



# Enhancing Marine Ecosystems and Promoting Sustainable Aquaculture

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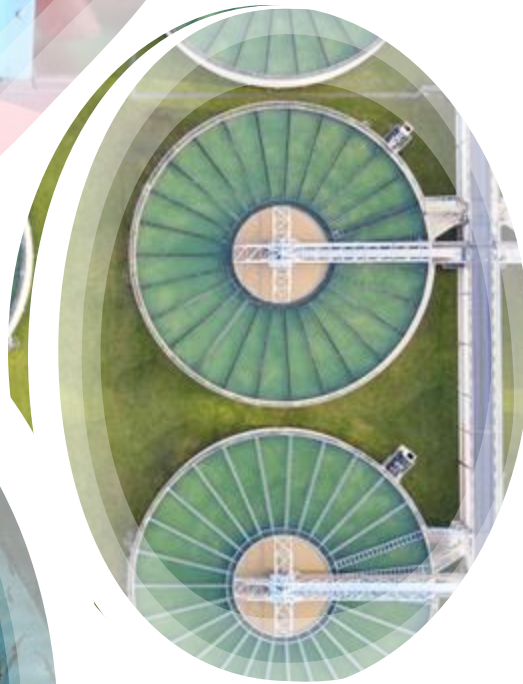
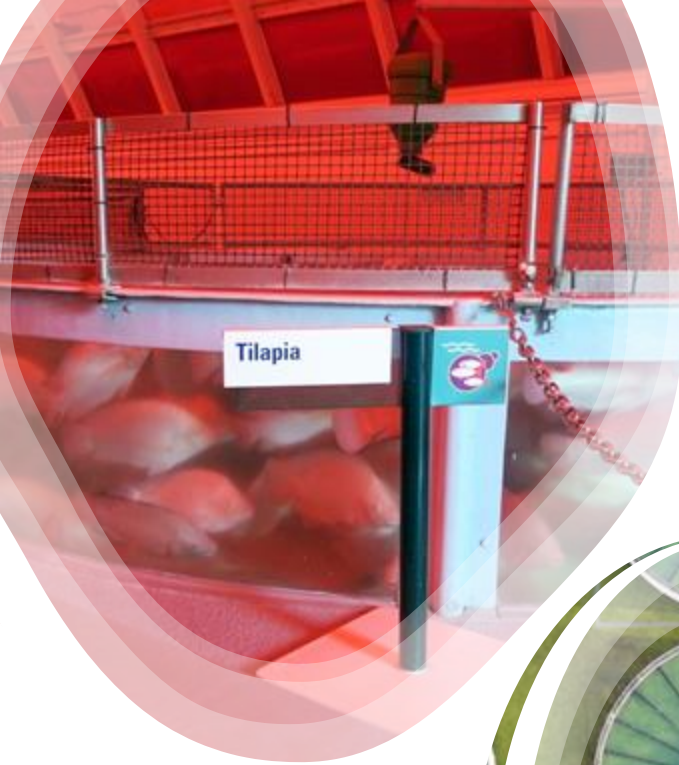
## Agriculture's Challenges

- Environment changes, soil degradation, biodiversity loss, and growing food demands.
- Traditional monoculture depletes soil nutrients and increases pest outbreaks.
- Greenhouse gas emissions from conventional farming threaten future food production.
- Integrated agriculture and land-based aquaculture offer a transformative solution.



## The Case for Integrated Agriculture and Aquaculture Systems

- Recirculating Aquaculture Systems (RAS) minimize water use, enhance marine systems, provide locally grown highly desirable species and reduce/eliminate nutrient discharge.
- Agricultural crops can absorb aquaculture nutrients while purifying water.
- Combining aquaculture with halophytes (saline-tolerant crops) enhances dual food production in marine systems.







# RAgS

Recirculating Agriculture Systems (RAgS) revolutionize food and farming by conserving water, reducing nutrient waste, and enabling crops to absorb aquaculture nutrients while purifying water, all within a holistic system where everything is upcycled or designed to enhance growth and maximize sustainability.



# How is a RAgS Project Different From Other Farm Projects?

## **Balanced Ecosystem for Sustainable Aquaponics**

RAgS maintains stability by balancing fish feeding rates with plant nutrient absorption, ensuring optimal water quality for fish, bacteria, and plants.

## **Beyond Organic and Climate-Smart by Design**

With a 3600L (950 gallons)/day water use, efficient nutrient cycling, no runoff, and built-in biosecurity, our facility maximizes sustainability while repurposing byproducts for soil enhancement. (25K plants equals 1 acre of land based grown crops x 10 cycles per year)

## **Efficient Nutrient Reclamation**

RAgS uniquely extracts and reclaims more nitrogen and phosphorus than conventional farms, creating a fresh, healthy, and sustainable production cycle.

