Social-Ecological Resilience to Oceanic Resources

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Introduction – The Coupled System

- Social ecological resilience is not easy to understand in relation to definition and importance.
- Social-ecological resilience to oceanic resources is the capacity of coupled human-nature systems to absorb shocks (e.g., climate change, overfishing) while maintaining ecosystem functions and human well-being.
- Understanding oceans not just as environmental spaces, but as social-ecological systems (SES).
- Interconnectedness: Human well-being (livelihoods, culture) is directly tied to the health of marine biodiversity and ocean habitats.
- Core Goal: How coastal and marine communities adapt, reorganize, and grow in the face of continuous environmental and economic disruptions.

ISSUES

- Understanding the Social-Ecological System (SES)
- Ocean Resources and Human Dependence
- Basic structure of Social Ecological Resilience (SER)
- Human Environment and SER Model Interaction
- Pillars of Marine Social-Ecological Resilience
- Governance and Co-Management Frameworks
- Key Threats to Oceanic Resilience
- Gender in Oceanic Resources
- Strategies for the Future Path

Resilience capacity related questions used

#	Understanding different capacity	Question	Reference
1	Capacity of absorption	Can your household back home after challenges?	Bahadur et al, 2011
2	Transformation capacity	Do you have any alternatives during hardships?	Kates et al., 2015
3	Adaptive capacity	Do you get prompt solutions when your family feels threats?	Bahadur et al., 2011
4	Financial capacity	Do you get financial support during hardship?	Mayunga, 2007
5	Social capacity	Can you rely on friends when you need support?	Aldritch, 2012
6	Political capacity	Can you rely on politicians when you need support?	Magis, 2010
7	Learning capacity	Can you use previous learning?	Cutter et al., 2008
8	Early warning capacity	Do you receive any early warning information on future risks?	Aldritch, 2012

Understanding the SES

- Core Concept: Oceanic resources cannot be managed in singly; they are deeply linked with human societies.
- Social Component: Coastal communities, cultural identities, economic livelihoods, and governance frameworks.
- Ecological Component: Marine biodiversity, fish stocks, habitats (mangroves, reefs), and ocean currents.
- Link: Human activities impact ocean health, while ocean health directly dictates human well-being.

Oceanic Resources and Human Dependence

- Provisioning Services: Global food security relies on fisheries and aquaculture, which supply millions of jobs and critical protein.
- Regulating Services: The ocean acts as a massive climate buffer, absorbing CO_2 and producing oxygen, which buffers terrestrial impacts.
- Cultural & Economic Services: Marine tourism, shipping, and coastal protection (e.g., mangrove buffers) support localized and global economies.

Defining "Resilience" in Ocean Systems

- Absorption Capacity: The ocean's ability to absorb shocks (like storms or temperature spikes) without permanently changing state.
- Adaptive Capacity: The ability of coastal communities to learn, adjust, and switch livelihood strategies (e.g., transitioning from overfished zones to sustainable aquaculture).
- Transformability: The capacity to create a fundamentally new system when the old one is ecologically or economically unsustainable

Basic structure of Social Ecological Resilience (SER)

SER is consist of three basic components:

1. Social capitals and Regulatory Measures (SRMs)
2. Hazard assessment and Economic Measures (HEMs)
3. Persuasive and Adaptation Measures(PAMs)

Community people are losing or eroding social capital continuously. Traditional ties and safety nets have diminished in terms of social bondage. It is hard to find patronage networks and ties among the fisher communities.

Fear is guided by regulatory law and ethics. Every citizen of a society or country aware of laws and regulations and bound to follow it and might be punished if disobeyed or neglected.

Risks, fear and other social components encouraged the community mind for necessary behavioural change.

