

ECOLOGICAL-RELATED ACTION PLANS AND STRATEGIES
for the improvement of the Blue Swimming Crab Industry of the Philippines

A. Critical Success Factors, Key Performance Indicators, and Implementation Scheme

CRITICAL SUCCESS FACTORS		KEY PERFORMANCE INDICATORS			IMPLEMENTATION SCHEME	
SPECIFIC OBJECTIVES / KEY ACTIONS	SPECIFIC ACTIONS	BASELINE DATA (if available) / SOURCES OF SITE-SPECIFIC DATA	OUTPUTS Verifiable Measures	EXPECTED OUTCOMES	MAIN IMPLEMENTERS	IMPLEMENTING PARTNERS
GOAL: Rehabilitated marine habitat for increased BSC production						
OBJECTIVE #1. To conduct BSC resource mapping and determine the impacts of the fishery to the ecosystem						
Improvement of data collection and reporting protocols	Implementation of the NSAP with some modifications	NSAP data	NSAP report	Improved data collection / reporting and enhanced BSC resource map for identification and prevention of ecosystem degradation	NFRDI	BFAR, LGU
	Harmonization of BSC data collection and reporting	NSAP, PSA, BFAR, PFDA data	Harmonized Protocol on data collection/reporting		BFAR	NFRDI, PFDA, PSA, BFAD
Conduct of BSC resource mapping (BSC sources and sinks; BSC facilities, etc) in selected areas (at least 10 in Luzon/Visayas areas, 38 in Mindanao)	Inventory and rapid assessment of existing technologies/studies and benchmarking activities through an R&D summit, to gather baseline information that can be used in evaluating the performance of the different projects for appropriate management of the BSC fishery in the different FMAs.	Published articles	Number of existing technologies assessed and studies reported	Compliance to Laws / Standards / Criteria, such as: - RA 8550 (Philippine Fisheries Code), as amended by RA 10654 - Agriculture and Fisheries Modernization Act (AFMA) of 1997 - RA9147 (Wildlife Resources Protection and Conservation Act of 2001) - CNFIDP 2016 - FAO 263 (FMA, 2019) - Marine Mammal Protection Act of the USA, 1972 - MSC Principle 1 (1.2.4 Assessment of Stock Status); - MSC Principle 2 (2.5.1 Ecosystem Outcome) - SFW Factor 1.2 Stock Status - SFW Factor 4.3 Impacts on the Ecosystem and Food Web	NFRDI	Academe (SSU, UPV), BFAR, PSA, PFDA
	Conduct of Geo-tagging of BSC facilities (i.e. cooking stations, picking stations, processing plants) and BSC fish landing centres	published articles	reports submitted		NFRDI	Academe, Science-based NGOs, BFAR, LGU
	Conduct of focus group discussions on resource mapping	(0) base	FGD Report		NFRDI	Academe, Science-based NGOs, BFAR
	Conduct of underwater assessment	(0) base	Underwater assessment report		NFRDI	Academe, Science-based NGOs, BFAR
	Conduct of grid mapping of BSC fishing gears operation	published articles	grid map report		NFRDI	Academe, Science-based NGOs, BFAR

