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Caption: *Cyrtodactylus myntkyawthurai*, endemic to Myanmar. Medium: Water colours on watercolor sheet. © Aakanksha Komanduri



## METHODS

### Study area

Ratnagiri is a district situated on the western coast of Maharashtra, having nine talukas (townships). Being open to the sea, it has a large population dependent on fishing for their livelihood. Our selected field site for research on otters is Anjarle (17.846N & 73.087E) (Image 2), a small village situated in Dapoli Taluka. It is more significant for wildlife than other talukas, as the Anjarle beach is a nesting site for Olive Ridley Sea Turtles *Lepidochelys olivacea* (Image 3). Every year, tourists flock to see the hatchlings going into the sea.

Part of the local population is aware of the otters and their whereabouts; however, knowledge of otters is scarce amongst the general population in India, and the villagers and tourists coming to Anjarle are no different.

Scat surveys have become the method of choice to monitor species distribution, population trends, and habitat use (Sittenthaler et al. 2020). The total length of the Jog River, about 33.3 km, and the Aade River, about 10.62 km, was digitized using Google Earth and QGIS; 2.5 km survey grids were placed on the river.

In each grid, a transect was done; in each transect was of 50 × 250 m (left and right bank of the river) was used. Six survey replicates were conducted in each grid (Mason & Macdonald 2009; Borker 2014).

Surveys were carried out from February to June 2020, as the summer season is the best time to survey otters, as sightings and otter signs are easier to detect. During transect surveys, otter signs (pugmarks, grooming sites, holts/dens) were recorded. GPS essentials were used to mark the latitude and longitude of any otter sign. Plots with otter signs were considered as 'used plot' and plots adjacent to that (upstream and downstream) were termed 'available plot' (this is done to reduce the dependency of plot use).

A plot was only considered a 'new plot' if otter signs are present, and there was a 5 m or more distance between the new and old otter signs. Camera trapping was used to record species identification (Image 5, 7; Video 1), but mostly focused on otter activity and group size (Mudappa et al. 2012; Khan et al. 2014; Prakash et al. 2014).

### Identifying the current status of otters

Threats faced by otters were visually identified and recorded during the surveys. These threats were taken into account during the analysis, which acted as covariates to measure impact on distribution.



Image 1. Aerial photograph of a Smooth-Coated Otter in Anjarle



Image 2. Field shot of Anjarle.



Image 3. Female Olive Ridley Sea Turtle *Lepidochelys olivacea* returning to sea after laying eggs at the field site in Anjarle.

### Data analysis

It was assumed (Foster-Turley 1992; Barrios 2020) that otters in human-modified areas would be nocturnal or crepuscular, and that this would create difficulty in using direct observation to estimate occupancy. As a

