Strategic Environmental Assessment (SEA)

Nurturing Green Aquaculture in Myanmar

Myanmar Koei International Ltd. (MKI)

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MYANMAR KOEI INTERNATIONAL LTD.
Consulting Engineers

Outlines

01. Introduction

02. Legal Framework and Institutional Landscape

03. Yangon-Ayeyarwady Aquaculture Corridor

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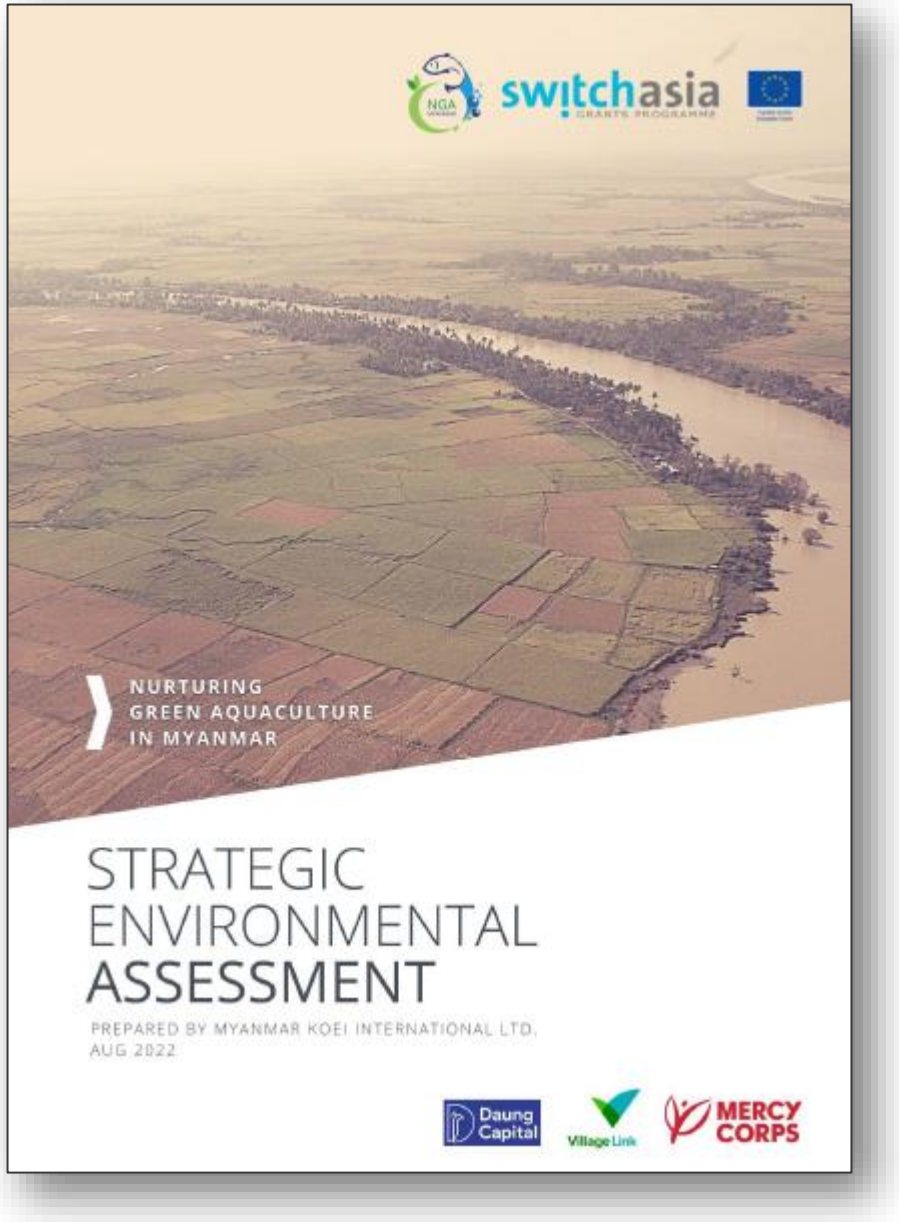
Introduction

This SEA aims providing a high-level examination of the environment protection aspects in aquaculture sector in the Yangon-Ayeyarwady aquaculture production centers to contribute to the integration of environmental considerations into the implementation of the EU funded NGA-Myanmar program, with a view of promoting sustainable development.



