

Seaweed

Priority statement

Seaweed represents a **MEDIUM to HIGH** priority for pro poor development. It is of growing importance for the national economy as well as for the diversification and sustainability of coastal livelihoods, some of which are landless families with high rates of poverty. It has been prioritized by Government but does not appear to be the subject of extensive recent research. However it should be noted that at present there are only relatively small number of farmers involving in the sector (over 600 thousand farmers), and in addition to that the industry is still plagued by limited potential to increase production, price volatility, and physical access to markets and post-harvest application.

East Java, NTT and NTB are among the largest producer of seaweed in Indonesia. In total they contribute one third (33%) of national production of Indonesia (see Table 1).

Table 1. Seaweed production statistics for selected provinces in Indonesia

Basic Statistics	East Java	West Nusa Tenggara (NTB)	East Nusa Tenggara (NTT)	Indonesia
Area of Production (ha) ²	16,000	22,000	10,000	2.6 million
Volume of Production (tonnes) (2009) ²	340,000	147,000	498,000	3 million
Yield (t/ha)	21	7	49	
Value of Production ¹ (Rp 1,000) (2005)	1,500,000	785,000	-	18,000,000
People Employed ³	230,000	98,000	330,000	2 million
Sources: ¹ Ministry of Marine Affairs and Fisheries (MMAF) (2007) ² MMAF and JICA (2011). Indonesian Fisheries Book 2011 ³ Estimates based on national yield of and ownership of 50 lines of seaweed per farmers				

Poverty and sustainability

Is there potential to reach large numbers of poor households in production and post-production?

There is medium potential to reach a large number of poor households.

- It has been estimated that the Indonesian industry supports close to 2 million farmers, of which around 30% are from the NTT, NTB and East Java.
- Beyond the farm level, development could impact the trader, exporter and processor industries.

What is the potential to increase income for producers?

The potential is medium.

- Typically, seaweed aquaculture provides the sole source of cash income for coastal dwelling, landless households, who otherwise depend on subsistence farming, and/or (increasingly failing) artisanal fishing.
- The average annual income of seaweed farmers is far below the poverty line, IDR 7-8 million. This is mainly because they only have a small plot of seaweed and a limited season to grow it.
- Main opportunities for increasing smallholder incomes are improved co-ordination of farmer groups, value adding, production process improvement, processing and market development.
- The increasing complexity of the product processing and transformation along the value chain limits the options for value adding of the primary product beyond the production level.
- Current research is assessing the development of technology and means to produce seaweed fertiliser products from the water removed from the seaweed and using these seaweed fertilisers as alternative income streams for farmers and processors.
- Farmers are expected to receive benefit from improved post-harvest processing via reduced transportation costs and increased farm gate prices. By creating a fertiliser using the by-products of on-farm processing, farmers will benefit from an increase in cash income or increased productivity of their family farms.

Does the chain/commodity fit with the focus of Government programs and priorities?

The growth of the seaweed industry is a top priority for Indonesia.

- Since 2008, Indonesia ranks as the top producer of tropical seaweeds for extraction of food additives and stabilizers, and mostly all of Indonesia's production comes from the Eastern Islands (tonnes and %).
- The Government aims to produce 10 million tons of seaweed by 2015, becoming the largest producer in the world. In order to promote expansion, the government has facilitated the development of seaweed to 2.6 million hectares in 2010.
- In order to coordinate the seaweed industry development in Indonesia, it was agreed in 2010 that 5 ministries and 1 body (MMAF, MoT, MoI, Ministry of Coop and SME Development, Ministry for Acceleration of Disadvantage Areas and Coordinating Body for Capital Investment) would collaborate to accelerate socio-economic development. The collaboration is led by Ministry for Acceleration of Development Disadvantage Areas.
- The government of NTB has launched the PIJAR “ Sapi, jagung ,rumput laut – cattle, maize and seaweed” program, which aims to make the province a key source

of seaweed and to increase seaweed production from 220,000 tons in 2010 to one million tons by 2013.

- NTT, East Java and NTB are ranked no 4, 6 and 7 respectively in the top seaweed production centres in Indonesia. The districts focus of each province as follows: NTT: Alor, Kupang and Sabu. NTB: Lombok Timur, Sumbawa and Lombok Barat, and East Java: Sumenep, Situbondo, Banyuwangi.

How project-crowded is the sector? (To what extent are sector needs addressed by current donors?)

