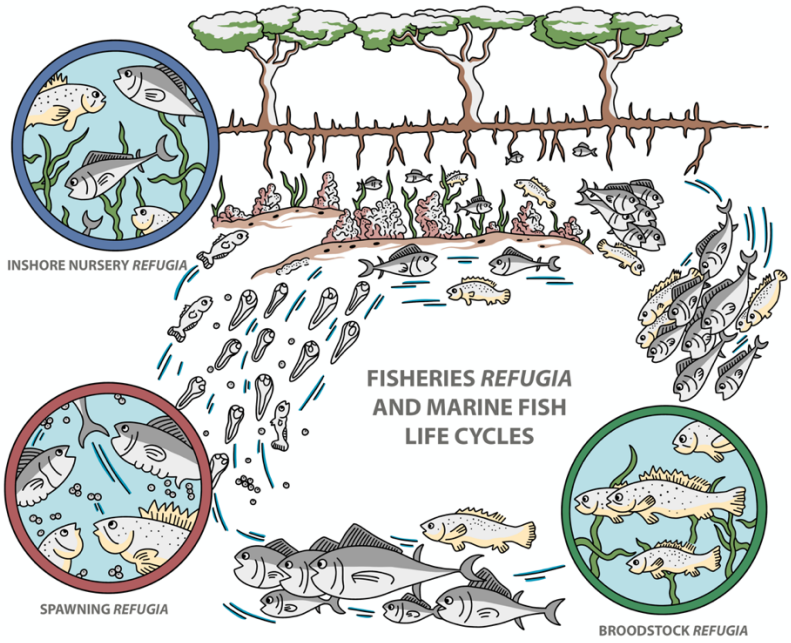
Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand

A REVIEW OF PHILIPPINE APPROACHES IN FISHERIES CONSERVATION AND MANAGEMENT AND DEVELOPING A POLICY FRAMEWORK FOR ESTABLISHING REFUGIA IN KEY FISHERIES MANAGEMENT AREAS



Prepared by

Valeriano M. Borja
and
Joeren S. Yleana

SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
TRAINING DEPARTMENT

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Southeast Asian Fisheries Development Center
Training Department
P.O.Box 97, Phrasamutchedi, Samut Prakan, Thailand
Tel: (66) 2 425 6100
Fax: (66) 2 425 6110
https://fisheries-refugia.org and
https://seafdec.or.th

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A Review of Philippine Approaches in Fisheries Conservation and Management and Developing a Policy Framework for Establishing Refugia in Key Fisheries Management Areas

I. State of Philippine Fisheries

The Philippines has been among the world's top 10 fish and seafood producers for several years, accounting for 4.42 million tons of fish production in 2019. (Tolentino-Zondervan and Zondervan, 2022).

In 2021, total fisheries production was recorded at 4,250.79 thousand metric tons, from 4,400.3 7 thousand metric tons output a year ago, representing an annual downtrend of -3.4 percent. This was brought about by decreased production from commercial and marine municipal fisheries, and aquaculture. Only inland fisheries registered an improvement in production during the period. (PSA, 2022)

With this pandemic-induced decline in fisheries production, the Philippines is also faced with a problem articulated in stark terms by the new Philippine President in his recent State of the Nation Address or SONA[1]:

Regarding food supply, we are confronted by a two-pronged problem: that which will hit us in the short term and that which will hit us in the long term.

He then proceeded to explain it further using the local language Filipino, which refers to the continuing increase in the prices of food as well as the deficiency in the supply of food.

This problem is not unusual though the current times only exacerbate the acuity of the bad situation the country is in.

For that matter, there is a broad consensus that fisheries in the developing world fail to fulfill their potential as engines of social and economic development. A common explanation for this has been 'failure of fisheries management' but this implies that the problem and the solution lie within the domain of the fisheries themselves. Yet often, failure to manage the interface between fisheries and the wider external environment characterizes the problem better. Fisheries are often adversely affected by the broader political, institutional and economic drivers of global and national economies. (Andrew, et al., 2007)

II. Experiences and Future Trends in Marine Ecosystem Conservation Practices/Sustainable Fisheries Management

Overall, the different fishery management themes in the Philippines are perceived to be more social and economic oriented, with limited effect on environmental goals. (Tolentino-Zondervan and Zondervan, 2022).

