GlobalSeaweedSTAR Workshop

Changing the International Landscape of Seaweed Aquaculture

Madagascar: Seaweed for Life

Project GSS/RF/055

10 November 2021

Global Seaweed STAR Finale

10 Nov 2021

The GlobalSeaweedSTAR team invites you to join us online at our finale to hear all about the impact and legacy that this unique programme has created for the global seaweed industry.

12-2 PM GMT

Seaweed for Life: Using Seaweed to Respond to Madagascar Food Security & Stability Emergency

Jamie Spencer OBE, Feedback Madagascar

Dr. Duncan Wood, IAS

Fiona Houston, Mara Seaweed

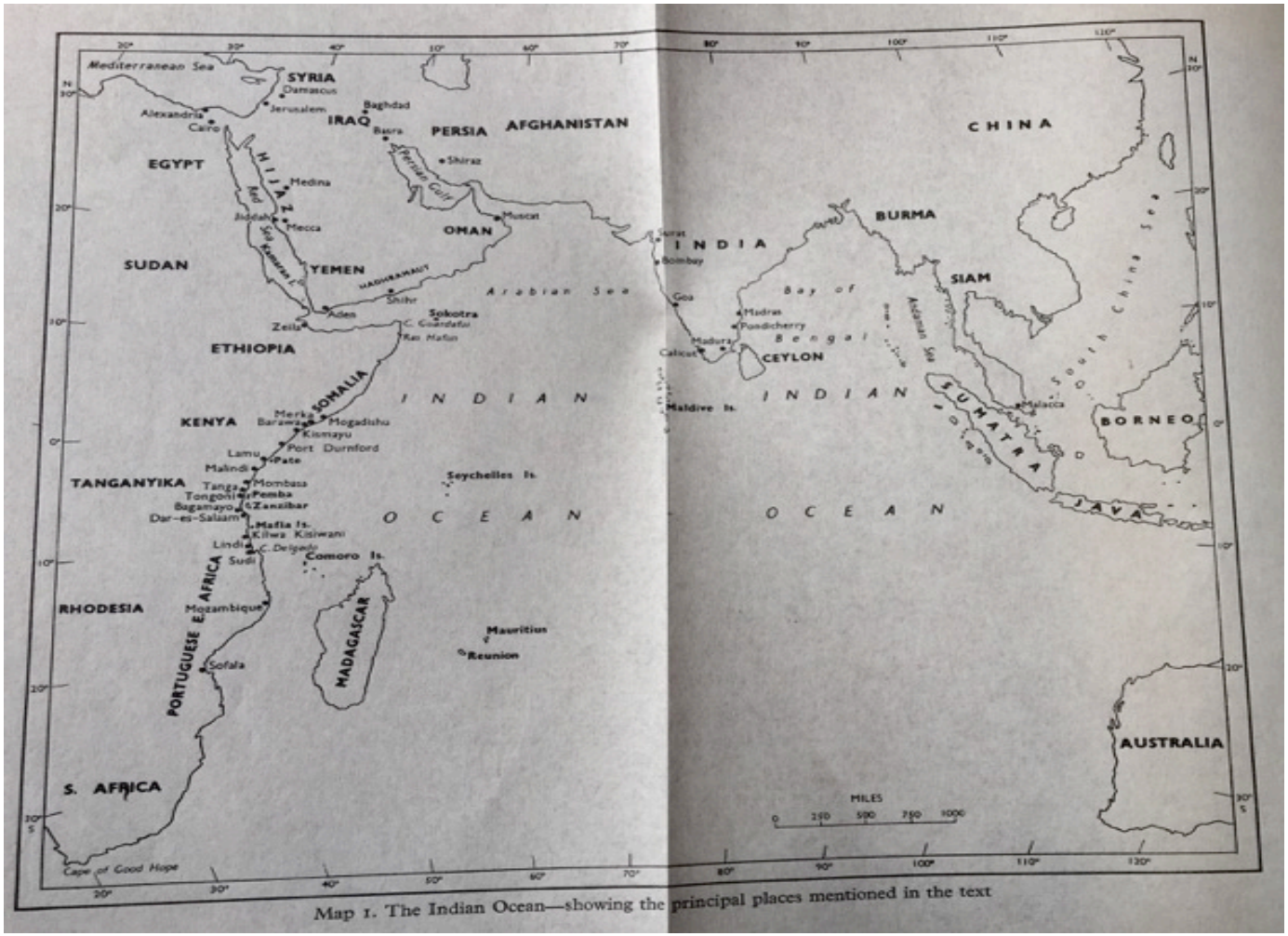
The Challenge:

