

Upcycling Crab Waste For Sustainable Livelihoods



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This illustrated booklet is a part of the “Unlocking India's Blue Economy Pathways” information series.

Dakshin Foundation is a charitable organisation, working towards the sustainable development of India's coastal communities.

SeaChange is our intersectoral approach towards achieving the twin goals of healthy ecosystems and thriving communities. The SeaChange model employs a systems approach to address the complex challenges facing India's coastal and marine systems. In several sites across the Indian coastline, fisher livelihoods are severely undermined by ecosystem degradation, fish stock declines, systemic poor health outcomes, climate challenges and poor resource governance. SeaChange interventions target such interlinked challenges by applying contextual solutions in partnership with local communities and system actors.

In alignment with SeaChange, this illustrated series presents Dakshin's intersectoral interventions towards building blue economy pathways for India's diverse coastal communities.



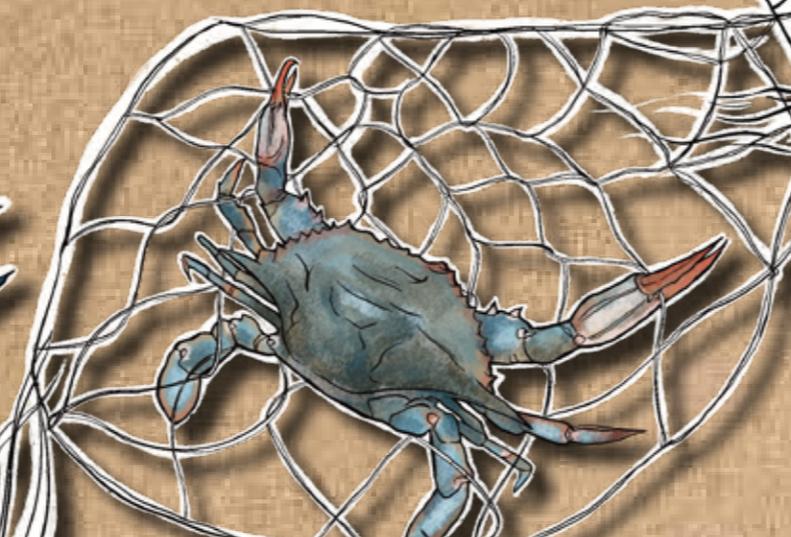
Palk Bay's shallow, nutrient-rich waters and extensive sea grass meadows provide ideal breeding, nursery and feeding grounds for Blue Swimmer Crabs (*Portunus pelagicus*).

These ecological conditions support a thriving Blue Swimmer Crab (BSC) population, making the species abundantly available throughout the year.

The estimated annual production of BSC is around 53,476 tonnes, contributing significantly to crustacean landings, with gillnets accounting for about 74% of the catch. As a high-value export commodity, BSC generates substantial economic benefits for both local fishers and exporters.



Small-scale fishers in Palk Bay have long depended on the BSC fishery as a primary source of livelihood. They operate both motorized boats and non-motorized crafts, typically using gill nets, designed specifically to target the BSC. Fresh crabs are processed into high-value crab meat products and exported to the USA and European countries, producing more than a thousand kilograms of crab shell waste daily.



Freshly harvested crabs are weighed and graded according to export standards, after which they are boiled to extract meat for processing and packaging.

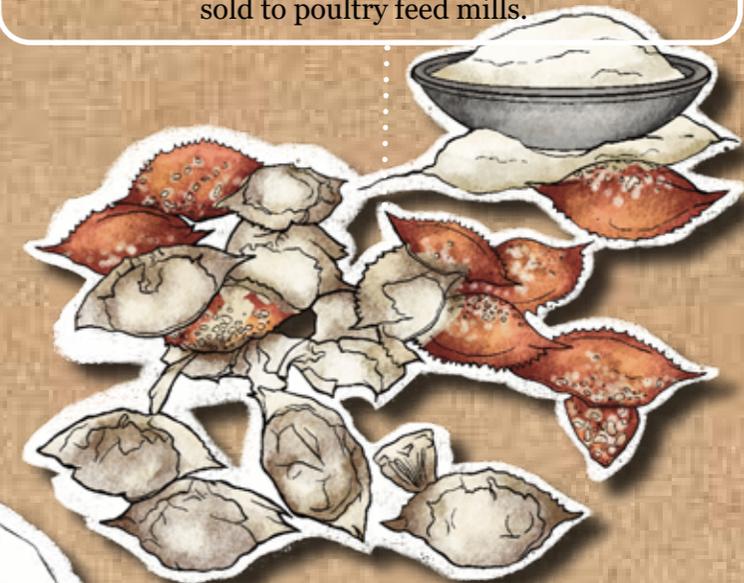


Processing units then clean, sort, and package the meat.

