Weaving Empowerment: The Transformative Role of Seaweed Farming for Coastal Women in Bangladesh

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Seaweed & it's Applications

What is Seaweed??

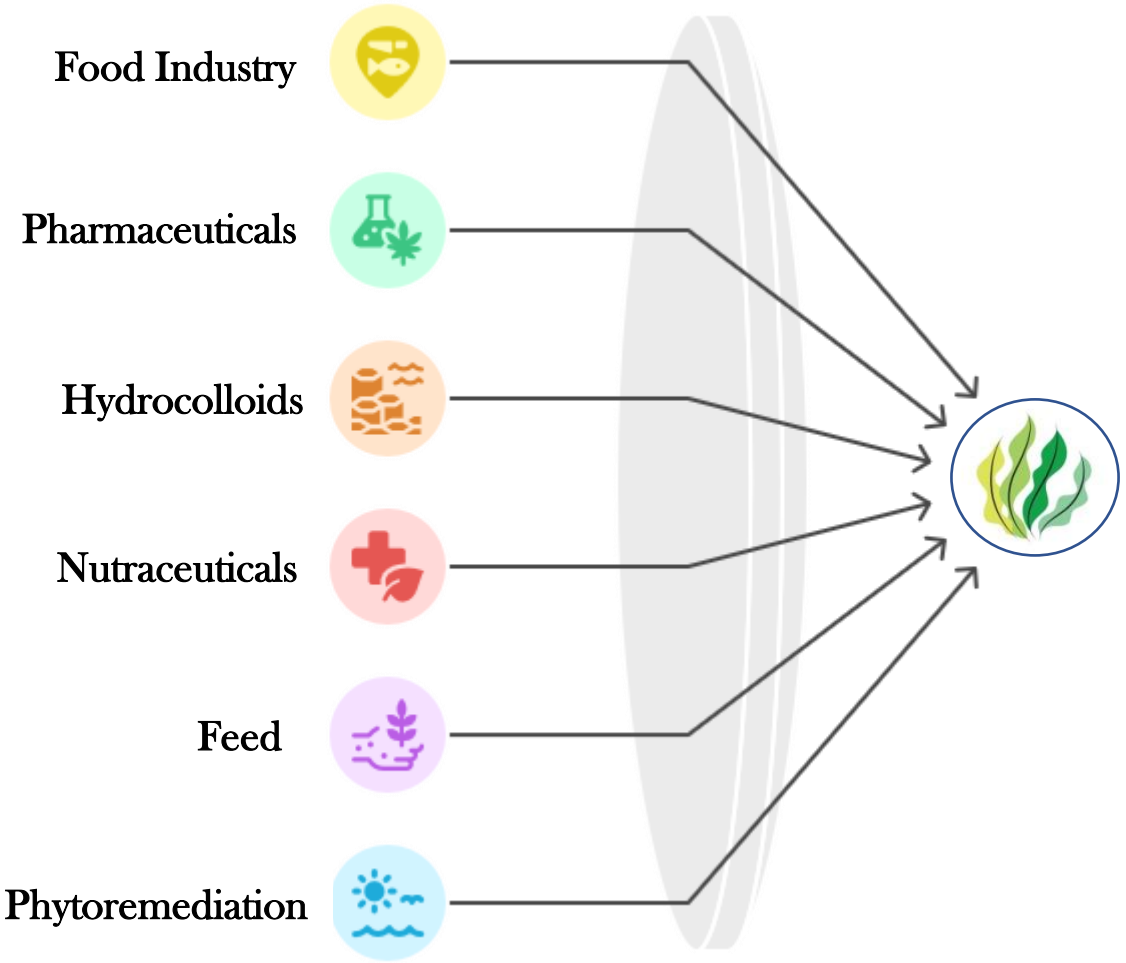
- Also called **Macroalgae**
- Macroscopic, Multicellular, Photosynthetic
- Occur from **intertidal zones** to **deeper** marine environments
- **Three** major groups

Red Seaweed

Green Seaweed

Brown Seaweed

Potential Applications



Seaweeds in Bangladesh

- Around 185–244 species across 77–94 genera
- Several commercially valuable types such as *Gracilaria*, *Hypnea*, *Enteromorpha*, *Ulva* and *Kappaphycus* (Sarkar et al., 2016; Islam et al., 2022)