	Conduct of BSC Habitat Profiling (Oceanographic, Biophysical, Natural Productivity studies) on identified BSC Areas	published articles	Studies conducted and reports generated		NFRDI	Academe, Science-based NGOs, BFAR, LGU
Investigation of the impacts of the fishery to the ecosystem and identification of appropriate measures to prevent irreversible ecosystem change	Development of ETP By-catch Risk Analysis methodology and the capacity of the research teams in the Philippines	published articles	report of the study		FishRight, UPV	BFAR
	Mapping out of critical habitats (e.g. in Region 6 portion of the Visayas Sea), to determine areas where at risk species are frequently spotted, identify safe zones, and recommend for adoption of LGUs	published articles	number of critical habitats mapped out; number of recommended policies for LGU adoption		FishRight	BFAR, LGU
	Study/investigation of the trophic impact and the likelihood of cascades from the BSC fishery	published articles	Number of studies conducted		PACPI	Academe, BAR, DOST
	Communication of results, implementation of precautionary measures, if necessary, and conduct of long term monitoring activities	published articles	number of IEC materials disseminated		FishRight	BFAR, LGU
OBJECTIVE #2. To increase BSC production by 10% from 29,960.59t in 5 years through the improvement and development of technologies in at least 19 BSC production areas						
Improvement of facilities and development of technologies for BSC	Inventory and rapid assessment of existing technologies/studies and benchmarking activities through an R&D summit, to gather baseline information that can be used in evaluating the performance of the different projects for appropriate management of the BSC fishery in the different FMAs.	Published articles	Number of existing technologies assessed	Improved / New technologies for increased BSC production Compliance to Laws / Standards / Criteria, such as: - RA 8550(Philippine Fisheries Code), as amended by RA 10654 - Agriculture and Fisheries Modernization Act (AFMA) of 1997 - CNFIDP 2016 - MSC Principle 2 (2.1.1 Primary Species Outcome); - SWF Factor 2.2 Stock Status	SEAFDEC, Academe	NFRDI
	Monitoring of catches in the crab landing areas and improvement of facilities and practices to reduce post-harvest losses	NSAP data	Number of crab landing centres monitored and facilities improved		LGU, BFAR, NFRDI	Academe, DOST
	Establishment and improved management of hatcheries for BSC (5 in Visayas, 3 in Mindanao)	LGU	Number of hatcheries established		BFAR, LGU	PACPI
	Establishment and improved management of lying-in areas such as crab condominium, etc. (at least 19 in Visayas, 10 in Luzon, 10 in Mindanao)	LGU	Number of lying-in areas established and maintained		LGU	BFAR

	Establishment of science-based techniques for stock reseeded and seed banking areas (10 in Luzon, 19 in Visayas, 9 in Mindanao)	LGU	Number of stock reseeded areas established		LGU	BFAR
	Development and dissemination of new technologies for improved BSC production	Published articles; IPO	Number of technologies developed		SEAFDEC, Academe	NFRDI
OBJECTIVE # 3. To promote the use of eco-friendly fishing gears in different BSC fishing grounds in 5 years						
Assessment and identification of the different types of gears that have by-catch in different fishing grounds (5 in Visayas, 8 in Luzon, 3 in Mindanao)	Testing and validation of eco-friendly collapsible crab traps(e.g. the Maqueda Bay model) (NB: Mindanao will engage on validation experiment e.g. escapement rate of juveniles)	published articles; IPO	reports submitted	Increased use of innovative, eco-friendly fishing gears with minimal by-catch Compliance to Laws / Standards / Criteria, such as: - DA's New Paradigm - RA 8550(Philippine Fisheries Code), as amended by RA 10654 - Agriculture and Fisheries Modernization Act (AFMA) of 1997 - RA9147 (Wildlife Resources Protection and Conservation Act of 2001) - FAO 237 (JTED, 2010) - Marine Mammal Protection Act of the USA, 1972 - MSC Principle 2 (2.2.1 Secondary Species Outcome) - MSC Principle 2 (2.2.2 Secondary Species Mgt Strategy) - MSC Principle 2 – By-catch Species (2.2.3 Information) - SWF Factor 2.2 Stock Status - SFW Factor 2.3 Fishing Mortality	LGU (Maqueda Bay area)	BFAR
	Determination of by-catch composition of gillnet, pot, and trap (design and specification) for the BSC fisheries	published articles; NSAP data	Published by-catch composition report		PACPI	BFAR, Academe
	Determination of by-catch composition and identification, and classification of by-catch into primary, secondary, or ETP species of BSC fishery	published articles; NSAP data	Published by-catch composition report		PACPI	BFAR, Academe
	RBF (Risk Based Framework) Assessment of the BSC fishery, with PSA (Productivity Susceptibility Analysis) for the secondary species and CSA (Consequence Spatial Analysis) for habitats	published articles	RBF report submitted		PACPI	WWF
	Gear inventory and specification to be included in stock assessment programs of LGU and BFAR	published articles; NSAP data	published gear inventory report		PACPI	BFAR
	Assessment and development of alternative measures, i.e. fishing gear and practices / gear modifications, etc., and their effectiveness at reducing mortality of unwanted and ETP bycatch	published articles	report on alternative measures		PACPI	BFAR 7, Academe
	Development and innovation of eco-friendly crab fishing gears	published articles; IPO	number of innovative eco-friendly fishing gears developed		NFRDI	Academe, BFAR, LGU, Science-based NGOs
	Standardization of specifications for all crab fishing gears throughout the country	published articles; IPO	reports submitted		BFAR	Academe, NFRDI, LGU
	Investigation of the impacts of crab fishing gears on habitat structure and function, and develop a strategy to ensure habitat integrity	Assessment of the scale and intensity of impacts of the BSC fishing gears on different habitats (i.e. seagrass beds, mangrove areas, coral reef areas) in the Visayan Sea, including spatial attributes and mapping	published articles; NSAP data		reports submitted	Management strategies to minimize impact of fishing gears on habitat structure Compliance to Laws / Standards / Criteria, such as: - RA 8550 (Philippine Fisheries