Seaweed is a delicious & nutritious food.
Madagascar is starving.
It has abundant seaweed but none is used for food in Madagascar.

The Solution:

Transform the Madagascar Food Matrix by introducing seaweed into the food supply chain.

Madagascar Location: A Massive Island
At a crossroads of the Indian Ocean Trade Winds



Map 1. The Indian Ocean—showing the principal places mentioned in the text

Madagascar Geography: 4th largest island in the World, home to 5% of the earths species, nearly all endemic, a wide variety of ecosystems & 5,000km of Coastline

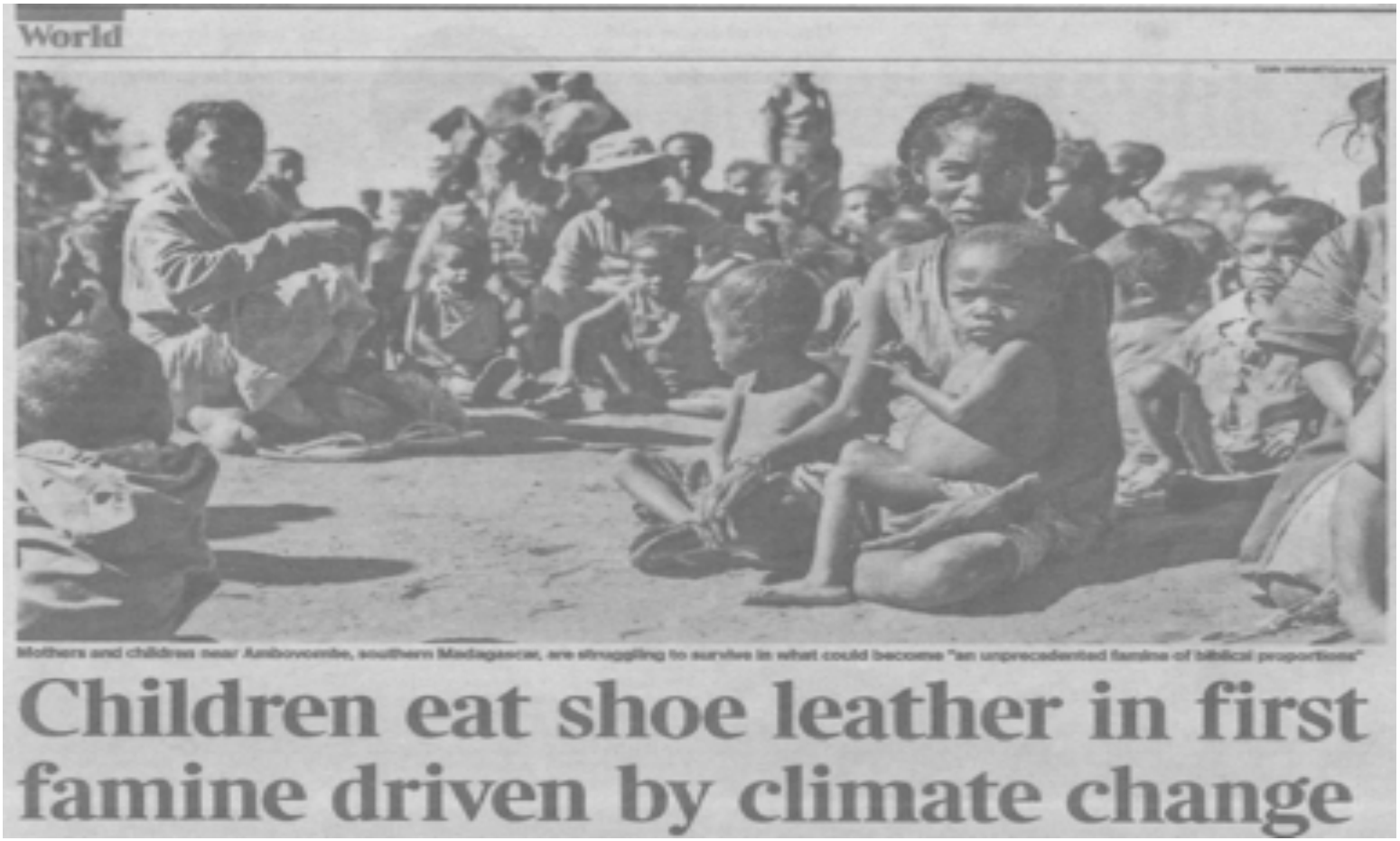
Current Situation

Madagascar:

- Population of 26 million people.
- 7th poorest country in the world.
- 114 out of 117 on the world hunger index.
- Huge proportion of the population in the vulnerable category due to malnutrition.
- 50% of children malnourished.
- 25% of children severely malnourished.
- Southern Madagascar is suffering worst drought & famine in 40 years.
- 1.5 million people living with insufficient food.
- People are eating leather, clay and ash to try and abate hunger.

The Times- Madagascar Famine

by Jane Flanagan - 2021



Ambovombe- Southern Madagascar
Watering Cattle with Seawater during Drought
Photo by Mara-FBM Project Team

The Project:
Seaweed for Life
Transforming the Food Matrix

A proof of concept project helping to transform the food matrix in Madagascar, demonstrating that seaweed can be used as a sustainable locally sourced food supply to provide valuable nutrition and health benefits potentially to >100,000 Malagasy school children per day.

The Project Team

A unique cross-disciplinary development project team combining:

- UK Government Foreign Aid funding
- A commercial UK food company
- Partnered with an in-country development NGO

Working in close collaboration with:

- A UK based food poverty NGO
- An in-country government institute
- A leading US Nonprofit, US University & US Donors