Horigue et al. (2012) and Maliao et al. (2009) show that the development of MPAs and integrated coastal management led to strengthening social networks among LGUs, fisherfolk,

[1] See https://www.rappler.com/nation/full-text-transcript-president-marcos-jr-state-nation-address-2022/ , accessed 8 August 2022

and community participation. Yet, the overall ecological effectiveness of MPAs are still limited to around 20–30%.(Tolentino-Zondervan and Zondervan, 2022).

Notwithstanding these realities in implementation, there are ongoing efforts at establishing no-take MPAs in NE and W. Mindanao (De Guzman & Quinones, 2021)
and then there's the BASIL Program of BFAR or the Balik Sigla sa Ilog at Lawa, which is an expansion of the National Inland Fisheries Enhancement Program (NIFEP)[2].

Given these experiences, it may be helpful for Philippine authorities to look at current trends and explore new management themes to promote sustainable fisheries, particularly those anchored on the use of big data and technologies, such as blockchain, artificial intelligence, and internet-of-things. This can already be observed in the fishery's current practices, such as using sensors, QR codes, and RFID tags to prove that the fish are properly labeled, safe, and are caught using sustainable practices. Future fishery management themes could focus on using big data and sharing information among fishers, to predict the most efficient, environmentally friendly, and socially accepted way of harvesting fish. (Tolentino-Zondervan and Zondervan, 2022).

III. Developments in Relevant International Initiatives/Platforms

A. Coral Triangle Initiative

The Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) is a multilateral partnership of six countries namely Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste established in 2009 with Indonesian President Yudhoyono inspired other leaders to work together to sustain extraordinary marine and coastal resources by addressing crucial issues such as food security, climate change and marine biodiversity[3].

One of the goals of the CTI-CFF is the complete application of the ecosystem approach to fisheries management and it adopted as one of its targets (Target 2.1) a strong legislative, policy and regulatory framework for achieving EAFM as a critical step towards addressing common concerns. These policies and legislation must address the EAFM principles described in the FAO Code of Conduct for Responsible Fisheries (CCRF). The policies do not have to be a one-to-one correspondence with EAFM Principles. A policy can address multiple principles and several policies and legislations on EAFM, and a budget has to be allocated for effective implementation[4].

According to the FAO Code of Conduct for Responsible Fisheries (FAO, 1995), article 7.2.1 articulated one of the responsible fisheries management objectives as follows:

7.2.1 Recognizing that long-term sustainable use of fisheries resources is the overriding objective of conservation and management, States and subregional or regional fisheries management organizations and arrangements should, inter alia, adopt appropriate measures, based on the best scientific evidence available, which are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant

[2] See https://www.bfar.da.gov.ph/wp-content/uploads/2021/06/CBT-Region-5.pdf
[3] About CTI-CFF, see https://www.coraltriangleinitiative.org/about, accessed 7 August 2022
[4] EAFM Working Group Goals, Targets nd Indicators, from https://www.coraltriangleinitiative.org/index.php?q=eafm, accessed 7 August 2022

environmental and economic factors, including the unique requirements of developing countries.

According to the group's Regional Plan of Action[5], EAFM is a crucial approach toward addressing common transboundary policy and regulatory concerns, such as (i) over-fishing of shared pelagic fish stocks; (ii) illegal cross-border fishing by small-scale fishers (stimulated by depletion of local coastal fisheries), commercial-scale fishing operations, and trans-shipment; (iii) fishing overcapacity; and (iv) by-catch of protected and endangered species.

Explaining it further, the Plan of Action further elaborates how EAFM addresses these concerns:

EAFM strives to balance diverse societal objectives by considering the knowledge and uncertainties of ecosystems' biotic, abiotic and human components and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries.
EAFM principles are the following;

(i) fisheries should be managed to limit their impact on the ecosystem to the extent possible;
(ii) ecological relationships between harvested, dependent and associated species should be maintained;
(iii) management measures should be compatible across the entire distribution of the resource (across jurisdictions and management plans);
iv) the precautionary approach should be applied because the knowledge on ecosystems is incomplete; and
(v) governance should ensure both human and ecosystem well-being and equity

The EAFM provides clear underpinnings as to why fisheries refugia are being undertaken and keep it grounded on its implementation's key considerations.