Location of the Study

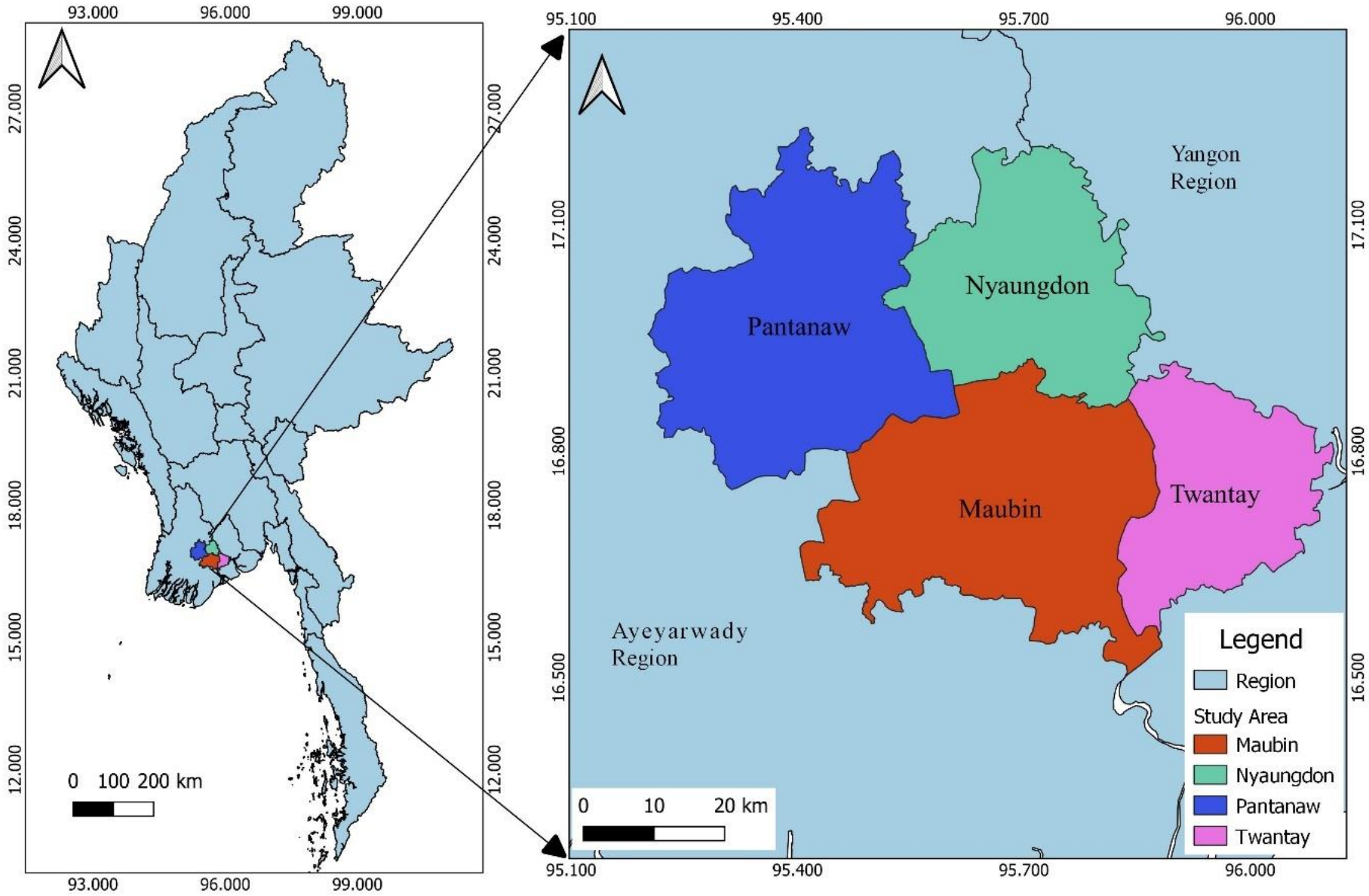


Figure: Four targeted townships of this study

Source: MKI

Legal Framework and Institutional Landscape

Legal Framework

- ❑ National Law
- ❑ Compliance to International Law
- ❑ Government Strategies and Plans
- ❑ Policy Related to Environmental Assessment
- ❑ National Environmental Quality Emission Guideline (NEQG)

Institutional Landscape

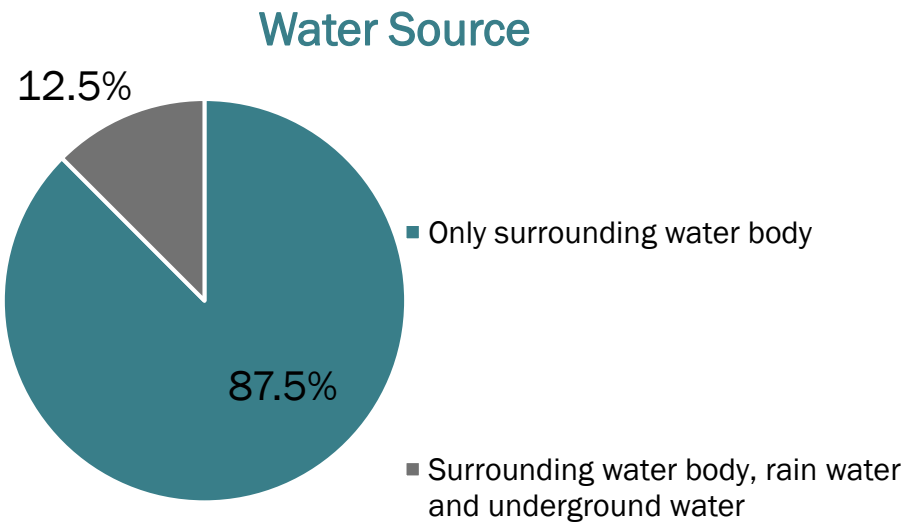
- ❑ The Department of Fisheries
- ❑ The Environmental Conservation Department (ECD)