The Project Team

Mara Seaweed

(www.maraseaweed.com)

Feedback Madagascar

(www.feedbackmadagascar.org)

Institute for Applied Science

(www.iapscience.net)

Project Team Collaborators

Institut Halieutique et des Sciences Marines

IHSM –the Madagascar Government's marine institute

Providing in-country macro-algae expertise & support

George Washington University

https://elliott.gwu.edu/ - Washington, DC

Providing masters program development economist interns supporting project scale up & financing

Institute for Applied Science

www.iapscience.net Washington DC

Providing additional and follow on funding funding

Mary's Meals

https://www.marysmeals.org.uk/

Providing funding for school meals

Mara Seaweed

Mara is a leading UK seaweed food company based in Scotland, focused on sustainable seaweed supply chains from sea to table.

Mara Seaweed is widely sold throughout the UK and the USA in food service, food ingredients, and retail.

Mara Seaweed – From Sea to Plate

Feedback Madagascar

Feedback Madagascar is a charity with over 25 years of experience in rural development intervention in Madagascar.

A Malagasy staff of over 190 with four regional hubs, offices and field agents living within and engaged with the communities, and good working relations with central government, local authorities and NGOS including IHSM - the Marine Sciences and Fisheries Institute in Madagascar.

Feedback Madagascar

Feedback Madagascar addresses peoples' primary needs (health, sanitation, agriculture) allowing them to focus on longer-term challenges (education, legal tenure, livelihoods), clearing a path to the creation of sustainable livelihoods and better environmental stewardship.

This process saves lives, improves community health, food security, education and prosperity, and protects the land on which they depend.

So far Feedback has helped protect over 164,000 hectares of forest, fauna and flora.

