

Newlab



Piloting a Sargassum Value Chain in Puerto Rico

CREATING THE CONDITIONS FOR WORLD-CHANGING IDEAS TO BECOME REAL-WORLD SOLUTIONS



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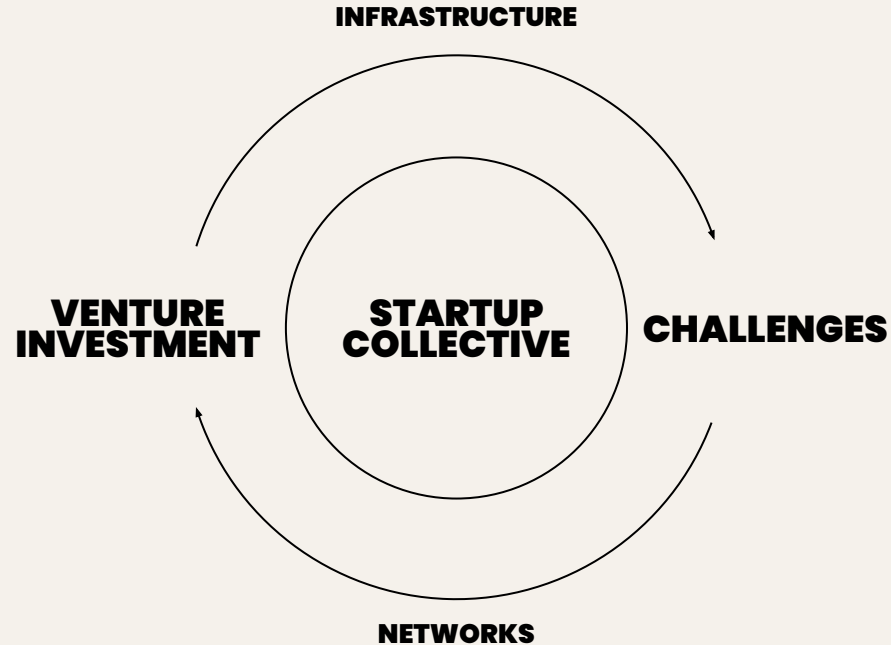
MICHIGAN CENTRAL

WE ARE A COLLECTIVE OF ENTREPRENEURS, ENGINEERS & SCIENTISTS



A PEER-TO-PEER COMMUNITY OF ACTION-ORIENTED BUILDERS DRIVING CHANGE IN THE WORLD.

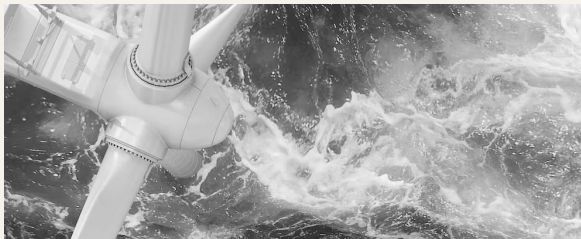
NEWLAB IS A CENTER OF INVENTION CREATING THE CONDITIONS FOR WORLD-CHANGING IDEAS TO BECOME REAL-WORLD SOLUTIONS.



FOCUSED ON CHALLENGES FACING INDUSTRIES CENTRAL TO OUR SUSTAINABLE FUTURE

ENERGY

TRANSITION THE WORLD TO ABUNDANT,
SUSTAINABLE ENERGY SYSTEMS



MOBILITY

REDUCE MOBILITY ENVIRONMENTAL IMPACT
AND UNLOCK SOCIO-ECONOMIC GROWTH



MATERIALS

ENABLE A FUTURE GENERATION
OF SUSTAINABLE PRODUCTS
AND RESILIENT SUPPLY CHAINS



CONTEXT

THIS PROJECT IS A COLLABORATION BETWEEN INVEST PUERTO RICO AND NEWLAB FOCUSED ON ENABLING THE CONVERSION OF LAND-BASED OR MARINE WASTE INTO HIGH VALUE-ADDED PRODUCTS

Our mission is to co-design and deploy a series of pilots that serve as proof cases for innovative solutions to the island's waste crisis and validate the waste-to-x market in Puerto Rico.