- ❑ The Myanmar Fisheries Federation (MFF)

Yangon-Ayeyarwady Aquaculture Corridor

Fish Ponds' Information and Production Rate at Study Townships

Township	Fish Pond Number	Total Pond (Acres)	Fish Production (Vises)
Twantay	3,692	34,198	164,908
Maubin	1,389	53,929	131,792
Pantanaw	351	17,967	51,164
Nyaungdone	1,321	29,924	13,451

Source: Township Profile Book, (2020), General Administration Department



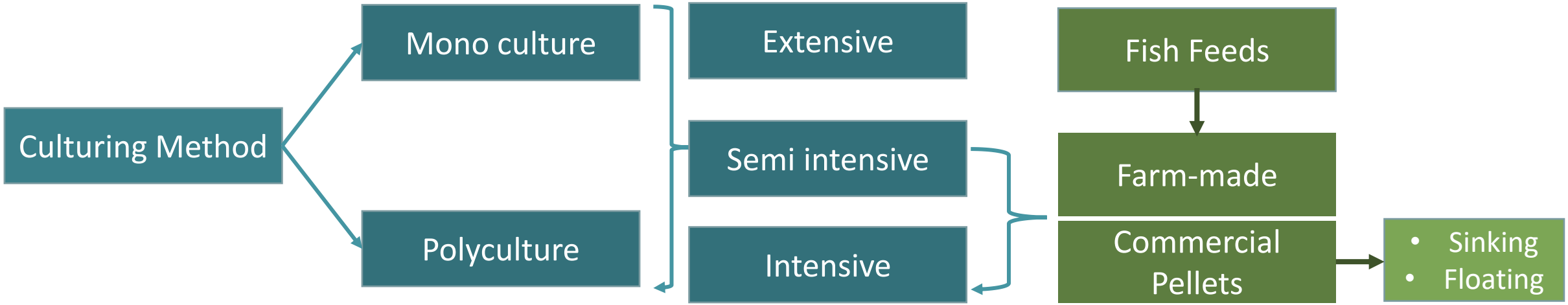
Commonly Cultured species in study townships