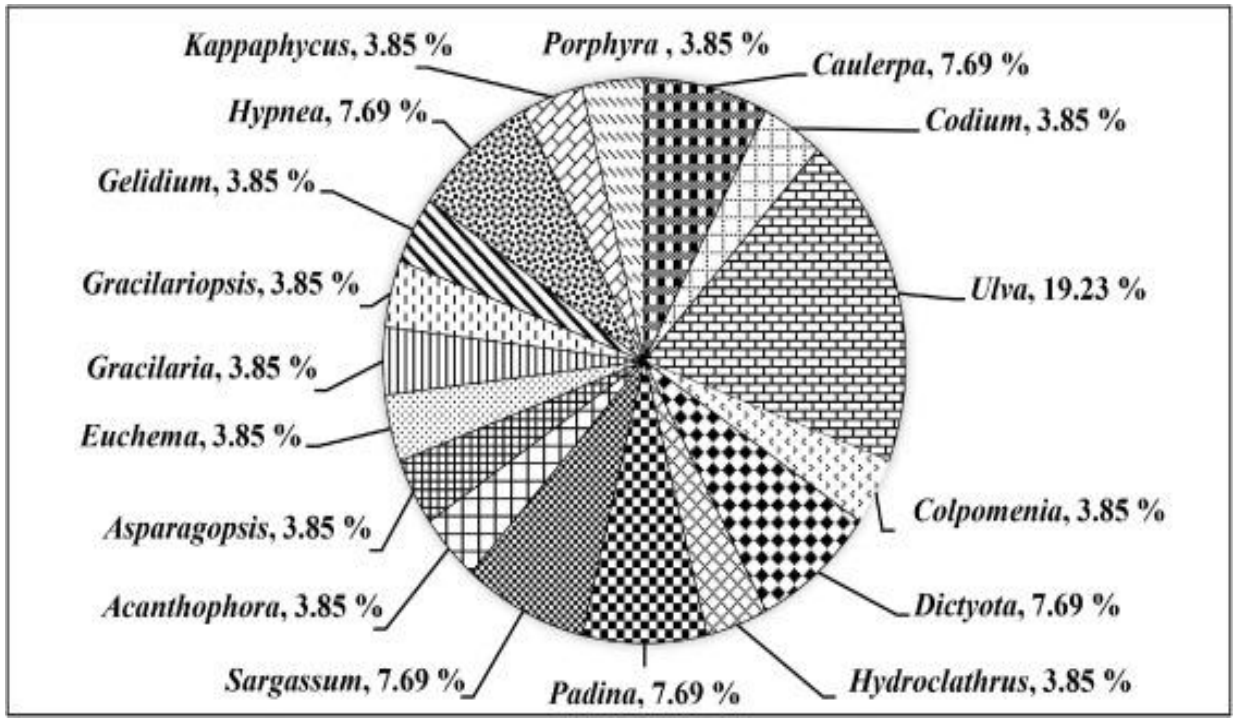
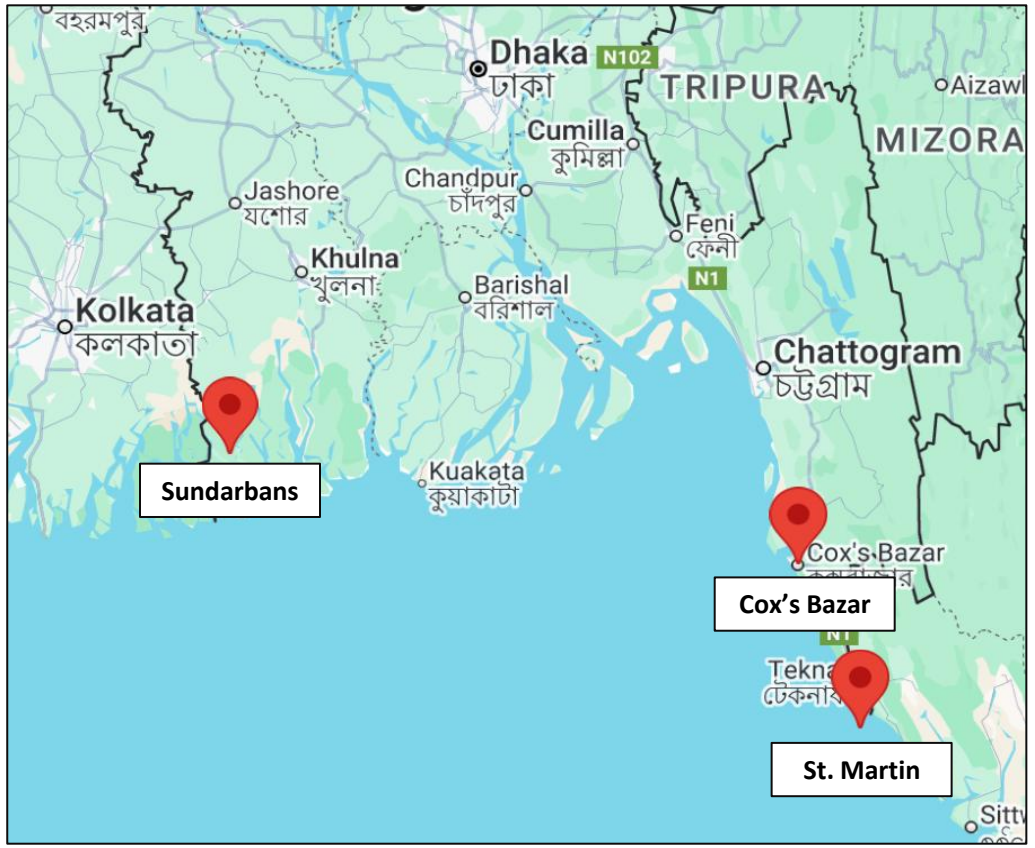