HUMAN ENVIRONMENT AND SER MODEL INTERACTION

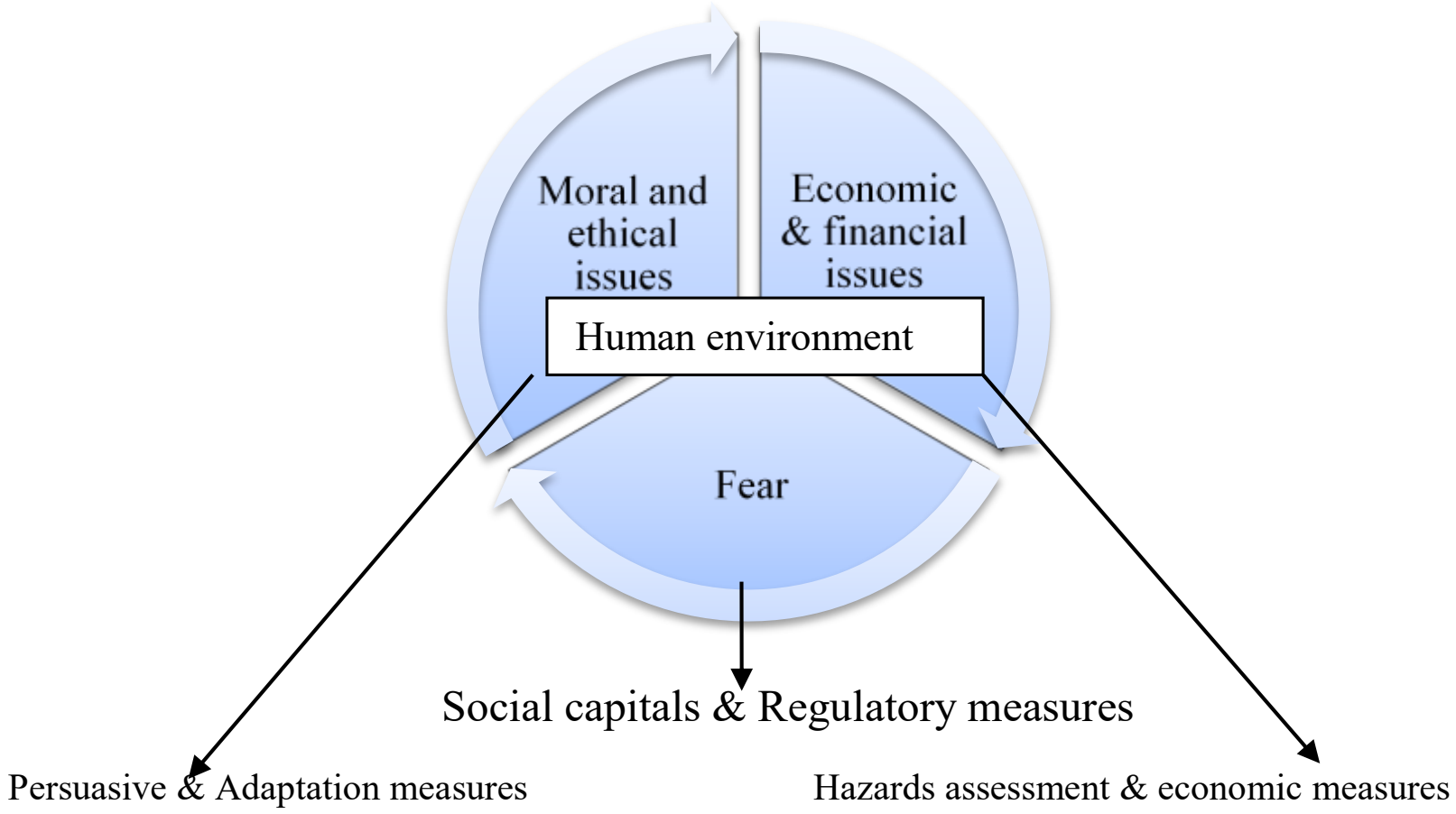

Figure 1: Human environment and SER model interaction

PILLARS

Ecological Pillars

- Biodiversity: Genetic and species richness helps ecosystems absorb environmental shocks.
- Connectivity: Protected migration corridors allow species to replenish degraded zones.

Social Pillars

- Adaptive Capacity: The ability of communities to change fishing practices or diversify income when resources decline.
- Traditional Knowledge: Indigenous management practices that align with natural cycles.

GOVERNANCE

- Top-Down vs. Bottom-Up: Shifting from strict government mandates to community-led conservation.
- Marine Protected Areas (MPAs): Designing networks of MPAs that protect critical habitats while respecting local fishing rights.
- Co-Management Partnerships: Sharing power between scientists, government agencies, and local fishers to create equitable policies.

THREATS

Anthropogenic Pressures

- Overfishing: Rapid depletion of target species disrupting marine food webs.
- Habitat Destruction: Destruction of coastal buffers like mangroves and coral reefs.
- Massive displacement of coastal populations, loss of arable land, and saltwater intrusion into freshwater resources.

Climate Drivers:

- Ocean Acidification: Weakening the structural foundation of marine calcifiers.
- Rising Sea Temperatures: Triggering mass coral bleaching and shifting species distributions.
- Pollution: The influx of marine plastics and chemical runoff compromises both ecological health and human safety.

GENDER IN OCEANIC RESOURCES

Direct engagement of women in coastal fishing is hard to found but the indirect involvement of women is remarkable. They are involved in multi-tasks; means diversified works including fish drying, cleaning, sorting, storage, packing, net maintenance, grading and some times collection of aquatic resources from natural sources. Women are the key person in homestead activities from cooking to managing households. Several livelihood activities get narrowed and community suffered more.

STRATEGIES FOR FUTURE PATH

- Climate-Smart Fisheries: Utilizing real-time data to adjust catch limits based on shifting ocean conditions.
- Livelihood Diversification: Developing sustainable ecotourism and restorative aquaculture (e.g., seaweed farming) to reduce fishing pressure.
- Inclusive Policy: Ensuring marginalized coastal voices are centred in international ocean governance dialogues.