These products are exported to international markets, primarily in the USA.



The leftover crab shell waste is collected, by the middlemen from the crab meat processing units. The sun-dried crab shells are packed in gunny bags, and sold to poultry feed mills.



**Every day, hundreds of kilograms of crab shell waste are produced across the Palk Bay region. This material holds significant potential for value addition through the production of chitin and chitosan; however, its utilisation remains largely untapped.*

There is strong market demand for chitin and chitosan, versatile biopolymers with diverse applications, derived from crab shell waste. However, small-scale producers often face barriers in accessing these markets.

Dakshin's initiative aims to bridge this gap by building rural production capacities and linking them to high-value markets. By enabling women's Self Help Groups (SHGs) to upcycle crab shells into valuable products, the programme will create supplementary livelihood opportunities, promote gender inclusion, and strengthen local economies.

Through targeted capacity building and market facilitation, this effort supports inclusive economic participation, fosters equitable growth and advances sustainability by turning waste into valuable resources.

Applications of chitin-chitosan



Effluent water treatment



As food coating materials



As animal feed additives



Pharmaceuticals & nutraceuticals



Cosmetics



Steps for Chitin-Chitosan Production from Crab Shell Waste

Crab shell waste is collected, washed and sun-dried to remove moisture and impurities.

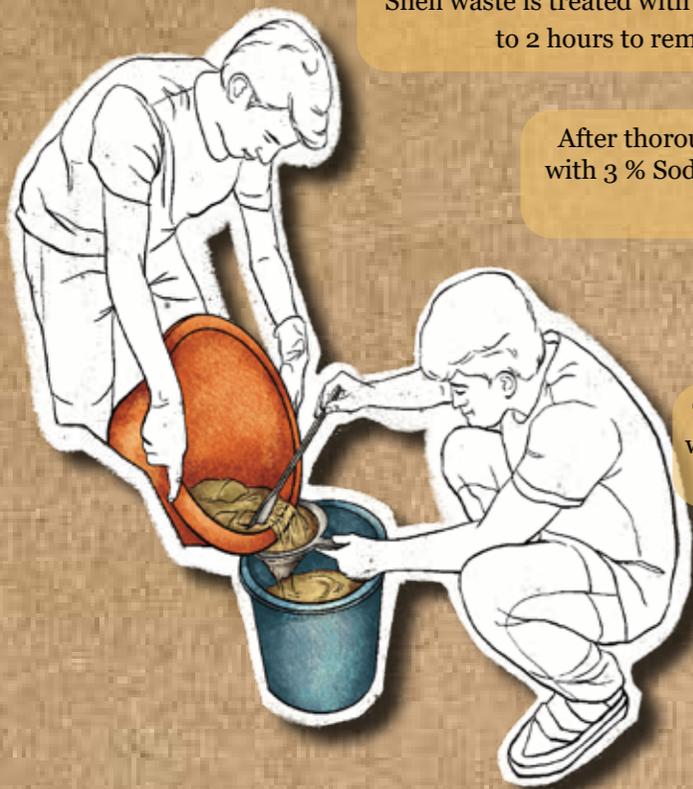
Shell waste is treated with diluted Hydrochloric acid (HCL) in a ratio of 1:10 for about 1 to 2 hours to remove the minerals from the shell (demineralization).

After thoroughly washing and drying, the demineralized shell is treated with 3 % Sodium Hydroxide solution (NaOH) and heated at 80–90°C for 1 hour (deproteinization).

Further washing and drying yields chitin.

The chitin obtained from the previous step is further treated with NaOH solution , in a 1:1 ratio, at a high temperature , for about 3 hours. (deacetylation).

The deacetylated Chitin is washed and dried to obtain Chitosan.



Chitin -A natural polymer found in crustacean and insect shells, it is the second most abundant biopolymer after cellulose.

Chitosan - The deacetylated form of chitin, it has applications in pharmaceuticals, agriculture, and water treatment.

Demineralization - This is the process of treating crab shells with a strong acid solution, such as HCL, to remove minerals.

Deproteinization - This is the process of treating crab shells with a strong alkaline solution, such as NaOH, to remove proteins.

Deacetylation - This is the process of removing the acetyl groups from the chitin by treating crab shells with concentrated alkaline solutions at a high temperature.

