials concerned, school and college teachers and local naturalists across the study area. Information on the occurrence of fishing cat by respondents, specifically sightings, locations, places of most frequent occurrence, livestock predation and killing or hunting by people, etc were collected. Some camera traps were also used at a few locations in Majuli, Nagaon district and Golaghat district where signs were verified by field team. However, systematic camera trapping in areas outside protected areas were not possible due to high chances of theft of camera traps and human disturbances. We also did sign survey along the wetlands, rivers to verify the occurrence of fishing cat, particularly followed by a positive interview of fishing cat occurrence. Using the grid-based fishing cat occurrence data thus collected, we did a simple and well established occupancy modelling to understand the distribution pattern.

We interviewed a total 150 respondents from 214 grids, 129 (86%) respondents mentioned to have direct sighting of which 9 (6%) respondents reported to have seen dead fishing cat and 9% respondents claimed to have seen at their own residence. About 7.75% of the people had never seen a fishing cat. In last one year the proportion of area occupied (PAO) by fishing cat ranges from 0.36 to 0.72.

The array of the major threats of the Fishing cat was found to be anthropogenic disturbance in its habitats, habitat loss, shrinking of water bodies and hunting or retaliatory killing. 86% of the respondents observed that the water bodies located near their vicinity were shrinking due to encroachment or other developmental activities.

A systematic camera trapping in the Kaziranga NP in Assam shows that the park holds future for fishing cat in the entire Brahmaputra floodplains given the encounter of the species in camera traps and individual identified. We have found that with systematic approach of camera trapping by targeting Fishing cat it should be possible to estimate its population using photographic capture recapture method. In Kazirnaga NP, this study found minimum of 13 individual fishing cat captured in camera trap.

Fishing cat outside protected areas in central Assam, the most potential habitats of the species are in severe threats. The species can only be saved through habitat protection and ensuring that anthropogenic pressure on habitats is minimum. To protect the species from extirpation from outside the protected areas, participation of local community is most essential. Their participation as key stakeholder can be increased through conservation awareness and providing key information through participatory research, both biological and socioeconomic. Thus, we recommend designing and delivering a small model in a key habitat having population of fishing cat so that the same can be adapted in other habitats encompassing wetlands and grasslands. Only such models can help protect the fishing cat in human dominated landscape like Assam.

1. Introduction

The Fishing cat (*Prionailurus viverrinus*), largest of all the lesser cats has a wide but patchy distribution throughout South and Southeast Asia. Globally its population is declining including India (Mukherjee *et al*. 2016) and is considered extinct in Pakistan. Fishing cat is listed as ENDANGERED (EN) in the IUCN red-list (Mukherjee *et al.* 2010) and is listed in the Schedule I of the Wildlife (Protection) Act 1972 in India.

In India fishing cat is distributed all the way from Himalayan foothills in the north to the Western Ghats in the south and along the Ganges to the flood plains of Brahmaputra (Sunquist and Sunquist 2002). The wetland dependent species is also found in Keoladeo National Park in north-western India, (Mukherjee *et al.* 2012), Chilika Wildlife Sanctuary in eastern India and the mangroves of Sundarbans.

Assam is an ideal habitat for fishing cat with its riverine and wetland ecosystems in the floodplains of the Brahmaputra and its tributaries. Fishing cat is reported to occur in protected areas of Kaziranga, Orang and Manas National Park (MF Ahmed, unpublished data). However, there are no systematic studies so far on the occurrence of fishing outside the protected areas of Assam where the threats to their conservation obviously very high. Loss of wetland habitats and its surrounding (Mukherjee *et al.* 2010) is a major threat. Sometimes they are also killed in retaliation for preying on domestic animals and farmed fishes as well as bush meat (Cutter 2009, Uttam Saikia, pers comm.). It is also recorded in illegal trade.

We set out this project on ground with three major objectives. That were, 1) To estimate proportion of area occupied by fishing cats in the five districts, 2) To identify threats to their existence, and, 3) Awareness and outreach programs for conservation of fishing cats.

We conducted a field survey to evaluate distribution of fishing cats in five districts of central Assam region in the floodplains of the Brahmaputra, the most potential districts to find population of fishing cat. Previously fishing cat was recorded only in the protected areas of Assam. The present study determined presence and its extent of fishing cat outside protected areas. This would help to raise conservation concern of this endangered species in private, community and government land outside protected areas to strengthen its conservation further.

Thick human population in the floodplain, destruction of natural water bodies, decreasing fish population and relevant ecological services, conversion of lands for development activities, encroachment on the natural water bodies were the major threat to the survival of fishing cat. Lack of public awareness also pose a great threat for their survival as often people unknowingly kill fishing cat of damage their natural habitat.

This first ever study, focusing fishing cat has helped in generating key information on this species in its most potential habitats outside protected areas like Kaziranga NP in Assam. Thus, Kaziranga shall continue to hold Fishing cat population as source population for time to come while most areas outside the park would act as sink. However, with participation of communities and other concerned stakeholders, some of the habitats outside Kaziranga can be maintained as key habitat and meta-population of fishing cat in the central Assam region roughly around the KORL (Kaziranga-Orang Riverine Landscape) that was identified during a previous study by Aaranyak (Ahmed et al. 2009).

2. Literature Review

Distribution of Fishing cat is patchy throughout its ranges (Nowell and Jackson 1996, Sunquist and Sunquist 2002) that spans India, Sri Lanka and Nepal through western India and Burma to Thailand, Cambodia, Bhutan, Java of Indonesia, Malaysia, Myanmar, Laos, China, Thailand, Vietnam and Pakistan (Mukherjee *et al.* 2010). Presence of Fishing cat in Laos and Sumatra is doubtful (Duckworth *et al.* 2009, Sanderson 2009, Duckworth *et al.* 2010). The presence in Cambodia was recently confirmed by Royan (2009). The Pakistani population is considered extinct recently (IUCN 2010).

The Major distributional ranges of Fishing cat are from Nepal and Assam (Pocock 1939) to Mayanmar (U Tun Yin 1967), Thailand (Lekagul and McNeely 1977) and Indochina (Delacour 1940). In India, the study on the distribution and behavior was initiated many decades ago (Pocock 1939; Nowell and Jackson 1996; Sunquist and Sunquist 2002). Very few recent studies have been made to determine their current status and distribution in the country (Kumara & Singh 2004; Kolipaka 2006; Datta *et al.* 2008; Janardhanan *et al.* 2014, Adhya 2011).