INVEST PUERTO RICO



InvestPR works to elevate Puerto Rico as a world-class business destination. The organization is a public-private partnership created by law and incorporated as a 501(c)3 nonprofit. It is governed by an eleven-member Board of Directors appointed by the Governor of Puerto Rico and is comprised of three public sector representatives and eight private sector representatives.

Their mission is to promote Puerto Rico as a competitive investment jurisdiction to attract new business and capital investment to the island. Their vision is to be a transformational and results-oriented accelerator of economic development in Puerto Rico.

SARGASSUM IN PUERTO RICO

MATERIAL COMPOSITION

Carbohydrates 35-50% (Cellulose, Laminarin, Alginic Acid, Fucoidans), Proteins 10-20% (Laminin, Collagen), Lipids 1-5% (Fatty acids), Minerals 10-20% (Calcium, Magnesium, Potassium, Sodium), Others 5-15%

PROJECTED ANNUAL TONNAGE

Material	Projected Annual Quantity (Tons) Generated	Formally Managed (Y/N)
Sargassum	1,097,000	N

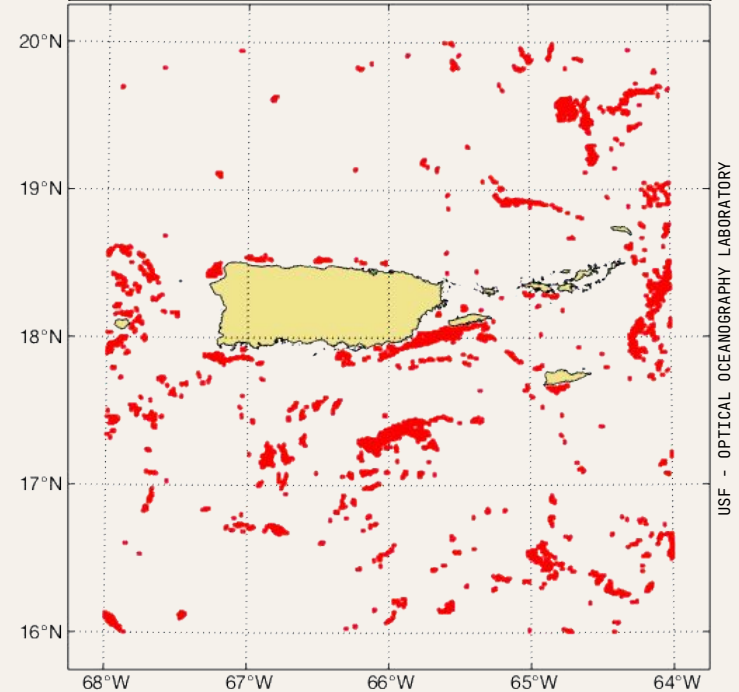
FEEDSTOCK ACCESS

Seasonality: High season, May to October

Some sargassum collection is managed by the hospitality industry and municipalities.

Would require DRNA and potentially USACOE permits/approval

SARGASSUM PARTICLE TRAJECTORY [2018]