Mara-FBM Project Philosophy

Effective economic development & environmental protection requires a genuinely bottom-up, local, Malagasy approach.

As Feedback Madagascar CEO Jamie Spencer explains:

"*All projects that are interested in managing the forest and the marine environment, saving natural habitat or preserving species or providing ecoservices or CO2 reduction etc. must first and foremost be "Human" projects that work to understand, and resolve the problems of life's daily struggles for the rural population of Madagascar.*"

Mara-FBM Design philosophy

Meeting UN Development Goals

Transforming the Food Matrix in Madagascar

Sustainable Seaweed Food Supply Chain

Identifying & Developing Seaweed Supply

Identifying & Developing a Market for Seaweed Food

NPD: Developing a Dried Milled Seaweed Food

Enhanced Nutrition & Approved Health Claims

Tastes Good

Food Safety & Sustainability

Supported by public opinion

Project UNDP Sustainable Development Goals

What Algae are available in Madagascar?

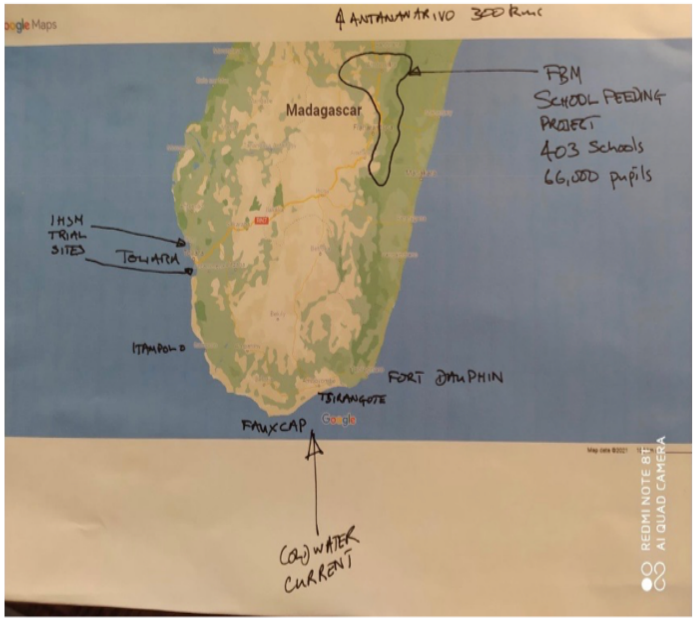
Farmed eucheuma is grown commercially for carrageen extract export in the South West around Toliara. 2016 production = 1500 dry tons

Farmed spirulina is grown experimentally by IHSM at Toliara in the South West and available in health shops and herbalists.

Wild Seaweed: Red, brown & green seaweeds including ulva (sea lettuce) is found in colder water in the South near Ft. Dauphin.

Maps showing main seaweed areas in Southern Madagascar:Toliara & Ft. Dauphin

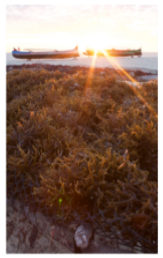
Toliara surface sea temperature = 22C to 29C;
Ft. Dauphin surface sea temperature = 21C to 26C



Cultivated Seaweeds in Madagascar

Seaweed Species Currently Under Cultivation in Madagascar

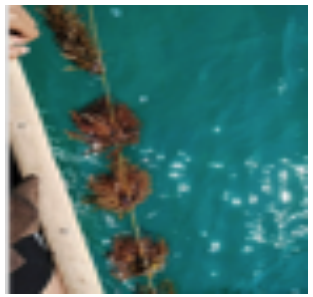
Gelidium Madascariense, Harvested Eucheuma drying & Harvest Boats, Eucheuma Denticulatum



Mara-FBM site visits to current harvesting areas North of Toliara

Mara-FBM site visits to Toliara seaweed harvests with IHSM

Project Coordinator Eugenie Raharisoa with
IHSM Research Director Richard Rasolofonirina



Mara-FBM site visits to Deep South

In the deep South towards Ft. Dauphin and South of Ambovombe the project team opened discussions with village leaders regarding seaweed production, and the potential for FBM to provide deep boreholes for water for cattle and the public and to provide emergency feeding to the community to combat famine.