In India, Fishing cats are mainly reported from protected areas (Nowell and Jackson, 1996). A small and isolated population currently exists in parts of Rajasthan (Sunquist and Sunquist 2002, Mukherjee 2012). There has been no systematic study of fishing cat in northeast India yet although it has been sporadically reported from sites within the region.

The fishing cat is a wetland specialist and their distributions in India suggest that they occur around major wetlands and mangroves (Pocock 1939; Nowell & Jackson 1996). These ecosystems are highly threatened due to competition for resources with humans, for land, water and fish. Several wetlands across India are rapidly being converted into agricultural land, fragmented or destroyed, to meet the demands of a growing human population (Prasad *et al.* 2002). In Assam, it is confirmed to occur in Kaziranga and Orang National Park.

3. Brief note on fishing cat ecology

Fishing cat is associated with wetland habitat and river courses. It has been recorded from mangroves habitat at sea level to subtropical habitats at an altitude of 1525 m above sea level. Though fish is its predominant diet, it also feeds on small mammals, birds, reptiles, amphibians, molluscs and insects (Lekagul and McNeely 1977). Fishing cats are strictly nocturnal and spend the daytime in dense bushes near as well as far from wetlands.

4. Study Area

The Assam is located between 25^{o} 44' - 27^{o} 45' latitude and 89^{o} 41' - 96^{o} 02' longitude. The total geographical area of the state is 78,523 sq km. The mighty River Brahmaputra flows transversely through the Assam, India along with its major tributaries forms many wetlands and floodplains. There are 3513 wetlands covering an area of 1012.316 sq km in Assam. These wetlands are mainly categorised as waterlogged, ox-bow lakes, tanks, lake/ponds, reservoirs and swamp/marsh. The present study was confined to six districts of the state of Assam viz Nagaon, Marigaon, Golaghat, Jorhat, Sonitpur and Biswanath. Within the study area, Nagaon district has the highest number of wetlands (379) covering an area of 112.95 sq km (Fig-1). The Majuli river island under the Jorhat district, the largest river island is embraced with many wetlands and marshes. The study also covered Kaziranga National Park where extensive camera trapping exercise was done for Tigers in 2014 as part of All India Tiger Monitoring. We selected most potential fishing cat habitats associated with wetlands based on some knowledge on the area and through visual impression using satellite imageries before on ground visit.

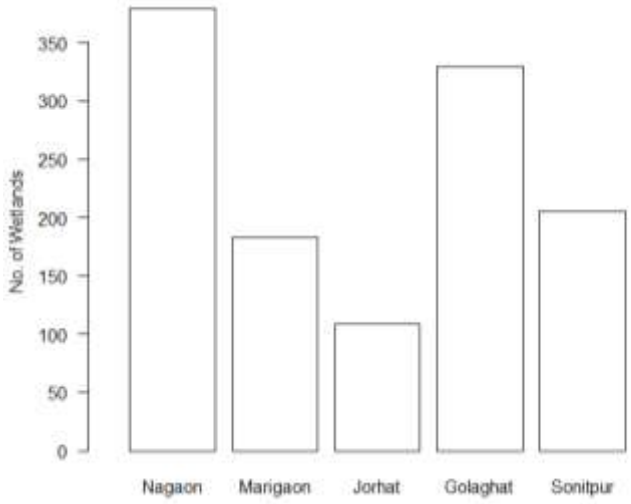


Fig-1: Number of wetlands in the targeted districts of central Assam.

5. Methods

5.1 Questionnaire Survey: Grid based questionnaire (2 x 2 km) survey was carried out among the community stakeholders, farmers, local naturalists, fishermen, cattle herders and people settled near wetlands. The questionnaire was designed with six segments to understand and document the following variables:

(a) General Introduction of the Respondent (b) Presence/Absence of Fishing cat (c) Habitat of the Fishing cat (d) Threats to Fishing cat (e) Conflict with communities (or Prey-Predator Condition) and (f) Threat Mitigation.

Name of the person being interviewed, their age, sex, place name with GPS location, date, time, village name and area of knowledge (AoK) (the knowledge a person has about grids in the neighbourhood or grids in their workplace) were recorded each respondent. Initially we asked the respondent about the occurrence of fishing cat in their locality. We then asked them to identify fishing cat from a set of pictures of fishing cats and few other animals like jungle cat, small Indian civet and otter. If the respondent identified the fishing cat correctly we proceeded with further questions. The surveyed team always carried a land use and land cover map along with GPS to confirm the locality of the respondent (Fig 2).

101	105	109	113	117
102	**106**	**110**	**114**	118
103	**107**	**111 ¶**	**115**	119
104	108	112	116	120

Fig 2. Area of knowledge (AoK): a person "¶"may reside in grid number 111 but he may have knowledge of other grids like shown in the diagram viz 106, 107, 110, 114 and 115.

5.2 Camera Trapping: Passive camera traps (Reconyx and Panthera V4) were deployed in strategic locations in consultation with local key resource person. However, we did only opportunistic camera trapping in few location for the photographic verification of the presence of fishing cat. The camera traps were activated only in the night time to minimise the loss of cameras due to removal/theft by inquisitive passer-by. The cameras were moved in response to the field situation and kept operational for a locality for at least 5 days.

5.3. Education Awareness and Capacity Building:

A brochure and a poster on fishing cat in local Assamese language describing on the general characteristics, global distribution and status, identification keys, food habit, conservation importance, legal status, conservation problems and possible participatory approaches for its conservation was prepared mass distribution to propagate awareness initiatives. A poster on the Fishing cat was also prepared as education material to sensitize local community towards the conservation of Fishing cat and its habitat.

A series of awareness program was conducted across the study area targeting school students, community stakeholders and villagers. Interaction with the fishermen, villagers, local shopkeepers, fishery holders, and local tribes were organized to exchange ideas and to trigger the conservation root causes through participatory approaches. District administration, religious leaders and local social groups were also involved in a common platform to sensitize and spread up conservation massage of Fishing cat and its habitat amongst the common mass.

6. Results

6.1 Camera Trapping

As part of the All India Tiger Monitoring mandated by the National Tiger Conservation Authority of India we jointly installed camera traps with Wildlife Institute of India and Assam Forest Department in the Kaziranga National Park and Orang National Park in the study area. In Kaziranga NP, Camera traps were installed at 415 locations to cover the 373 sq km area of the Kaziranga National Park. The study was mainly carried out to estimate the abundance and density of tigers in the park. The Fishing cats were captured at 37 locations out of 415. Among the 106 total photographs of fishing cat, 85 independent photographs were detected during 9651 trap nights. The calculated Relative Abundance Index (RAI-1) was 0.88. As many as 13 adult individuals were identified so far with the help of the pattern of pelage, size and body condition (Fig-3).