OPPORTUNITY: BUILDING THE FUTURE SARGASSUM VALUE CHAIN IN PUERTO RICO

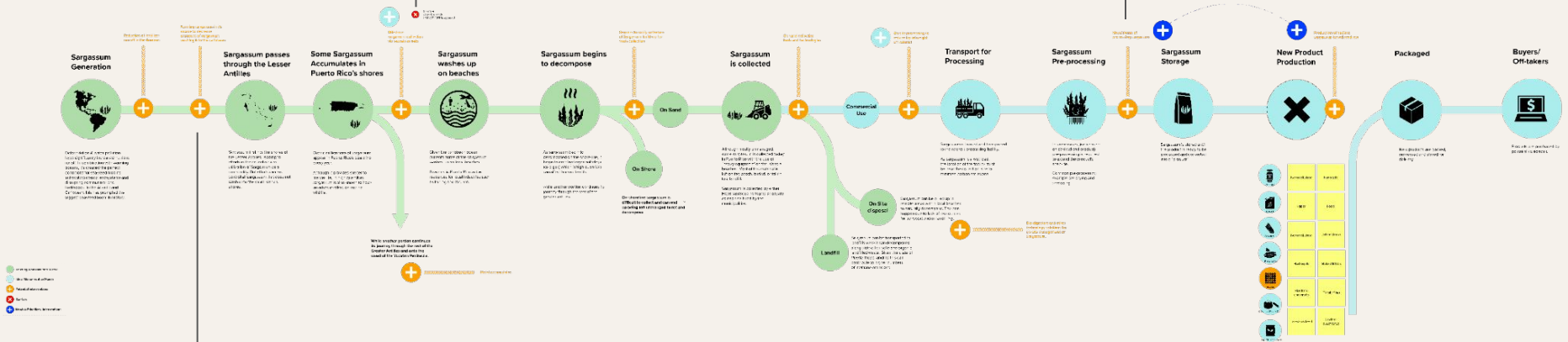
Sargassum Value-Chain

INNOVATION PATHWAY:

Onshore and offshore collection of sargassum in more effective and efficient ways

INNOVATION PATHWAY:

Novel forms of processing sargassum in cheap, effective and sustainable ways



INNOVATION PATHWAY:
 Harvesting sargassum to prevent shoring and stabilize feedstock access.

INNOVATION PATHWAY:
 Production of high value added commodities or products (e.g. PHAs, textiles)

SARGASSUM TO PILOT CONCEPTS

	INNOVATION PATHWAYS TO END PRODUCTS			
Innovation Pathways	DOMESTICATION	COLLECTION	PRE-PROCESSING & PROCESSING	PRODUCTIZATION
Products	Sustained (non seasonal) supply of fresh sargassum	Supply of fresh sargassum, varying by season	Dried shredded shelf stable sargassum Refined materials (e.g. alginate, fucodians, proteins),	Fuels, PHA plastics, fibers, pigments, etc.
Pilot Concepts	FARMING SARGASSUM	COLLECTION PILOT	OFFSITE BIOREFINERY MODULAR BIOREFINERY	BIODIESEL BIOPLASTICS (PHA) BIO-TEXTILES TEXTILE DYES CONSTRUCTION MATERIALS

SARGASSUM: PILOT VISION

PILOT PERIOD – PHASE 1

Feb 2024

FUTURE PLANS – PHASE 2

Dec 2024

Demonstration collection and study on bycatch and impacts of near-shore sargassum collection to **inform and shortcut permitting processes**

Ramp up of sargassum collection operations including involvement of local fishing communities and coordination with tourism industry



Delivery and testing of **on-the-ground micro-biorefinery** in PR with collected sargassum.

Continued establishment of **additional micro-biorefineries** to serve developing sargassum market in PR



Exploration and production of **sargassum-based yarn and integration** into existing product line with focus on **supply chain development**

With successful pilot, creation of manufacturing facilities in PR to utilize local textile industry and integrate corporate partners



Lab testing of integration of sargassum into bioplastic film production using proprietary process

Scaling up of plastic packaging film production. If pilot is successful, desire to locate manufacturing plant alongside feedstock in PR.



OUTCOMES

Solution to address the part of the **22M+ tons of sargassum** in the Caribbean annually, which **increased 20% between 2021 and 2022**.

Alleviate the estimated **\$120M cleanup costs in the Caribbean** for 2018 and the estimated up to **30% decline in tourism** in the region

Dozens of jobs created in fishing communities through sargassum collection, drying and milling activities

Partnerships with hospitality industry and municipalities to address sargassum issue and **generate local income**

Addressing potential ecological, health and environmental issues through the release of hydrogen sulfide from decomposing sargassum

Bio-based chemicals and compounds are a growing market. The main product from sargassum, **alginate's market was valued at \$770M in 2021** and is predicted to increase at a CAGR of 5.02% to reach USD \$1.2B by 2030

The brown commercial seaweed market is projected to grow from \$16B in 2022 to \$36B in 2032 at a CAGR of 8.7%

All seaweed product markets expected to grow significantly in the next decade:

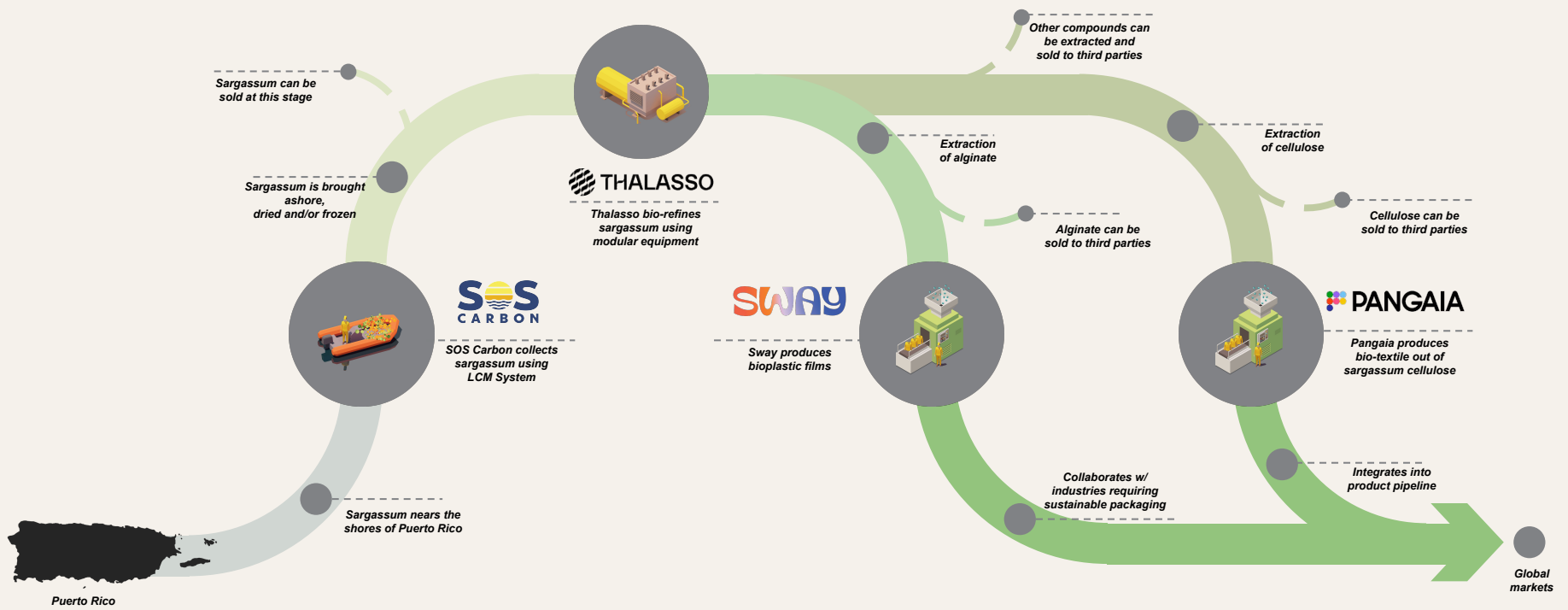
- The global **biotextiles market is expected to grow at a CAGR of 9.5%** from 2022 to 2030
- The global seaweed extracts **biostimulant market is expected to grow with a CAGR of 12.9%** from 2023 to 2030 to reach \$2.6B by 2030
- The global **bioplastics market size was estimated to grow with a CAGR of 18.8%** from 2023 to 2030, ESTIMATED AT \$12B in 2022

Puerto Rico can establish itself as a **hub for the Caribbean seaweed industry**

Partnerships and local interest from big brands in packaging, fashion, and/or chemical companies

CREATING AND TESTING A SARGASSUM VALUE CHAIN

INTERCONNECTED DEVELOPMENT - IDEAL STATE



NEXT STEPS

PHASE 1

The work continues, current program next steps:

- Finalize planning of pilot projects, including sites
- Plan for permitting
- Identify and lock-down potential scaling partners
- Implement pilot projects

Engagement with government and private sector entities with specific Puerto Rican and/or waste-to-x interest

PHASE 2

We are committed to the success and the impact of our work in Puerto Rico. Identifying additional sources of funding will be key to see out the full potential of the sargassum value chain.

- ◆ Roll out of sargassum collection across fishing communities
- ◆ Development of network of micro-biorefinery network for sargassum processing
- ◆ Scale up of sargassum end product development

Immediate funding opportunities that require investment in the next year

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