The specification of EAFM in the group's Regional Plan of Action is imperative since internalizing ecosystem-based concepts has proven difficult because science has limited capacity to develop an ever more complex understanding of the behavior of ecosystems under exploitation and to advise managers on appropriate responses. This conclusion is especially relevant for small-scale fisheries in the developing world where the cost–benefit ratio of research is high compared to benefits from spending elsewhere, and data and expertise are sparser. The impact of ecosystem degradation on people's lives is also more significant in these countries. Perhaps here, more than anywhere else, the way forward must lie in more practical, adaptive approaches. (Andrew, et.al., 2007)

B. Convention on Biological Diversity

Ecologically or Biologically Significant Marine Areas (EBSAs)

The Convention on Biological Diversity is an international treaty for the conservation of biodiversity, the sustainable use of the components of biodiversity, and the equitable sharing of the benefits derived from the use of genetic resources. With 196 Parties, the Convention has near-universal participation among countries. The Convention seeks to address all threats to biodiversity and ecosystem services through scientific assessments, the development of tools, incentives and processes, the transfer of technologies and good practices, and the complete and active involvement of relevant stakeholders including indigenous and local

[5] CTI-CFF Regional Plan of Action, https://www.coraltriangleinitiative.org/sites/default/files/resources/CTI-CFF%20Regional%20Plan%20Of%20Action%20(RPOA)%20.pdf, accessed 8 August 2022

communities, youth, NGOs, women and the business community. (Secretariat of the Convention on Biological Diversity, 2021).

The global EBSA process emerged in the Convention on Biological Diversity (CBD) context and is an important initiative intended to support Parties in their efforts to implement the Convention. An EBSA (an acronym that stands for ecologically or biologically significant marine areas) is an area of the ocean that has particular importance in terms of its ecological or biological characteristics, for example, by providing essential habitats, food sources or breeding grounds for specific species. These areas can include all seabed habitats from the coastline to the open ocean and can be located at any depth in the water column from the surface to the abyss. (Secretariat of the Convention on Biological Diversity, 2021).

As of 2021, the CBD Secretariat has convened 15 regional EBSA workshops, covering nearly the entire global ocean, through an inclusive and science-driven process involving experts from all over the world and an enormous amount of scientific data. These regional workshops have described more than 300 EBSAs worldwide formally identified by the CBD Conference of the Parties. The descriptions and associated technical information for all identified officially EBSAs are available via the EBSA website (www.cbd.int/ebsa) (Secretariat of the Convention on Biological Diversity, 2021).

EBSAs are identified through the application of seven criteria : 1.) uniqueness or rarity; 2.) special importance for life-history stages; 3.) importance for threatened, endangered or declining species and/or habitats; 4.) vulnerability, fragility, sensitivity, or slow recovery; 5.) biological productivity; 6.) biological diversity, and 7.) naturalness. (Clark, et al., 2014)

In a 2008 Decision, the Conference of the Parties of the Convention on Biological Diversith via decision X/29, noted that the application of the EBSA criteria is a scientific and technical exercise, that areas found to meet the requirements may require enhanced conservation and management measures, and that this can be achieved through a variety of means, including MPAs and impact assessments. The COP also emphasized that identifying EBSAs and selecting conservation and management measures is a matter for States. (Secretariat of the Convention on Biological Diversity, 2021).

The description of EBSAs is based on the scientific information and expert knowledge available at the time of the workshop. Areas described as meeting the EBSA criteria have ranged from relatively small sites to very extensive oceanographic features, and they can overlap or be nested within each other. Areas may meet multiple EBSA criteria, but a strong response to just one is sufficient for description as a system. Recently, Johnson and Kenchington (2019) proposed eighth criterion to be added to the seven criteria in designating a marine area as an EBSA and this criterion is to be called “climate change refugium”.

They defined it as “habitats that components of biodiversity retreat to, persist in, and can potentially expand from under changing environmental conditions or areas relatively buffered from contemporary climate change over time that enable persistence of valued physical, ecological, and sociocultural resources.”

The rationale for this criterion is to facilitate the survival of biota under changing environmental conditions and to allow time for adaptation to occur in the face of the acute effects of climate change.

This continuing evolution and development of the concept of EBSA under the CBD could help facilitate the adoption of the concept of fisheries refugia with the additional justifications discussed therein adopted to the Philippine context.