Figure: Genus-wise distribution percentage of commercially important seaweed biodiversity in Bangladesh (Sobuj et al., 2024)

- Naturally Produced Seaweed found in Cox's Bazar, Saint Martin & in Sundarban.
- St. Martin is considered as hotspot for seaweed cultivation



Seaweeds in Bangladesh

- ✓ Some Commercially Important **Brown** Seaweed in Bangladesh (Islam et al., 2019)
- ✓ Some Commercially Important **Green** Seaweed in Bangladesh (Islam et al., 2019)
- ✓ Some Commercially Important **Red** Seaweed in Bangladesh (Islam et al., 2019)


Dictyota dichotoma

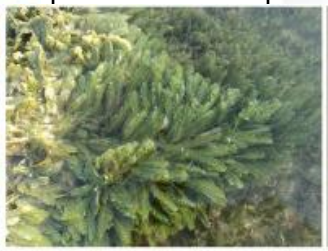

Dictyota bartayresiana


Padina tetrastromatica


Padina gymnospora


Colpomenia sinuosa

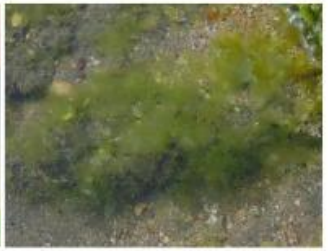

Caulerpa racemosa


Caulerpa taxifolia


