

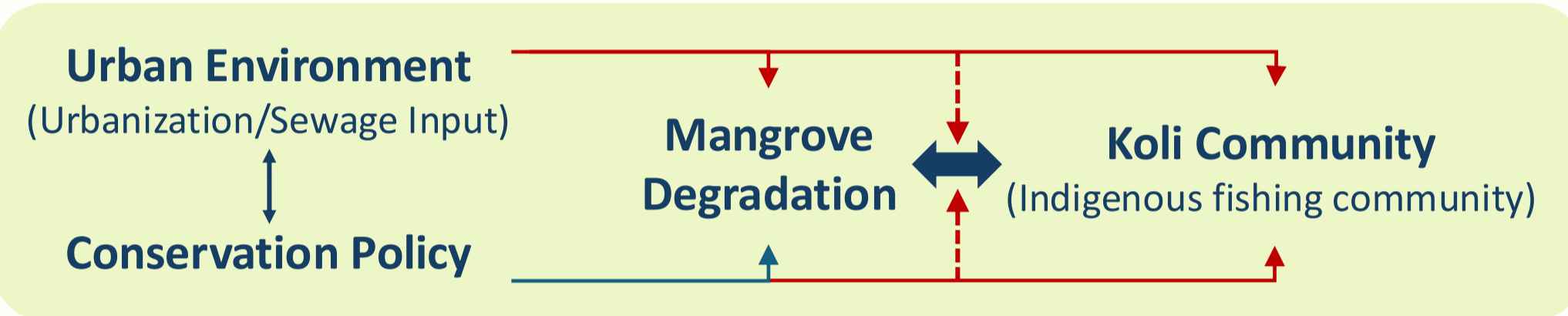
# Mangrove Degradation in a Megacity: Linking Tree-Ring $\delta^{15}\text{N}$ with Local Ecological Perceptions in Mumbai



## Understand mangrove degradation by combining ecological data and local knowledge

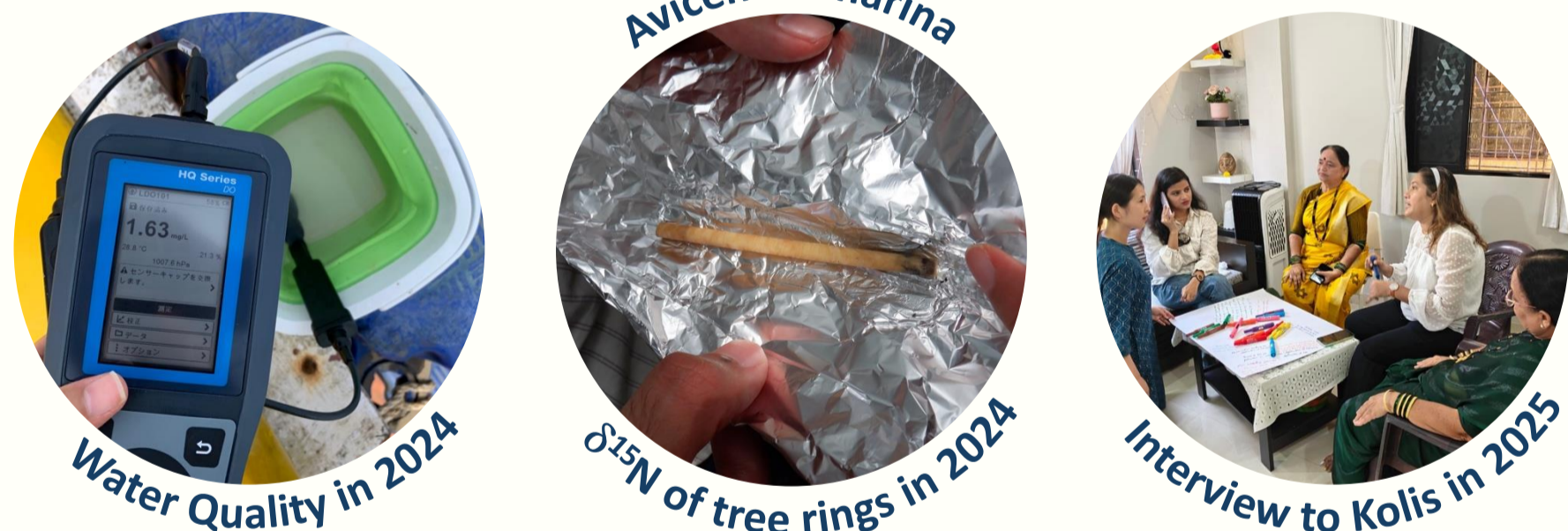
In megacities like Mumbai:

