Seaweed farming

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Introduction

Seaweeds are leafless, stem-less and rootless plants that grow in the sea. The word seaweed gives the wrong impression that it is a useless plant. Seaweeds are wonder plants of the sea and highly useful plants. Seaweeds grow in the shallow waters. Root system and conducting tissues like land plants are absent in seaweeds. Most of them have hold-fast for attachment and some drift loose in the sea. Four groups of seaweeds are recognized according to their pigments that absorb light of particular wave lengths and give them their colours of green, blue, brown and red.

Seaweeds are marine macro-algae found growing throughout the world oceans and seas. Though there are about 9200 species of seaweeds, only 221 species are economically important. Over 68.33 lakh tons of brown, red and green seaweeds are exploited annually for the production of various commercially important phyco-colloids such as of agar, algin and carrageenan. Thus, natural seaweed stocks have become inadequate to meet the industrial requirements and hence cultivation of these important resources has become necessary. Asia stands as the world leader in seaweed cultivation and more than 80% is contributed by China, Korea and Japan. India has not taken up seaweed cultivation interestingly in the past though it is bestowed with a coastline of more than 17,000 km, embracing 821 species of seaweeds. Only recently, seaweed cultivation is picking up in certain coastal districts of the Tamil Nadu state. Central Salt Marine Chemical Research Institute and Central Marine Fisheries Research Institute have developed culture techniques for some of the commercially important seaweed species in India. As a consequence to this, cultivation of Eucheuma and Hypnea has been taken up on a commercial scale. As a result of this effort, a lot of Self Help Groups, Village Youth Groups and NGOs have come forward to promote seaweed cultivation as an alternate livelihood option for the coastal poor. Considering the great demand for these resources in the international market and availability of adequate manpower and interest in the country, seaweed cultivation has a very good prospect and it can be developed as a successful cottage or co-operative sector industry.

In India, mariculture is a sunrise enterprise. Technologies that have attracted the imagination of coastal stakeholders include mussel farming, seaweed farming and sea cage culture. Mussel (Perna viridis) farming technology has diffused along the Malabar coast (southwest India), and seaweed (Kappaphycus alverezii) farming prevails along the Coromandel coast (southeast India), after it found a niche in the Gulf of Mannar. Having proven their potential as empowerment platforms for coastal women, the theatres where these technologies were adopted raised a number of issues in the realm of a gendered political ecology. The aim of this paper is not only to diagnose these issues but juxtapose them with some of the epistemological concerns being brought by "gender lens" scholarship, especially in the neo-liberal context of global fisheries. A paradox brought out by the present study is the ambivalence of the State in manifesting itself as a positive "bargaining" force in the intra-household domestic space (by providing State-sponsored platforms through the Self Help Groups) while leaving the "common access resource" space, from which these platforms gain sustenance, less amenable to its democratic ideals.

Uses of seaweeds

New renewable source of food, energy, chemicals and medicines

Create opportunity for employment

Provide valuable source of raw material for industries like health food, medicines, pharmaceuticals, textiles, fertilizers, animal feed etc.

Seaweeds used for production of Agar, Alginates & Carrageenan.

Why seaweed farming

Remedy for non-availability of required quan-

tity of seaweeds for various uses.

Provide occupation for the coastal people.

Provide continues supply of raw material for seaweed based industry.

Provide seaweeds of uniform quality for use in industry

Conserve natural populations of concerned seaweeds

Ecofriendly activity

Major tool to treat coastal pollution in the sea and reduce CO2 in global warming

Gracilaria farming

Gracilaria spp. can be cultivated using vegetative fragments. Vegetative fragment culture of Gracilaria easy practice and it can be carried out throughout the year. Vegetative fragments of the plants are divided into 5 cm and these are introduced between the twists of the rope at 10 cm intervals. Fixed off bottom long line or floating raft methods can be selected. In the fixed off bottom long line method seaweed inserted ropes were tied to the posts planted in the sandy and muddy bottom of the intertidal regions..The position of the ropes is adjusted to remain at a constant depth in the tidal zone. In the raft method vegetative fragments inserted ropes were tied to the floating raft. First harvest can be made in three months and subsequent harvest in one and months. After harvest it may be dried in beaches itself for a week and kept in bales ready for shipping.

Kappaphycus farming

The farming of the seaweed Kappaphycus can be a low-cost venture and a profitable one, with the right site. The technology can use family labor in either fixed off-bottom or single raft long-line culture. The more line modules, the more investment and care are needed. After tying seaweed plantlets or "seedlings" to the ropes, and the ropes staked to the sea bed by bamboo or tied to floating rafts staked to the sea bed, seaweed farming needs no more inputs. There is periodic visitation, two to three times a week, to remove undesirable algae, barnacles, and attached sediments; to re-tie loose or fallen seaweed; to tighten lines; and to check for signs of "ice-ice" disease. Seaweed culture can last 45-60 days. In one Hectare 900 rafts can earn a net annual income of Rs. 4,60,000/- assuming per raft yields 280 kg of fresh seaweed per raft after grow out period of 45 days.. The ratio of fresh and dry seaweed is 1:10 and the price is Rs. 16/- per kg of dry seaweed (CMFRI Special Publication No. 104).

