Restorative Aquaculture in Hawaii 2021

Topics

- Introducing the Aquaculture Development Program
- Regenerative Agriculture & Restorative Aquaculture
- Restorative Aquaculture in Hawaii
- Looking Forward

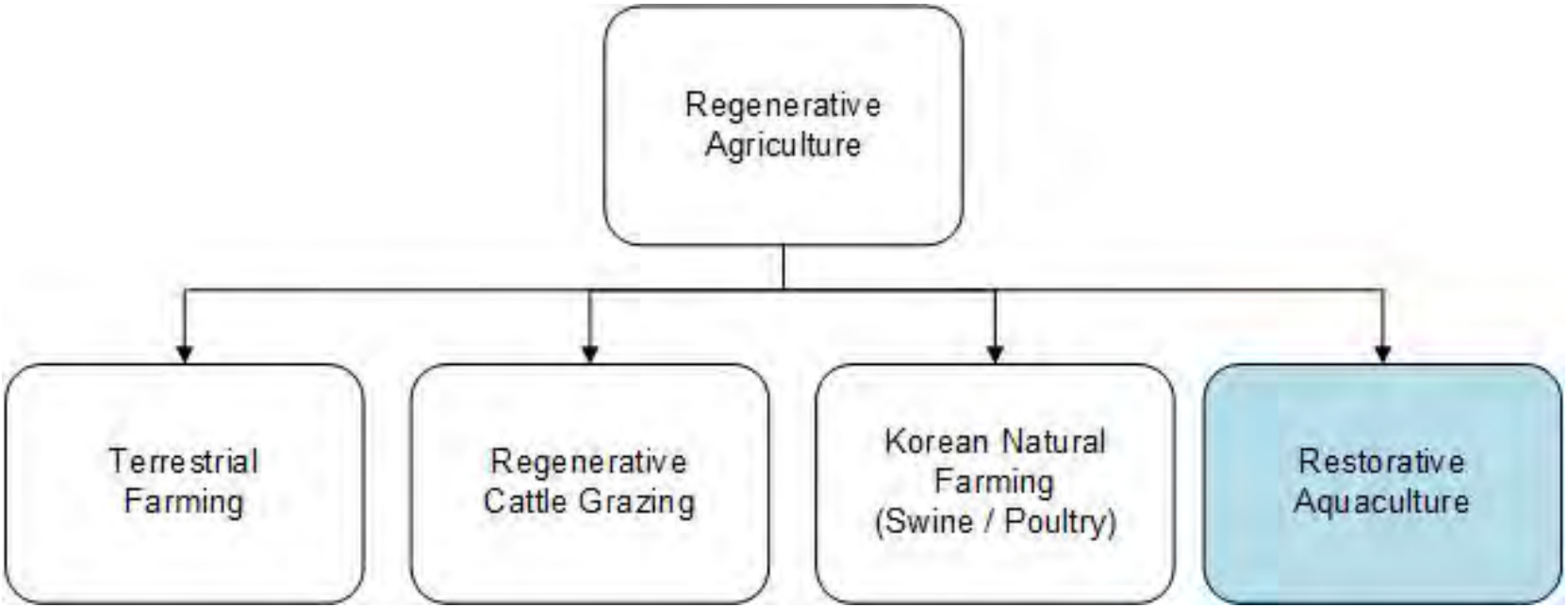
HDOA ADP

- Aquaculture Development Program
  - Component of Hawaii Department of Agriculture
- Primarily focus on commercial aquaculture development
- Leverage synergy between livestock sectors
    - High cost of feed (majority imported)
    - Animal (herd) health concerns
    - Pressure from imports (price / quality)
    - Land and water constraints

Regenerative Agriculture & Restorative Aquaculture

Regenerative Agriculture

- Restorative Aquaculture is a subset of Regenerative Agriculture



Regenerative Terrestrial Farming

- Process of restoring degraded soils using practices (e.g., adaptive grazing, no-till planting, no or limited use of pesticides and synthetic fertilizer, etc.) based on biological principles
  - Building soil organic matter and biodiversity
  - Decreased use of chemical inputs and subsequent pollution
  - Capturing carbon in the soil to combat climate change