Codium fragile


Ulva intestinalis


Ulva lactuca


Ulva fasciata


Ulva compressa


Ulva reticulata


Kappaphycus alvarezii


Porphyra indica


Gracilaria tenuistipitata


Gracilariopsis longissima

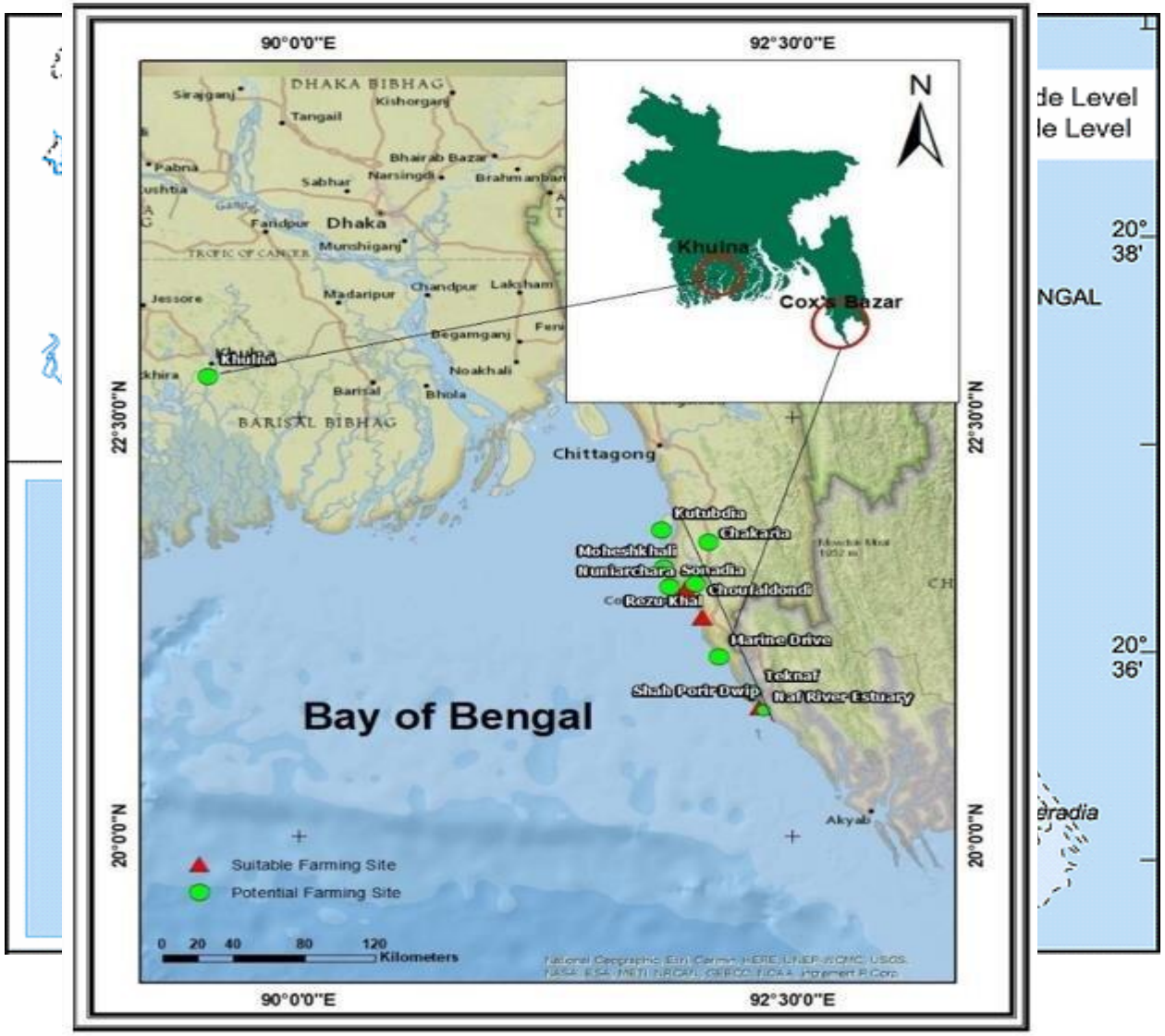

Hypnea musciformis


Hypnea valentiae

Seaweed Farming in Bangladesh

Cultured Seaweed Species in Bangladesh

Species	Location of cultivation	Culture method	Reference
Hypnea sp	Cox's Bazar, Inani, Bakkhali, Saint Martin Island	Rope & net culture	(Islam et.al., 2017)
Caulerpa sp	Saint Martin & Cox's Bazar	Long Line Floating	(Siddiqi et. al., 2019)
Entero-morpha sp	Cox's Bazar	Rope culture	(USAID, 2019)
Gracilaria , *Ulva*	Nuniarchora , Cox's Bazar	Rope culture	(USAID report, 2019)



(Siddiqui et al., 2019)

(Akhtar et al., 2022)