Other Effective Area-Based Conservation Measures (OECMs)

Another development in the CBD arena that may add additional rationale and scientific grounding to fisheries *refugia* is the concept of other effective area-based conservation measures or OECMs. As decided by the Conference of the Parties to the Convention on Biological Diversity in 2018, OECMs is "a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values" (Conference of the Parties to the Convention on Biological Diversity, 2018)

From a fishery point of view, it may be necessary to stress that an OECM is a cross-sectoral concept. Any proposal to include an area managed by fisheries with an effective contribution to broader conservation will also be reviewed relative to other pressures either present or likely in the same area. (Rice, Garcia & Kaiser, 2018)

In determining the effectiveness of area-based fisheries measures, identifying the enabling and limiting factors allow for two broad generalizations, with exceptions: First certain types of area-based fisheries measures seem to be easier to implement successfully than others. Second, certain enabling factors, if present, are more likely than others to broadly increase the effectiveness of a measure, whereas certain limiting factors, if present, are likely to reduce or negate usefulness. These general patterns can help guide choices of which area-based fishery measures, implemented in which contexts, are good candidates for further evaluation as potential OEABCMs. They can also assist in the planning process for increasing the chances of success if an authority wants to implement an area-based measure to address a particular type of fisheries management challenge. (*Ibid.)*

Some considerations can be used as subjective pre-screening criteria, to pick more likely candidates for a more thorough evaluation, such as the following:

- The more exclusionary a measure is, the more likely it is to provide desired broader biodiversity benefits, but the more disruptive it is expected to be to fisheries performance;
- The more consultative the process for selecting measures and designing their implementation, the more likely there will be compliance with the measure subsequently;
- If serious structural problems exist in a fishery, such as substantial over-capacity and excessive fleet size and effort, few spatial measures can perform to their full potential, and many will have limited or no effectiveness until the structural problems are addressed;
- Inability to provide some form of effective monitoring, surveillance and enforcement of area-based measures (including community-based for small-scale fisheries), is likely to weaken or negate the effectiveness of any area-based fisheries measure;
- Spill-over benefits to fisheries from areas where the fisheries are excluded depend significantly on the status of the target stocks before the closures, with substantial benefit possible for depleted target species that do well within the closed area, but limited or no potential benefits for stocks that were maintained in a healthy condition (say, near Bmsy) throughout their range before the closure (although the closures to

protect particular life history functions of the target species may still be effective) (*Ibid.)*

These considerations would mean that fisheries refugia cannot be easily considered an OECM outright as there has to be some evaluation of the enabling and hindering factors in achieving the objectives as to why the refugia in question are being set up.

Thus, in determining whether fisheries refugia may be considered as an OECM and therefore be reported by a CBD Party as an OECM, the following key features of the area to be considered in the evaluation of specific applications of an area-based fisheries management measure include:

- The ecological components of particular conservation concern in both the specific area and the larger region, and how the measure could contribute to their conservation;
- The size, duration, extent of restrictions and placement of the area;
- The ability of the management authority to implement the measure if adopted, and monitor and provide enforcement in the area while the measure is in place;
- The structure of the fisheries that would be excluded by the measure, including how their likely responses to the measure could impact the effectiveness of the measure at providing biodiversity outcomes;
- The potential contributions the measure could make to the overall performance of the fishery. (*Id.)*

C. Convention on Migratory Species

As stated on its website[6], as an environmental treaty of the United Nations, the Convention on Migratory Species or CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.

As the only global convention specializing in the conservation of migratory species, their habitats and migration routes, CMS complements and co-operates with several other international organizations, NGOs and partners in the media and the corporate sector.

Migratory species threatened with extinction are listed in Appendix I of the Convention. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species.

Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range of States to conclude global or regional agreements.

In this respect, CMS acts as a framework Convention. The agreements may range from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. The

[6] See https://www.cms.int/en/legalinstrument/cms, accessed 8 August 2022

development of models tailored according to the conservation needs throughout the migratory range is a unique capacity of CMS.

Of relevance to the adoption of fisheries refugia is the Convention's Resolution 12.24[7] Promoting MPA Networks in the ASEAN Region adopted in 2017, which called on the ASEAN Member States
To support government implementation of marine biodiversity conservation actions at the regional, national and local levels and scale up the coverage and effectiveness of marine conservation areas and threatened species protection in Southeast and East Asia in support of the implementation of regional strategies and plans of action that address issues relating to the governance of coasts and oceans including but not limited to the ASEAN Heritage Parks Programme, the Coral Triangle Initiative on Coral Reefs Fisheries and Food Security Regional Plan of Action (CTI-CFF RPOA) and the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA).

Whenever certain migratory fish species may be eventually identified for specific protection via fisheries refugia, the CMS Concerted Actions for Appendix I and II species can later be consulted to further reinforce coordinative action among the other ASEAN Member States to ensure the protection of these fish species.