- There are six donor projects that include the seaweed sector as one of their areas of intervention.
- CIDA is the only donor that is currently active, but in the past GTZ, AusAID, IFC, ACIAR and COREMAP provide significant input to the sector. Most of the projects are not exclusively targeting seaweed farming but tackle issues such as SME clusters, promotion of cross-border value links, business development, and post-harvest processing.

What is the agro - ecological feasibility?

Medium

- The marine environment in Indonesia is among the most productive in the world for seaweed growing due to its currents and tropical conditions, allowing Indonesia to become the world's biggest dried seaweed exporter with its annual exports reaching 145,000 tonnes, or about 50% of the tropical world's total exports of 290,000 tonnes.
- However there has been recent productivity declines from slower growth rates, and increased incidence of the bacterial 'ice-ice' disease.

Sustainability (economic and environmental)

The sustainability is high, both economically and environmentally.

- Seaweed is a rapidly expanding sector and provides the biggest aquaculture output. There is a growing world demand for carrageenan and Indonesia is well positioned as a market leader to increase production and exports.
- At farmer level, sustainability of the business is vulnerable to fluctuating prices and quality of production, however due to low input costs and compatibility with other economic activities seaweed farming is a viable source of additional income.
- Farm and community level processing sector development provides the opportunity to turn by-product into valuable resource increasing profitability and reducing environmental impacts.
- Seaweed farming has far fewer environmental impacts than other mariculture. However it can have some impacts on sedimentation and water movement or alteration to the natural habitat. Sea grass beds can be negatively impacted by the change in light and water quality due to the introduction of seaweed on the water surface.

External risk

These are considered high.

- The long-term success of seaweed farming is directly linked to the fluctuation of market prices, and their volatility presents the biggest risk for the development of the sector.
- The introduction of the activity can be quickly compromised if prices drop. This was clearly demonstrated in 2008 by the sharp fall of prices – prices of IDR 5,000 rocketed to IDR 18,000 and then dropped to under IDR 10,000, resulting in a drop in production in Indonesia.
- The lack of seaweed nursery grounds in farming areas pose a medium to long term risk to the industry.
- ACIAR sponsored scoping missions found an alarming, widespread drop in productivity in the aquaculture of these seaweeds in Indonesia, mainly due to three common characteristics:
 - 1) slower growth rates,
 - 2) increased incidence of the bacterial (*Vibrio* sp.) disease 'ice-ice', and
 - 3) increased epiphyte (*Neosiphoniaapiculata*) infestations.
- The changing of sea water temperatures and current patterns as well as the sea pollution pose additional risk to seaweed farming.

Structure of the chain

What is the potential for improving market access?

Limited

- The market can often be described as oligopsony with farmers at village level having to sell dry seaweed directly to only a few buyers (collectors or middlemen).
- Incentives and market transparency are important but lacking. The average moisture content of dried seaweed produced by the farmers is between 38 to 45% and the dirt content is between 5 to 15%. This is far below the National standard that is set at 38% for moisture content and 5% for dirt content. Unfortunately at the farm level generally producers get same price regardless of the quality, consequently the producers are not interested in improving seaweed quality.
- Farmers' market access can be improved through change in power relations along the chain involving the review of farmer groups, organizational design, chain governance and power relationships.
- Market access can be improved if production is clustered and coastal road accesses, as well as drying and storage infrastructure, are improved.

Is there potential for post-harvest productivity value-added?

There is limited potential at the farm gate level.

- The current market chain emphasizes export of raw seaweed. It is based on a network of producers, collectors and traders with the majority of the seaweed being exported prior to value-adding transformation.

- However, the new government policy for the development of the sub-sector is aiming to create the conditions for value to be added close to Indonesian sources. Currently, Indonesia has 34 seaweed processing factories of which only 20 are operational, and local seaweed processors have a capacity of about 120,000 tons a year.
- Farm and community level processing sector development provides the opportunity to turn a waste product into valuable resources such as fertilizers.

What is the scalability and transferability potential?

Medium

- There are 15 Provinces in Indonesia (including NTT, NTB and East Java) that are currently involved in seaweed production thus indicating the scalability potential of the research.
- Findings are transferable to other marine fishery commodities.
- Both the scalability and transferability are limited by the availability of infrastructure, access to finance and the recent decline of industry growth that will limit the capacity of early adopters.

Is there sufficient infrastructure availability?

- There is limited availability of suitable infrastructure such as good drying and storage facilities, and road access from remote production areas to the network of bigger traders and/or exporters.