Innovations to address the Health and Livelihood challenges of Coastal Communities

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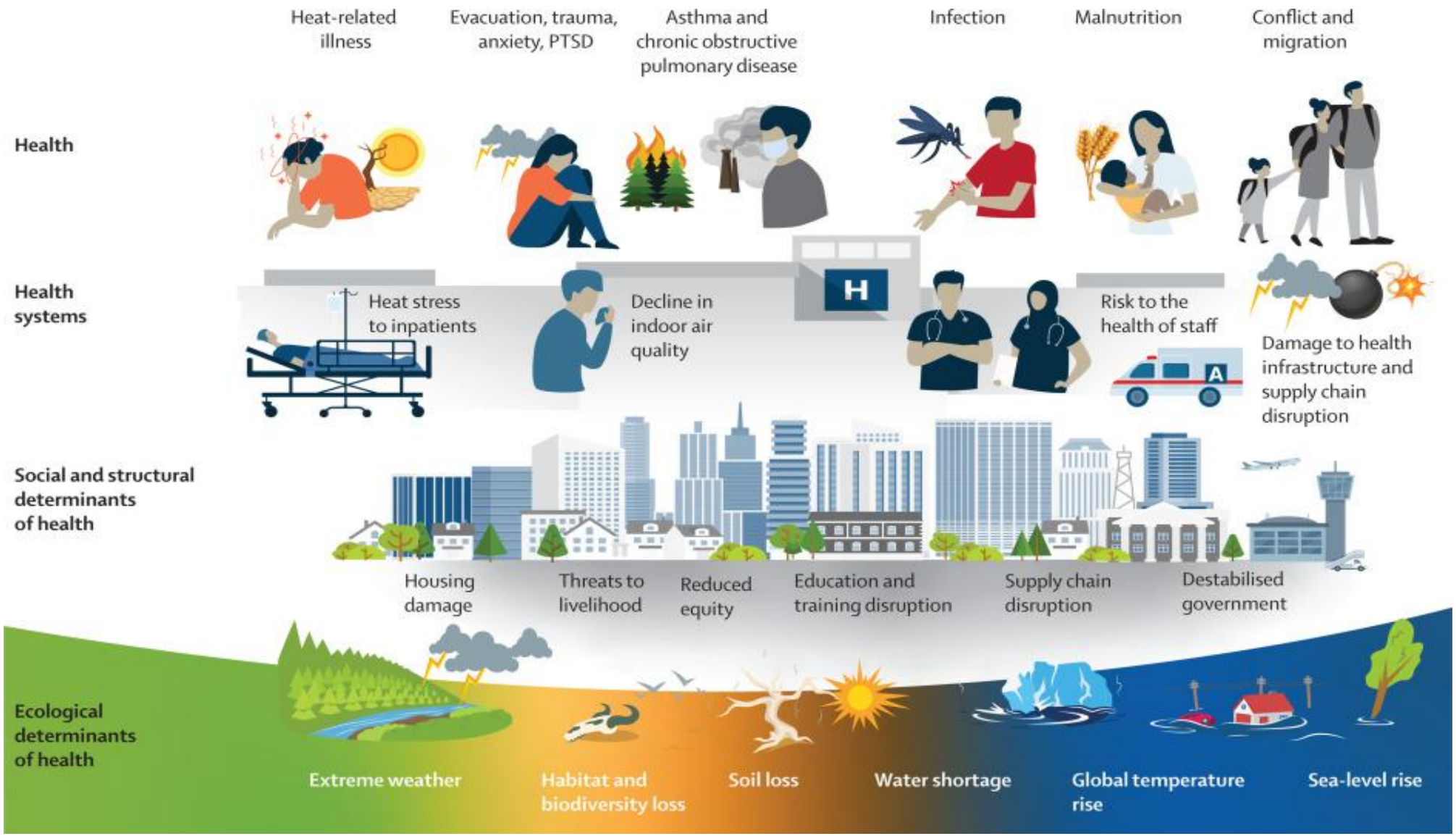
Climate change-related impacts on health and health systems