Fish Species (Myanmar Name/English Name)						
1.Nga Myit Chin (Rohu)	2. Nga Thine Gaung Pwa (Catla)	3. Nga Gyin (Common carp)	4. Nga Gyin (Mrigal)	5. Tilapia (Tilapia)	6. Nga Tan (Striped fish)	7. Myet Serr Nga Gyin (Grass carp)

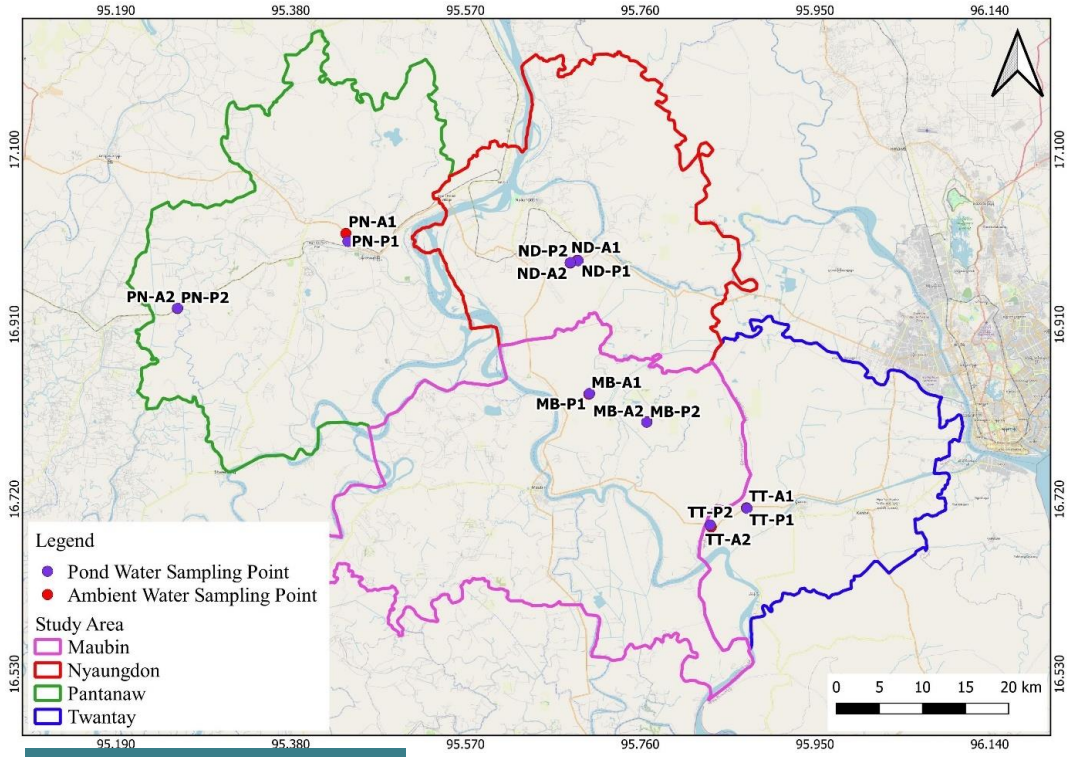
- All fish farms surveyed were polyculture fish farms (more than two species cultured).
- Rohu and Catla were the most cultured species.