Similar camera trap study in Orang NP (ONP) did not yield any record of fishing cat although signs (pug mark) of the cat were evident close to wetlands. A dead fishing cat was recorded in ONP in 2013 that confirmed its occurrence in the park.

We attempted to conduct camera trapping in key locations in the Majuli Island (under Jorhat district) and in Nagaon district. However, because of the high anthropogenic pressure we could not place cameras for long duration and was not successful in camera capture of fishing cat.

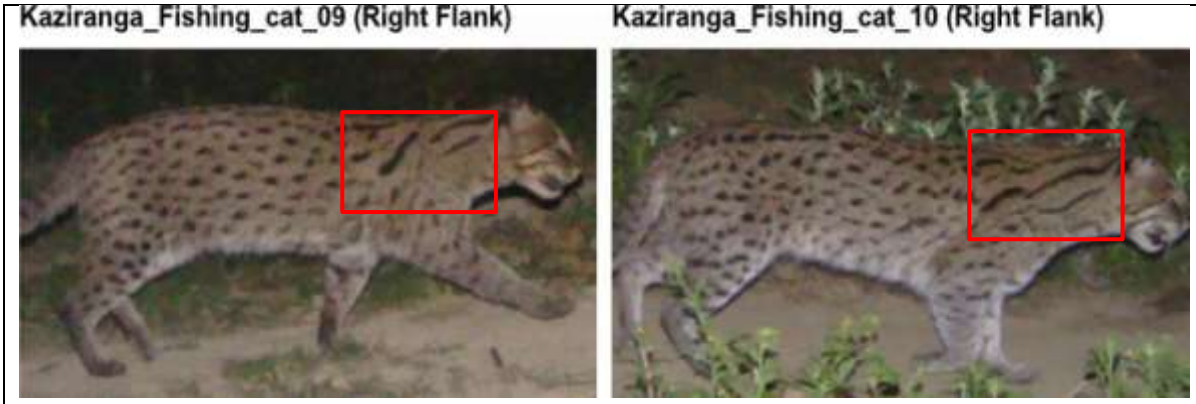


Fig-3: Individual identification of Fishing cat based on the pelage marking, on the left side individual number 09 and on the right side 10.

6.2 Occurrence of fishing cat through questionnaire survey

All total 150 respondents were interviewed to assess the occurrence of fishing cat and their potential threats across six districts viz Nagaon, Marigaon, Sonitpur, Golaghat and Jorhat of Assam which covered 214 grids. We interviewed at least one permanent resident or a person having enough knowledge of the area, representing a grid or multiple grids within his Area of Knowledge (AoK). The respondents were age group between 15 to 65 years. Long term (≥ 30 years residence) residents of a grid constituted 90.3% of the respondents.

Out of 150 respondents 140 (93.34%) mentioned to have seen fishing cat in their localities of which 129 (86%) had made direct sighting, 7.34% had come to know about the presence of fishing act from indirect evidences (indirect sighting-pugmark/scat/vocalization/kill, reported by other people etc.) and 9 (6%) respondent reported to had seen both death and direct sighting of fishing cat. In Majuli under Jorhat district, 5 respondents have seen fishing cat at the embankment along with the other animals during high floods. About 7.5% of the people had never seen a fishing cat while 6% have seen them more than 12 times (Fig-4).

We had also interviewed respondents about their sightings of fishing cat in last one year period to understand the present status of the fishing cat in their locality. 67% of the respondents were reported that they had seen fishing cat in last one year interval of which 24.67% had seen only 1-2 times (extremely rare) followed by 22% had seen >4 times (rare), 12.67% had seen >8 times (often), 7.34% had seen >12 times (most often) and 33.34% were reported to had not seen fishing cat in their localities in last one year period (Fig-4).

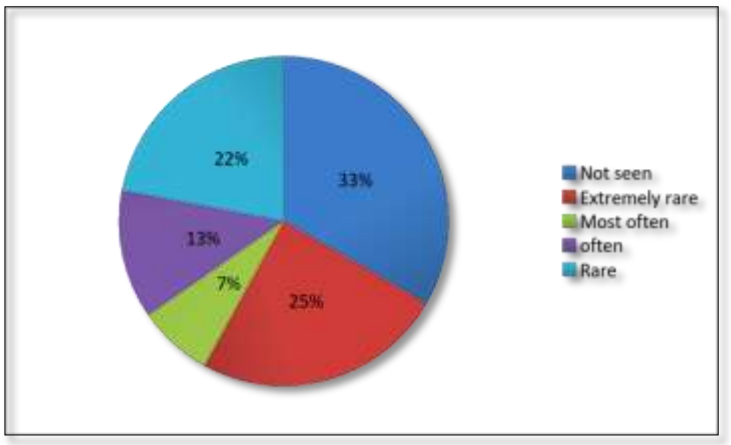


Fig-4. Frequency of sightings of fishing cat reported by the respondents in last one year period (total respondents=150).

Out of 93.34% respondents that were reported to have the presence of fishing cat in their localities, 66.67% people had encountered fishing cat in last one year period (Fig 5). In Majuli, only 32 (58%) of total 55 respondents had seen fishing cat in last one year period, followed by 22 (64%) of 34 respondents in Nagaon, 17 (65%) of 26 respondents in Golaghat, 19 (83%) of 23 respondents in Sonitpur and 10 (83%) of 12 respondents in Marigaon reported to had seen fishing cat in last one year period in their localities (Fig-5).

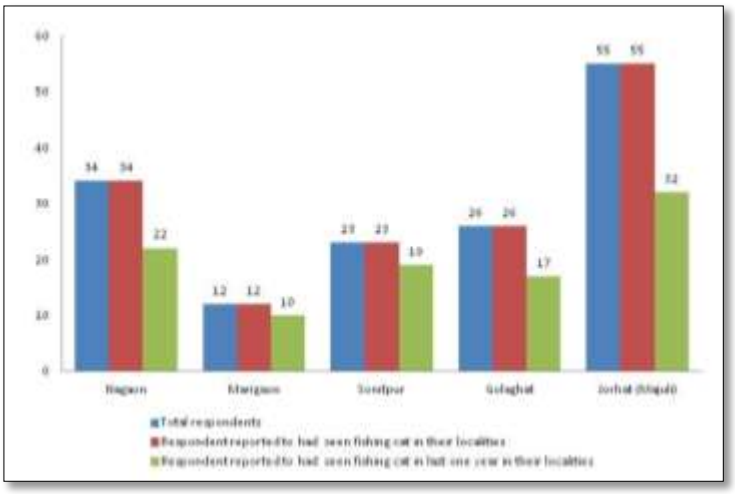


Fig-5. Comparative display of respondents that had seen fishing cat in their localities.