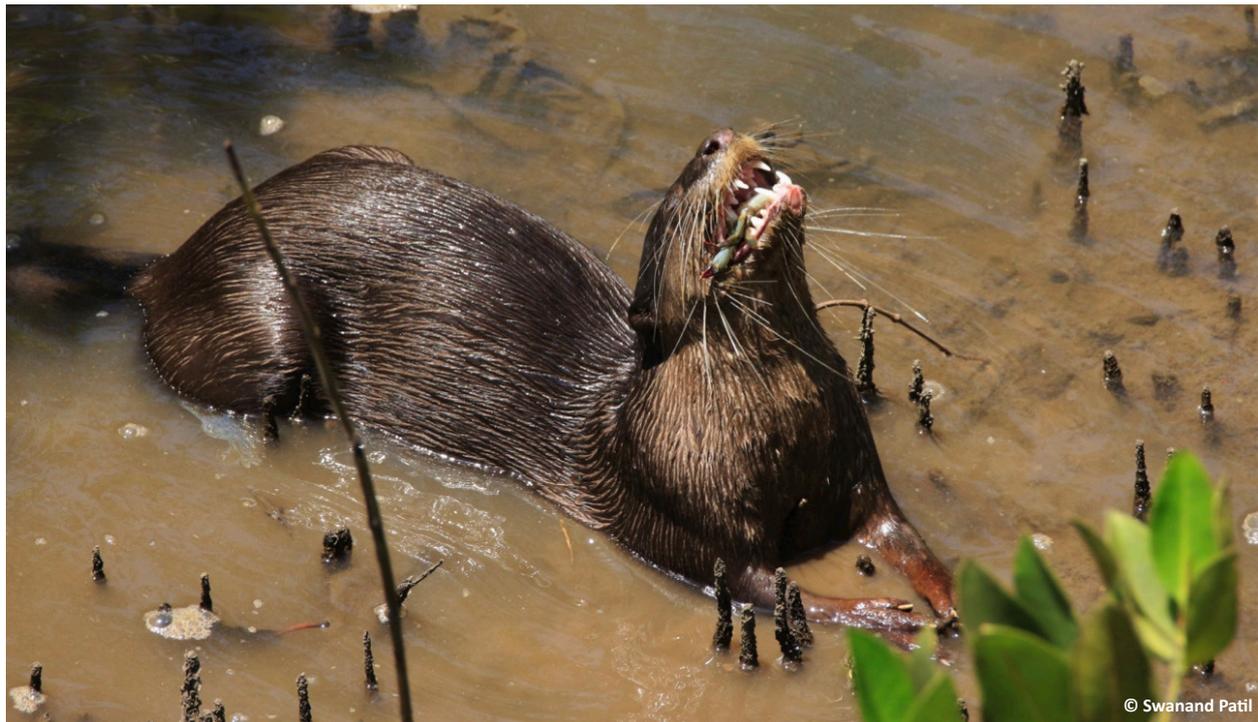


Image 4. Smooth-coated Otter feasting on a mud crab (Kirva).

result, distribution and frequency of spraint and tracks (indirect signs) were used. To estimate the percentage of area occupied by otters, we used principal component analysis (PCA) coupled with logistic regression with forward stepwise analysis. Scores of those were considered as the percentage of occurrence of otters.

## RESULTS

The estimated length of the Jog River surveyed is about 33.3 km starting from Sondeghar, flowing to Matwan to Sakurde to Bandhativare to Sarang to Tadil to Kongale to Murdi, and ending into Anjarle (Arabian Sea) on the western Coast of Maharashtra, India. The estimated proportion of the length of Jog River occupied by Smooth-coated Otters was 76.2% based on our sign survey as shown in Figure 1.

The estimated length of the Aade River surveyed is about 10.6 km starting from Aade to Adekond to Lonvadi to Borthal dam. The estimated proportion of the length of Aade River occupied by Smooth-coated Otters was 47.6% based on our sign survey as shown in Figure 2.

### Threats to the Otter population

**Habitat loss:** For otters, the requirement to breed, rest, and defecate is vital. In our study area, these roles are carried out within the mangrove forests. Places like sandbanks, soil, or even leaf litter act as grooming and

defecation areas for otters along the river banks. Such areas are in decline owing to illegal sand mining and increasing conversion of wetlands into agricultural areas (Image 6).

Sand mining poses a direct threat to habitat of many species, as uncontrolled extraction of benthic sand from rivers (Image 6) and from riverbanks leads to an increase in water depth, loss of prey base, and habitat degradation and loss. Some stretches of the rivers are completely degraded because of sand mining.

### Otter-fisherman competition

In certain areas with high fish resources, high fishing activity and high otter activity have been observed, showing a positive correlation of 0.663 with otter presence (Table 1).