D. Western and Central Pacific Fisheries Commission (WCPFC)

Consonant with the approach taken under the Convention on Migratory Species, specific Conservation and Management Measures adopted under the WCPFC may also be considered as additional policy rationale in adopting fisheries refugia for certain fish species that will come under the coverage of this RFMO.

IV. Developing a Policy Framework for Establishing Refugia in Identified Ecosystem Sites

A. Rationale

The establishment of fisheries refugia in the Philippines finds its justification in RA 10654, Fisheries Code, as amended[8], which makes it the policy of the State (c) To ensure the rational and sustainable development, management and conservation of the fishery and aquatic resources in Philippine waters including the Exclusive Economic Zone (EEZ) and in the adjacent high seas, consistent with the primordial objective of maintaining a sound ecological balance, protecting and enhancing the quality of the environment. xxx

In addition, the said law also expressed the State policy x x x (f) To adopt the precautionary principle and manage the fishery and aquatic resources, in a manner consistent with the concept of an ecosystem-based approach to fisheries management and integrated coastal area management in specific natural fishery management areas, appropriately supported by research, technical services and guidance provided by the State.

[7] See https://www.cms.int/sites/default/files/document/cms_cop12_res.12.24_mpa-network-asean_e.pdf, accessed 8 August 2022
[8] Sec. 1, RA 10654, Fisheries Code, as amended, https://www.lawphil.net/statutes/repacts/ra2015/ra_10654_2015.html, accessed 30 July 2022

This finds support in the Local Government Code, which likewise makes it an operative principle of decentralization[9] whereby :

(i) Local government units shall share with the national government the responsibility for the management and maintenance of ecological balance within their territorial jurisdiction, subject to the provisions of this Code and national policies;

(j) Effective mechanisms for ensuring the accountability of local government units to their respective constituents shall be strengthened to upgrade the quality of local leadership continually;

(k) The realization of local autonomy shall be facilitated through improved coordination of national government policies and programs and extension of adequate technical and material assistance to less developed and deserving local government units;

These explicit statements of policy under existing laws, particularly the Fisheries Code as well as the Local Government Code, already provide a sound rationale for the adoption of a more specific policy on fisheries refugia, to give it more priority and to enable it to be scaled up at the soonest possible time, given the current challenges on food security and over-all sustainability of our existing fisheries resources.

Looking at other government agencies, we can see the DENR which recently issued DAO 26-2016, which made it a policy of the State to protect the nation's marine wealth and exclusive economic zone and reserve its use and enjoyment exclusively for Filipino citizens and promote the right to a healthful and balanced ecology in accord with the rhythm and harmony of nature.

From the academic literature, a further justification for the fisheries refugia concept was that it was developed as a novel fisheries resource management approach to identifying and designation of priority areas in which to integrate fisheries and habitat management in the context of maintaining fish stocks and critical habitats. (Siriraksophon, 2022)

In the Fisheries Code of the Philippines (Republic Act 8550) before its amendment by Republic Act 10654, fisheries refugia are found in the following provisions:

Section 81. **Fish Refuge and Sanctuaries**. - The Department may establish fish refuge and sanctuaries to be administered in the manner to be prescribed by the BFAR at least twenty-five percent (25%) but not more than forty percent (40%) of bays, foreshore lands, continental shelf or any fishing ground shall be set aside for the cultivation of mangroves to strengthen the habitat and the spawning grounds of fish. Within these areas no commercial fishing shall be allowed. All marine fishery reserves, fish sanctuaries and mangrove swamp reservations already declared or proclaimed by the President or legislated by the Congress of the Philippines shall be continuously administered and supervised by the concerned agency: Provided, however, that in municipal waters, the concerned LGU in consultation with the FARMCs may establish fishery refuge and sanctuaries. The FARMCs may also recommend fishery refuge and sanctuaries: Provided, further, that at least fifteen percent (15%) where applicable of the total coastal areas in each municipality shall be identified, based on the best available scientific data and in consultation with the Department, and

[9] Sec. 3, RA 7160, Local Government Code, https://www.officialgazette.gov.ph/1991/10/10/republic-act-no-7160/, accessed 30 July 2022

automatically designated as fish sanctuaries by the LGUs in consultation with the concerned FARMCs.

To provide some coercive force to this provision, the Fisheries Code likewise makes it illegal to fish in fisheries refuges and sanctuaries and subjects those who fish in their areas to criminal liability with imprisonment and a fine, including a forfeiture of the fish caught in these areas[10].

