Long line farming of *Kappaphycus alvarezi* in Tuticorin coastal areas and its implication on environment

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*Kappaphycus alvarezi*, one of the fastest growing tropical red algae, is currently been cultivated by a group of fishermen in many areas of Tuticorin coastal waters. It is used mainly as the raw material for commercial production of hydrocolloid known as Kappa carrageen. In Tuticorin, long line method of culture is followed in coastal waters where the tidal currents are strong. In this system, thin lines having loops to secure multiple small seedlings are spread at regular intervals attached to longer and thicker lines. Poly-ethylene terephthalate (PET) bottles with caps are used as floats (Fig.1). Weighed blocks are used as anchors and use sufficient quantity of floats to maintain the proper depth below the water surface level.

The extensive use of plastic bottles as floats in the long line seaweed cultivation reveals the lack or poor awareness among fishermen on the ban of plastics in Tuticorin, which came into force since 2011. In the long run, this would become one of the primary causes of marine litter build up and the liberation of micro plastics causing hazardous effects to the marine environment. These micro plastics (>5 mm) are usually produced because of the mechanical force like waves and photochemical process triggered by sun light on large plastic materials which are damaging the filter and deposit feeder fauna. Worldwide micro plastics has become a paramount issue due to the alarming effect it cause to the ecosystem.

Each crop of *Kappaphycus* takes an average 40 days and the average productivity from a single mainline rope is up to 2100 kg. Normally, 40% of the harvest is used for reseeding the upcoming crop. The wet product fetch 3.50/kg and the sun dried ones will realize up to 25/kg. They get an average income of up to ₹ 7400/- if they sell the wet product and the sun dried product can fetch an additional income of up to ₹ 500/-. Considering the poor labor inputs, lesser expenditure and infrastructure
requirements, this becomes a good income source for the poor fishermen families. It is important to make this sector of people aware on the impacts of the plastic pollution caused to the ecosystem and how they attribute it. Proper financial assistance through government agencies can be given to the genuine farmers for building up quality infrastructure which will help to maintain the income to these poor families and to reduce the pollution through these sources.

Economic analysis of fishmeal plants in Uttar Kannada district, Karnataka

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Fishmeal is a highly concentrated nutritious feed ingredient produced by processing of low value fishes and trash fish which are either not suitable for human consumption or has limited consumer preference. It is mainly used as ingredient for preparation of aqua feeds, poultry feeds or animal feeds. The growing demand for aquafeed production and increased landings of low value fishes promoted the establishment of a number of fishmeal plants in the country. Oil sardines, stomatopods, silver bellies and other trash fishes are usually preferred for preparing fishmeal. The trash fishes once discarded by the trawlers are now brought to shore as they realize an economic value owing to the demand from fishmeal plants.

The fishmeal plants convert the trash fish and other low value fishes and fish wastes to fishmeal. Byproducts like fish oil or fish manure are also produced by the fishmeal plants. In India, fishmeal plants are operating in the states of Karnataka, Kerala, Maharashtra, Gujarat and Tamil Nadu. The state of Karnataka has the maximum number of fishmeal plants mainly located in Mangalore and Uttarkannada regions. The present study deals with the economic analysis of fishmeal plants operating in Uttarkannada district of Karnataka. The annual net profit, benefit cost ratio and return on investment were worked out.

There are two fishmeal plants in Uttarkannada district, the Annapoorna bioproteins located at Baithkol and Anfal feed plant at Amdali. These plants operate for a period of nearly nine months depending on the availability of raw material in the region. Both units produce fishmeal and oil which are used as ingredients of aqua feeds. These units have processing capacity ranging from 100-400 tonnes of fish per day. Oil sardines are mainly used for fishmeal as it yields more oil when compared to other fishes. The purchase price of oil sardines varies.