As agriculturalists and not fishing villages they are inherently more predisposed to adapt to a cultivation, harvesting and processing activity such as seaweed harvesting than are the hunter-gathering fishermen on the SW coast where most of the current harvesting activity is undertaken.

Mara-FBM site visits to Deep South

The local economy in the deep South is based on livestock and agriculture and not fishing, so villages are desperate for a drought-proof livelihood.

Identifying a Route to Market for Seaweed Food in Madagascar

Seaweed is not part of the traditional diet in Madagascar. Developing a route to market is necessarily challenging.

However, Feedback Madagascar has an established network having already developed water, school and work resources in 403 villages.

Feedback Madagascar's school meals program currently feeds 66,000 children per day, rising to 100,000 in 2022.

This is an ideal initial route to market: an established and trusted delivery mechanism providing enhanced nutrition and health benefits to children facing famine.

Map of Feedback Madagascar activities & seaweed areas in South

NPD: Developing a dried, milled seaweed flour for Madagascar school meals

The project team have conducted analysis of Malagasy eucheuma, ulva and spirulina as well as other seaweeds to calculate their nutritional values and health benefits.

The project team have also experimented with various mixes of coarse and fine milled seaweed flour.

The project team have also calculated the nutritional gain from adding this seaweed flour to the daily school ration.

Putting it all together in a proof of concept new food product

The preferred algae option is a combination of Malagasy seaweed and spirulina.

The preferred milling option is a dried fine milled seaweed flour which is easy-to-use and has a long-shelf life.

The preferred “seaweed flour” portion size is 2 grams seaweed & 2 grams spirulina.

Dried coarse & fine milled mixed seaweed flour

Proven nutritional & health benefit to school meals program

The project team analyzed the school meals provided via Feedback Madagascar & calculated their nutritional value without the addition of seaweed flour and then with the addition of seaweed flour.

Based on 4 grams seaweed per 200 gram meal:

Significant Nutritional uplift in vitamin & mineral content:

Iodine, Potassium, Calcium, and Magnesium - providing the main elements or ‘building blocks’ that contribute towards muscle growth and function (critically important for children), normal growth and development of bones and prevention of osteoporosis.

Feedback Madagascar -Rice & Vegetable School Meal Mineral Content

	Without Seaweed	*With Seaweed*
	- MINERALS & TRACE ELEMENTS -	
Sodium	414mg	450mg
Potassium	135mg	174mg
Chloride	652mg	707mg
Calcium	26.3mg	35.8mg
Phosphorus	32.3mg	34mg
Magnesium	10.4mg	18.1mg
Iron	0.5mg	0.53mg
Zinc	0.26mg	0.31mg
Copper	0.12mg	0.15mg
Manganese	0.19mg	0.2mg
Selenium	3.9µg	3.9µg
Iodine	1.4µg	43µg

Feedback Madagascar –Rice & Lentils
School Meal Mineral Content

	Without Seaweed	*With Seaweed*
- MINERALS & TRACE ELEMENTS -		
Sodium	470mg	512mg
Potassium	98mg	144mg
Chloride	752mg	814mg
Calcium	18.9mg	30.1mg
Phosphorus	49mg	51mg
Magnesium	14mg	23mg
Iron	0.95mg	0.98mg
Zinc	0.44mg	0.5mg
Copper	0.17mg	0.21mg
Manganese	0.18mg	0.19mg
Selenium	4.6ug	4.5ug
Iodine	0.74ug	50ug

Feedback Madagascar
Delivering School Meals

Feedback Madagascar
Meal Time

Next Steps: Roadmap for Scale Up

Objectives:

- To meet school meal requirements.
- To address famine and economic distress in southern Madagascar.
- To provide long-term resilience & action on environmental shock caused by Covid, drought and famine, by alleviating the damage to Madagascars' forests through blue economy solutions to food shortages in Madagascar.

Acknowledgments

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