Regenerative Livestock Practices

- Regenerative Cattle Grazing
  - Maintains rest-rotation cycles, which are short periods of dense grazing followed by long forage rest periods, to support vegetative recovery

- Korean Natural Farming (Swine / Poultry)
  - Uses indigenous microorganisms (IMO) to produce fertile soils enabling odor-free hog and poultry farming without the need to dispose of effluent material

Restorative Aquaculture

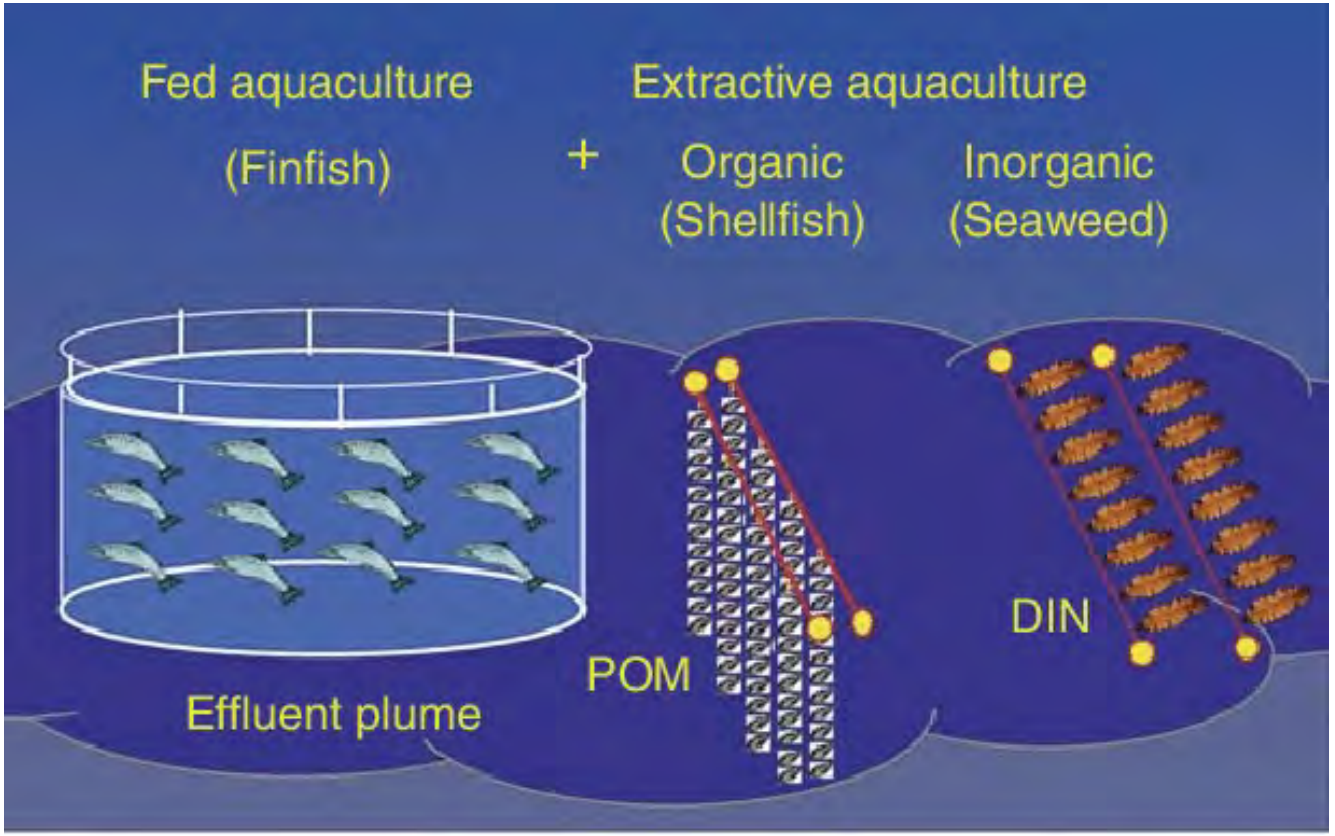
- Cultivation of low trophic level, filter-feeding species, such as seaweed and bivalve shellfish, that positively affect the environment