Yangon-Ayeyarwady Aquaculture Corridor

Current Aquaculture Practices

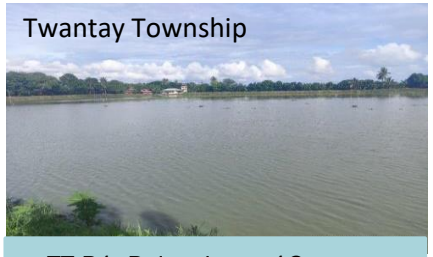


Water Quality Parameter and On-farm Emission



Water Sampling Collection

Each Study Township → Ponds water: (2) Locations → Ambient Water : (2) locations



TT-P1, Polyculture, 13 acres, farm-made feed, Twantay Canal

TT-A1

Water Quality Parameters

- Temperature
- pH
- Dissolved Oxygen
- Turbidity
- Total Suspended Solids
- Nitrate
- Ammonia
- Total Nitrogen
- Total Phosphate
- Other phosphate

WQI Value	Rating of Water Quality
0-25	Excellent water quality
26-50	Good water quality
51-75	Poor Water quality
76-100	Very poor water quality
Above 100	Unsuitable for drinking purpose

Water Quality Status

Sampling points	TT-A1	TT-A2	ND-A1	ND-A2	PN-A1	PN-A2	MB-A1	MB-A2
WQI	47.53	59.44	53.61	51.05	51.61	45.56	53.14	43.73
Status	Good	Poor	Poor	Poor	Poor	Good	Poor	Good

Note: Weighted arithmetic water quality index approach (Brown et al 1970) is appliced.

Pond Water Quality Survey Results

No.	Parameters	Unit	Twantay		Nyaungdone		Pantanaw		Maubin		NEQG Guideline Value for Aquaculture (Effluent Levels)	Pond water quality in Aquaculture (Permissible Level) (Boyd C. E 1990)
	Date		13 July 2022		14 July 2022		14 July 2022		15 July 2022			
	Point		TT-P1	TT-P2	ND-P1	ND-P2	PN-P1	PN-P2	MB-P1	MB-P2		
	Time		10:14	11:20	09:44	10:33	12:12	14:33	09:27	11:55		
1	Temperature	^{o}C	29	29	27	26	28	28	27	29	<3[b]	26-32 (Species dependent)
2	pH	-	6.5	6.6	7.8	7.3	7.9	7.3	7.6	8.0	6-9	6.5-8.5
3	Dissolved Oxygen	mg/L	5.50	1.12	4.31	1.56	6.68	3.70	3.29	5.67	-	4-8 (species dependent)
4	Turbidity	NTU	143	214	39	266	100	139	185	144		25-80
5	Water Discharge and Level	m^3/s	-	-	-	-	-	-	-	-		
6	Total Suspended Solids (TSS)	mg/L	130	80	25	170	540	100	100	80	50	200
7	Nitrate	mg/L	<0.1	1.6	<0.1	1.2	<0.1	8.1	<0.1	<0.1		0.2 – 10
8	Ammonia	mg/L	<0.02	<0.02	<0.02	<0.02	0.22	0.39	<0.02	<0.02		0-0.5
9	Total Nitrogen (TN)	mg/L	<2	<2	<2	9	5	<2	6	<2	10	0.5-4.5ppm
10	Orthophosphate	mg/L as PO_4^{3-}	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25		
11	Total Phosphorus (TP)	mg/L as P	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	2	0.1 -0.5