Approaches for seaweed farming

Two approaches are followed: 1) Providing intensive training 2) Input assistance

ECOFISH approaches for seaweed farming

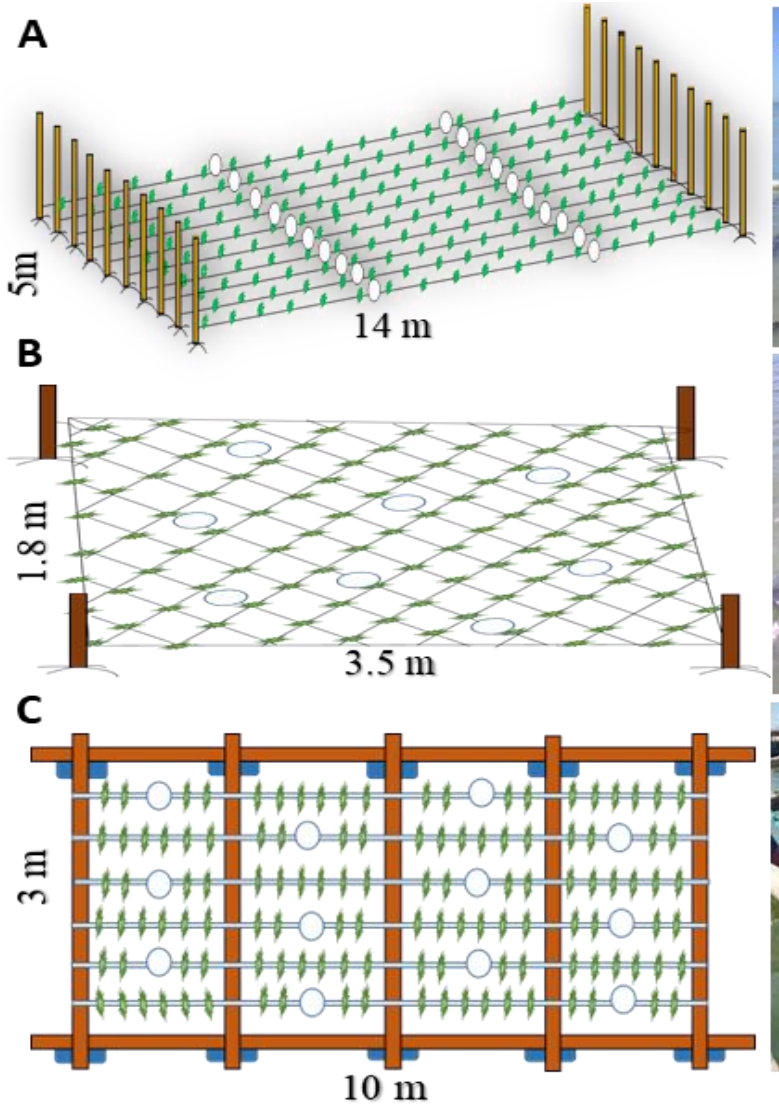
- **Input-assisted approaches: Providing all necessary inputs for seaweed farming for the resource-poor farmers**

Seaweed Farming Systems in Bangladesh

Off bottom Long line

Off bottom Net

Floating Long line



Off-bottom long line system—Female dominated

Off-bottom net system of Gracilaria---Female dominated

Ulva lactuca culture by off-bottom net culture: Female dominated

Floating long-line system: Male dominated

Can floating long-line culture be a promising technology?

Floating system

Advantages

- No space limitation for seaweed farming
- High production and quality

Challenges

- Difficult for women to involve in farming
- Comparatively high cost
- More prone to natural disasters

Off-bottom system

Advantages

- Lost cost approach and easy management
- Suitable for coastal women to involve in farming

Challenges

- Very limited place available for farming
- Lower per unit area production
- Inferior nutritional and food safety aspect

Floating long-line culture can be a best example for gender balance work

- Men can involve in seaweed raft construction, installation, farm management and harvesting

- Women can involve in seaweed seedling preparation, washing and cleaning, and drying activities