Urbanization is accelerating mangrove degradation and reshaping conservation policies, leading to the marginalization of the Koli community and their disconnection from mangroves.



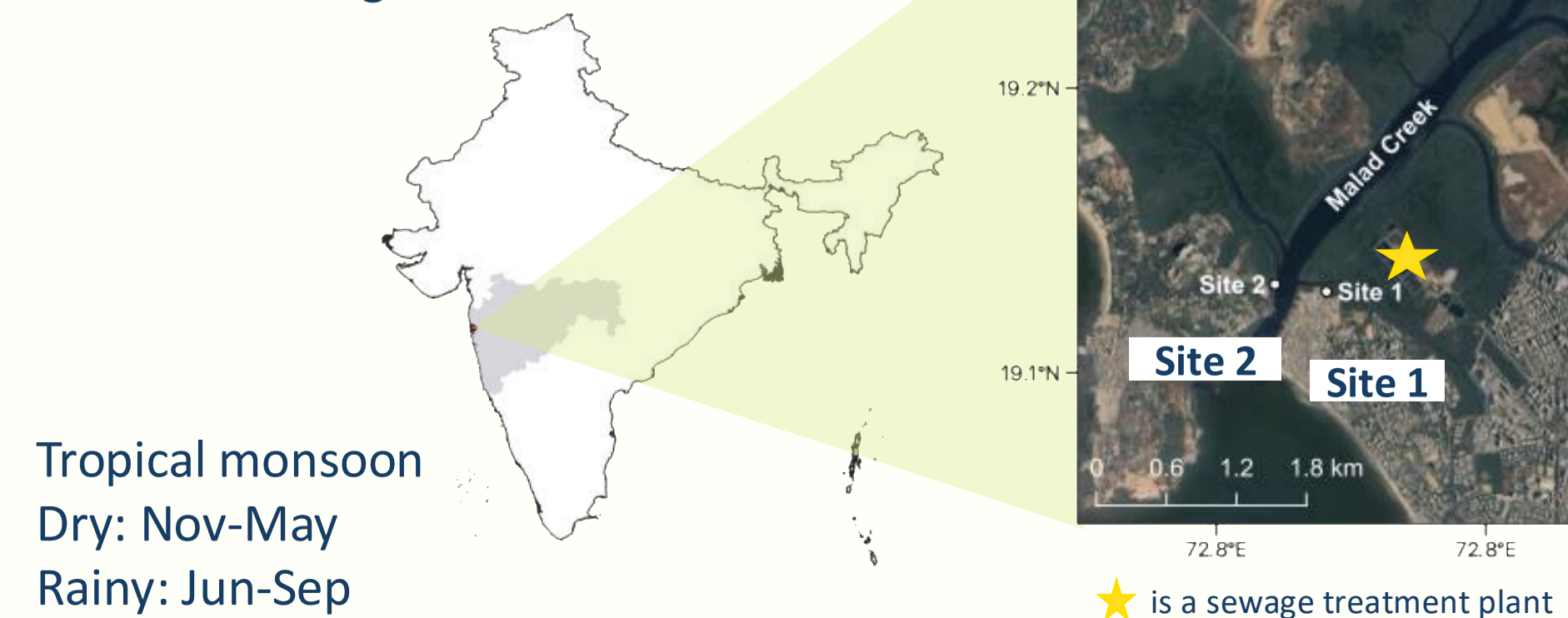
## What is missed when mangrove condition is assessed without local ecological knowledge?

Examined mangrove degradation from both environmental and social perspectives.