6.3 Occupancy survey and modelling

From the grid-based fishing cat presence data we estimated the mean proportion of area occupied (PAO) by fishing cats in last one year. The PAO ranged from 0.36 to 0.72 (Table-1).

District	No. of grids surveyed	No. of grids with fishing cat presence	Estimated PAO	95% Confidence Interval	
				LCI	UCI
Golaghat	23	3	0.36	0.13	1
Majuli	77	14	0.43	0.18	1
Nagaon-Marigaon	75	16	0.49	0.24	1
Sonitpur	39	14	0.72	0.52	1

Table 1. Proportion of area (PAO) occupied by fishing cat in five riverine districts of Assam.

6.4 Threat assessment to fishing cat from the questionnaire survey

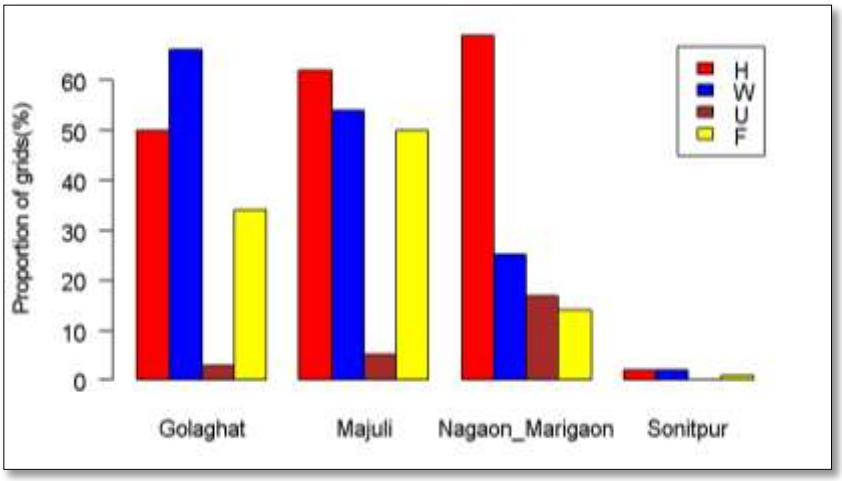


Fig 6. Assessment of threat to fishing cats by locals. H: hunting/Retaliation, W: conversion of water bodies, U: Urbanization and F: food scarcity.

The array of the major threats of the Fishing cat was found habitat loss, shrinking of water bodies and hunting. Among 86% of the respondents were admitted that the water bodies located near their vicinity were shrinking due to encroachment and developmental activities. Particularly in Majuli (Jorhat district), majority of the respondent were informed that the climate change is the major factor for the distortion of the water bodies (Fig-6). Subsequently abundance and diversity of fish has also reducing considerably.

Amongst the respondents 52% admitted that the condition of the water bodies were “poor”, 29% admitted “average”, and rest 29% reported as “good”. 77% of the respondents admitted that the water bodies present near their localities have Fishing cat. 68% of the surveyed area has fishermen community and fish farming have been practicing in 54% these areas.

Three percent of the respondents claimed that they have seen fishing cat prey upon their livestock. Besides hunting for meat (35%), retaliatory killing (3% respondents admitted) was also posing to be a major threat for their survival. To corroborate the fact 56% of the total respondents amenably admitted the occurrence of hunting in their locality (Fig-6).

Considering that fact, 24% and 52% respondents admitted that the population of the Fishing cat has been “alarmingly decreasing” and “decreasing” respectively over the study area.