Whether this has been implemented by BFAR well is not that clear but as rationalized by Aquino, Ani and Festejo (2013), fish refuge and marine sanctuaries are established to regulate, restrict or prohibit fishing in overfished areas or those that are in danger of being overfished. As the law provides, at least 15% of the total coastal regions in each municipality should be designated as a fish refuge and marine sanctuaries.

Pomeroy and Courney (2018) explained further that fishery sanctuaries under the Fisheries Code have biodiversity conservation functions though they are primarily established to help sustain fisheries production.

B. Objectives - effective conservation, sustainable fisheries

Based on the projects that implemented the fisheries refugia concept, the objectives of fisheries refugia were to improve the management of fish stock and habitat links (Kiengiang Provincial People's Committee, no date), and that the maintenance of natural *refugia* critical to the life-cycle and sustainability of fished species or the establishment of refugia in cases where natural refugia no longer exist, enables the management of intense small-scale fishing pressure, particularly from the perspective of the food security objective. (Paterson, et al., 2013).

Coral reefs, mangroves and seagrasses are the distinct ecosystems that play a role in providing fisheries refugia. When these systems are protected together, they may provide synergistic benefits by (1) increasing resistance to disturbance across ecosystem boundaries, (2) supporting high biodiversity by providing heterogeneous resources for organisms at different life history stages, (3) creating portfolio effects, where alternative habitats can support displaced organisms, increasing the stability of each system, and (4) disincentivizing harmful human activity. (Carlson,et.al., 2021)

Fish Refuges can serve as focal points for a process of engagement that gives fishers expanded rights (albeit informal), generating incentives to try community-based conservation with implications for climate resiliency. (Quintana and Basurto, 2020)

Magellan, et al. (2021) say that the provision of refugia is one of a suite of potential mitigation approaches to deal with the multiple interacting stressors that redfins face. In addition to habitat degradation, an anthropogenic stressor of particular concern is the threat of invasion by novel predators. This represents a "double whammy" for redfins—habitat alteration is likely to reduce refuge availability, and at the same time, may favor the survival of invasive

[10] See Section 96 of the Fisheries Code :

> **Fishing in Fishery Reserves, Refuge and Sanctuaries**. - It shall be unlawful to fish in fishery areas declared by the Department as fishery reserves, refuge and sanctuaries. Violation of the provision of this section shall be punished by imprisonment of two (2) years to six (6) years and/or fine of Two thousand pesos (P2,000.00) to Twenty thousand pesos (P20,000.00) and by forfeiture of the catch and the cancellation of fishing permit or license.

species over native species. Increasing the availability of natural or artificial refugia is, thus, likely to benefit redfins in invaded habitats.

Another anthropogenic change of global concern that they are noted is the climate crisis, which is also likely to interact with both habitat degradation and invasive species and complicate their impacts. Deeper water may act as a thermal refuge and artificial refugia can mitigate habitat destruction impacts and protect from invasive predators. Integrating these mitigation factors with others across freshwater, marine, and terrestrial systems will be more effective than using them in isolation. The provision of refugia may thus benefit other species as well. Assessing the interactions among refuge use strategies, various anthropogenic stressors, and the potential interacting solutions would be informative.

Effective and sustainable management of climate change bright spots, alongside refugia and hotspots, may thus provide a needed route to identify adaptive measures that can help deliver blue growth compatible with sustainability targets, and the realization of climate-smart marine spatial planning. (Queiros, et.a., 2021)

The urgency of the exigent demands to address food security concerns including food price inflation from the SONA of the President may also be added to the objectives for the adoption of fisheries refugia in the country.

C. Approaches

Refugia may be broadly defined as all habitats and environmental factors that temporally or spatially reduce the adverse effects of biophysical disturbances compared to surrounding places or times.(Magellan, et.al., 2021)

The fisheries refugia concept, is defined as “spatially and geographically defined, marine or coastal areas in which specific management measures are applied to sustain important species [fisheries resources] during critical stages of their life cycle for their sustainable use” (UNEP, 2005) was developed as a novel approach to the identification and designation of priority areas in which to integrate fisheries and habitat management in the context of high and increasing levels of small-scale fishing pressure in the South China Sea (Siriraksophon, 2016).

The Sixth Meeting of the Regional Working Group for Fisheries in the ASEAN Region noted that most fish populations are vulnerable to the impacts of over-fishing in areas and at times where there are high abundances of (a) stock in spawning condition, (b) juveniles and pre-recruits or (c) pre-recruits migrating to fishing grounds. (Siriraksophon, 2016). The impact of overfishing is intensified in instances where small-scale fishers and commercial fishers share the same stock, often leading to disputes regarding the relative impact of each group.