Development of an appropriate management strategy to ensure protection of habitats, including but not limited to fishing gear management and zonation and MPAs	published articles; NSAP data	reports submitted	Code), as amended by RA 10654 - RA9147 (Wildlife Resources Protection and Conservation Act of 2001) - MSC Principle 2 (2.4.1 Habitat Outcome) - MSC Principle 2 (2.4.2 Habitats Mgt Strategy) - SFW Factor 4.1 Impact of Fishing Gear on Substrate - SFW Factor 4.2 Modifying Factor: Mitigation of Fishing Gear Impacts	PACPI	LGU
Collection of information related to ghost fishing (including but not limited to accounting of gear loss, concentration, and distribution of lost fishing gears, evaluation of economic and environmental impacts) and the use of these information to come up with appropriate actions and policy guidelines to mitigate the impact of ghost fishing.	published articles; NSAP data	reports submitted		PACPI	Academe, DOST, BAR

OBJECTIVE #4. To increase the BSC stock biomass by 10% (from 4.27kg/day CPUE in FMA 11, as an example) in different FMAs where BSC is one of the key species of interest

Establishment of biologically based target and limit reference points as basis in the determination of harvest strategies and harvest control rules	Conduct of studies on the population genetic structure and management of the BSC fishery in the Philippines	published articles	number of population genetics studies conducted	Established reference points as basis for harvest strategies and harvest control rules in different FMAs Compliance to Laws / Standards / Criteria, such as: - RA 8550(Philippine Fisheries Code), as amended by RA 10654 - FAO 263 (FMA, 2019) - MSC Principle 1 (1.1.1 Stock Status) - MSC Principle 1 (1.2.1 Harvest strategy) - MSC Principle 1 (1.2.2 HCR and tools) - MSC Principle 1 (1.2.3 Information and monitoring) - MSC Principle 1 (1.2.4 Assessment of Stock Status) - MSC Principle 3 (3.2.2 Decision-making Processes); - SFW Factor 1.2 Stock Status - SFW Factor 3.1 - Mgt on Impacts - Mgt strategy and implementation of HCRs - SFW Factor 3.1 Mgt of Impacts - Scientific research and monitoring	Academe (Silliman Univ , UPD, etc.), NFRDI	PACPI
	Conduct of studies on reproductive biology of BSC and other crustaceans	published articles	number of studies conducted		Academe (SSU, UPV)	NFRDI, BFAR, Other SUCs
	Establishment of fishery management units	BFAR	number of FMAs launched		Academe, BFAR, NFRDI	LGU, CSO
	Conduct of comprehensive stock assessment in selected areas (e.g. at least 10 in Visayas, 8 in Luzon, 20 in Mindanao)	published articles	number of studies conducted		Academe, NFRDI, NSAP	PACPI, USAID
	Determination of biological indicators as basis in establishing target and limit reference points (e.g. fishing mortality, catch rate, spawning potential ratio, exploitation values, length at first maturity, etc.)	published articles	limit and target reference points determined		Academe, NFRDI, NSAP	
	Establishment of harvest strategies and harvest control rules based on reference points	BFAR	assessment report		BFAR, FMA-MB	LGU, FMA-SAG, Academe
	Dissemination of results to all stakeholders		number of IEC disseminated		BFAR, FMA-MB	LGU
	Drafting of policy recommendations on harvest control rules / measures through MFOs	BFAR	number of policy recommendations		BFAR, FMA-MBLGU	FMA-SAG, Academe

