Jonas Seifert - Student ID: 000100950
HZ Studio – Applied Research minor
Research Coach: Jasper van den Heuvel
HZ Studio Coach: Carlien Nijdam

Sustainable Farming in Tra Vinh
A Hydroponic Solution?

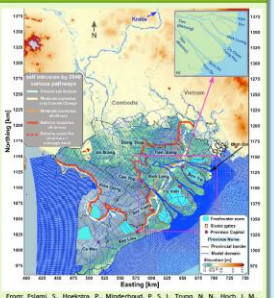
THE MEKONG DELTA & THE SALT LAB

The Mekong Delta's Importance:

- Known as Vietnam's "Rice Bowl," the Mekong Delta is crucial for food production and exports
- Environmental challenges like salinity intrusion and water shortages threaten livelihoods and food security

The Mekong Saltlab and Open Field Hydroponics:

- Partnering with Dutch experts, the Mekong Saltlab seeks innovative solutions to support farmers
- Open Field Hydroponics, a system where plants grow on rafts in nutrient-rich water, offers a sustainable way to adapt to these challenges



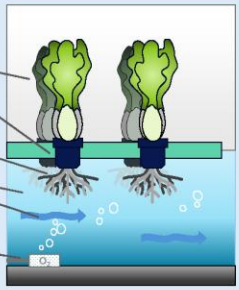
From: Eslami, S., Hoekstra, P., Minderhoud, P. S. J., Trung, N. N., Hoch, J. M., Sutanudjaja, E. H., Dung, D. D., Tho, T. Q., Veepel, H. E., Wolfenbuttel, M.-N., & Van Der Vegt, M. (2021). Projections of salt intrusion in a mega-delta under climatic and anthropogenic stressors. *Communications Earth & Environment*, *2*(1), 142

Research Objectives:

- Assess the financial sustainability of the crop pond
- Analyze costs, revenues, and benefits to evaluate if the system provides farmers with a viable, resilient income source
- Explore its potential to address environmental challenges

LOW TECH HYDROPONICS - WHAT IS THE CROP POND?

- A **cover protects** the crops from the sun and rain
- Possible crops include: pak choi, water spinach, cabbage, cauliflower, cherry tomatos ...
- Plants grow in baskets, floating in rafts on the pond
- Plant **roots grow in water** instead of soil
- Vital **nutrients** are solved **in** the **water**
- Pumps **circulate** the water to diffuse solved contents
- Airstones **oxygenate** the solution
- The pond covers an area of ca. 11 m x 2,5 m and is 0,5 m deep



- **Adapting to Salinity:** Protects crops by controlling water quality, preventing harmful salt accumulation near roots.
- **Water Efficiency:** Uses 80-90% less water compared to traditional farming!
- **Improved Crop Yields:** Certain crops marture faster and yield is increased
- **Dry Season Farming:** Enables cultivation, even when freshwater is scarce.

But is the crop pond affordable?
Can it be a lively hood
for the farmers in the Mekong Delta?

RESULTS

Results for Key Financial Metrics

Investment Costs:	51,180,000 VND (~€1,944.84)
Operating Costs (Annual):	
Maintenance:	3,999,833 VND (~€151.99)
Crop-Specific Costs:	11,208,768 VND (~€425.93)
Costs per kg:	4,554 VND – 6,745 VND
Annual Revenue:	54,432,000 VND (~€2,068.42)
Profitability:	
Return on Investment (ROI):	76.64% annually
Annual Profit:	39,223,399 VND (~€1,490.49)
Payback Period:	
	Less than **1.31 years**

Results of the Interview

Advantages:
- Water-saving
- Reduced risks: less affected by rain and drought
- Cleaner products: Improved hygiene and marketability
- Cost-efficient operation: 70% lower operational costs compared to traditional farming methods.

Challenges:
- High initial investment: Limits access for many farmers
- Limited crop variety: System is better suited for leafy vegetables, less effective for fruit or root crops
- Knowledge barrier: Requires training and experience

Market Limitations:
- High yields can lead to oversupply
- Small-scale production may not meet the demands of larger buyers like supermarkets

Significance:
- The crop pond system offers a sustainable solution for adapting farming practices in regions facing water scarcity and salinity intrusion.
- While promising, adoption depends on addressing financial and educational barriers for farmers.

CONCLUSION

- **Strong potential** as a **sustainable farming solution** for the Mekong Delta
- **Short payback period (1.3 years)** and a **high return on investment (76.64% annually)**

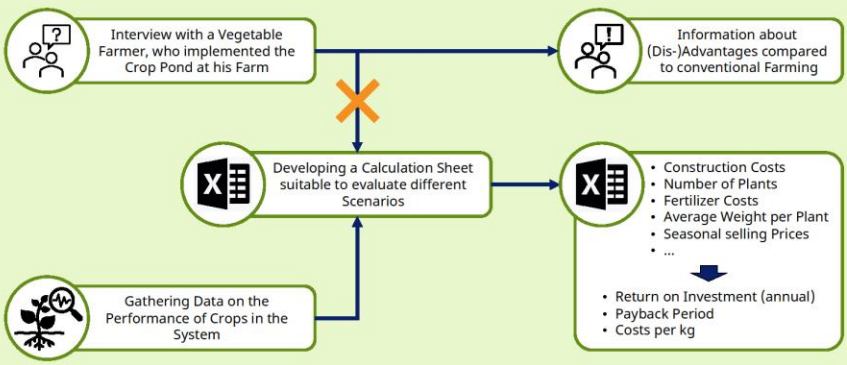
Economic Viability: The financial metrics, though based on a conservative scenario, highlight the crop ponds cost-effectiveness and its ability to provide farmers with a stable income despite environmental challenges.

Environmental Adaptation: The system's water efficiency and capacity to mitigate salinity intrusion make it a valuable tool for adapting to the region's changing environmental conditions.

Challenges to Adoption:
- High upfront investment costs remain a significant barrier for small-scale farmers.
- Farmers require technical training to operate and maintain the system effectively.
- Market conditions, such as oversupply risks for specific crops, must be addressed for long-term profitability.

Final Remark: While the financial metrics are promising, the adoption of open-field hydroponics can be further supported through financial aid, technical training programs, and crop diversification strategies. With these measures, this technology could play a critical role in increasing the resilience and sustainability of agricultural practices in the Mekong Delta.

METHODOLOGY



Scenario used for calculation:
A whole year of water spinach

- Sells for between 17,500 – 22,500 VND
- Matures in 20 Days
- 18 Harvests per year
- Each Harvest ca. 151 kg