In the ASEAN Region, the Regional Working Group for Fisheries or RWG-F agreed to manage ‘nursery refugia’ to safeguard fish during the juvenile and pre-recruit phases of their lifecycle and the habitats utilized as nurseries can assist in the prevention of growth over-fishing. Similarly, management of ‘spawning refugia’ may assist in preventing recruitment overfishing. (Siriraksophon, 2016)

Although refuge preference and use tend to be species-specific, any type of habitat heterogeneity generally provides a refuge for some species and the selection of appropriate refugia can aid in the conservation of target species. Natural freshwater refugia may be

generated by differences in flow regime or consist of biotic features such as vegetation. An alternative option that may be viable, particularly in already degraded habitats, is the provision of artificial shelter. Artificial refugia may take various forms, including plastic pipes, artificial vegetation, and introduced boulders or deadwood. (Magellan, et.a., 2021)

D. Fisheries Management Actions

What usually happens when fisheries refugia are set up is that there will be a blanket prohibition on fishing activity in the designated refugia, as what is called for in section 101 of RA 10654, which reads:

Section 101. **Fishing in Marine Protected Areas, Fishery Reserves, Refuge and Sanctuaries**.– It shall be unlawful to fish in marine protected areas, fishery reserves, refuge, or fish sanctuaries as declared by the Department or the LGUs.

This blanket prohibition arises from the fact that fishing in these areas is declared unlawful by the law.

However, the definition of fishery refuge and sanctuaries in the law states a more nuanced approach as restrictions are the order of the day, thus there will be limitations on what may be fished in these areas. This is what can be gleaned from the definition of fishery refuge and sanctuaries, thus:

Definition - 40. **Fishery Refuge and Sanctuaries–** a designated area where fishing or other activities that may damage the area's ecosystem is prohibited and human access may be restricted.

The LGUs, however have a role to play in the management of fisheries refugia through the municipal fisheries ordinances that they can issue, as can be seen here:

Role of LGUs- Rule 16.3. Other MFOs for Fisheries Management. – The municipal/city government, in consultation with DA-BFAR, M/CFARMC and stakeholders, shall enact MFOs declaring demarcated fisheries areas, closed season, marine protected areas, **fish refuge and sanctuaries,** fishery reserves, and environmentally critical areas and sanctuaries;

The DA for its part is tasked to establish fish refuge and sanctuaries of at least twenty-five percent (25%) but not more than forty percent (40%) of bays, foreshore lands, continental shelf or any fishing ground and this is set aside for the cultivation of mangroves to strengthen the habitat and spawning grounds of fish.

The question is, is this sufficient to maintain the refugia, or are other measures needed to ensure that the refugia serve its purpose.

In addition to this ability to set aside areas as sanctuaries, the DA-BFAR is also tasked to promulgate a regulation identifying the fisheries, industrial and other economic activities that may be prohibited from being undertaken in areas declared as fish refuge and sanctuaries[11].

[11] See Rule 81.1. Regulation. – The DA-BFAR, following the process stated in Rule 65.2, shall promulgate a regulation identifying the fisheries, industrial and other economic activities that may be prohibited to be undertaken in areas declared as fish refuge and sanctuaries.

Furthermore, the DA-BFAR shall consolidate, maintain and update a list of marine protected areas, fishery reserves, refuge and sanctuaries declared by the Department, other government agencies, and LGUs. Such a list shall be made available to the public[12].

FARMCs, the institutional mechanism established under the Fisheries Code to enable participation of fisherfolk communities in fisheries management, also has a role to play in establishing fishery refuge and sanctuaries in municipal waters as the LGU will consult it in the establishment of this fishery refuge and sanctuaries. It can also recommend fishery refuge and sanctuaries.[13]

One other action that a local government unit can do is to conserve mangroves, and this is part of its powers under the Local Government Code, particularly:

(i) Extension and on-site research services and facilities related to agriculture and fishery activities which include dispersal of livestock and poultry, fingerlings, and other seeding materials for aquaculture; palay, corn, and vegetable seed farms; medicinal plant gardens; fruit tree, coconut, and other kinds of seedling nurseries; demonstration farms; quality control of copra and improvement and development of local distribution channels, preferably through cooperatives; inter-barangay irrigation systems; water and soil resource utilization and conservation projects; and enforcement of fishery laws in municipal waters **including the conservation of mangroves;** (sec. 17 (b)(2)(i), RA 7160)[14]