Technology profile

Get and select good quality seedlings; these are brittle, shiny and young branches with sharp pointed tips, no traces of grazing or whitened thallus (sign of beginning "ice-ice" disease), and 100-150 g.

For fixed off-bottom culture: while on land, tie seaweed seedlings 15-20 cm apart to the cultivation rope 10-20 m long with soft plastic string (commonly called "tie-tie"). Carry the ropes to the site at the lowest tide and tie both ends to stakes already placed 1-meter apart on the seabed. For single raft long-line ~ Tie seedlings as above but anchor ropes to a bamboo raft. A raft unit consists of four bamboos in a square arrangement as support with two ends tied in turn to anchor lines which are staked to the seabed. A longer raft long-line (50-70 m long) can be made;floats are regularly spaced in this instance to add buoyancy to the raft.In deeper waters (5-10 m), the hanging long-line may be best; less bamboo support is used but a good concrete block anchor is necessary.

Visit the farm two to three times a week. Remove undesirable algae, barnacles, or attached sediments. Re-tie loose or fallen seaweed. Check and tighten loose rope or stake. Check for signs of diseases; totally harvest crops immediately if present. Use new set of seedlings, change farming site / method, and use lower stocking density.

Harvest in 45-60 days. Seaweed can be sold wet or dry to processors. Dried seaweed brings more income if it is clean and with moisture content of 35-39%. It is best to keep harvested seaweeds off the ground (remember that the carrageenan is bound for products for human consumption). Use a layer of mat, fish net, or coconut leaves and constantly turn seaweeds to accelerate drying; or dry seaweeds in a platform or hangings lines. Sun-dry for 2-3 days.

Tie the seaweed in bales, then store in a clean, cool, dry and well-ventilated place while awaiting buyers.

Why Kappaphycus farming

High return on investment

Demand for seaweeds is high in the local and international markets

Culture period could be as short as 45 days under optimal conditions

Environment-friendly

Could be a source of supplemental income for small fisherfolk associations and people's cooperatives

The farming of the seaweed Kappaphycus can be a low-cost venture and a profitable one

Conclusion

Seaweed farming based primarily on the culture of Kappaphycus species has grown significantly in the Philippines and Indonesia over the last two decades, with growth also taking place at a smaller scale in India and a few other developing countries. Unlike other forms of aquaculture, seaweed farming foregoes the use of feed and fertilizers and has minimum technological and capital requirements. In addition, grow out cycles are short, normally lasting less than two months. Given these unique characteristics, seaweed farming has generated substantial socio-economic benefits to marginalized coastal communities in developing countries, most of which have reduced access to alternative economic activities. In some communities, seaweed farming has emerged as the most relevant livelihood strategy. Given the rising global demand for seaweed-derived products, seaweed farming has the potential to generate further socio-economic benefits to coastal communities in tropical regions.

Vegetative fragment of Kappaphycus

Kappaphycus farming by floating raft culture method

Fixed off bottom long line method of Kappaphycus farming in the lagoon

A long view of Kappaphycus farming by adopting fixed off bottom method

Harvested Kappaphycus

Harvested Kappaphycus along with raft

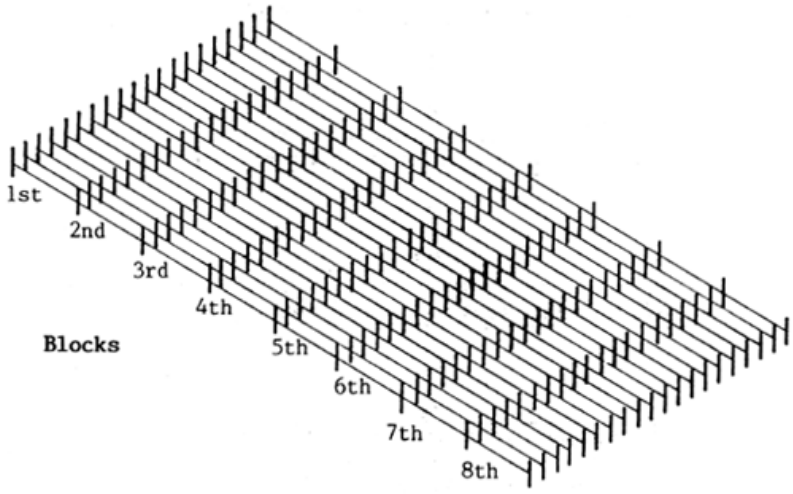

Diagram showing fixed off bottom seaweed farming method