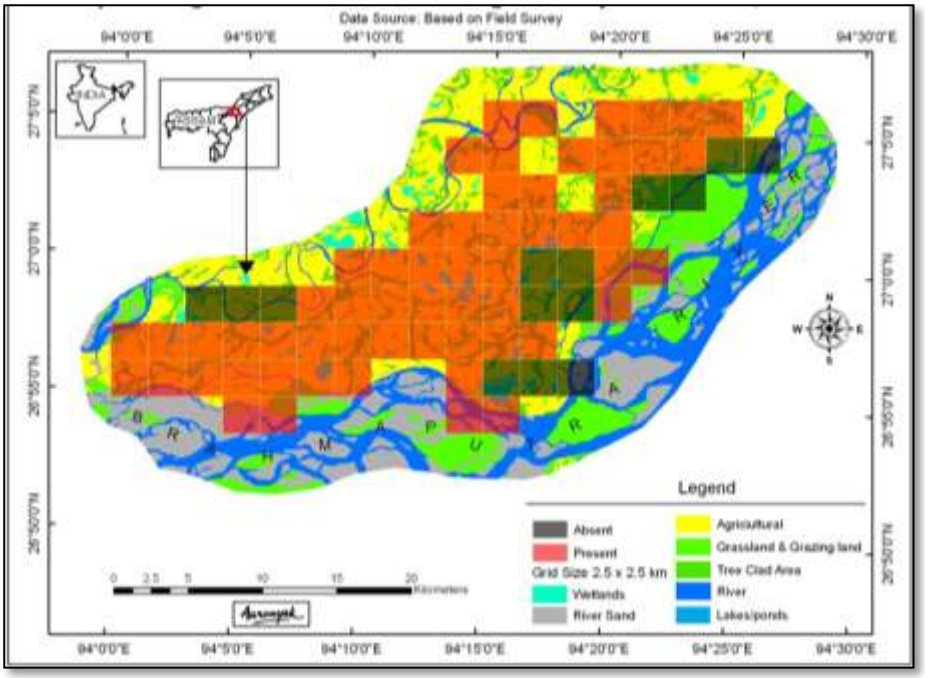


Fig 7: Map showing presence and absence of fishing cat in Majuli

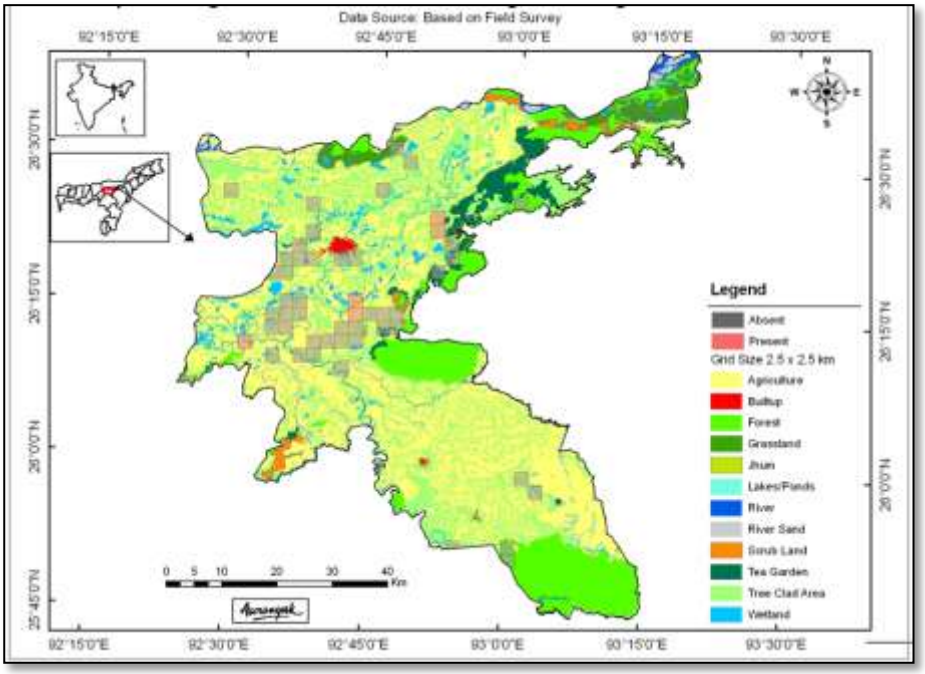


Fig 8. Map showing presence and absence of fishing cat in Nagaon district

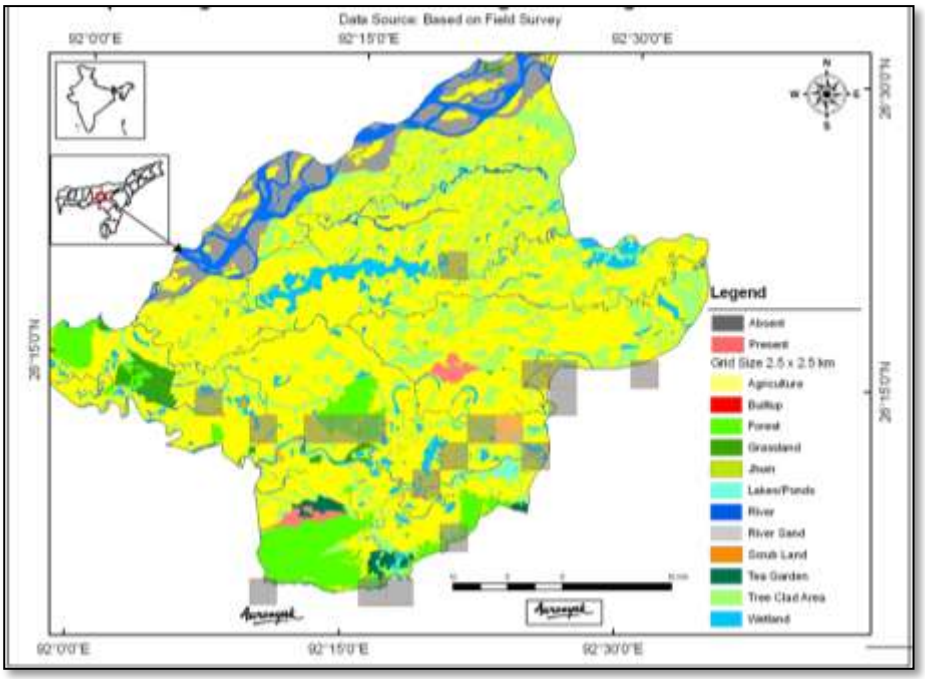


Fig 9. Map showing presence and absence of fishing cat in Marigaon district.

