UNDP/GEF YSLME Phase II Project
The 1st Meeting of the Regional Working Group on Sustainable Mariculture

The Economic Effectiveness of IMTA in Korea

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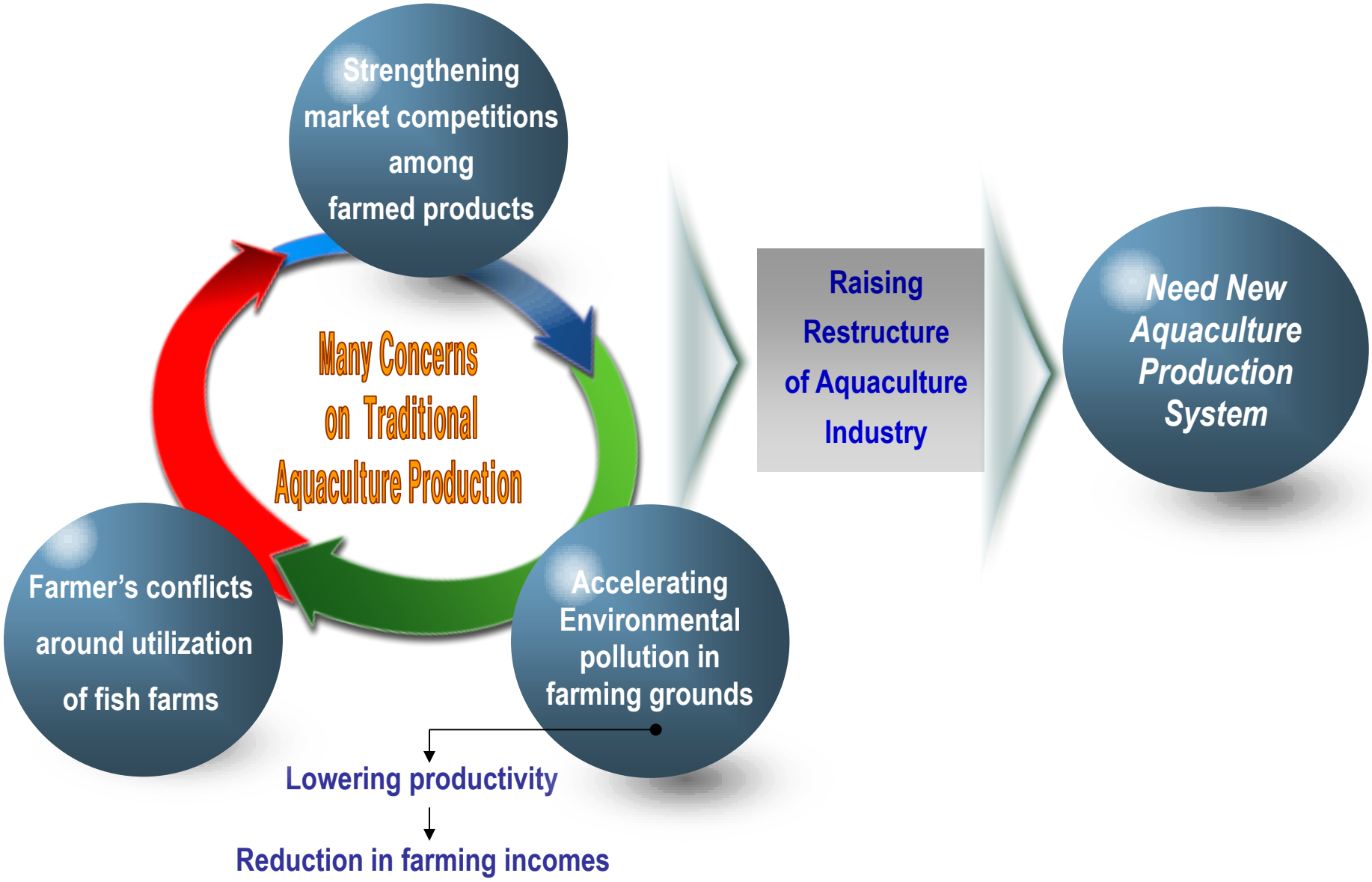


1. Introduction

Interests on IMTA production system are growing

- Protecting environmental negative impacts and large-scale production system
- Establishing a new farm's utilization system => A good business model
- Reorganizing marine aquaculture industry => Restructuring farming systems

Industrializing IMTA Production System

- IMTA can be utilized not only to increase productivity, but also to improve farm environment and prevent viral diseases
- Need to review on technical feasibility, institutional revision, economic feasibility
- Environmental gains may be offset by higher investment costs and greater risk

2. Types of Economic Values of IMTA

Value of Production	• Production Incomes • Farming incomes can be increased by multiple cultured products
Value of Biomitigation	• Reducing environmental costs of farming grounds • US$44, the cost of remediating 1kg of nitrogen in Demark
Value of Recreational Place	• Recreational sites for sightseeing and education etc. • Additional economic benefits to fish farmers and regions

