Southeast Asian Fisheries Development Center

United Nations Environment Programme

Global Environment Facility

Annex 6

Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand

Regional Meeting on Indicators for Fisheries *Refugia* Management and Discussion on Project Follow-up

A-one The Royal Cruise Hotel, Pattaya City, Chonburi Province, Thailand
9th – 11th September 2019

RESULTS OF THE BRAINSTROMING SESSION ON INDICATORS FOR LONG TERM MANAGEMENT OF FISHERIES REFUGIA

SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER

11 SEPTEMBER 2019

1) OBJECTIVES
   a. Maintain the fish stock and critical habitat;
   b. Satisfy fishing community, social needs now and futures; and
   c. Put in place on effective management system
2) DEVELOPMENT OF INDICATORS FOR MANAGEMENT OF FISHERIES REFUGIA

Dimensions	Sub-dimensions	Criteria	Indicators
1) Ecosystem	**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
	Habitat (mangrove, coral, seagrass, and other critical habitats)	Healthy/ condition/ Area	Size Coverage (Percent)
			Healthy Index
			Target habitat density (IUCN reference)
		Pollution	Standard Water Quality (e.g. COD, BOD)

Dimensions	Sub-dimensions	Criteria	Indicators
	Environment (Impact from human act.)	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	**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	**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
		Effectiveness fishing gear	level of CPUE

Dimensions	Sub-dimensions	Criteria	Indicators
	Innovative Fisheries Technology	Cost effectiveness	Cost reduction, time, human power
		Environment friendly (Green technology)	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	**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
	Capacity Building	Best Practice	Adoption of best practice in place

Dimensions	Sub-dimensions	Criteria	Indicators
		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	**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) Ocean acidification	Level of Precipitation PH level