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

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

STANDARDIZED METHODS FOR COLLECTION AND ANALYSIS OF DATA AND INFORMATION, FOR THE USE IN ASSESSING THE IMPACTS OF FISHERIES REFUGIA AND IN THE DESIGNING OF APPROPRIATE INDICATORS FOR LONG TERM MANAGEMENT OF THE REGIONAL SYSTEM OF FISHERIES REFUGIA

FOR DISCUSSION AND COMMENTS

AT BRAINSTROMING SESSION

Standardized Methods for Collection and Analysis of Data and Information, for the use in Assessing the Impacts of Fisheries Refugia and in the Designing of Appropriate Indicators for Long Term Management of the Regional System of Fisheries Refugia

Issues/Knowledge Gaps	Requirements	Data Collection Methods	Analysis methods	
1) Ecosystem Component				
1.1. Fisheries Resources	o	o	o	o
a. Availability of fishery data and information	o Fishing operation, fishing area and the fishery status o Group and species composition of catches from each fishing gear deployed to catch target species o Catch and effort of each fishing gears deployed to catch target species o Catch/effort trend	o Statistic data collection	o	o
b. Mortality parameters of target species:	o Z - Total mortality coefficient, or instantaneous rate of total mortality or total mortality rate (per time unit), o M - natural mortality coefficient, or instantaneous rate of natural mortality or natural mortality rate (per time unit). o F - fishing mortality coefficient or instantaneous rate of fishing mortality (per time unit).	o $Z = M + F$ (including the Z estimation from catch/effort data)	o Catch curve analysis is used to estimate L50% (length at which 50% of the fish is retained by the gear 50% escape) and convert it to age, t50% (age at which 50% of the fish is retained in the gear).	o
	o Determination of Exploitation rate	o E ($E = F/Z$) using mortality parameters.	o	o
	o Determination of yield per recruit (Y/R) pattern.	o	o	o

Issues/Knowledge Gaps	Requirements	Data Collection Methods	Analysis methods	
	o Stock unit/population structure	o morphological and DNA methods	o	o
	o F-array	o by length and Cohort Analysis including Thompson and Bell Prediction Model.	o	o
c. Availability of fishery biological data	o Monthly size composition	o Samplings at landing site	o Length-weight relationship o Length at first maturity o Sex ratios	o
	o Growth rate	o Growth parameters 1) K - Curvature growth 2) L_∞ - Asymptotic length 3) t_0 - Age at length equal to 0 o	o	o
	o Spawning season	o Determination from Gonado Somatic Index (GSI) and % of maturity	o	o
	o Spawning grounds	o Eggs & larval fish samplings 1) Bongo net	o	o
	o	o Local knowledge reviews	o	o
	o Nursery & Feeding grounds	o Zooplankton samplings	o	o
	o	o Phytoplankton sampling	o	o
	o	o Fish samplings for stomach contents study	o	o
d. Stock status and trends	o Stock Assessment	o Ref. 1.1 o Historical catch data o Standardized CPUEs data	o Ref. to Fish Stock Assessment Manual (FAO, 2003) o	o
	o Risk Assessment	o	o	o
1.2. Environment	o	o	o	o

Issues/Knowledge Gaps	Requirements	Data Collection Methods	Analysis methods	
a. Habitat linkages	o Status of marine habitats *e.g.* mangrove, corals, seagrass, and wetland.	o	o	o
	o Area of critical habitats	o	o	o
b. Effluent discharge	o Monitoring the effluent discharge o Forecasting system	o Ocean forecasting: http://221.215.61.118:2018/#/ o Survey	o Sea surface temperature o Wind o Wave o Salinity o Current Stream o Current vector	o
	o Evaluate the impacts	o Questionnaires o Interviews o Survey	o	o
2) Social Component				
o Impacts on Social aspects	o Fishing community characteristics	o Questionnaires o Interviews o Survey	o	o
	o Gender mainstreaming in fisheries	o Questionnaires o Interviews o Survey	o	o
	o Income AND Livelihoods	o Questionnaires o Interviews o Survey	o	o
3) Economic Component				
o Impacts on Economic	o Fisheries exports value (compared with total value of exports)	o	o	o
	o Investment in fishing fleets and processing facilities	o	o	o
	o Taxes and subsidies	o	o	o
	o Employment	o	o	o
	o Income/ Fishery net revenues	o	o	o

Issues/Knowledge Gaps	Requirements	Data Collection Methods	Analysis methods	
	o Fisheries contribution to GDP	o	o	o
4) Institutions/Governance				
	o Fishery Management Policy	o	o	o
	o Regional Cooperation	o	o	o
	o Stakeholder Participation	o	o	o
5) IMPACT OF CLIMATE CHANGE	o Affecting of climate change to fish behavior/ fishing	o	o	o
	o	o	o	o