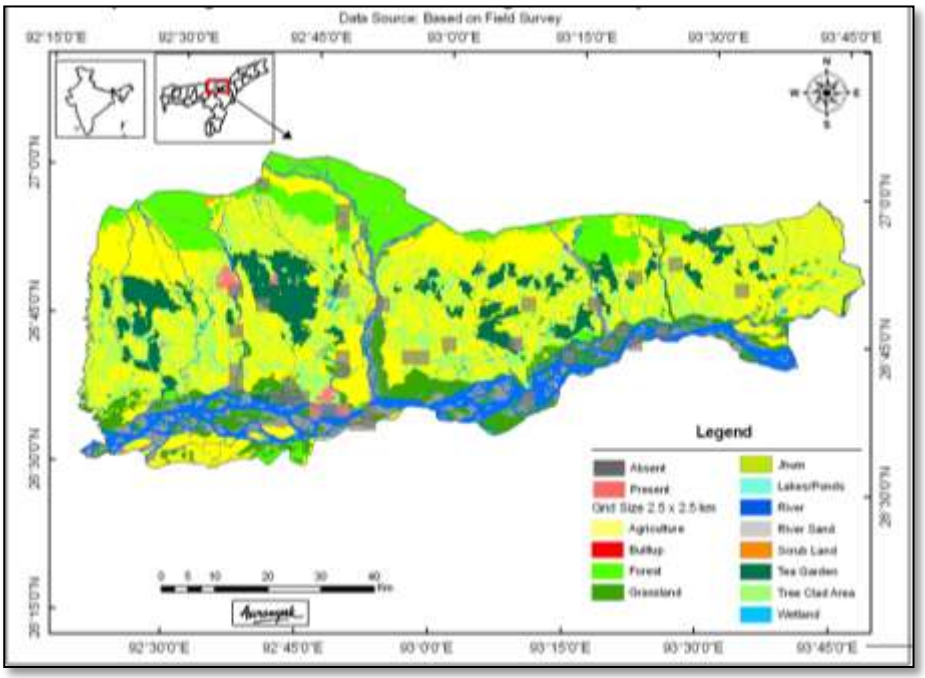


Fig 10. Map showing presence and absence of fishing cat in Sonitpur district

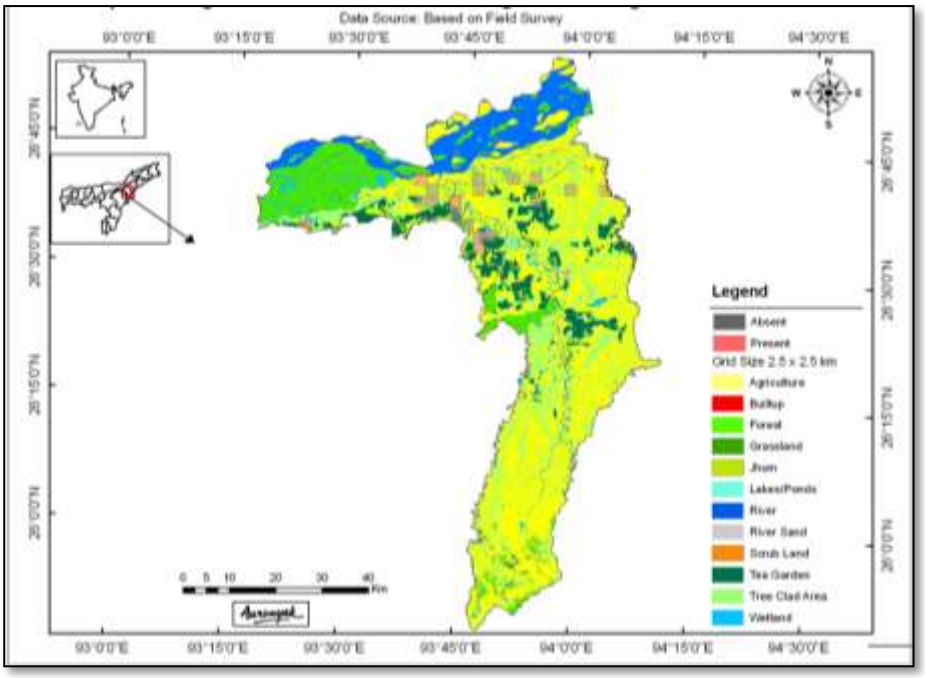


Fig 11. Map showing presence and absence of fishing cat in Golaghat district

6.5 Education Awareness and Capacity Building

We first conducted a reconnaissance survey and interacted with the local naturalists and experts to develop an idea about the landscape. In Majuli under Jorhat and Nagaon districts we conducted 20 road side interactions with residents to understand the presence of fishing cats in their habitat and their perceptions. We hired residents to assist us with the interactions and navigation to interior parts of the district. We also trained the hired residents to conduct systematic sign survey and camera trapping as a part of the salient project activity.

Two students one from the North Orissa University, Orissa, India and other from Gauhati University, Assam worked as volunteers to fulfil their master's dissertation. We also collaborated with local environmental agencies, student groups, schools, district administrations and local forest officials to conduct education and outreach activities.

Altogether 16 school awareness campaigns were conducted through which 3725 students were reached. The schools were strategically selected nearby the habitats of the fishing cat.

Wildlife documentary show along with quiz and extemporary speech competitions were also organised amongst for the school children. The aims of these competitions were to attract, prompt and develop knowledge on wildlife and its importance in the local youth thus preparing for conservation in the future as well. We also hired local experts and school teachers to motivate and inspire students for fishing cat and their habitat conservation. We circulated our educational materials of posters and leaflets among the students and villagers. Subsequently we also highlighted the issues related to wildlife and the need for participatory management with local stakeholders for sustainable use of natural resources in order to conserve nature.

7. Discussion

About 13% of the 150 people surveyed have seen a fishing cat often enough (Fig-3) and this is quite surprising in human dominated landscape. Fishing cat occupancy model from questionnaire survey of fishing cat sightings in the last one month estimates the Proportion of Area occupied (POA) to be from 36% to 72% (Table-1) in the five districts surveyed in central Assam. Sonitpur that had the least threat intensity (Fig-4) to fishing cats also had the highest POA (mean 72%). Golaghat and Majuli with very high threats to fishing cats from hunting and conversion of water bodies (Fig-4) have significantly less POA (mean 36% and 42%) as anticipated (Table-1).

Through camera trapping, it is learnt that the Kaziranga NP in Assam holds future for fishing cat in the entire Brahmaputra floodplains given the encounter of the species in camera traps and individual identified. This is for the first time that several individuals of fishing cat has been identified in a source population using camera traps since the idea was floated by Cutter (2009). We have found that with systematic approach of camera trapping by targeting Fishing cat it should be possible to estimate its population using photographic capture recapture method.

We observed that the Kaziranga National park is certainly a source population of Fishing cat and all surrounding protected areas and forests can be populated by spill over populations from this park. Thus the river islands of the park may also hold fishing cats that would need further investigation. The study confirmed that fishing cat is widely distributed in the floodplains of the Assam which is difficult to encounter in the wild.

The conflict between the fishing cat and villagers were reported throughout the study area and retaliatory killing is a major concern for their conservation. Often fishing cat is considered vermin on domestic chicken and small sized animals. However, these conflicts are not verified to be Fishing cat at alone or some other carnivores. Even such incidents are not quantified yet due to lack of proper record keeping with concerned agencies.

It was observed that most of the wetlands that seem suitable habitat for fishing cat are also within human dominated landscape giving the cat little space to live. This often led to conflict with people living in and around the key wetlands. Further, tranquil environment to sustain for such a species has become a distant dream in most wetlands due to anthropogenic pressure.

Although, fishing cat seems observed by survey respondents in a number of locations in the surveyed area, it is unlikely that a viable population thrive in those. Rather, it might be stray occurrence or thinly occurring individuals from some suitable but impoverished habitats.

Since, anthropogenic pressure on wetlands and its resources are immense and ever increasing, without community support and well-designed protection and conservation approach, it may not be possible to raise viable population of fishing cats in most of the sites surveyed.

Further, Majuli, world's largest river island, located just east of Kaziranga National Park has a reasonably larger habitats remaining for fishing cats. The island may hold potential for community initiated conservation of fishing cat. The denizens of the island are also socially and culturally very rich and the traditional institutions called Satras can play an effective role. However, it will be pertinent to investigate the suitability of habitats and presence of fishing cat in this island in more detailed and systematic way in future.

Creating awareness among the stakeholders particularly those living close to the fishing cat populations is very important as most often they are killed as retaliation to the killing of domestic animals (small sized). Making that group of people understand that one can coexist with fishing cat and that is more necessary for a healthy ecosystem they live in, we shall achieve the goal of conservation of this species faster. However, this is a daunting task and most of the people facing conflict are not friendly to fishing cat or anything that cause damage to their domestic animals. Moreover, creating awareness among teachers and students will go a long way as young generation will hopefully participate in conservation in coming decades.