These are potential otter conservation zones, but measures need to be taken to ensure fishermen who are dependent on the particular zone are provided with some alternative, or that sustainable methods that allow otters to coexist are adopted

## DISCUSSION

Otters are widely distributed in Anjarle and Adekond, and a survey of spraints using standard methodology gives a reliable picture of otter distributions. According to informal interviews, food-rich zones are prime areas for

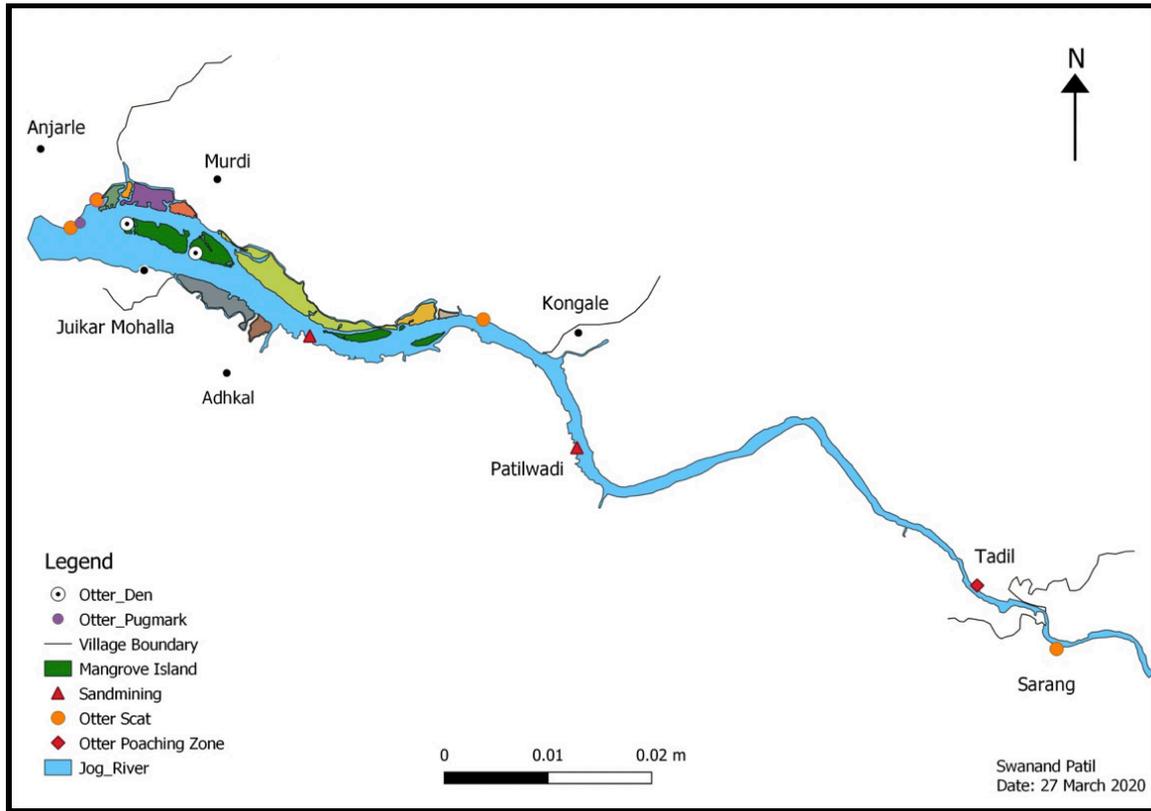


Figure 1. Map showing Smooth-coated Otter distribution in Jog River, Anjarle.