Sustainability of Restorative Aquaculture
Economic / Environmental / Social

Economic Sustainability

- Integration of algae & oysters into commercial aquaculture operations
- Stand alone algae and oyster production
- Development of innovative solutions
- Partners
  - USDA / NOAA
  - HDOA / DBEDT / DOH
  - HATCH Aquaculture Accelerator
  - Commercial Operations

Integrated Multi-Trophic Aquaculture (IMTA)



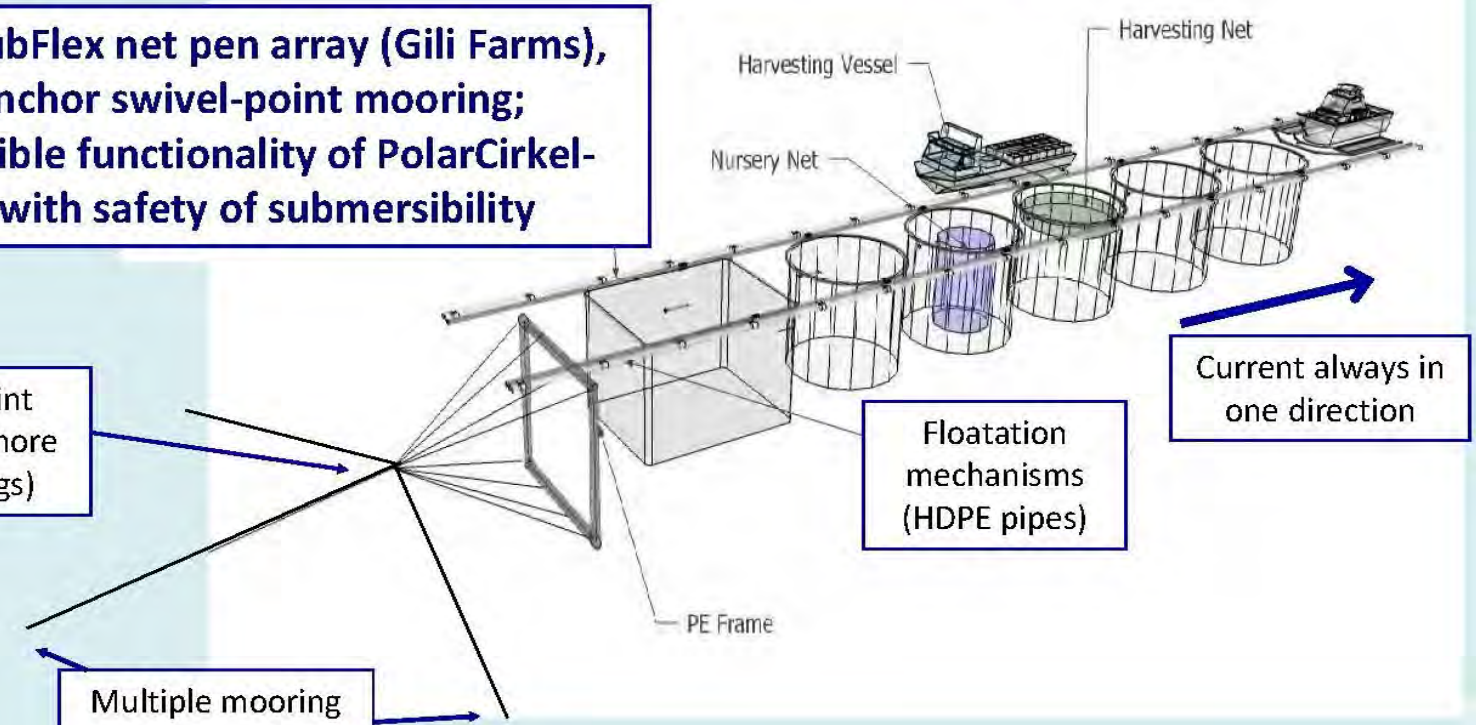
POM = Particulate Organic Matter / DIN = Dissolved Inorganic Matter