3. Economic Analysis of IMTA in Korea

A Pilot Project on IMTA Production System in Korea

- **IMTA pilot farming has started since 2016 in South Coast (*Tongyoung*), targeting Red seabream, sea cucumber, oyster, and seaweed**

[IMTA site in South coast]

[IMTA system in Tongyoung]

3. Economic Analysis of IMTA in Korea

Economic Analysis of IMTA production system

- Analyzing with biological and economic data from the IMTA pilot project (red seabream + sea cucumber + oyster)

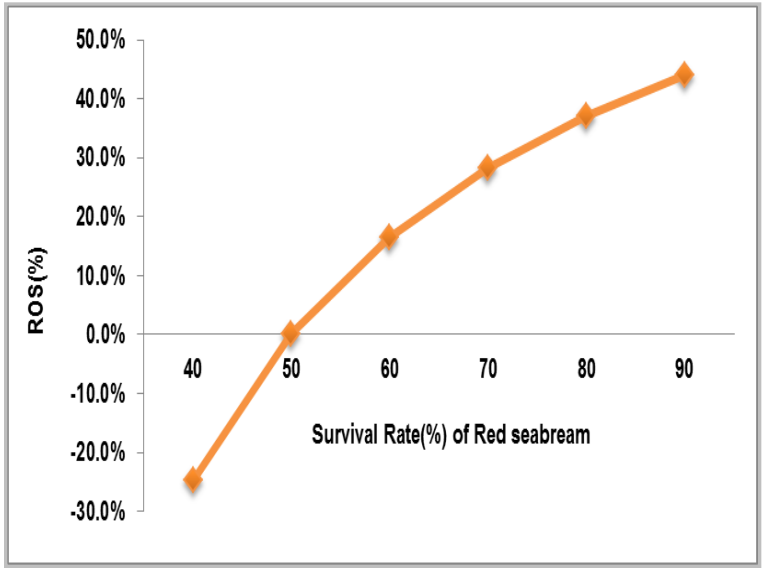
	Red seabream	Sea cucumber	Oyster
Stocking density	200,000	40,000	800 longlines
Production (kg)	140,000	4,440	4,000
Market price (won/kg)	11,000	15,000	10,000

- Operating costs : fingerling and seed (4.7%), feed (43.5%), labor (16.9%) etc.

