**The 3ʳᵈ Regional Scientific and Technical Committee Meeting for
the SEAFDEC/UN Environment/GEF Project on Establishment and Operation of
a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand**

5ᵗʰ – 7ᵗʰ February 2020
Classic Hoang Long Hotel, Hai Phong City, Viet Nam

Regional Guidelines on Indicators
for Management of Fisheries Refugia: Methodology

Executive Summary

The draft Indicators for Management of Fisheries Refugia was developed at the 1ˢᵗ Regional Meeting on Indicators for Fisheries Refugia Management held on 9-11 September 2019 at A-One the Royal Cruise Hotel, Pattaya City, Chonburi Province, Thailand. The guidelines are aimed to support participating countries on the effective management of fisheries refugia established during the project implementation and to ensure that after project-end, country will continue and increase number of fisheries refugia in their country, besides monitoring the existed refugia using the agreed indicators as enclosed herewith..

However, the agreed indicators require the appropriate methodology and references in which the PCU takes this opportunity to continue discuss with the Regional Scientific and Technical Committee as well as the regional experts who join this RTSC3.

ACTIONS BY THE RSTC3 AND REGIONAL EXPERT:
- ❖ Considering the List of Indicators and provide suggestions on the methodology and Reference alignment with each indicator.

LIST OF INDICATORS FOR MANAGEMENT OF FISHERIES REFUGIA[1] (DRAFT)

1) ECOSYATEM DIMENSION

SUB-DIMENSIONS	CRITERIA	INDICATORS	METHODS/REFERENCES
Fisheries Resources	Abundance stock / Distribution / Fishing Effort	• Biomass Estimation (ton)	
		• Level of MSY (ton)	
		• Level of MEY (ton)	
		• Level of CPUE (Kg/…)	
		• CPUA (Kg/Area)	
		• Catch landing (ton or Kg)	
	Biological Parameter	• Length at first capture (Lc)	
		• Length at first mature (Lm)	
		• Sex ratio	
		• Spawning Potential Ratio	
		• Length frequency	
		• Exploitation rate	
		• GSI (Gonadosomatic Index)	
	Species composition / Catch structure	• Percentage of dominance species	
		• Number of species	
		• % Main economic/commercial species	
		• Percentage of Bycatch	
	Healthy/condition/Area	• Size Coverage (Percent)	
		• Healthy Index	

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[1] The outputs from the Regional Meeting on Indicators for Fisheries Refugia Management held on 9-11 September 2019 at A-One the Royal Cruise Hotel, Pattaya City, Chonburi Province, Thailand.

Habitat (mangrove, coral, seagrass, and other critical habitats)		• Target habitat density (IUCN reference)	
Environment (Impact from human act.)	Pollution	• Standard Water Quality (e.g. COD, BOD)	
	Eutrophication	• Phytoplankton Abundance	
		• Phosphate, Nitrate Concentration (Nutrient loading)	
	Anthropogenic (Human activity)	• Coastal reclamation area	
		• Level of maritime activity (If appropriated)	
	Erosion	• Level and distribution of sedimentation	
		• Loss of area/habitat	

2) SOCIAL DIMENSION

SUB-DIMENSIONS	CRITERIA	INDICATORS	METHODS/REFERENCES
Livelihoods	Choice of Occupation	• Number of option/ Occupation/ work (Alternative, Permanent work, Subsistence work)	
	Fish consumption	• Fish consumption per capita per year	
	Nutrition	• % animal protein (if appropriate)	
Stakeholder Participation (Indigenous People, Gender, etc.)	Participation	• Ratio of Number of participations (gender and IP)	
	Local Organization	• Number of organizations,	
		• Number of Best practices applied	
	Networking	• Number of networking	
		• Type /way of direct or indirect communication	
		• Number of agreements	
Education (Local knowledge, Local wisdom)	Awareness program (e.g. information center, information education campaign (IEC))	• Number of information center or similar.	
		• Number of consultations	
		• Number of best practices	
		• Number of awareness program	
		• Number of understanding by stakeholder	
	Capacity building	• Number of training/Extension	

3) ECONOMIC DIMENSION

SUB-DIMENSIONS	CRITERIA	INDICATORS	METHODS/REFERENCES
Economic Condition (to community)	Poverty incident	• Poverty Index	
	Capital accessibility	• Number of financial accessible	
	Income	• Income per household	
Fisheries Production, Fishing Efforts	Contribution of target species / Availability	• Value of contribution/production	
Innovative Fisheries Technology	Effectiveness fishing gear	• level of CPUE	
	Cost effectiveness	• Cost reduction, time, human power	
	Environment friendly (Green technology)DIMEN	• Reduce of fuel consumption	
		• Reduce bycatch	
	Investment	• Number of investment (for e.g. fishing fleet, processing, ship builder, management tools/software, etc.)	
		• New domestic product	

4) GOVERNANCE DIMENSION

SUB-DIMENSIONS	CRITERIA	INDICATORS	METHODS/REFERENCES
Fisheries management policy (Fishing/User Right, Precautionary approaches/Science-based management, and Synergistic Way/Strategy)	Legal framework	• Number of law and regulation	
	Harvest strategy/ Limit of fishing effort	• Fishing close, (area and seasonal closure, Zoning	
		• Number of Input control (Number, mesh size, length of fishing gear, Licensing control, Capacity (e.g. Gross tonnage, horsepower, etc.)	
		• Number of output control (TAC, Quota, Target species)	
	Fisheries management plan/ strategy/ framework	• Available/not available	
		• Management plan of Fisheries refugia in place,	
		• Habitat rehabilitation, protection and stock enhancement.	
	Efficiency fishing gear	• Length limit (e.g. crab fishery)	
Stakeholder Cooperation/Coordination (Regional / national levels)	Management mechanism	• Management board/ committee, transboundary committee, RPOA for refugia in place	
		• Linkage to the existing management/conservation framework (e.g. MPAs)	
Enforcement	Coordination mechanism	• Inter-agency coordination in place, Number of joint operations	
	Fishery Law enforcement	• Level of enforcement	
		• Frequency of regular patrol	
		• Number of violation prosecution	

	Best Practice	• Adoption of best practice in place	
Capacity Building	Maritime policy and regulation/ International policy	• Number of training/workshops	
Funding (Infrastructure, Enforcement, etc.)	Sustainability	• Long term commitment of Government on finance	
	Source of funding (incentive, soft loan, donation/CSR)	• Number of donors	
		• Type of funds	
	incentive	• Type of incentive	
		• Number of activities	
		• Number of best practices	

5) CLIMATE CHANGE AND DISASTER CROSS-CUTTING ISSUES

SUB-DIMENSIONS	CRITERIA	INDICATORS	METHODS/REFERENCES
Fish Stock	Impact to Fish Stock	• Availability/levels of knowledge abundance, distribution, genetic diversity, recruitment	
		• Update information impact to fish stock	
Impact to Habitat	Coral bleaching	• Area	
		• Incident/ frequency	
		• Recovery Rate	
	Destruction of mangrove	• Area coverage	
		• Recovery Rate	
	Destruction of sea grass	• Area coverage	
		• Recovery Rate	
Impact to Environment	Sea level rise	• Saline intrusion	
		• Mean sea level annual	
		• Coastal Erosion (Area)	
	Physical/chemical parameters (T, Salinity, PH, DO)	• Level of physical and chemical parameters	
	Precipitation (rainfall)	• Level of Precipitation	
	Ocean acidification	• PH level	