## Mumbai

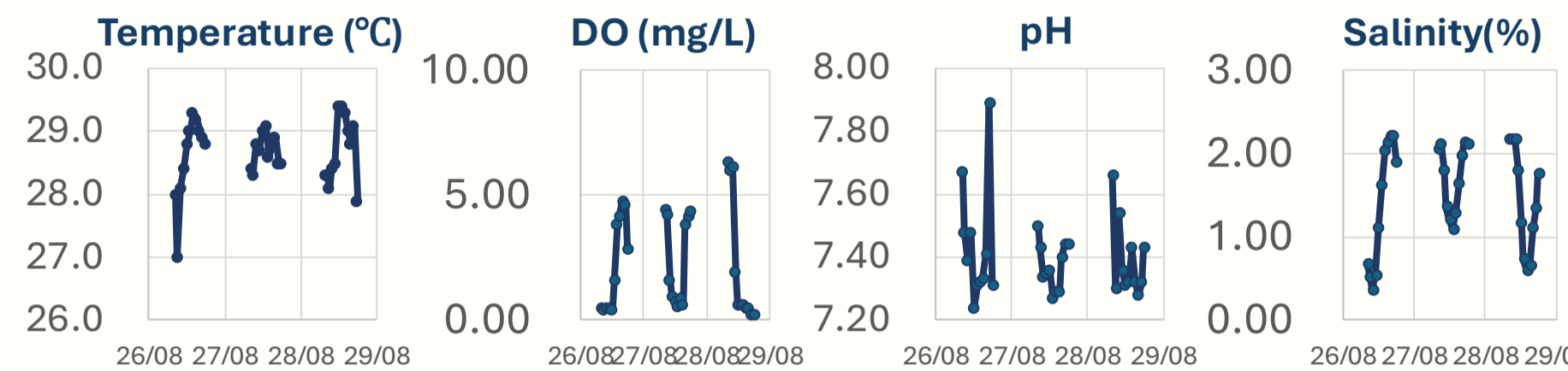
- India's financial and commercial center
- More than 20 million people
- Mangrove area: 59.92 km<sup>2</sup>  
→accounting for one-tenth of Mumbai