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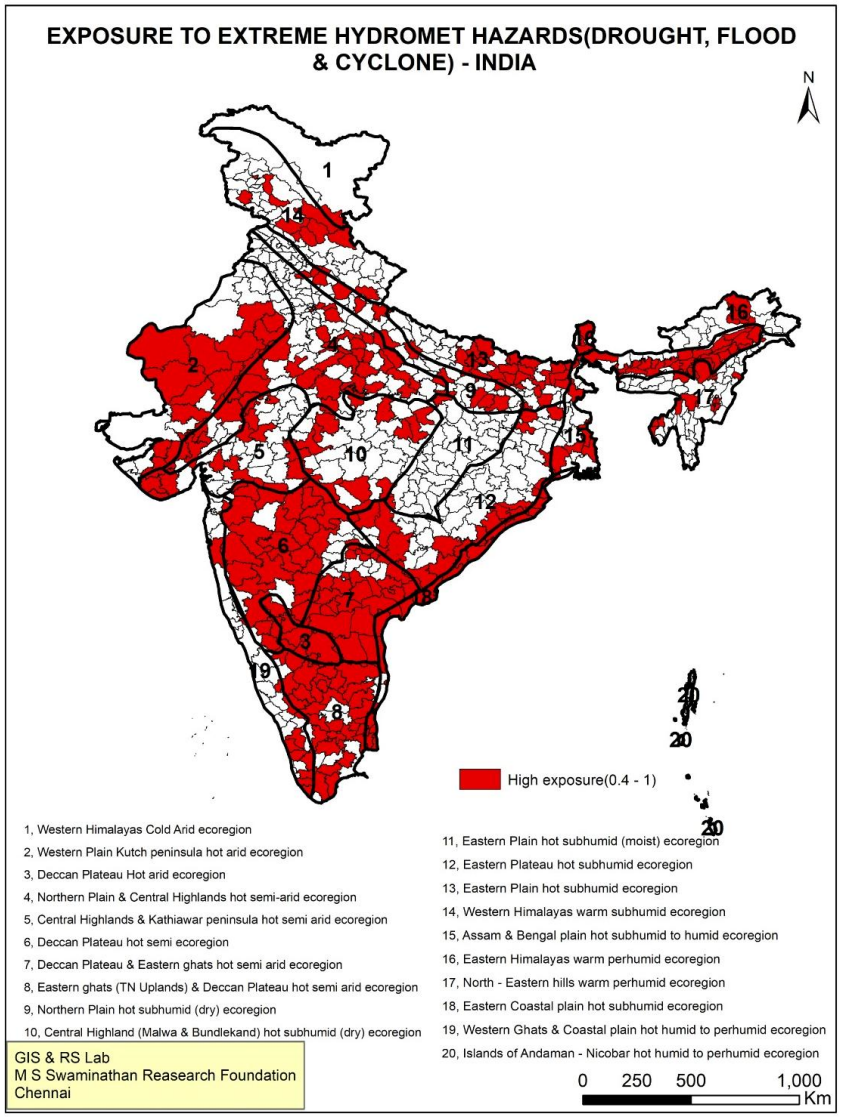
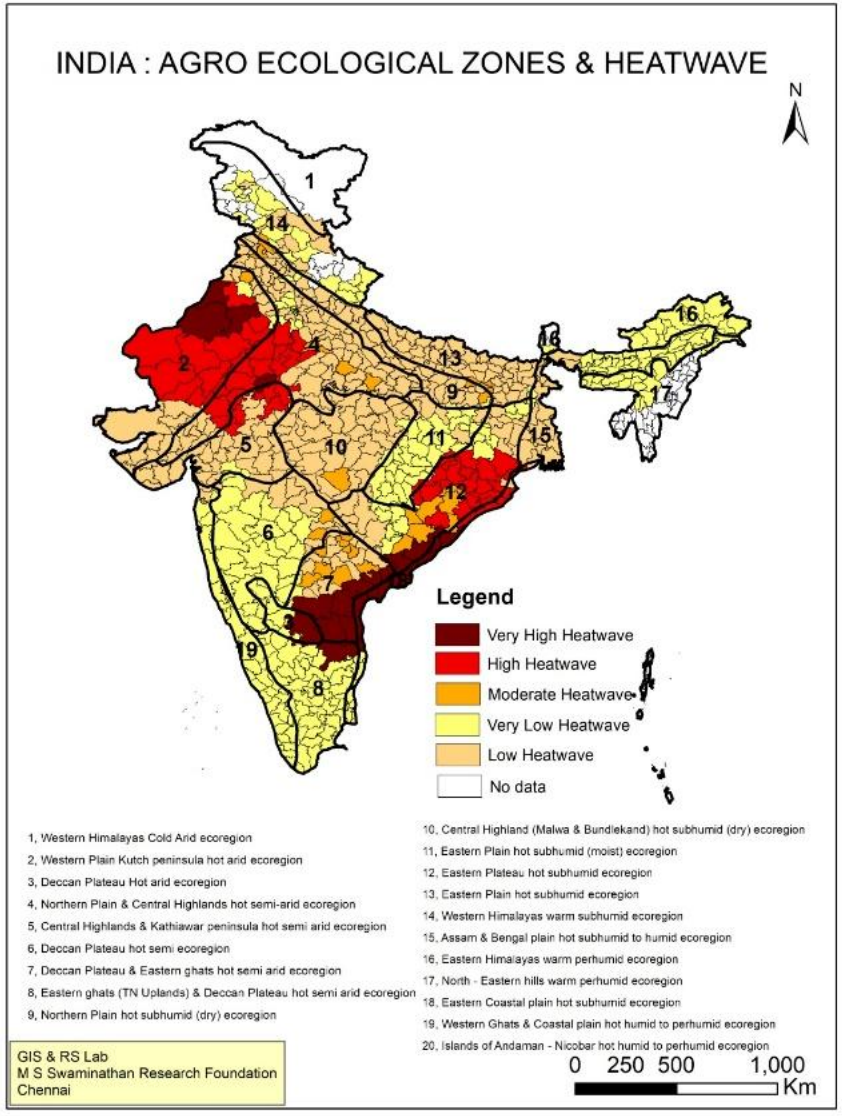
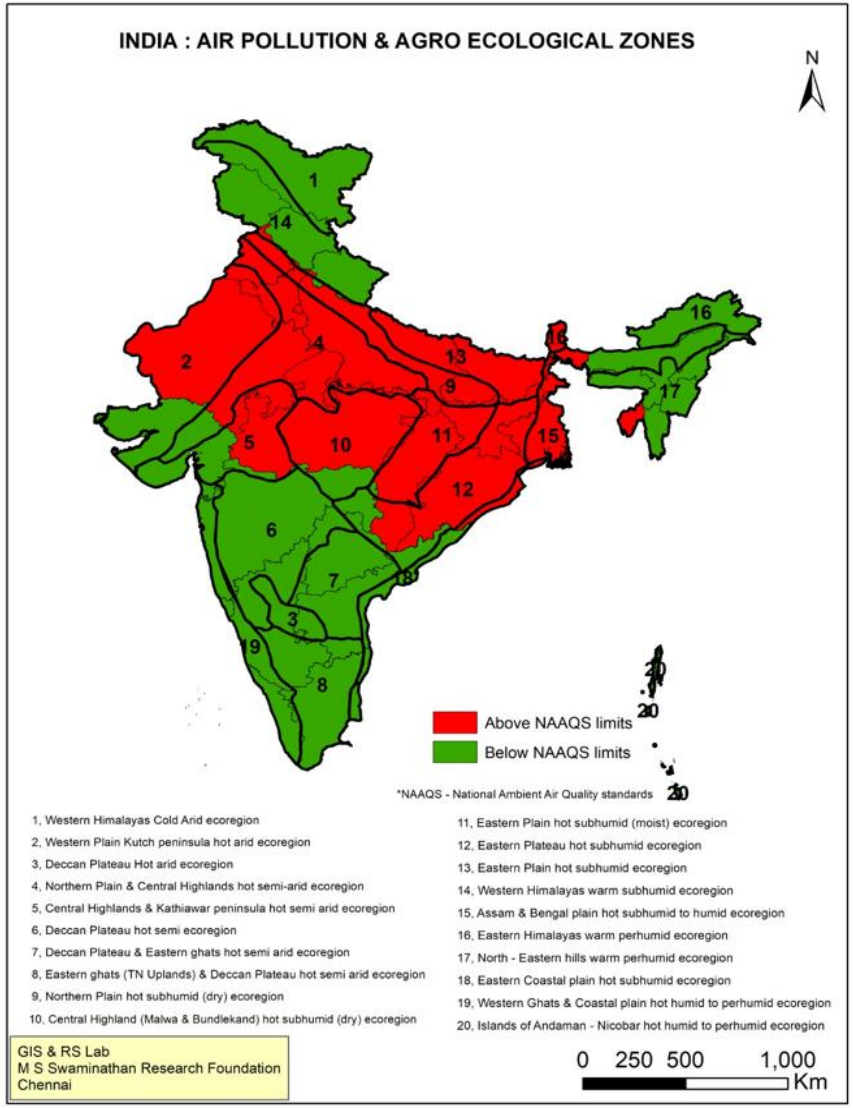