## **Diversified Revenue Streams**

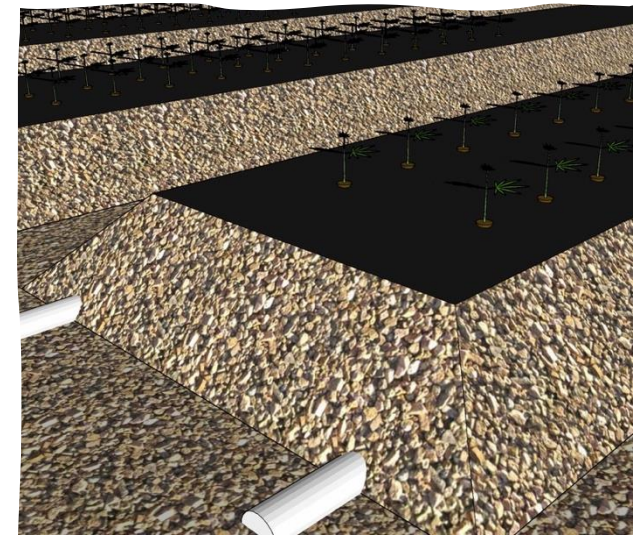
Our have on - farm products and services (compost, soil amendments from by products), income through agritourism, weekly crop sales, aquaculture sales (3/year), orchard (yaupon holly for tea), and land based crops.



# The project

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- East Palatka, FL
- 44 other facilities worldwide - US, CARICOM, Africa, Europe, South America
- RAgS (FOOD for ALL) – small facilities owned/operated by local communities.





# Where We Are Today...



Produce: Heads of Lettuce, Leaf Lettuce, Arugula, plant starts, Tomatoes (Slicer), Tomatoes (Cherry), Hot Peppers, Bell Peppers, Basil (nufar/purple/GEN), Asian Basil, Thai Basil, Dill, Cilantro, Parsley, Oregano, Kale, Red Kale, Swiss Chard, Onions, Garlic Chives, Fine Leaf Chives, Wrinkled Cress, Celery, Cucumbers, Okra, Watermelon, Edible Flowers, Bergamot (Citronella), Eggplant, Beets, Pak Choi, Cassava, Yaupon Holly, Pulses, Pumpkins, & Flowers .

Aquaculture: Shrimp, Hybrid Stripe Bass, Tilapia and Koi.





The future...





# Key Benefits of Integrated Systems

- **Pollution Reduction:** 80-90% nitrogen and phosphorus absorption from aquaculture effluent.
- **Resource Efficiency:** RAS reduces water usage by up to 99%. RAgS reduces waste, pollution and you reduce COGs (cost of goods sold).
- **Dual Outputs:** Crops and aquaculture complement each other for higher yields.



# Biodiversity and Ecosystem Services

- Integrated farming systems attract pollinators and pest predators.
- Improves nutrient cycling and reduces agricultural waste.
- Supports a balanced and resilient ecosystem.





# Practical Implementation Strategies

1. Education and Training: Skills in regenerative practices and sustainable aquaculture.
2. Demonstration Sites: Showcasing land-based RAgS paired with crops like tomatoes, kale, herbs and lettuce.
3. Infrastructure Development: Connecting aquaculture effluent to crop production.



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## Empirical Data on Integrated Systems

- RAS reduces water usage by up to 99% compared to traditional aquaculture.
- Studies show crops like lettuce and basil absorb 80-90% nitrogen and phosphorus from fish effluent.
- Marine aquaculture with halophytes improves nutrient recovery by 40-50%.







## What is needed in Infrastructure and Demonstration Sites

- Develop land-based aquaculture (fresh and marine) systems integrating RAgS and off farm agriculture.
- Crop selection to optimize nutrient cycling from aquaculture effluent – fresh and marine.
- Implement sustainable hatchery management for regional seed stocks.





## Conclusion: A Sustainable Future

- Integrated agriculture and aquaculture offer a scalable, sustainable food production model.
- Reduces pollution, enhances biodiversity, and builds resilience to climate change.
- This transformation is essential for securing food and environmental sustainability.
- Let's revolutionize agriculture and aquaculture to create a resilient future!



תודה  
 Dankie Gracias  
 Спасибо  
 شكرًا  
 Merci Takk  
 Köszönjük Terima kasih  
 Grazie Dziękujemy Děkojame  
 Ďakujeme Vielen Dank Paldies  
 Kiitos Täname teid 谢谢  
**Thank You** Tak  
 感謝您 Obrigado Teşekkür Ederiz  
 Σας Ευχαριστούμ 감사합니다  
 Bedankt Děkujeme vám  
 ありがとうございます  
 Tack



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