## RESULTS

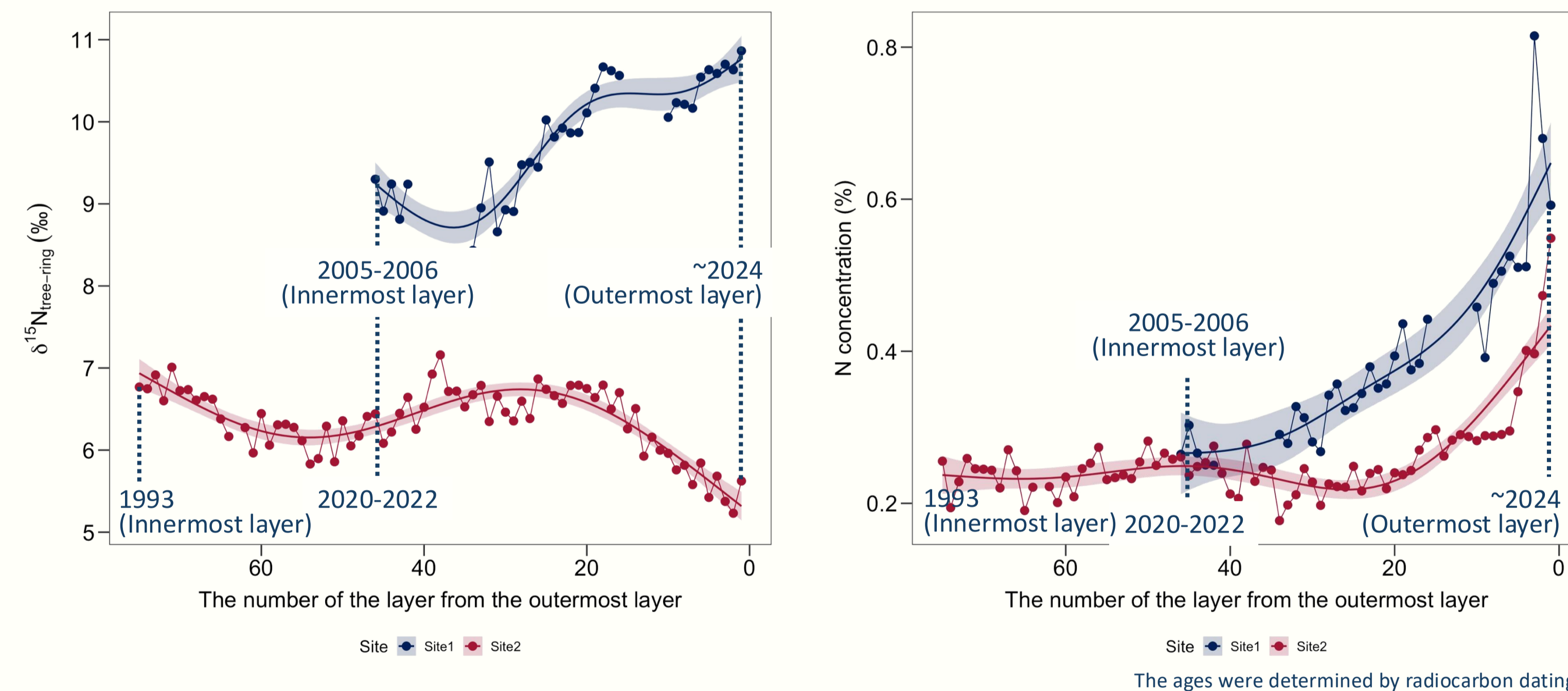
### Water Quality

BOD exceeded 40mg/L and NH<sub>4</sub>-N exceeded 4.0 mg/L at low tide, both decreasing during high tide. The creek is a tidally dynamic but chronically polluted system, strongly influenced by continuous sewage inputs.



### $\delta^{15}\text{N}$ of mangrove tree rings

- Avicennia marina's* tree-ring  $\delta^{15}\text{N}$  records long-term anthropogenic nitrogen inputs
- Urban site (Site 1): increasing  $\delta^{15}\text{N}$  → strong sewage influence (near the sewage treatment plant)
- Semi-urban site (Site 2): decreasing  $\delta^{15}\text{N}$  → atmospheric N (NH<sub>3</sub>-derived) + tidal mixing (Choi et al., 2023)