	Implementation of harvest strategies and harvest control rules	BFAR	number of HCR implemented		BFAR, FMA-MB, LGU	
Implementation of stock enhancement strategies	Conduct of studies on stock enhancement of BSC through breeding and seed production	published articles	number of studies conducted	Enhanced stocks in different FMAs Compliance to Laws / Standards / Criteria, such as - RA 8550(Philippine Fisheries Code), as amended by RA 10654 - 2000 Bangkok Declaration on Strategy for Aquaculture Development - MSC Principle 1 (1.1.3 Stock rebuilding); - SFW Factor 3.1 Mgt of Impacts	BFAR 7, Academe (SSU)	LGU, CSO
	Conduct of a study on the proper management of holding cages, improvement of handling and survival rate of berried crabs	published articles	refer to BSC lying-in and holding cages indicator		BFAR 7, Academe	LGU, CSO
	Installation of holding cages	published articles	refer to BSC lying-in and holding cages indicator		LGU, BFAR	CSO
	Benchmarking, monitoring, and impact assessment of holding cages	published articles	refer to BSC lying-in and holding cages indicator		BFAR, Academe	LGU, CSO
	Monitoring and impact assessment of stock enhancement	published articles	M&E report submitted		BFAR, Academe	LGU, CSO
Identification of the spawning season of BSC in selected areas for the implementation of closed season in 2022	Conduct of stock assessment and reproductive biology studies to determine spawning season (5 for Visayas area, 5 for Mindanao) ; Note: other major crabbing regions to conduct periodic stock assessment	published articles	Number of studies conducted	Closed season implemented in some FMAs Compliance to Laws / Standards / Criteria, such as - RA 8550(Philippine Fisheries Code), as amended by RA 10654 - FAO 263 (FMA, 2019) - MSC Principle 1 (1.1.2 Stock Rebuilding and 1.2.1 Harvest Strategy); - SFW Factor 1.2 Stock Status; - SFW Factor 3.1 Mgt of Impacts on Retained Stocks - Mgt Strategy and Implementation (HCRs)	NFRDI	Academe, DOST, BAR
	Information dissemination of the results on the identified spawning seasons for BSC in the selected areas	LGU; BFAR	Number of IEC Activities and IEC Materials		BFAR (IFCU,RFIMC, CFD)	LGUs, Academe
	Establishment of closed season for BSC in select areas				BFAR, LGU	FMA-SAF, Academe
OBJECTIVE # 5. To establish a network of MPAs (Marine Protected Areas) for BSC in 5 years						
Determination of functional MPAs in different areas and restoration of non-functional MPAs	Inventory of existing MPAs (through BFAR Regional Offices), e.g. through MPA Support Network	LGU/BFAR/DENR Data	Inventory report per region	Proper management of MPAs for increased BSC production Compliance to Laws / Standards / Criteria, such as - RA 8550(Philippine Fisheries Code), as amended by RA 10654 - RA 7586 - National Integrated Protected Areas System - series of 1992	LGU & BFAR	DENR (MENRO, CNERO, PENRO), Academe, NGOs, & POs
	Classification of functional MPAs through MEAT (specifically for BSC)	LGU/BFAR/DENR Data	MEAT report per region			
	Technology development for sea grass transplantation	Published articles	Number of technologies developed		Academe (BUCF)	POs, BFAR-5, NGOs
Establishment and management of	Defining location selection criteria	LGU/BFAR/DENR Data	1 user manual		BSC-TWG	LGU, DENR, Academe

at least 19 functional MPAs (Marine Protected Areas) for BSC in 5 years	Assessment of potential sites for the establishment of MPAs for BSC through initial baseline surveys and associated analyses	LGU/BFAR/DENR Data	Number of potential sites as SFMAs or MPAs assessed	- FAO 196 (FARMC, 2000)	BFAR	NGOs
	Establishment of social license, community engagement and acceptance through various forms of public consultations or public hearing	LGU/BFAR/DENR Data	Number of consultations conducted; evidence of community acceptance and engagement		LGU	NGAs
	Organization and strengthening of BFARMCs/MFARMCs to recommend the re-enactment of MFOs	LGU/BFAR/DENR Data	Number of FARMCs organized and strengthened		BFAR	LGUs, NGOs
	To fully engage in the processes necessary for the enactment/declaration of MFO by the Sangguniang Bayan / Panlalawigan (i.e., presentation of results, committee hearing, approvals, etc.)	LGU/BFAR/DENR Data	Number of Approved BSC MPAs		LGU	BFAR
	Capacity building of organized fisherfolk association and management team/committee on proper/responsible fisheries management through the engagement of communities and enablers	LGU/BFAR/DENR Data	Number of MPAs established		BFAR	LGU, partner NGOs
	Establishment of BSC MPAs (i.e., installation of marker buoys, procurement of logistics for monitoring, etc.)	LGU/BFAR/DENR Data	Number of BSC MPAs functionalized / activated		LGU	BFAR