Ambient Water Quality Survey Results

No.	Parameters	Unit	Twantay		Nyaungdone		Pantanaw		Maubin		Vietnamese Environmental Standard for surface water
	Date		13 July 2022		14 July 2022		14 July 2022		15 July 2022		
	Point		TT-A1	TT-A2	ND-A1	ND-A2	PN-A1	PN-A2	MB-A1	MB-A2	
	Time		09:48	11:46	09:15	10:56	12:56	14:07	09:06	11:23	Class (for domestic water supply)
1	Temperature	^{o}C	28	29	26	26	27	27	27	28	-
2	pH	-	6.4	6.7	6.6	6.5	6.7	6.7	7.1	7.0	6-8.5
3	Dissolved Oxygen	mg/L	1.30	0.74	1.44	1.31	0.00	0.55	2.09	1.33	≥ 5
4	Turbidity	NTU	69	38	37	123	22	20	60	88	-
5	Water Discharge and Level	m^3/s	2.41	0.14	0.58	0.62	0.14	0.20	1.85	0.72	-
6	Total Suspended Solids	mg/L	50	40	20	100	10	15	33.33	80	30
7	Nitrate	mg/L	0.4	3.5	2.6	<0.1	2.3	1.2	1.6	<0.1	5
8	Ammonia	mg/L	0.16	<0.02	<0.02	0.16	0.26	0.1	0.14	<0.02	-
9	Total Nitrogen	mg/L	<2	<2	2	3	3	<2	5	4	-
10	Orthophosphate	mg/L as PO_4^{3-}	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-
11	Total Phosphorus	mg/L as P	<0.15	0.18	<0.15	<0.15	0.78	<0.15	<0.15	<0.15	-