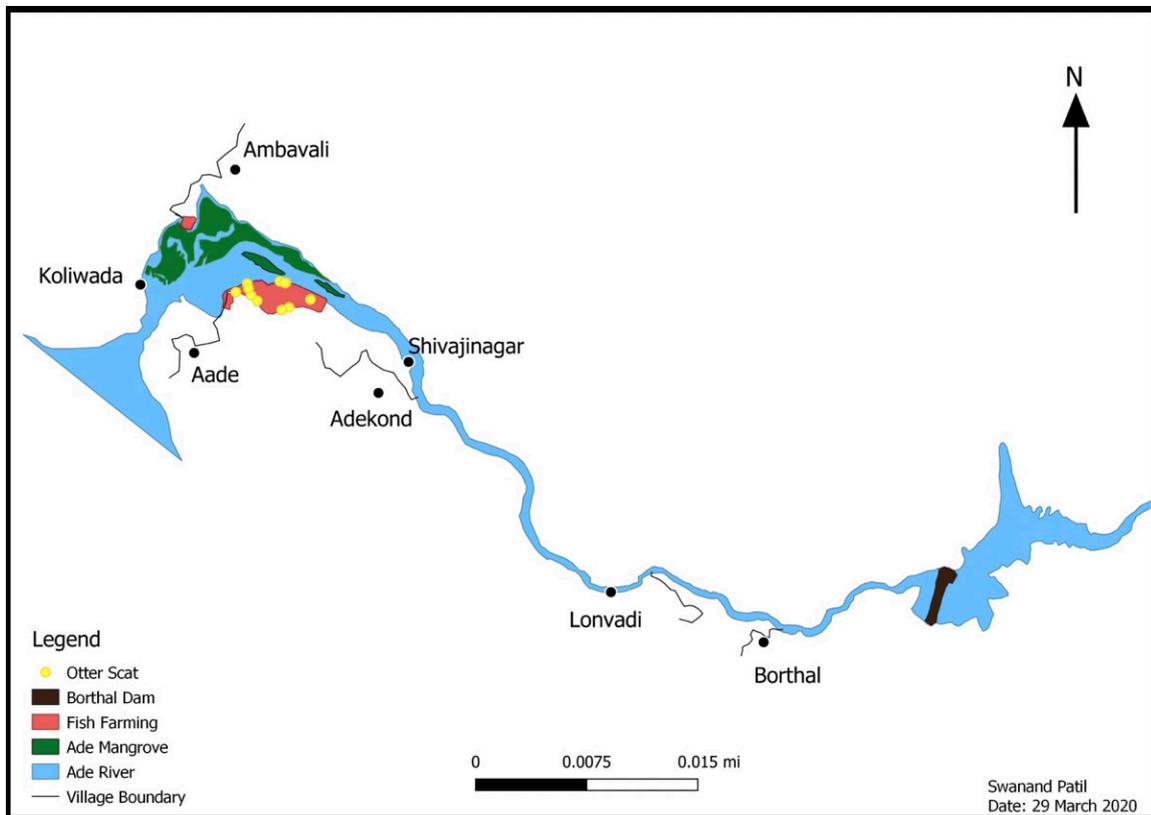


Figure 2. Map showing Smooth-coated Otter distribution in Aade River, Aade.



Image 5. Camera trap image showing otters in Anjarle.



Image 6. Extensive sand mining at the field site.



Image 7. Video snapshot of romp of Smooth-coated Otters.

Table 1. Table showing positive correlation of 0.663 between otter and fishing activity,

Correlations			
		Fishing activity	Otter sign
Fishing_Activity	Pearson Correlation	1	.663**
	Sig. (2-tailed)		.000
	N	54	54
Otter_Sign	Pearson Correlation	.663**	1
	Sig. (2-tailed)	.000	
	N	54	54

\*\* . Correlation is significant at the 0.01 level (2-tailed).

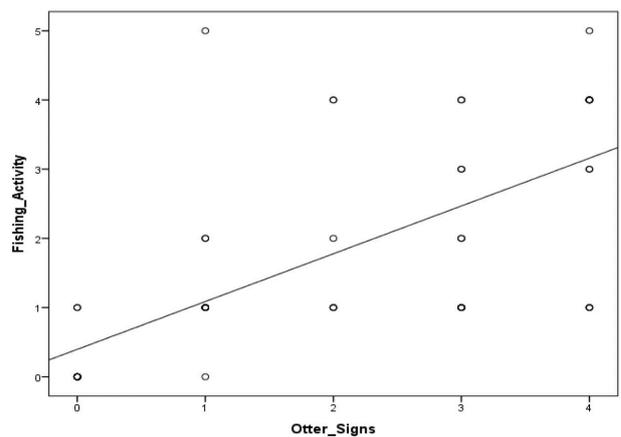


Figure 3. Plot of fishing intensity v/s otter signs.



Image 8. Fresh otter scat/ defecation area.