OBJECTIVE #6. To minimize the level of environmental pollution due to crab meat industry wastes

Development of technologies to utilize solid and liquid wastes from crab pre-processing and processing stations	Technology verification on the existing studies on feed formulation using crab shell (e.g. NONESCOST)	published articles	reports submitted	Use of improved/new technologies for utilization of BSC wastes from pre-processing and processing plants Compliance to Laws / Standards / Criteria, such as - DA's New 8 Paradigms - Phil Clean Water Act of 2004 (RA 9275); Ecological Solid Waste Mgt Act of 2001 (RA 9003)	Academe (NONESCOST)	DOST
	Technology development on the use of crab shell as fertilizers/feeds other foods and innovative products (e.g. CBSUA, PaRSU, CNSC, SSC, BU, all other SUCs and HEIs)	published articles, IPO	Technology developed; patents approved		RIs, Academe	LGU, private sector, DA-BAR, NFRDI
	Conduct of other research activities on the viability of solid and liquid wastes from crab pre-processing and processing stations	published articles, research institutions	Number of research reports submitted		Academe, SEAFDEC	DENR-EMB
	Establishment of treatment facilities for unusable and usable waste and its proper storage and disposal	private sector, EMB data	Number of established treatment facility		Academe, SEAFDEC	DENR-EMB

B. Implementation Schedule, Budgetary Requirements and Sources of Funds

CRITICAL SUCCESS FACTORS		IMPLEMENTATION SCHEDULE																PROPOSED BUDGET		SOURCES OF FUNDS					
SPECIFIC OBJECTIVES / KEY ACTIONS	SPECIFIC ACTIONS	2020				2021				2022				2023				2024				Year 1	Years 2-5		
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2		3			4	
GOAL: Rehabilitated marine habitat for increased BSC production																									
OBJECTIVE #1. To conduct BSC resource mapping and determine the impacts of the fishery to the ecosystem																									
Improvement of data collection and reporting protocols	Implementation of the NSAP with some modifications																					2,500,000	2,500,000	NFRDI	
	Harmonization of BSC data collection and reporting																						2,500,000	2,500,000	BFAR, NFRDI
Conduct of BSC resource mapping (BSC sources and sinks; BSC facilities, etc) in selected areas (at least 10 in Luzon/Visayas areas, 38 in Mindanao)	Inventory and rapid assessment of existing technologies/studies and benchmarking activities through an R&D summit, to gather baseline information that can be used in evaluating the performance of the different projects for appropriate management of the BSC fishery in the different FMAs.																					1,250,000	1,250,000	NFRDI, DOST	
	Conduct of Geo-tagging of BSC facilities (i.e. cooking stations, picking stations, processing plants) and BSC fish landing centres																						500,000	1,500,000	BFAR, PACPI
	Conduct of focus group discussions on resource mapping																							1,000,000	BFAR, NFRDI
	Conduct of underwater assessment																							2,000,000	NFRDI
	Conduct of grid mapping of BSC fishing gears operation																							2,000,000	NFRDI, DOST, Academe
	Conduct of BSC Habitat Profiling (Oceanographic, Biophysical, Natural Productivity studies) on identified BSC Areas																							3,000,000	NFRDI, DOST, Academe
	Investigation of the impacts of the fishery to the ecosystem and identification of appropriate measures to prevent irreversible ecosystem change	Development of ETP By-catch Risk Analysis methodology and the capacity of the research teams in the Philippines																						1,750,000	
	Mapping out of critical habitats (e.g. in Region 6 portion of the Visayas Sea), to determine areas where at risk species are frequently spotted, identify safe zones, and recommend for adoption of LGUs																						1,750,000		FishRight