New Commercial Designs

Example of IMTA Innovation

Ocean Era – Ewa Beach Proposal:

Submersible SubFlex net pen array (Gili Farms), on multi-anchor swivel-point mooring; surface-accessible functionality of PolarCirkel-style pens, with safety of submersibility



Environmental Sustainability - Monitoring

- Consistent analysis of ocean H_2O to monitor the ecological effects of aquaculture initiatives
  - Acidification Mitigation
  - Carbon Sequestration
  - Nutrient Removal
  - Water Quality Improvement
- Partners
  - DLNR / NOAA / UH

Environmental Sustainability - Seedstock

- Clean algae & oyster seedstock produced by sanctioned hatchery operations
- Partners
  - DLNR / HDOA / UH

Existing Hatchery Activity

Anuenue Fisheries Research Center Hatchery

- Kua Aina Auamo volunteers and DLNR staff raise juvenile seaweed sporelings for distribution

Limu Kohu (*Asparagopsis taxiformis*)

- Potential for livestock feed additive to reduce methane

Limu Manauea (*Gracilaria coronopifolia*)

- Potential for food product – “ogo”

UH-Hilo Pacific Aquaculture & Coastal Resource Center

- PACRC staff raise juvenile oysters for distribution

Indigenous Oysters

- Hawaiian Oyster (*Dendostrea sandvicensis*)

- Black-lip Pearl Oyster (*Pinctada margaritifera*)

Social Sustainability

- Integration of algae & oysters into coastal resilience, education and restoration initiatives
- Partners
  - NOAA
  - DOE / UH
  - Community Outreach
    - Kua Aina Ulu Auamo (Limu Hui) / Waterkeeper Alliance

Waimanalo Limu Hui (Outreach)

- Plants *limu* to help restore Waimanalo's marine ecosystem and build a greater sense of community among Waimanalo residents

Billion Oyster Project
(www.billionoysterproject.org)

- Restoring oyster reefs in NY Harbor in collaboration with NYC communities
  - 72M live oysters restored
  - 1.8M lbs of shells collected
  - 8,000+ NYC students engaged

Wai Wai Ola Waterkeepers (Outreach)

- 30,000+ Hawaiian Oysters have been restored to Joint Base Pearl Harbor-Hickam, Kaneohe Marine Corps Base, Hawaii Yacht Club & Waikiki Yacht Club

Seaweed's Ability to Store Carbon

2016 Research

“Magnitude of carbon sequestered by algal forests is comparable to that of all those three habitats (mangroves, salt marshes & seagrass meadows) together” Dr. Carlos Duarte

Current Research

Oceans 2050 will publish a report in Q1 2022

- Quantify seaweed carbon sequestration
- Assess the role of seaweed aquaculture as a key recovery wedge for the world's oceans and the climate
- 12 countries / 5 continents

OCEANS·2050
GLOBAL SEAWEED PROJECT
BLUE CARBON

Moving Forward

Desired Outcomes (1)

- Create framework for governance and organizational leadership including science advisory body
- Formalize relationships between partners for collaborative project development and execution
- Establish conduits for fundraising and project financing
- Define and measure scientific baselines in metric areas

Desired Outcomes (2)

- Identify and fill gaps for research and innovation required for advancement
- Review existing policy and propose legislation to support development
- Deploy scalable demonstration projects with measurable outcomes to engage stakeholders and community

ADP Contact

Todd Low
ADP Manager
todd.e.low@hawaii.gov
808.483.7130

Liz Akina
Economic Dev Specialist
liz.akina@hawaii.gov
808.483.7104