Women Involvement in Seaweed Cultivation

Women

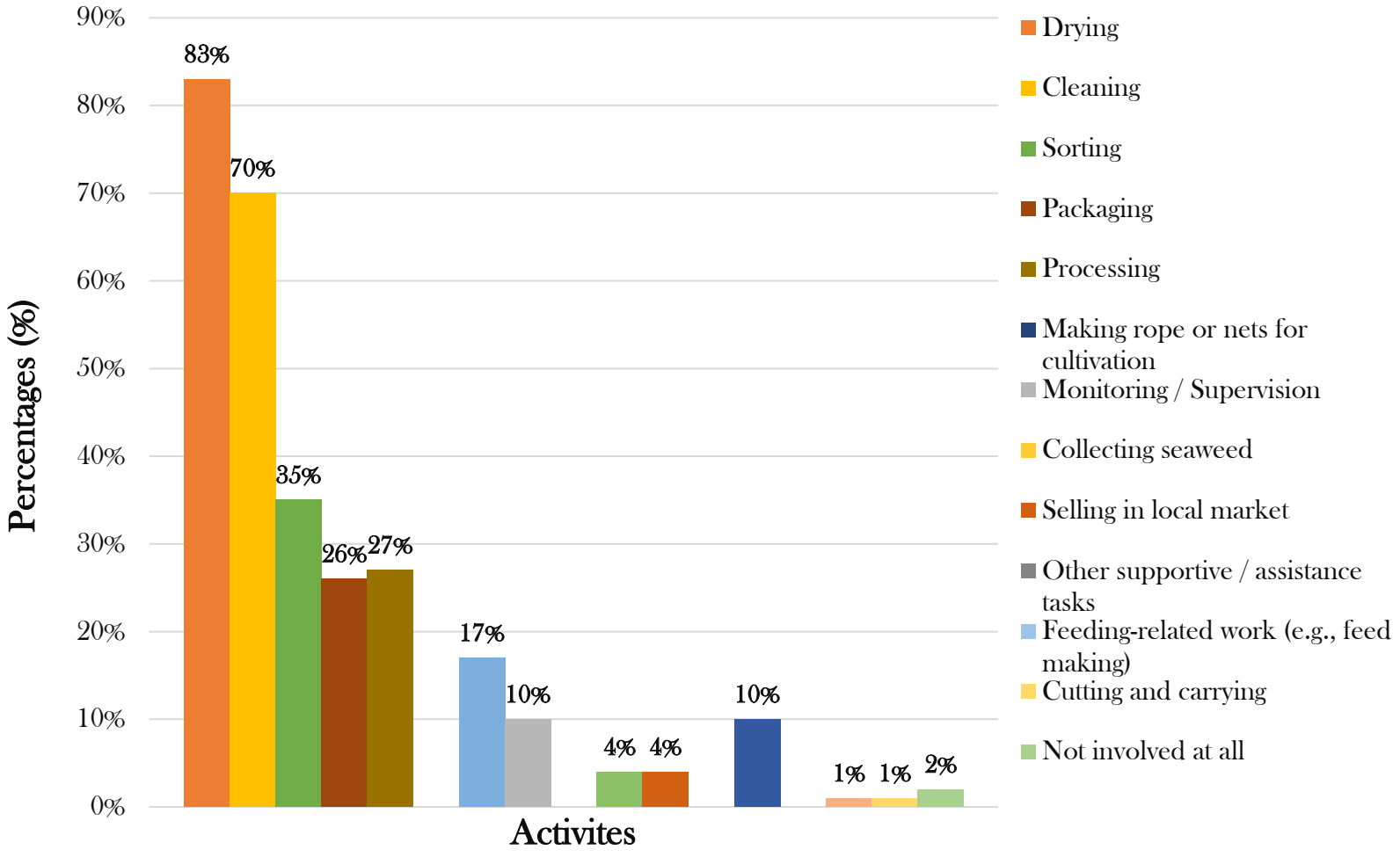
Input Supply → Seaweed Farming → Harvesting → Post-Harvest Management → Processing → Local Market Selling → Ethnic Consumers / Distance Market Selling