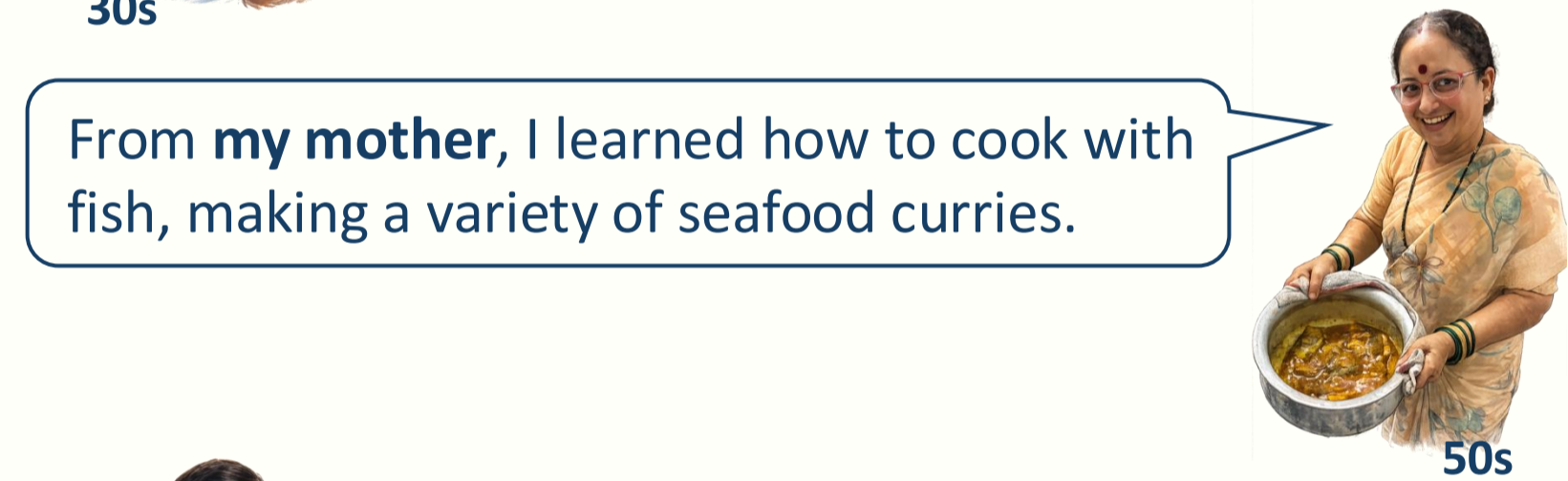
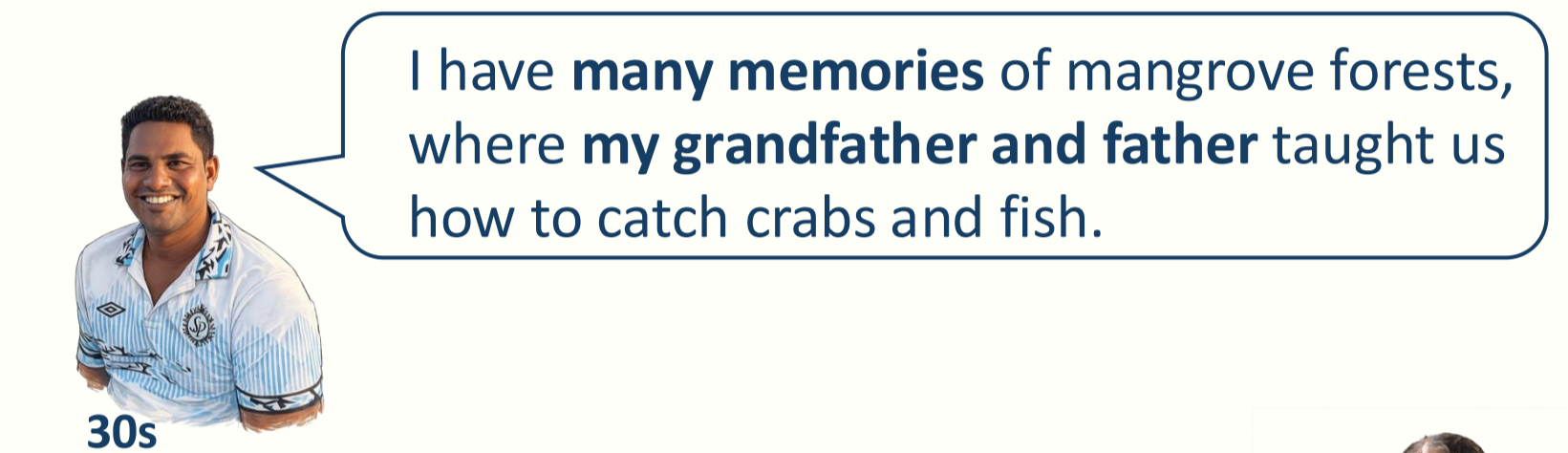
### Interview to Kolis

Local knowledge captures gradual changes in water quality and fisheries that align with ecological evidence but are often missed by conventional assessments (mangrove covered area).



Without local ecological knowledge, long-term environmental degradation, its underlying drivers, and the lived impacts on local communities remain overlooked.

Mangrove degradation in urban coastal areas is socio-ecological process, but urbanization is eroding the human-mangrove relationship needed for conservation.



## Future Questions

- What is the future value of mangrove forests under accelerating urbanization?
- How can indigenous livelihoods be sustained amid environmental degradation and social transformations?
- Who will lead the future of human-mangrove coexistence?

uruma.karin.86j@kyoto-u.ac.jp

<sup>1</sup>Graduate school of Informatics, Kyoto University  
<sup>2</sup>Institute of Development Studies

This research was conducted with permission from the Maharashtra Forest Department (Mangrove Cell)