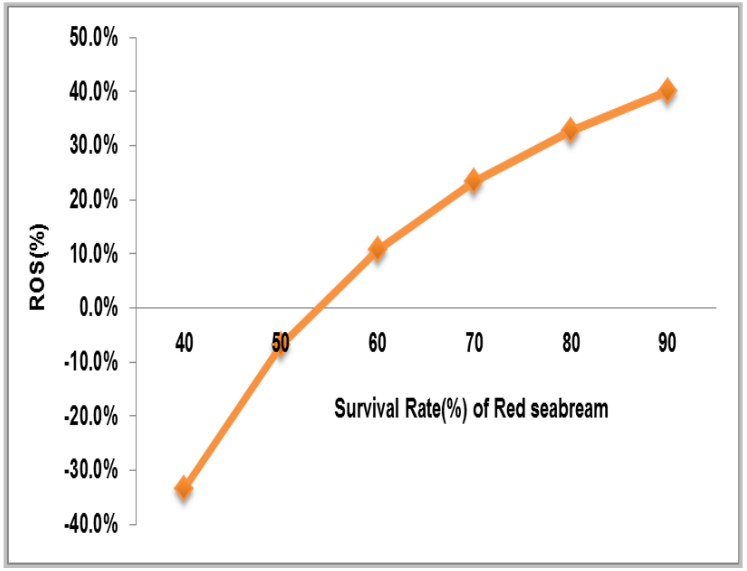
3. Economic Analysis of IMTA in Korea

Economic Analysis of IMTA production system

	IMTA	Red seabream monoculture
Returns on Sale (Profitability)	28.3%	23.3%



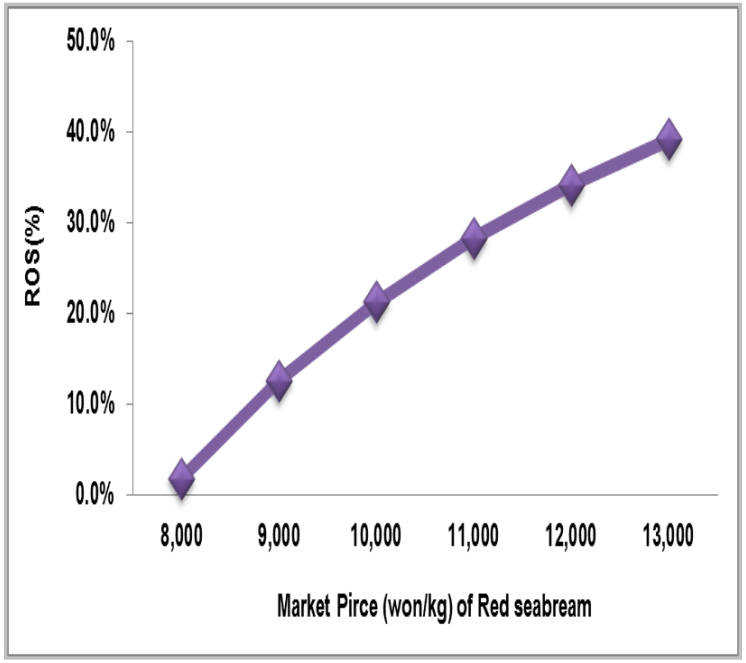
[IMTA]



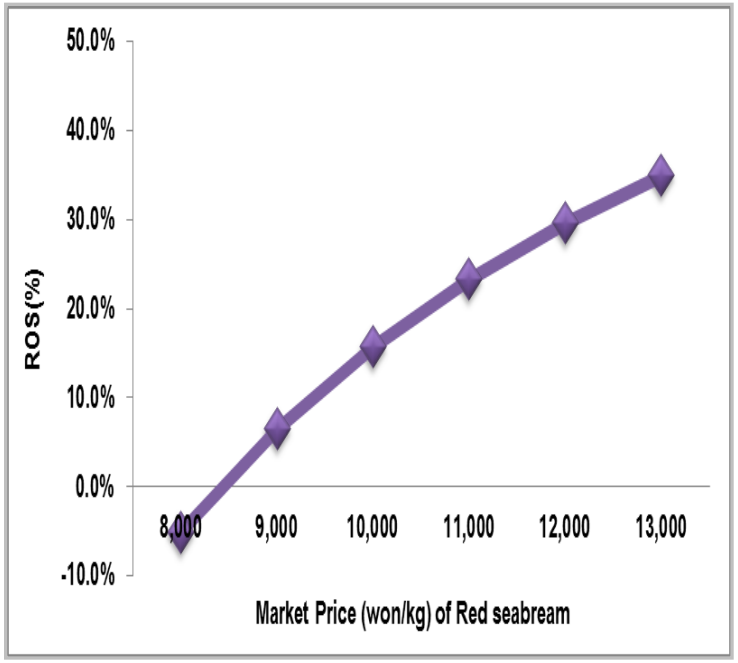
[Red seabream monoculture]

3. Economic Analysis of IMTA in Korea

Economic Analysis of IMTA production system



[IMTA]



[Red seabream monoculture]

3. Economic Analysis of IMTA in Korea

Biological and Environmental Research

NIFS (2014)	• Rockfish waste (faeces) per day : 0.316g • Consumption of waste by sea cucumber per day : 2.4g
JG Kim (2016)	• 97% of nitrogen generating from Red seabream farms could be eliminated by sea cucumber, shellfish, and seaweed • Environmental carrying capacity could eliminate about 3% of nitrogen generating from Red seabream farms

3. Economic Analysis of IMTA in Korea

Environmental Impact of Rockfish farming

Ferreira et al. (2012)	• When organic deposits of Red seabream farming are 56,880kg, Nitrogen regeneration is 3,185kg
Ackefors and Enell (1994)	• Nitrogen regeneration from production per ton of fish farming is 49.3kg • Nitrogen regeneration by Red seabream production of 140 ton is 6,902kg

3. Economic Analysis of IMTA in Korea

Economic Analysis of IMTA production system

Parameter	Red seabream monoculture	IMTA
Total production (kg)	140,000	140,000+4,440+4,000 =148,440
Environmental impact		
- Organic deposits (kg DW)	56,880	-
- Nitrogen regeneration (kg N)	3,185~6,902	-
Financial data		
- Revenue (million won)	1,540.0	1,646.6
- Costs (million won)	1,181.4	1,203.8
- Environmental Benefit (million won)[a]	-	127.4~276.1
- Profit (million won)	358.6	570.2~718.8

[a: Assume the cost of remediating nitrogen is 40,000 won/kg]

4. Limitations and Future Study

- **Under current conditions, IMTA might be more profitable and stable**
  - Increasing farming incomes from multiple target species
  - Reducing costs and improving survival rates could make more profitable

- **More researches on bio-mitigation effects by shellfish, seaweed etc.**
  - Estimating biomitigation and pollution reduction effects by shellfish, seaweed, sea cucumber etc. to quantify those economic values

- **More researches on optimal IMTA production system *(Ideal type)***
  - Researches on optimal sites, target species, stocking density etc.
  - Considering various utilization of IMTA such as recreational, educational uses etc.

Thank you for attention

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