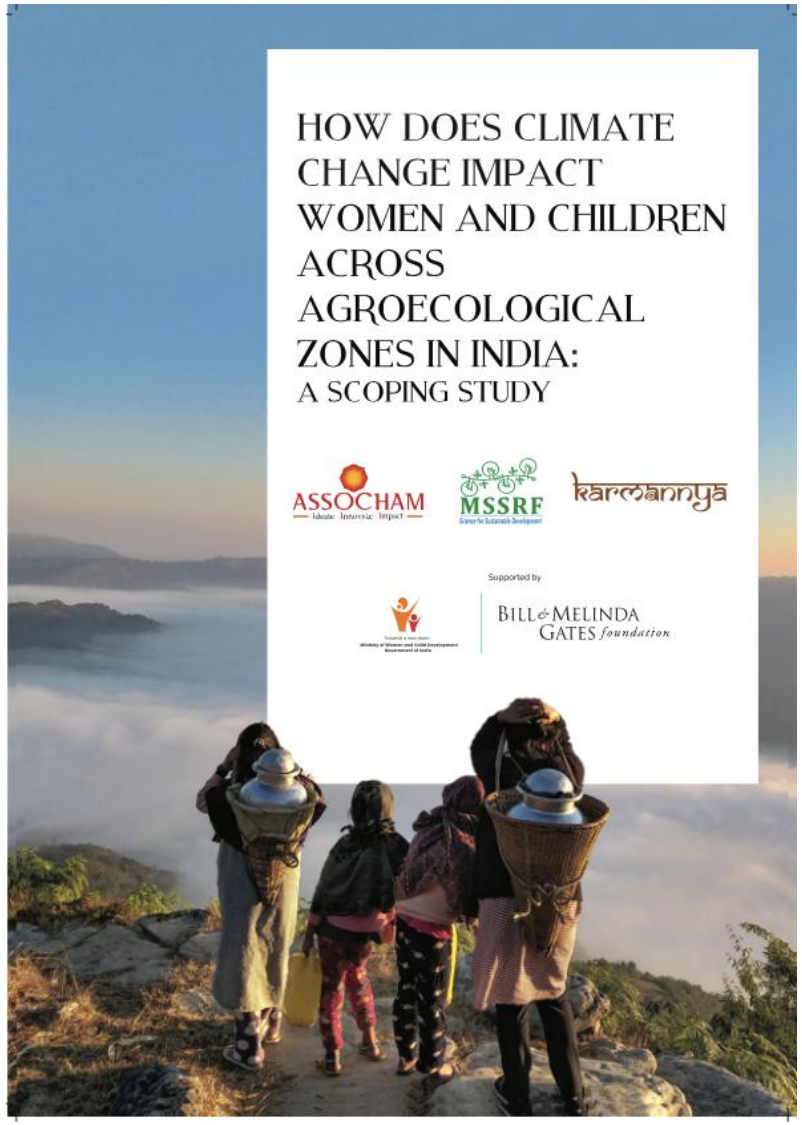




- **75%** of Indian districts are extreme hydro-met event hotspots
- **17 out of 20 people** in India are vulnerable to extreme hydro-met disasters

- Rajasthan (15 districts) & Andhra Pradesh (13 districts) – the most vulnerable states for heat waves (MoES, 2023).

- PM 2.5 prevalence **exceeds the National Ambient Air Quality Standards** (>40 µg/m^3 annual averages) in the entire northern and central belts of India.



Key Findings

- Pregnant women experience disproportionately higher health risks from the impacts of prolonged heat exposure and air pollution
- A direct correlation between natural disasters and gender-based violence was observed
- Livelihoods especially of rural, agricultural women are increasingly being threatened.
- Children's health and education severely impacted
- Scope for innovations at the personal, household and community level to prevent or reduce climate change impacts on health & wellbeing
- Need more Research, Data frameworks
- Report provides recommendations for policy makers, academics and NGOs
- Decentralized planning, financing, empower panchayats and local urban bodies with tools and resources

MSSRF's Survey On The Health Impacts Of Heat On Women

- Women from the **poorest wealth quintile** reported significantly higher heat-related health impacts across physical, reproductive, menstrual, and mental health domains.
- **Women belonging to SC communities** reported the highest prevalence of heat-related health impacts across all domains, including general physical health **(73%),** reproductive health **(58%)**, menstrual health **(44%)**, and mental health **(76%)**.
- Nearly all respondents (**97%**) reported **wage losses exceeding ₹1,500** over the time period of April-June (peak summer months).

Heat Doesn't Affect All Women Equally

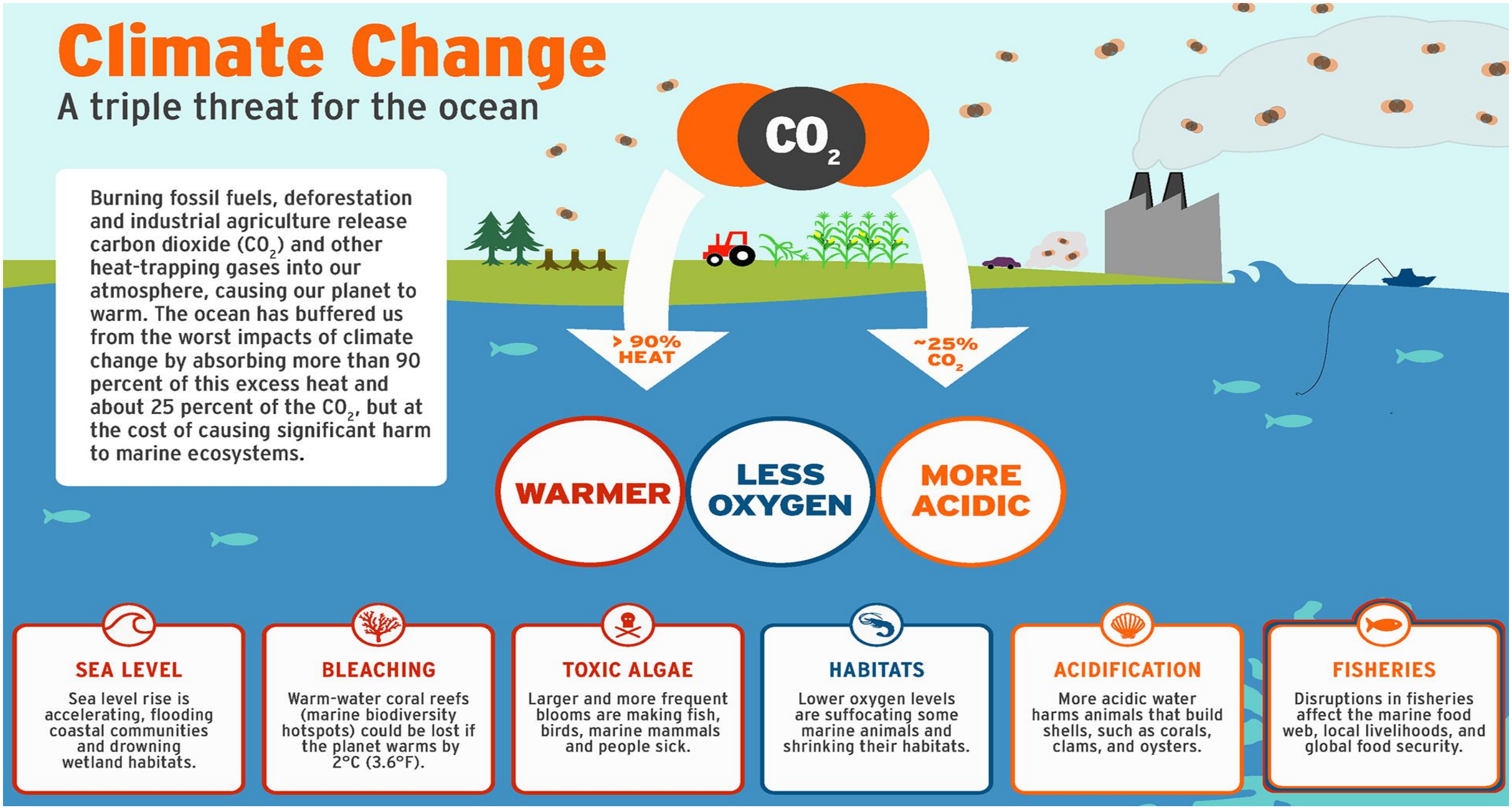
Mental Health, Relationships & Domestic Violence

- Women reported **anxiety (33%)**, **irritability (41%)**, and **sleep issues (32%)**.
- **42%** and **69%** of respondents in low HVI and high HVI districts respectively reported that heat had an impact on their interpersonal family relationships.
- **18%** reported having experienced household violence; **over half reported higher occurrence** during summer.

Climate Change

A triple threat for the ocean

Burning fossil fuels, deforestation and industrial agriculture release carbon dioxide (CO_2) and other heat-trapping gases into our atmosphere, causing our planet to warm. The ocean has buffered us from the worst impacts of climate change by absorbing more than 90 percent of this excess heat and about 25 percent of the CO_2, but at the cost of causing significant harm to marine ecosystems.



