# Livelihood Plan for Forest-Dependent Fisherfolk – Climate Resilience Plan with Environmental Restoration & Conservation

## Context

Thousands of families in the Sundarbans rely on fishing, crab collection, and honey gathering from forest zones (including Tiger Reserve areas) for survival. This exposes them to:

- Dangerous wildlife encounters (especially tiger attacks),
- Administrative restrictions and permit issues,
- Seasonal livelihood gaps,
- Climate vulnerabilities like cyclones and salinity intrusion.

## Goal

To provide **sustainable and dignified alternate livelihoods** that reduce dependency on forest-based extraction, without compromising the cultural and ecological identity of the region.

## Proposed Alternate Livelihood Strategies

### 1. Integrated Sustainable Agriculture

#### A. Climate-Resilient & Organic Farming

- **Activities**:
  - ✓ Promote **salt-tolerant paddy**
  - ✓ Introduce organic vegetable cultivation
  - ✓ Intercropping with pulses and oilseeds to improve soil health.
- **Training Modules**:
  - ✓ Composting, vermicomposting, and organic pesticide preparation,
  - ✓ Crop rotation and mulching for moisture conservation.
- **Agency-Supported Examples**:
  - ✓ Salt-tolerant rice and bio-farming in Basanti, Canning, Kultali.

#### B. Community Kitchen Gardens (for Women SHGs)

- **Target Group**: Women-headed households
- **Outcome**: Food security + small surplus for local market sale

### 2. Integrated Mangrove Aquaculture (IMA)

- **Description**: Combining aquaculture with mangrove plantation
- **Activities**:
  - ✓ Promote crab fattening and small-scale brackish water fishery,
  - ✓ Training on sustainable stocking and harvesting cycles.
- **Co-Benefits**:
  - ✓ Coastal protection through mangroves,
  - ✓ Employment generation,

- ✓ Women can participate in pond management and post-harvest handling.

**3. Sustainable Handicrafts and Stitching-Based Livelihoods**

**A. Tailoring & Stitching Training**

- **Target Group**: Young women and widows of tiger victims
- **Activities**:
  - ✓ Tailoring, blouse and petticoat making, school uniforms,
  - ✓ Soft toy, bag, and mask production (with branding as "Made in Sundarban").
- **Support Required**:
  - ✓ Machines, training support, raw materials
- **Marketing**: Local fairs, tourist outlets, online platforms with NGO/FPO facilitation

**B. Traditional Handicrafts Revival**

- **Raw Materials**: Golpata, date palm leaves, bamboo, mat sticks (madur), and jute
- **Products**: Decorative fans, eco-friendly packaging, baskets, wall hangings
- **Training Partners**: Rural crafts institutes, MSME schemes, artisan mentors

**C. Honey Processing and Packaging**

- **From traditional collection to hygienic packaging**
- **With branding and FSSAI registration for local sale**
- **Honey cooperatives can be set up, led by community women**

**4. Community-Based Ecotourism**

- **Activities**:
  - ✓ Training youth as local eco-guides,
  - ✓ Home-stay model development,
  - ✓ Traditional folk theatre (Banbibi, Marichjhapi stories) performances
- **Link to Conservation**: Promotes awareness and pride in Sundarbans heritage
- **Partner Organizations**: Local SHGs, eco-clubs

**5. Renewable Energy & Green Livelihoods**

- **Solar driers** for fish drying and vegetables,
- **Solar pumps** for small-scale irrigation,
- **Biogas units** for cooking in SHG hostels and training centres

**6. Skill Training & Capacity Building**

SJSM can offer dedicated **skill hubs** at its base in Gosaba, with modules like:

- Forest Rights Act and legal awareness
- Organic certification processes
- Bookkeeping and digital literacy for SHGs
- Disaster preparedness and first-aid for climate events

**Implementation Support Requested from Agencies**

| Component | Details |
|---|---|
| Technical Assistance | In IMA, organic farming, renewable energy |
| Capacity Building | Training support for SHGs and youth |
| Infrastructure | Stitching units, honey processing unit, demo farms |
| Eco-Labelling & Branding | To promote Sundarban-made products |
| Monitoring & Evaluation | To track outcomes and sustainability |

**Expected Outcomes**

- Diversified, climate-resilient livelihoods for at least **500 families** in Phase 1
- Reduced entry into core forest zones by at least **60%** in target areas (like Kultali, Chhoto Mollakhali, Shamsher Nagar)
- Women's income doubled in **2 years** through stitching, kitchen gardens, and honey processing
- Revival of traditional arts and identity, improving mental well-being and cultural pride

**This plan aligns directly with**

- Climate-resilient livelihoods
- Integrated mangrove aquaculture
- Renewable energy for sustainable livelihoods

**Integrated Mangrove Aquaculture (IMA)** is an innovative, eco-friendly approach that combines **aquaculture (fish, crab, or shrimp farming)** with the **conservation and restoration of mangrove forests**. It is particularly suited for coastal and deltaic regions like the **Sundarbans**, where mangrove ecosystems are integral to both **biodiversity** and **community livelihoods**.