On-farm Emission

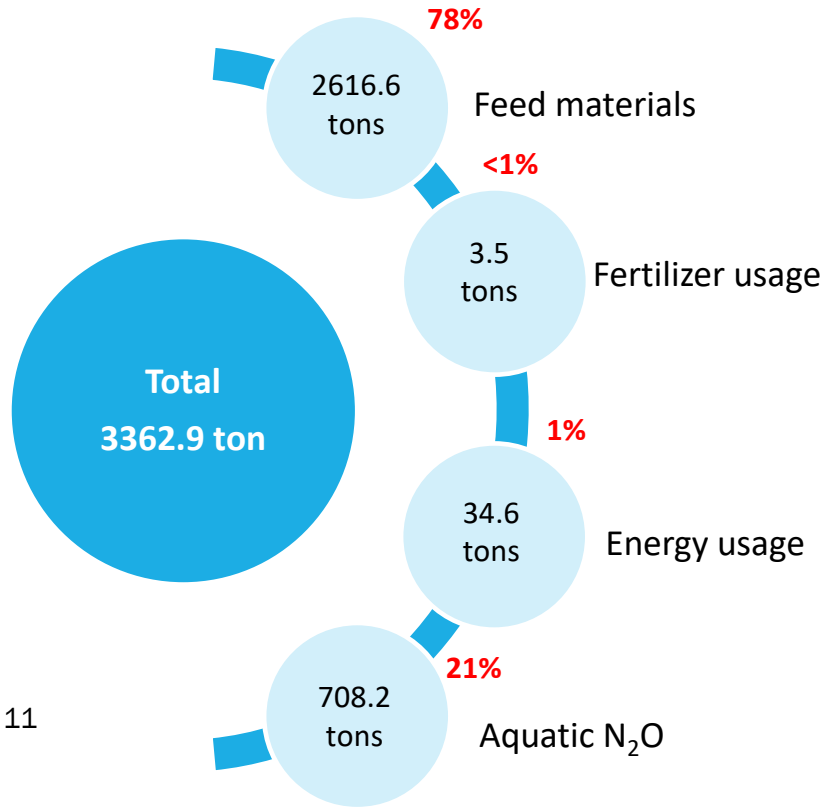
(1) Feed materials

(2) Fertilizer usage

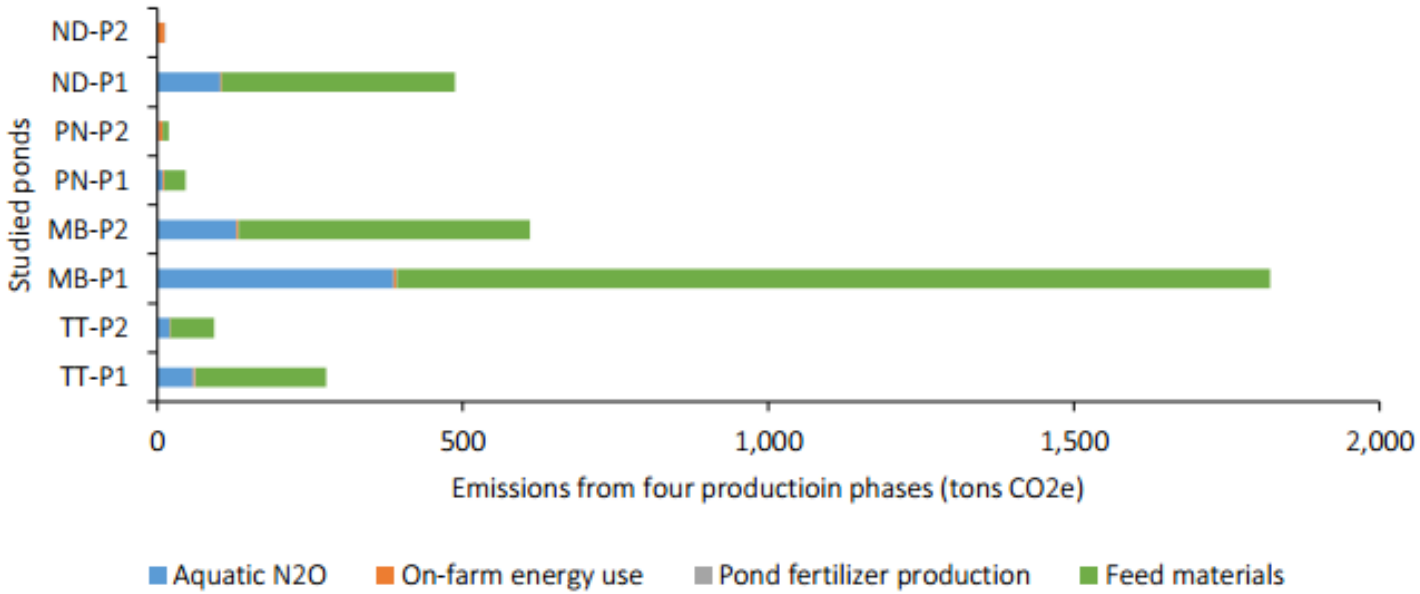
(3) Energy usage

(4) Aquatic N_2O

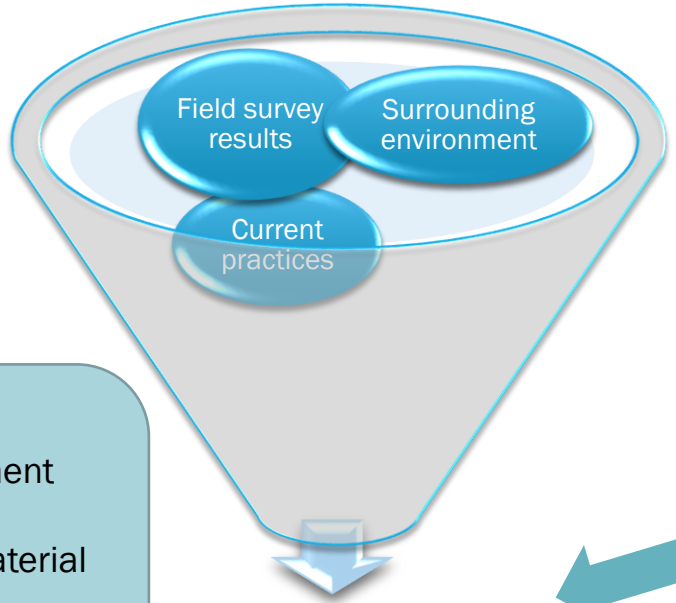
CO_2 Emissions from Aquaculture



Emissions from four Production Phases (tons CO2 e)



Impact Assessment



- Water quality
- Bottom Sediment
- Solid waste
- Hazardous material
- Biodiversity
- Community health and safety
- Climate change