SEA LEVEL

Sea level rise is accelerating, flooding coastal communities and drowning wetland habitats.

BLEACHING

Warm-water coral reefs (marine biodiversity hotspots) could be lost if the planet warms by 2°C (3.6°F).

TOXIC ALGAE

Larger and more frequent blooms are making fish, birds, marine mammals and people sick.

HABITATS

Lower oxygen levels are suffocating some marine animals and shrinking their habitats.

ACIDIFICATION

More acidic water harms animals that build shells, such as corals, clams, and oysters.

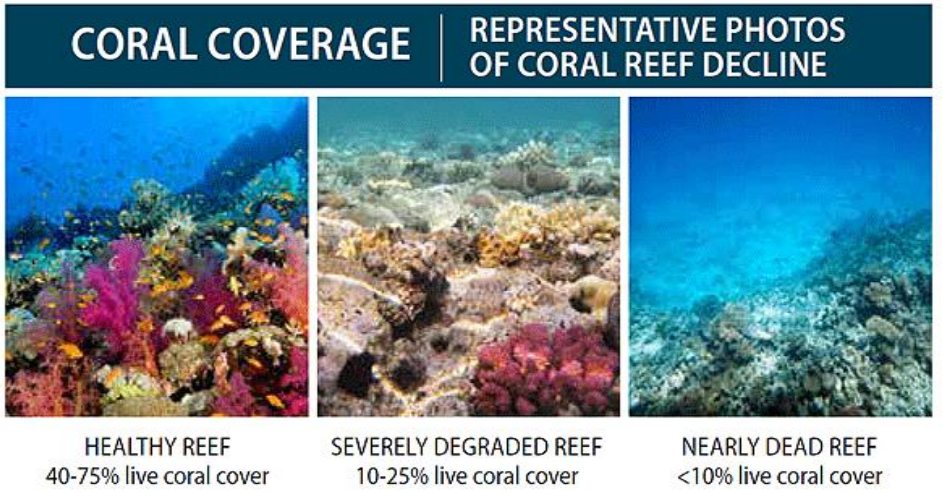
FISHERIES

Disruptions in fisheries affect the marine food web, local livelihoods, and global food security.

Source IPCC 2019 - SROCC

Impact in Marine Ecosystem

- Effects on all marine animals– **seriously disrupt the food webs**
- Rapidly eroding reef **habitats threaten and collapse for some coastal fisheries**
- Changes in **fish migration, breeding, spawning and feeding** seasons and its patterns

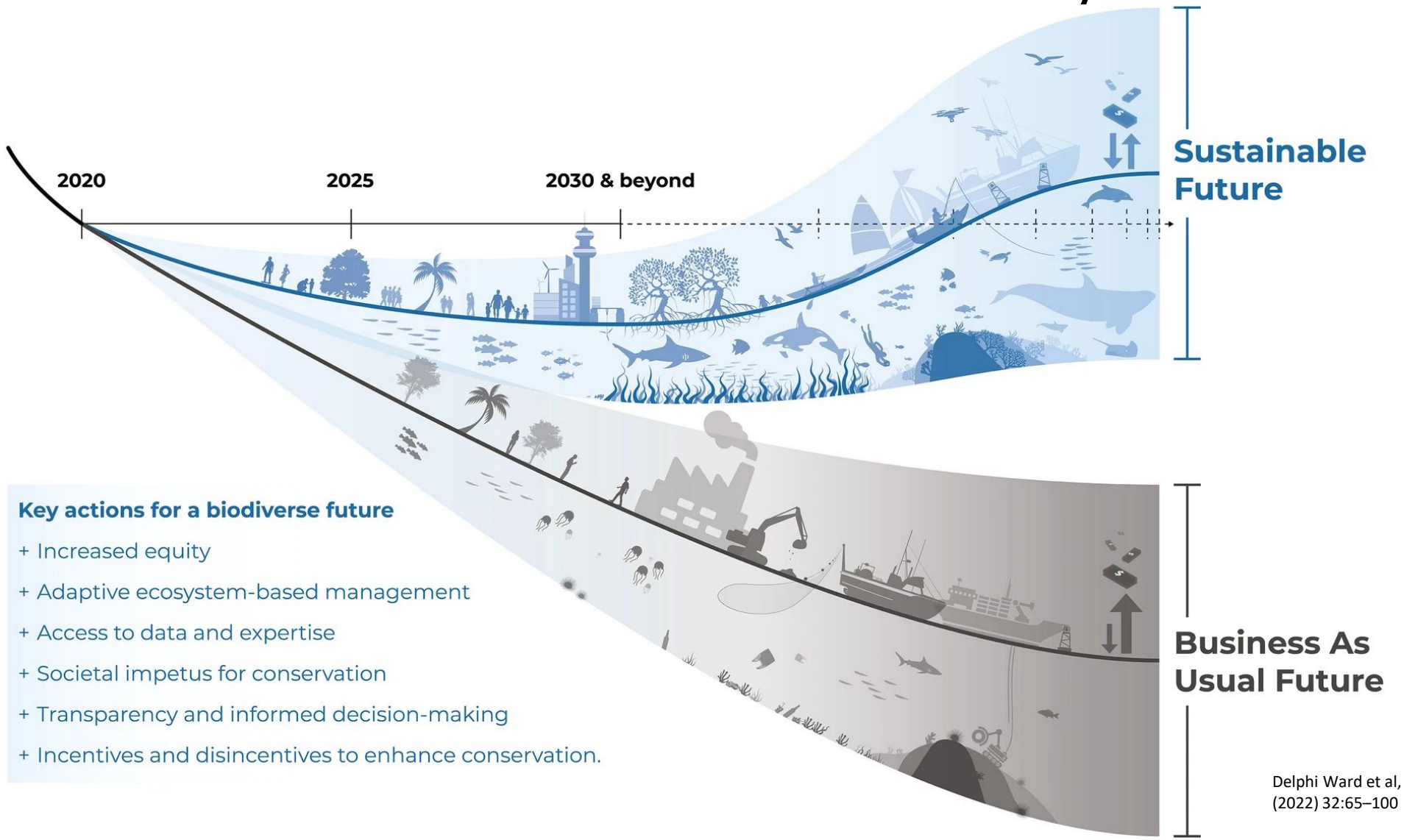


- Fish redistribution : **Fish populations are shifting away -** there will be high level of local extinction
- Fish size : large fish will **have smaller maximum body size** due to reduced oxygen capacity of sea water
- Reduction of **animals ability to produce shells and skeletons** and interference with fish navigation
- Mussels, oysters and shell fish growth affected by shell thinning and increased mortality

Increasing temperature and heat Impact on Post -harvest Fisheries

- **Spoilage and quality loss:** Higher temperatures can cause fish to spoil faster, leading to quality loss and reduced shelf life.
- **Microbial growth:** Increased temperature can lead to rapid growth of bacteria, viruses, and other microorganisms, causing contamination and food safety issues.
- **Enzymatic reactions:** Higher temperatures can trigger enzymatic reactions, leading to texture, color, and flavor changes in fish products.
- **Nutritional value:** Temperature increase can lead to a decrease in the nutritional value of fish products, particularly if they are not handled and stored properly.
- **Economic losses:** Temperature-related spoilage and quality loss can result in significant economic losses for the fishing communities.
- **Changes in product texture and appearance:** Temperature fluctuations can cause changes in product texture and appearance, affecting consumer acceptance

Preservation of Coastal Biodiversity



Delphi Ward et al, Rev Fish Biol Fisheries (2022) 32:65–100

MSSRF's Initiatives on Coastal Biodiversity Preservation and Marine Ecosystem Management

Coastal Systems Research

- Integrating ecological security of coastal areas and livelihood security of coastal communities, in a mutually reinforcing manner, to achieve sustainable management of coastal resources.
- The ecosystem chosen for this study is mangrove wetland. It is a multiple-use ecosystem and plays a role in mitigating the impact of natural disasters such as cyclones, storm surges, and tsunamis in coastal zones. It provides livelihood to millions of artisanal fishers and acts as a critical habitat for wildlife.