Government Institute, NGOs, Researcher → Seaweed Farming

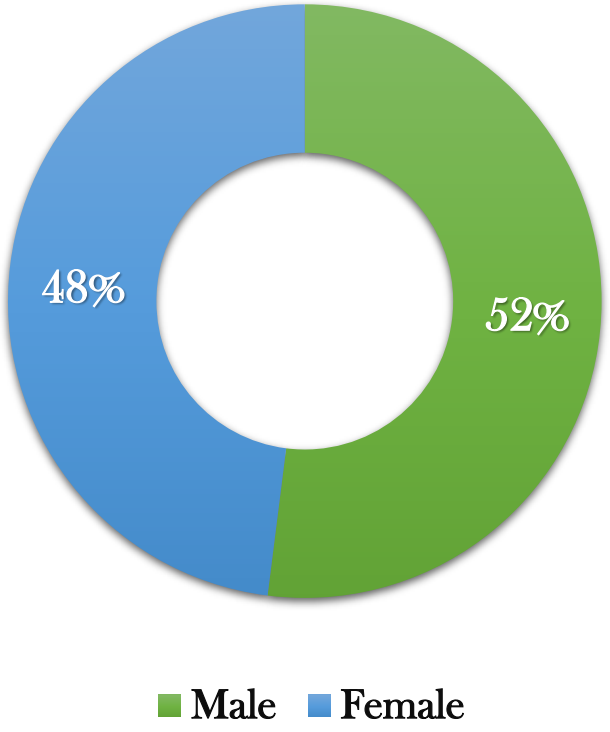
A Flowchart presenting the position of **women** in the seaweed farming in Bangladesh

Continued…

Participation in Seaweed Activities



Gender wise Participation



Women working throughout the Process…

Harvesting

Sorting

Drying

Selling in Local Market

Packaging Machine Handover

Positive Outcomes of Women's Participation

Benefits

Economics
- Contribute to Financial Security
- Development of the Households

Social
- Expanding human capital
- Self-esteem
- Confidence
- Respect from others

Determinants: Socio-economical group

Degrees of Empowerment
Financial; Social and Political Freedoms

Determinants: Gender norms and relations

Negative Outcomes of Women's Participation

Social Judgement

Time Burdens

Household Well-being

Security Risk

Cost and Risks

Social Norms: Gender norms; and Relations

Policy Implications and Recommendations

Gender Inclusion

- Multifaceted approaches applied in women-targeted programs
- Technical strategies developed to reduce time burdens, increase value

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Gender Transformative Change Mechanisms

- Policy supporting gender equal access to resources such as land ownership
- Cultivation programs engage both men and women in gender transformative strategies including to enable women's mobility and gendered role-sharing

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- Both tangible and intangible barriers addressed
- More gender-equitable capabilities and enabling factors
- Multi-faceted and multi-scale social change

People, Planet, and Prosperity

- **Weaving Empowerment: The Transformative Role of Seaweed Farming for Coastal Women in Bangladesh**

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- Seaweed farming is emerging as a vital catalyst for socio-economic transformation in coastal Bangladesh, particularly in empowering women from vulnerable communities. This study explores the nuanced roles women play across the seaweed value chain and evaluates the potential of this sector to advance gender equity and coastal resilience. Drawing on recent field data from Cox's Bazar, where seaweed production is practiced mainly through off-bottom long line and net culture, findings reveal that women constitute approximately 70% of active producers and collectors. While the expansion of sub-tidal floating raft culture remains largely male-dominated due to its physical demands and offshore nature, women's engagement is significant in seed inoculation, monitoring, harvesting, washing, drying, and post-harvest handling

- Economic analysis highlights encouraging profitability: an average 24 m^2 seaweed plot yields about 63 kg of dry *Gracilaria* over five months, generating a net return of BDT 6,064.66 and a return on investment of 104.59%. Despite limited formal education (52.5% of farmers are illiterate), women's participation has grown steadily, fueled by NGO support, local training, and low capital requirements. Value chain mapping reveals women's dominance in early production and processing stages, although market linkages remain constrained by reliance on middlemen, limited transport, and inadequate post-harvest infrastructure. The marketing system largely channels products from farmgate wholesalers to distant markets like Bandarban, where demand is driven by ethnic communities, limiting broader market penetration.The study concludes that seaweed farming holds transformative potential to empower coastal women economically and socially by providing accessible, climate-resilient livelihoods. Policy recommendations include expanding training tailored for women, improving local processing facilities, and diversifying markets through branding and export strategies. By strengthening women's agency within the value chain and addressing structural barriers, seaweed farming can significantly contribute to Bangladesh's blue economy goals while promoting gender equity and community resilience against climate change.
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- Keywords: women empowerment, seaweed farming, value chain, coastal livelihoods, Bangladesh, blue economy

- **Lets Weave the sustainable future lets be in the wave of wonderul world of women**

Thank You