Image 9. Kataris from local community showing otter dens.

otter-fisherman interactions (Figure 3). During informal interviews within the village community, a person had killed an otter using stones and wooden logs, as his only source of income was harvesting mud crabs and fishing. Such instances are rare, but help us understand the attitude of small-scale fishermen towards otters. Due to habitat fragmentation and degradation, unsustainable fishing practices and lack of awareness are such parameters responsible for the decline in the population of Smooth-coated Otters. There is limited or no data on otter research and conservation within the forest department.

According to otter surveys conducted, a considerable amount of otter distribution lies outside the protected area, which emphasizes the need for integrating the management of human-modified land with the

management of protected areas (DeFries et al. 2010).

## CONCLUSION

Though this is a preliminary study, baseline data was created to guide future otter conservation efforts in Ratnagiri, facilitated by Arcane Conservancy, an NGO for long-term research and conservation to improve the protection of otters.

## REFERENCES

- Barrios, O. (2020).** Approach to a qualitative methodology for the search and direct detection of the Neotropical Otter (*Lontra longicaudis* Olfers, 1818). *IUCN Otter Specialist Group Bulletin* 37: 140–146.
- Borker, A. (2014).** Conservation of otter habitats through stakeholder participation [WWW Document]. Conservation Leadership Programme. <http://www.conservationleadershipprogramme.org/project/otters-go-india/> (accessed 8.20.19).
- DeFries, R., K.K. Karanth & S. Pareeth (2010).** Interactions between protected areas and their surroundings in human-dominated tropical landscapes. *Biological Conservation* 143: 2870–2880. <https://doi.org/10.1016/j.biocon.2010.02.010>
- Foster-Turley, P. (1992).** Conservation Aspects of the Ecology of Asian Small-Clawed and Smooth Otters on the Malay Peninsulas [WWW Document]. URL [https://www.iucnosgbull.org/Volume7/Foster\\_Turley\\_1992.html](https://www.iucnosgbull.org/Volume7/Foster_Turley_1992.html) (accessed 8.20.19).
- Khan, M.S., N.K. Dimri, A. Nawab, O. Ilyas & P. Gautam (2014).** Habitat use pattern and conservation status of smooth-coated otters *Lutrogale perspicillata* in the Upper Ganges Basin, India. *Animal Biodiversity and Conservation* 31(1): 69–76. <https://doi.org/10.32800/abc.2014.37.0069>
- Mason, C.F. & S.M. Macdonald (1987).** The use of spraints for surveying Otter *Lutra lutra* populations: an evaluation. *Biological Conservation* 41: 167–177. [https://doi.org/10.1016/0006-3207\(87\)90100-5](https://doi.org/10.1016/0006-3207(87)90100-5)
- Mason, C.F. & S.M. Macdonald (2009).** *Otters: Ecology and Conservation*. Cambridge University Press, 248 pp.
- Mudappa, D., A. Kumar & N. Prakash (2012).** Conservation of the Asian Small-Clawed Otter (*Aonyx cinereus*) in human-modified landscapes, Western Ghats, India. *Tropical Conservation Science* 5: 67–78. <https://doi.org/10.1177/194008291200500107>
- Prakash, N., A. Perinchery & R.R. Nayak (2014).** Monitoring Otter Populations and Combating Poaching Through Stakeholder Participation in India (Final Report). Conservation Leadership Programme, 31 pp.
- Sittenthaler, M., E.M. Schöll, C. Leeb, E. Haring, R. Parz-Gollner & K. Hackländer (2020).** Marking behaviour and census of Eurasian Otters (*Lutra lutra*) in riverine habitats: what can scat abundances and non-invasive genetic sampling tell us about Otter numbers? *Mammal Research* 65: 191–202. <https://doi.org/10.1007/s13364-020-00486-y>
- Wilson, G.J. & R.J. Delahay (2001).** A review of methods to estimate the abundance of terrestrial carnivores using field signs and observation. *Wildlife Research* 28(2): 151–164. <https://doi.org/10.1071/WR00033>

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