Genetic Shield against Sea Level Rise

The beginning of the mangrove revolution

Charter for Mangroves, Pichavaram

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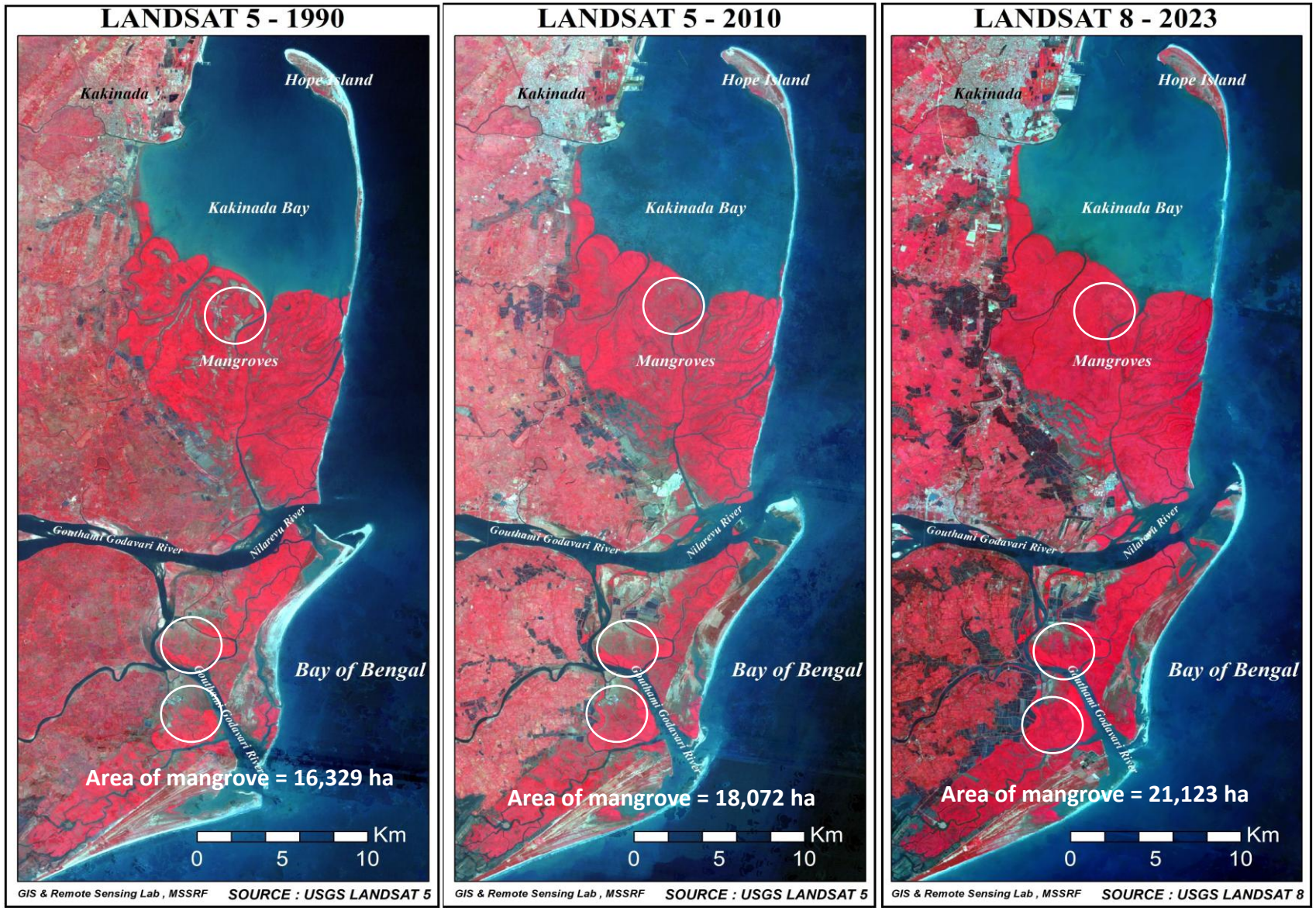
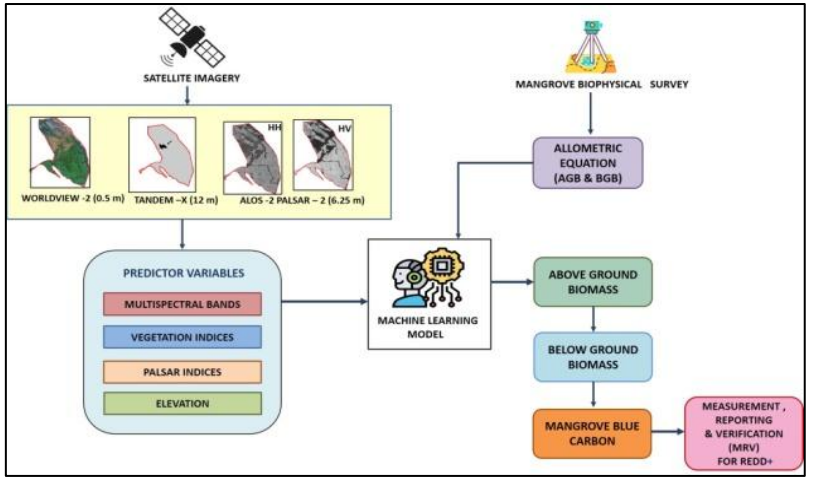
MONITORING MANGROVES USING REMOTE SENSING – GODAVARI MANGROVES , ANDHRA PRADESH

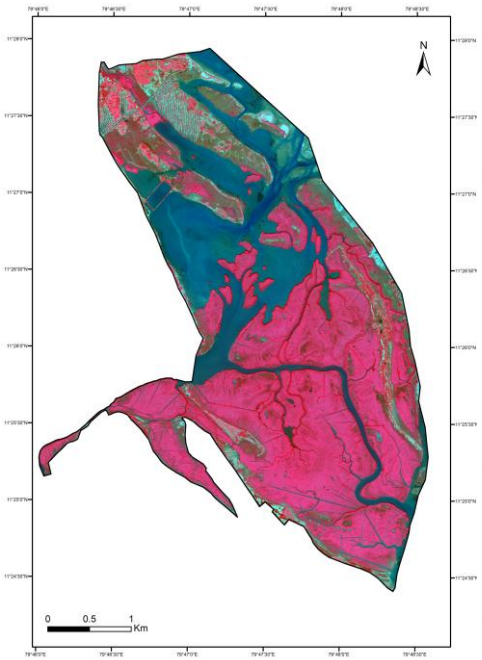
GIS and Remote sensing is extensively used to plan and monitor the mangrove restoration initiatives and quantity the spatial temporal variations of the mangroves