**What is Integrated Mangrove Aquaculture (IMA)?**

**IMA is a land-use system that integrates aquaculture (in ponds, creeks, or enclosures) with mangrove plantation either around or within the aquaculture area.** It is a model for both income generation and ecological sustainability.

**It balances:**

- **Fish/crab production** for income
- **Mangrove restoration** for climate and ecological benefits
- **Water quality improvement** through natural filtration
- **Protection against erosion and storm surges**

**Why IMA for Sundarbans?**

The Sundarbans is a fragile region prone to:

- Cyclones and sea-level rise
- Salinity intrusion
- Overfishing and biodiversity loss
- Livelihood insecurity among fishing communities

**IMA directly addresses these challenges** by:

- Diversifying income
- Strengthening natural defenses
- Rehabilitating degraded lands
- Reducing pressure on core forest zones

**Components of an IMA System**

| Component | Description |
|---|---|
| **Aquaculture Pond** | Cultivation of crabs, shrimp, or brackish water fish in earthen ponds or embanked enclosures |
| **Mangrove Belt** | Mangroves planted on pond bunds, periphery zones, or interspersed within the aquaculture area |
| **Tidal Inlet/Outlet** | Water exchange system using natural tides, minimizing pumping costs |
| **Sluice Gate/Filter** | Control saline water inflow and outflow, prevent escape or entry of unwanted species |
| **Species Diversity** | Integration of multiple species (e.g., Mud crab + mullet + mangroves) to replicate natural ecosystems |

**Common Aquatic Species Used**

| Species | Role |
|---|---|
| **Mud Crab (Scylla serrata)** | High-value species for fattening units |
| **Tiger Prawn (Penaeus monodon)** | Commercial brackish water shrimp |
| **Mullet (Mugil spp.)** | Bottom feeder, helps clean pond |
| **Milkfish (Chanos chanos)** | Fast-growing, hardy species |
| **Tilapia (in less saline zones)** | Can be grown in integrated or seasonal ponds |

**Common Mangrove Species Planted**

| Species | Benefits |
|---|---|
| **Avicennia marina** | Fast-growing, stabilizes bunds |
| **Rhizophora mucronata** | Excellent wave buffer |
| **Sonneratia apetala** | Preferred for degraded zones |
| **Excoecaria agallocha** | Medicinal, adds diversity |

**Benefits of IMA**

**Economic**

- **Dual income** from fish/crab/shrimp and mangrove-based eco-tourism or carbon credits
- **Low-cost input system** after initial setup
- **Reduced disease incidence** due to improved water quality

**Environmental**

- **Carbon sequestration** by mangroves
- **Improved soil salinity management**
- **Habitat for juvenile fish and birds**
- **Reduced erosion and storm damage**

**Social**

- **Involves women and youth** in pond management and nursery raising
- **Enhances food and income security**
- **Builds disaster resilience**

**Case Studies & Support**

**IMA pilots in the Sundarbans** through:

- Demonstration ponds in community land
- Technical training for pond and bund design
- Monitoring for ecological balance
- Support in market linkage and capacity building

Organizations such as **ICAR-CIBA** (Central Institute of Brackishwater Aquaculture), **Sundarbans Affairs Dept.**, and **Zilla Parishads** have also supported this model in different forms.

**Implementation Steps**

1. **Site Selection**:
   - ✓ Choose land near tidal creeks with existing or restorable mangroves
   - ✓ Ensure community ownership or lease availability
2. **Design and Layout**:
   - ✓ 70–80% pond area, 20–30% mangrove zone
   - ✓ Proper bunding and inlet/outlet structures
3. **Species Selection & Stocking**:
   - ✓ Based on salinity, season, and market demand
4. **Training and Monitoring**:
   - ✓ Aquaculture techniques
   - ✓ Mangrove planting and maintenance
   - ✓ Record-keeping and harvesting schedules
5. **Market Linkage & Branding**:

- ✓ Community branding: e.g., “Eco Fish from Sundarban”
- ✓ Connect with ecotourism and conscious consumer markets

**Potential for Scaling in Sundarbans**

| **Block** | **Potential** |
|---|---|
| Gosaba | High – Community land and NGOs active |
| Basanti | High – Existing engagement |
| Kultali | Moderate – High salinity, but adaptive |
| Hingalgunj | Good scope near Ichhamati/ Raimangal river |
| Patharpratima | Good in mixed zones with tourism potential |

**SJSM’s Role**

- **Mobilize SHGs and youth for training**
- **Coordinate with Fishermen Unions and local govt. for support**
- **Monitor ecological impact and share learnings**
- **Promote FRA rights over aquatic resources alongside IMA**