8. Recommendations

1. Understand ecology and dispersal of fishing cat in the central Assam region using population in Kaziranga NP as a source population.
2. Community initiated model for fishing cat survey and conservation in Majuli island involving the traditional institutions like Satras and other academic institutions.
3. Create awareness among forest staff and officials as well as other decision makers about conservation status and steps to be taken to conserve the species.
4. Aware and involve communities in and around most suitable habitats and also around source population.
5. Protect connectivity and corridors amongst the wetlands and habitats including the protected areas.
6. The information generated through this project could be taken as a baseline to prepare conservation action plan for fishing cat in Assam.
7. Long Term conservation and research work is highly recommended for detail understanding to develop an effective conservation plan.

9. References

Adhya, T. 2011. Status survey of Fishing Cat (Prionailurus viverrinus) in Howrah and Hooghly, West Bengal.Intermediate report submitted to the Small Grants Programme, WWF, India.

Ahmed, M. F., J. Borah and P. K. Sarma. 2009. Assessing the Potential of the Brahmaputra River Islands to Support Dispersing Tigers within the Central Assam, North East India. Technical Report_Aaranyak_TRCI_02/2009. p 45 + folded map.

Cutter, P. (2009). Camera Trapping and Conservation Status Assessment of Fishing Cats at Khao Sam Roi Yod National Park, Thailand and Surrounding Areas. Fishing Cat Research and Conservation Project Occasional Report #5, University of Minnesota, USA pp 1-10.

Delacour, J. (1940). List proviso ire des mammiferes se L'Indonechine Francaise. *Extrail de mammalia* 4 (1&2):1-22.

Duckworth J.W., C. R. Shepherd, G. Semiadi, P. Schauenberg, J. Sanderson, S.I. Roberton, T. G. O'Brien, T. Maddox, M. Linkie, J. Holden & N. W. Brickle (2009). Does the fishing cat inhabit Sumatra? *Cat News* 51: 4-9.

Duckworth J.W., T. Stones, R. Tizard, S. Watson & J. Wolstencroft (2010). Does the fishing cat inhabit Laos? *Cat News* 52: 4-7.

Datta A., M. O. Anand & R. Naniwadekar (2008). Empty forests: Large carnivore and prey abundance in Namdapha National Park, north-east India. *Biological Conservation* 141: 1429–435.

IUCN 2010. The IUCN Red List of Threatened Species. Version 2010.1. www.iucnredlist.org

Janardhanan, R., S. Mukherjee, P.V. Karunakaran & R. Athreya (2014). On the occurrence of the Fishing Cat *Prionailurus viverrinus* Bennet, 1833 (Carnivora: Felidae) in coastal Kerala, India. *Journal of Threatened Taxa* 6(3): 5569–5573.

Kolipaka S. (2006). Fishing Cat on India's East Coast. *Cat News* 44: 22.

Kumara, H.N. & M. Singh (2007). Small carnivores of Karnataka: distribution and sight records. *Journal of the Bombay Natural History Society* 104:155-162

Lekagul, B. & J. A. McNeely (1977). Mammals of Thailand. Association for the Conservation of Wildlife, Bangkok.

Mukherjee, S., J. Sanderson, W. Duckworth, R. Melisch, J. Khan, A. Wilting, S. Sunarto & J. C. Howard (2010). Prionailurus viverrinus. In IUCN 2011. IUCN Redlist of Threatened Species. Version 2011.2. www.iucnredlist.org. Downloaded on 26 April 2012.

Mukherjee S., T. Adhya, P. Thatte & U. Ramakrishnan (2012). Survey of the Fishing Cat *Prionailurus viverrinus* Bennett,1833 (Carnivora: Felidae) and some aspects impacting its conservation in India. *Journal of Threatened Taxa*, 4(14): 3355–3361.

Mukherjee, S., Appel, A., Duckworth, J.W., Sanderson, J., Dahal, S., Willcox, D.H.A., Herranz Muñoz, V., Malla, G., Ratnayaka, A., Kantimahanti, M., Thudugala, A., Thaung R. & Rahman, H. (2016). *Prionailurus viverrinus*. The IUCN Red List of Threatened Species 2016: e.T18150A50662615. http://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T18150A50662615.en. Downloaded on 02 June 2017.

Nowell K, & P. Jackson (1996). Status Survey and Conservation Action Plan Wild Cats. IUCN/SSC Cat Specialist Group. ISBN Z-8317-0045-0.

Prasad, S. N., T. V. Ramachandran, N. Ahalya, T. Sengupta, A. Alokumar, A. K. Tiwari, V. S. vijayan & L. Vijayan (2002). Conservation of wetlands of India-a review. *Tropical Ecology* 43:173-186.

Pocock R.I. (1939). The fauna of British India, Mammalia, I. Primates and Carnivora, 2d edn. London: Taylor and Francis.

Sunquist, M. E & F. C. Sunquist (2002). Wild Cats of the world University Chicago Press, Chicago, 452pp.

Sanderson J. (2009). How the fishing cat came to occur in Sumatra. Cat News 50: 6-9.

Royan A. (2009). Confirmation of the endangered fishing cat in the Botum-Sakor National Park Cambodia. *Cat News* 51:10-11.

U Tun Yin (1967). Wild Animals of Burma. Rangoon Gazette, Rangoon.

Annexure 1

Individual Fishing cats of Kaziranga NP, 2014 [Plate 1]

KZFC_01

KZFC_02

KZFC_03

KZFC_04

Individual Fishing cats of Kaziranga NP, 2014 [Plate 2]

KZFC_05

KZFC_06

KZFC_07

KZFC_08

Individual Fishing cats of Kaziranga NP, 2014 [Plate 3]

KZFC_09

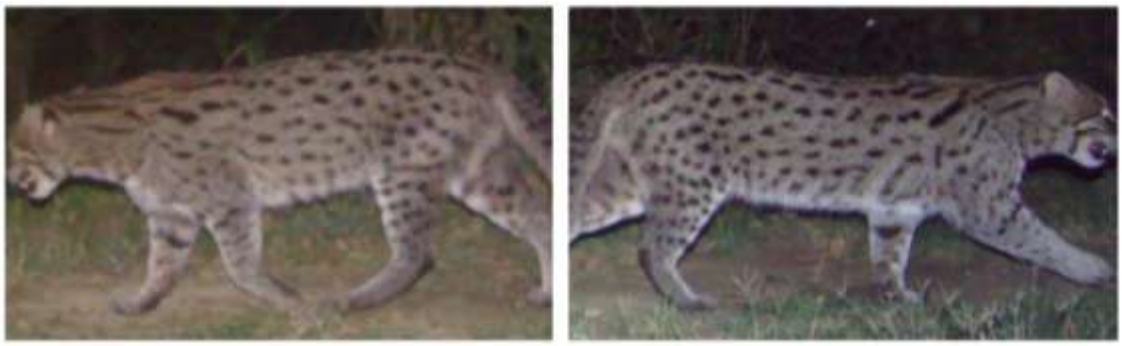
KZFC_10

KZFC_11

KZFC_12

Individual Fishing cats of Kaziranga NP, 2014 [Plate 4]

KZFC_13



Annexure 2: Awareness camps on fishing cat Conservation with number of audience reached.