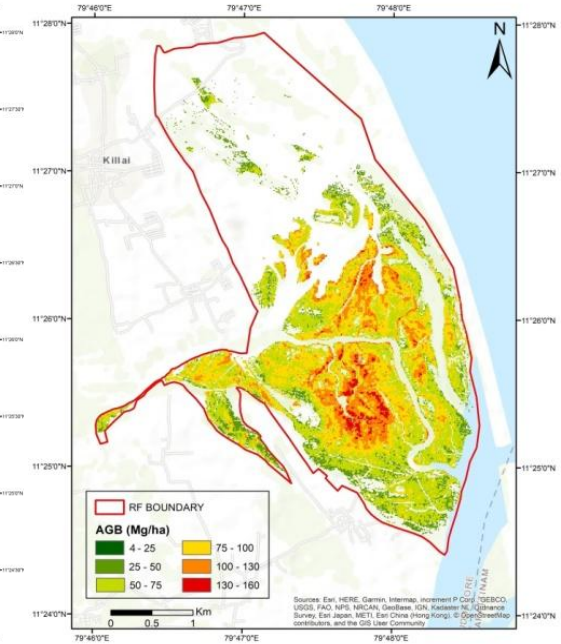


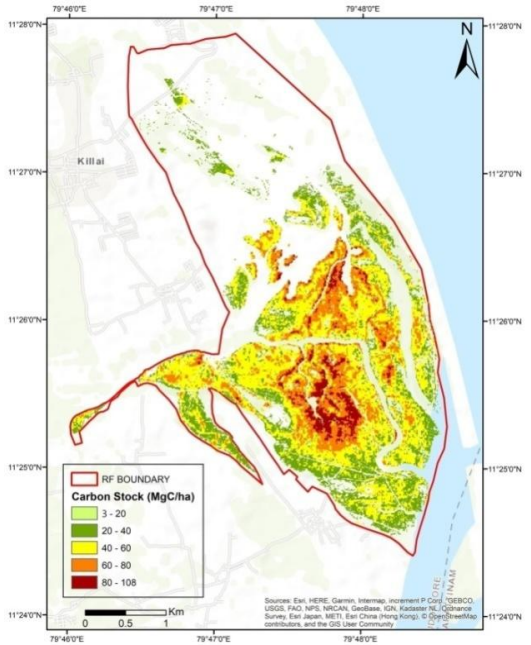
Quantification of blue carbon in mangroves using remote sensing and machine learning
Pichavaram, Tamil Nadu

The blue carbon in mangroves is quantified using the high resolution satellite imageries and machine learning algorithms for Pichavaram reserve forest and the result shows that it stores around 32,000 tones of carbon in mangroves.









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Promoting small scale aquaculture - Improve diversity in Production : Pichavaram region

- **Diversify aquatic production systems**
- **Saline lands converted into the fish culture**
- **Introduce flood and drought tolerant crops with fish culture**

Integrated Fish Farming System

Maximum diversified farm output with minimum financial and labour costs.

- **Family farming**
- **Increase productivity**
- **Recycling of wastes**
- **Income round the year**

Integrated Aquaculture in Mangrove areas with Seabass and Mud crabs

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Crab fattening Demonstration

Crab Fattening in Pazayar Tsunami Nager -Nagai

Fish for All Research and Training Centre, MSSRF, Poompuhar

Marine fish catch is declining

As pressure on land increases, aquatic sources (marine and inland fisheries) have to play an increasingly important role in ensuring nutrition security.

15 years ago, MSSRF started a programme **"Fish for All and Forever'** as part of the 2004 Indian Ocean Tsunami rehabilitation initiative.

The **concept of Fish for All is similar to the evergreen revolution concept** in the case of crop plants, viz. the promotion of sustainable fisheries for the sustainable livelihoods of coastal communities

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Fishery Resource Enhancement: Community-Managed Artificial Reefs Building

- Deployed in Tamil Nadu and Puducherry Coast since 2004
- An enormous settlement of sedentary flora and fauna was recorded
- An assemblage of different varieties of fishes was recorded in the artificial reef system
- Community monitory mechanism evolved and there is overwhelming support from traditional fisher folk

Biodiversity enhancement :

Sponges, soft coral, hard coral, barnacles, and oysters are present all over the reef modules

Commercial fishery :

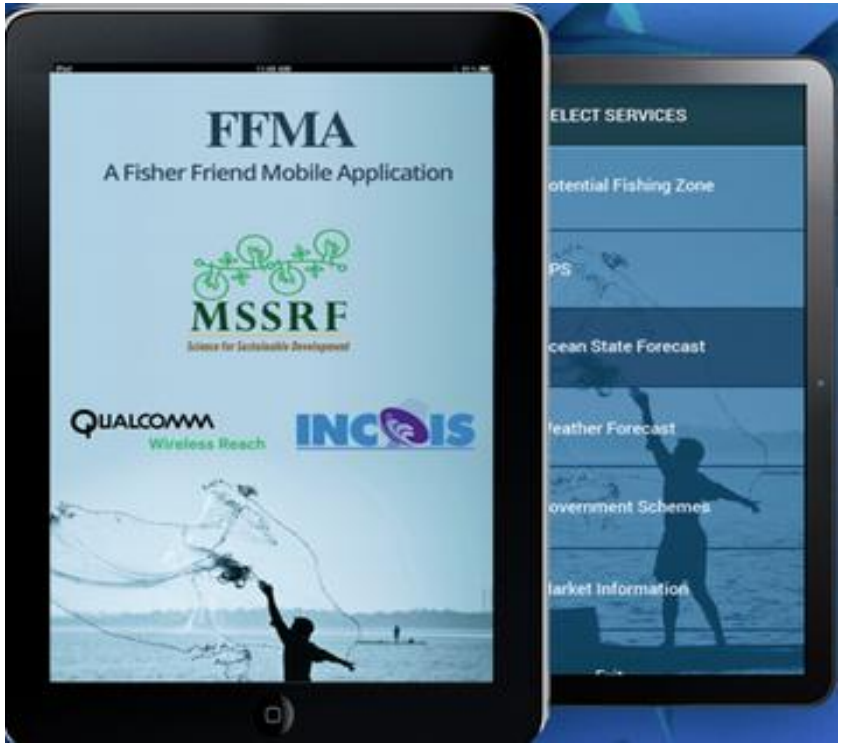
More than 20 to 30 tones of fish are harvested every year including carangids, bream, barracuda, groupers, snappers, etc

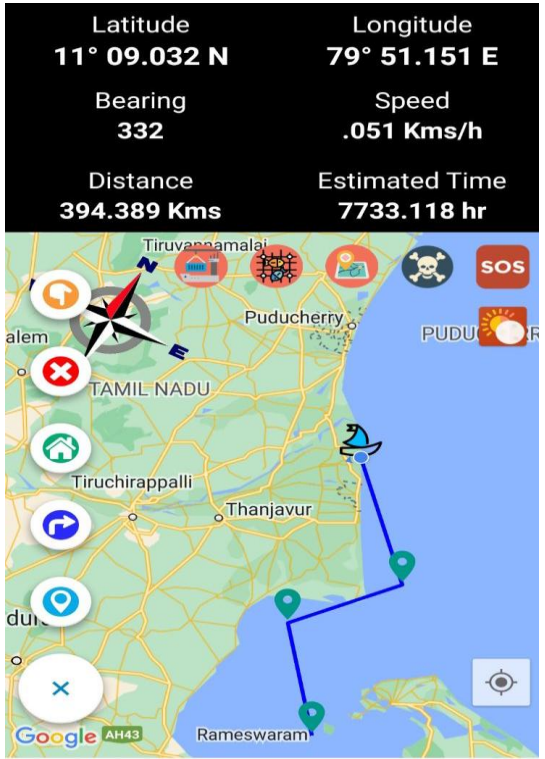
Spawning of many commercially valuable fish is observed in seasons