Environmental Impact of Aquaculture

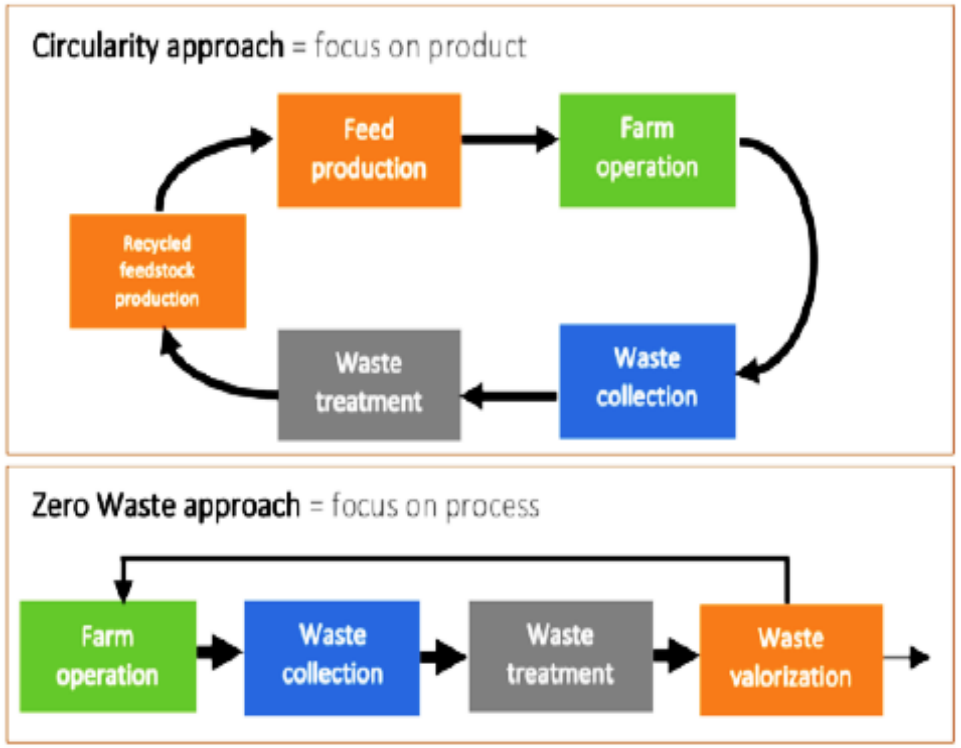
Proposed the mitigation measures

Impact Character	Symbol	Description
Probability	VP	Impact very likely to occur
	P	Impact likely to occur
Scale	++	Large positive impact
	+	Positive impact
	0	No impact
	–	Negative impact
	– –	Large negative impact
Direct/ Indirect	I	Indirect impact
	D	Direct impact
Frequency/ duration	LT	Long term
	ST	Short term

Recommendations

Promoting Appropriate Aquaculture Practices

Recommended circular bioeconomy by using both circularity and zero waste pathways.



Source: iFishIENCi

What	How
Improved feed formulations & circularity of feed ingredients	▪ Improved feed formulations, both for home-made production and commercial one. ▪ Production of 'green water' rich in natural feed especially for micro/small operators in extensive production system
Resource efficiency of feeding	▪ Monitor FCR and make improvement to minimize nutrient excretion ▪ Promote 'smart-feeding' technology for medium/large operators.
Circularity of waste	▪ Integrated aquaculture systems, either polyculture or integrated aquaculture-agriculture systems.

Recommendations

Water Quality Monitoring

- Considering the rapid growth of aquaculture sector in the Yangon-Ayeyarwady aquaculture corridor, the degradation of ambient water quality in the long-term should be expected, if no environmental safeguard is implemented.

- Setting the objectives (to prevent degradation of ambient water quality)
- Providing capacity building on pond water quality management
- Effective low cost in-situ measurement
- Setting the water quality monitoring method (sensor method or test strip method)
- Standard or guideline value
- Design and implement low-cost participatory water quality monitoring


Thank You!