Sl. No.	District	Venue	Collaboration	Participants	Activities
1	Morigaon	Dumal Telahi Ancholic M.E. School, Dumal Telahigaon		100	Audio visual talk show and Quiz
2	Biswanath	Bedeti	Pub Bihali Higher secondary School, Lakhiminath Bezbaruah M.E. School, Bimaa Adarsha M.E. School, Milan M.E School, K.C. Das Memorial English High School	50	Audio visual talk show and Quiz
3	Biswanath	Borgang High School	Rajgarah Eco-development Society	800	Audio visual talk show and Quiz
4	Sonitpur	Lutheran High Bamunu hills, Tezpur		50	Audio visual talk show and Quiz
5	Nagaon	Udmari High School, Udmari	Green Guard Nature, a local NGO	350	Audio visual talk show and Quiz
6	Nagaon	Jay Narayan H.S School, Gorajan, Laokhuwa	Laokhuwa Burachapori Conservation Society, Nagaon Wildlife Division, Dept. of Environment and Forest, Govt. of Assam	400	Audio visual talk show and Quiz
7	Golaghat	Geleki Gukhanibor L.P. School, Kaziranga	Swapan Nath, Sr. Journalist Kaziranga	80	Audio visual talk show and Quiz
8	Golaghat	Gulung Pathori High School	Mr. Evan Loying, Local young Naturalist	150	Audio visual talk show and Quiz
9	Golaghat	Binapani M.E. School, Rongagora		150	Audio visual talk show and Quiz
Sl.	**District**	**Venue**	**Collaboration**	**Particip**	**Activities**

No.				ants	
10	Golaghat	Gormur High School, Bokakhat		400	Audio visual talk show, interaction and Quiz
11	Jorhat	Samoguri Satra Rawnapara High School, Majuli	Superintend of Police, Majuli	600	Audio visual talk show, Quiz and interaction
12	Jorhat	Auni-aati High School, Majuli		100	Audio visual talk show and Quiz
13	Jorhat	Pitambar Deve Goswami College, Gormur, Majuli		100	Audio visual talk show, and Quiz
14	Biswanath	Subilal Upadhay Smriti H.S School, Ciwaripal	Upatakya, local NGO	250	Audio visual talk show and Quiz
15	Jorhat	School		65	Talk show and interaction
16	Jorhat	Aauni-aati Hemchandra H.S School Majuli		80	Audio visual talk show and Quiz

Annexure 3:

Field activity Photographs

A typical Habitat of Fishing cat: a wetland inside Kaziranga National Park, Assam

Habitat of Fishing cat: another wetland

Interviewing respondents about the occurrence of fishing cat and their threats

Interviewing respondents about the occurrence of fishing cat and their threats

Fishing act survey team with the district police authority in Majuli

Interview taken by fishing cat survey team in Nagaon district

Discussion with cultural and religious institution heads in Majuli regarding Fishing cat and its conservation.

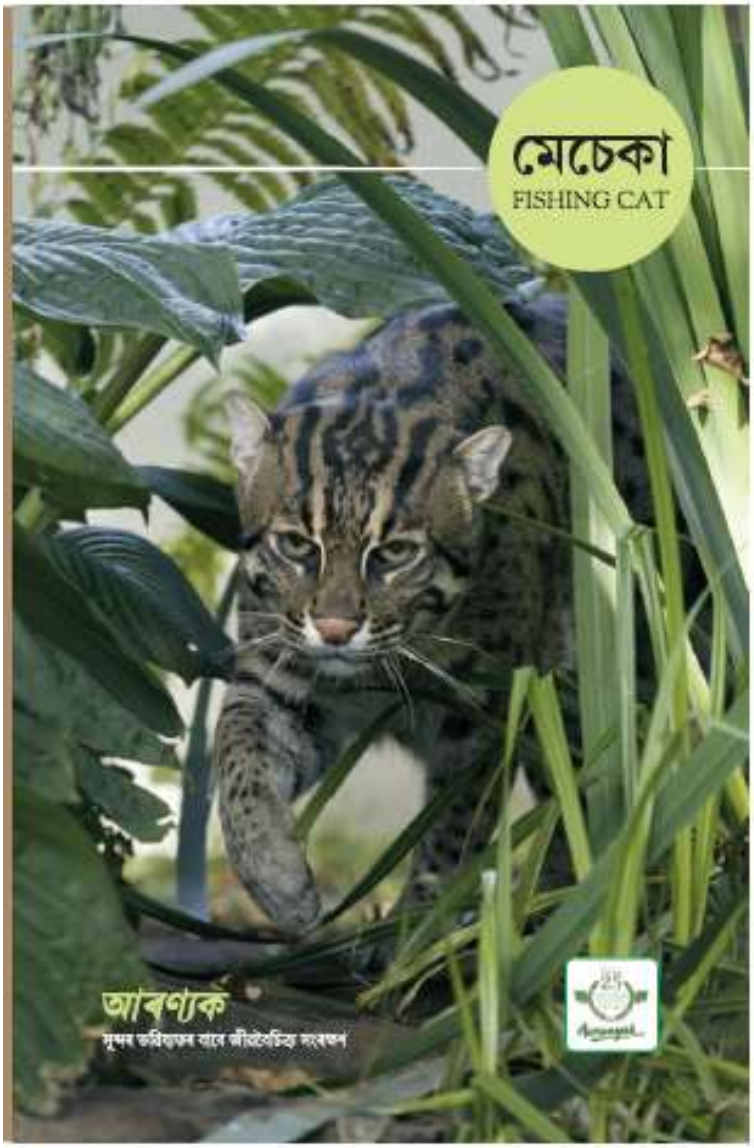
Creating awareness about Fishing cat among communities.

A random discussion and knowledge sharing about Fishing cat with villagers.

Catching them Young: Children from an awareness event.

Annexure-4: **Published materials for awareness and education**

A poster in Assamese language was printed and distributed among the target audiences.



A four-fold leaflet in Assamese was produced with detailed account about Fishing Cat and distributed among stakeholders to create awareness.

Life size model was used for education purpose.

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