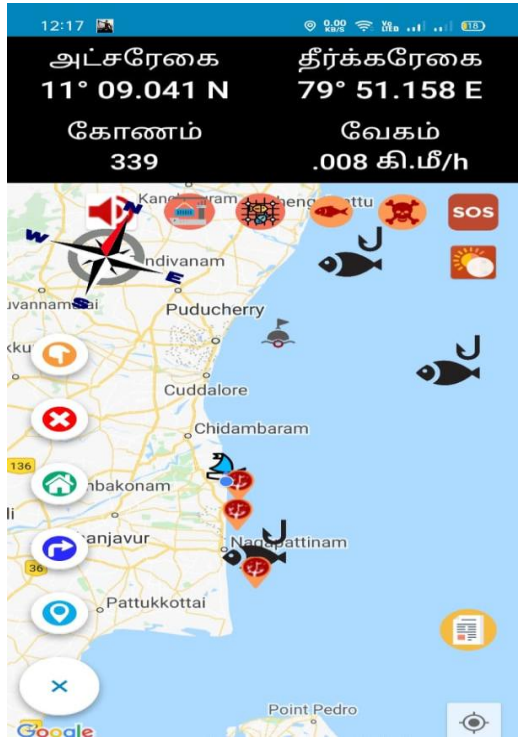
Fisher Friend Mobile Application – A Decision Making tool for Small Scale Fishers

- Bouquet of services for decision-making
- Value-added information on ocean conditions in local languages
- Authenticated data from INCOIS
- Available in all Indian Coastal Languages

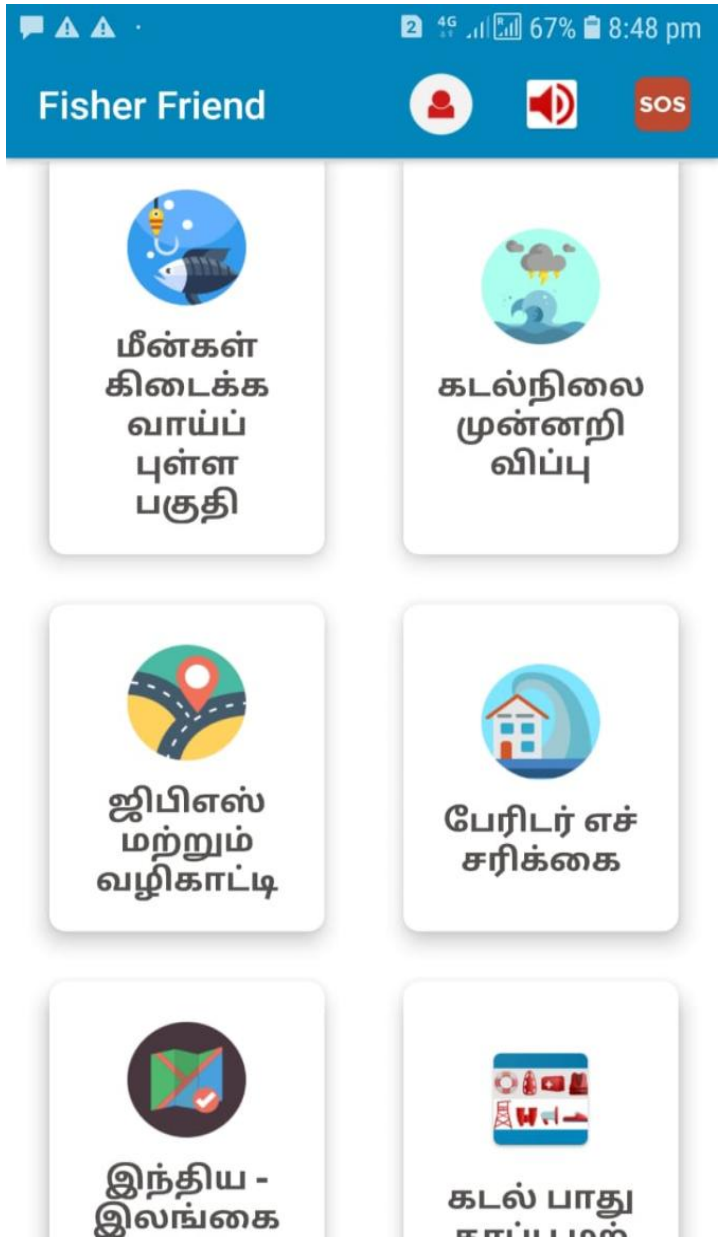
1.22 lakh fishers across all eight coastal states of India downloaded the application





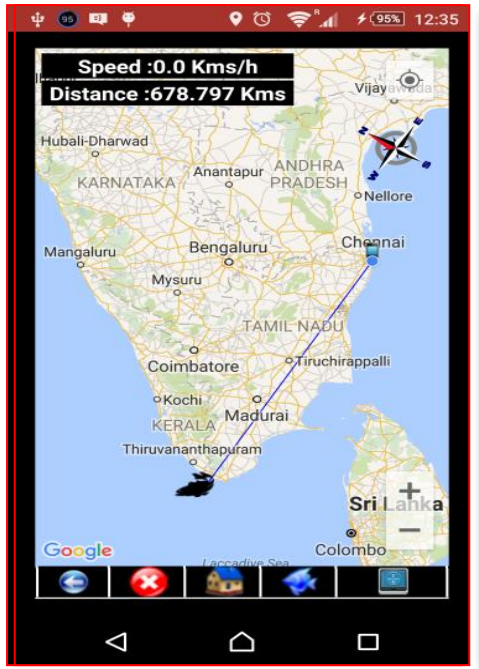


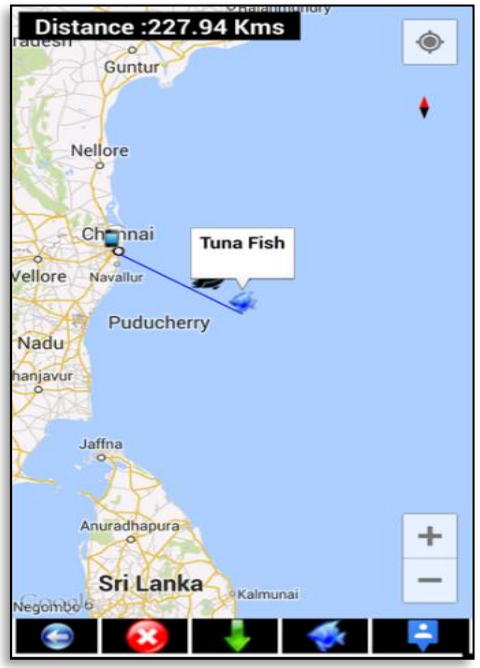
Features in Fisher Friend Mobile Application

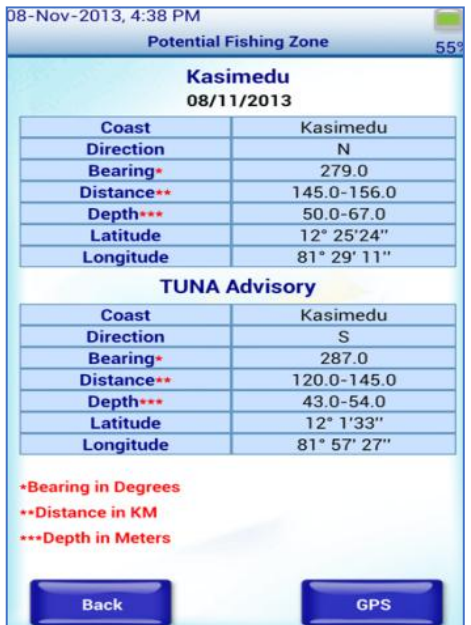


Fisher friend :

- Potential fishing Zone
- TUNA species forecast
- No Fishing Zone (Turtle Zone alert)
- Sea current
- Sea surface temperature
- Wave height, Wind Speed
- Cyclone alert, High wave alert
- GPS for navigation
- Facility to Marking danger zones
- International Border Line
- Navigation to harbor locations
- Daily News
- My Tracker
- Compass
- Fishing route navigation
- Livelihood related information
- Government schemes
- Sea safety and first aids



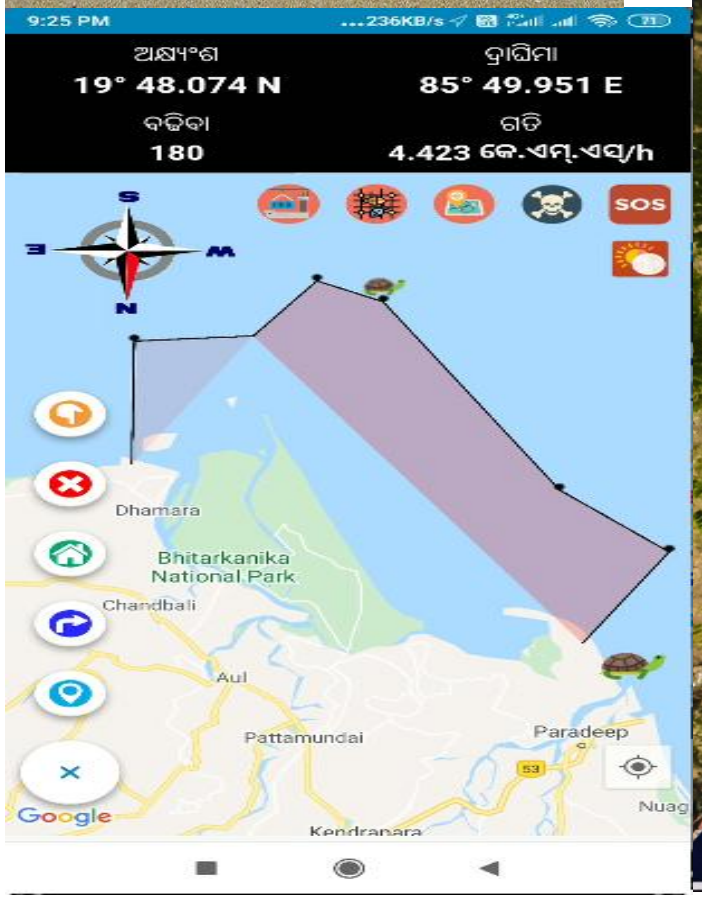




Fisher Friend helping resolve human-wildlife conflict in Odisha Coast

No fishing Zone Alert

- Gahirmatha wild life sanctuary
- Rusikulya
- Devi
- Dhamra river mouths



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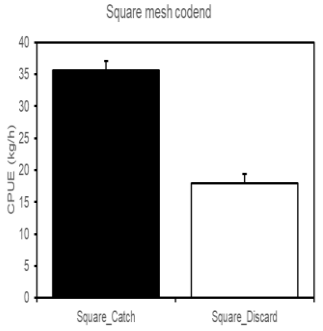
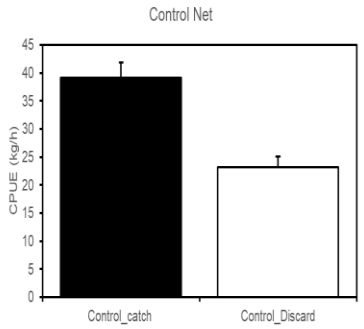
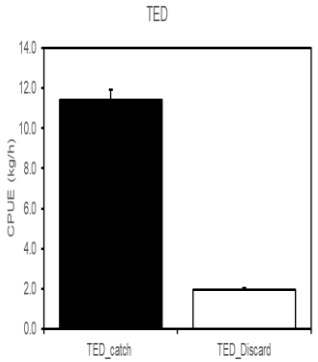
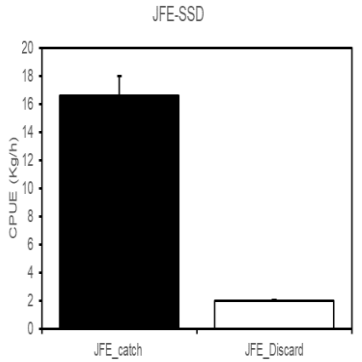
Promotion of Bycatch Reduction Devices
Benefit to Biodiversity: Smart ways to reduce bycatches and make the ocean healthier









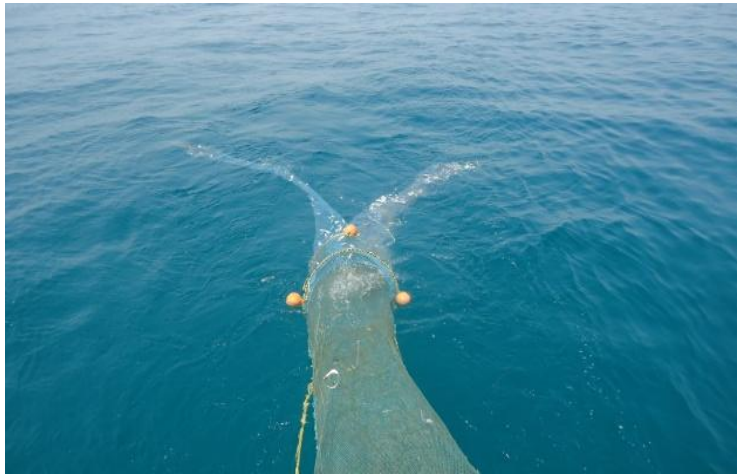
Promoting bycatch reduction devices in Trawl fisheries to minimize the juvenile and bycatches

- Square mesh cod end
- Turtle Excluder devices
- Juvenile sorting devices

Participatory trials with fishers

Square mesh cod ends showed promising results, with no significant decrease in total catch and a significant reduction in the discards (compared to the control net)

Promoted with fishers with voluntary code of practices



Minimize the impact of ghost gears to conserve the marine biodiversity and critical habitats in the Gulf of Mannar through Community-centric collective approach

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Shoreline and island drives with community commitment

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Post Harvest Fisheries development through collective action

- Community-based Fish processing set up for training women on the pre-processing and processing of fish
- Capacity building on quality control, fish safety measures
- Technical Know-how and scientific do-how
- Organizational, Management training and promoting them as FFPO with forward and backward linkages

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Promotion of Fisheries Entrepreneurs through Fish Value Addition

Increase dietary diversity with small fish and other aquatic foods in household through value addition

Develop culturally acceptable, context-specific, aquatic food-based products from low value and locally availably fish

- Small fish powder
- Pickles
- Fish Wafers
- Fish sticks
- Other ready-to-eat and cook products

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FisherwomenConnect- A Mobile Application for **Empowering Women in Post Harvest Fisheries**

Key Features of FisherwomenConnect Mobile Application

- **Knowledge on Post-harvest fisheries**
- **Fish business promotion/marketing:**
- **Weather /ocean state forecast:**
- **Market information:**

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Thank You