More broadly, the actions of a municipal government towards the adoption of fisheries refugia can be justified under the following specific legal framework (DENR, BFAR DA DILG and CRMP. 2001) :

- Authority of LGUs to prohibit or limit fishery (Sec. 23)
- Whenever it is determined by the LGUs and the DA that municipal water is overfished based on available data or information or in danger of being overfished, and that there is a need to regenerate the fishery resources in that water, the LGU shall prohibit or limit fishery activities in the said waters.
- Authorizes LGUs to recommend to DA portions of municipal waters that can be declared as fishery reserves (Sec. 80)
- In municipalities and cities, the concerned LGUs, in consultation with the FARMCs may recommend to the DA that a portion of the municipal waters be declared as fishery

[12] **Rule 101.1. Maintenance of a Database**. – The DA-BFAR shall consolidate, maintain and update a list of marine protected areas, fishery reserves, refuge and sanctuaries declared by the Department, other government agencies, and LGUs. Such list shall be made available to the public.

[13] **SEC. 81. Fish Refuge and Sanctuaries**. – The Department may establish fish refuge and sanctuaries to be administered in the manner to be prescribed by the BFAR at least twenty-five percent (25%) but not more than forty percent (40%) of bays, foreshore lands, continental shelf or any fishing ground shall be set aside for the cultivation of mangroves to strengthen the habitat and the spawning grounds of fish. Within these areas no commercial fishing shall be allowed. All marine fishery reserves, fish sanctuaries and mangrove swamp reservations already declared or proclaimed by the President or legislated by the Congress of the Philippines shall be continuously administered and supervised by the concerned agency: Provided, however, that in municipal waters, the concerned LGU in consultation with the FARMCs may establish fishery refuge and sanctuaries: The FARMCs may also recommend fishery refuge and sanctuaries: Provided. further, that at least fifteen percent (15%) where applicable of the total coastal areas in each municipality shall be identified, based on the best available scientific data and in consultation with the Department, and **automatically designated** as fish sanctuaries by the LGUs in consultation with the concerned FARMCs.

[14] See Local Government Code - https://www.officialgazette.gov.ph/1991/10/10/republic-act-no-7160/

reserves for unique or limited use, for educational, research, and unique management purposes.

- Authority of LGUs to establish fishery refuges and sanctuaries (Sec. 81) In municipal waters, the concerned LGU in consultation with the FARMCs may establish fishery refuge and sanctuaries.

V. Complementary Reform Measures

A. Marine Spatial Planning (MSP)

Marine spatial planning, or MSP is a comprehensive and strategic process to analyze and allocate the use of sea areas to minimize conflicts between human activities and maximize benefits while ensuring the resilience of marine ecosystems. It typically addresses many sectors, their interrelationships and cumulative impacts, and provides for spatial and temporal measures to steer different uses of the sea areas or resources. Spatial measures can be, for instance, the allocation of space for particular uses (and exclusion of uses) or place-specific or general conditions for using sea areas or resources. (UNESCO-IOC/European Commission. 2021)

As applied in the Philippines in Balayan Bay in Batangas, MSP addressed the overlapping of municipal waters between LGUs in Balayan Bay when it was established, resolving the conflict caused by fishermen encroaching on one jurisdiction's waters. One of the MSP process's significant achievements is the zoning classification where various zones were identified and approved to address water delineation, existing uses, and proposed development levels among Balayan Bay municipalities. The MSP process also defined other maritime activities in the area, clearly understanding how it influences the MSP process. In addition, the zoning application helps identify areas designated for conservation and protection and sustainable use and management of coastal and marine resources (Laynesa, 2021).

The identification of the areas under the MSP process will be crucial in identifying the zones within municipal areas that will be crucial for refugia establishment, including regulating the kinds of activities that will be allowed while the temporal restrictions associated with the *refugia* are in effect.

The experience of Balayan Bay may eventually serve as a model for future MSP establishments throughout the country to resolve conflict and ensure long-term sustainability and governance. While the government has extensive experience with ICM, this approach focuses primarily on the growing issue of marine ecosystem decline and degradation. In the Philippines, the ICM does not always resolve conflicts between various human activities in specific marine areas.

B. Multisectoral Coordination and Stakeholdership

The fisheries refugia can be considered a type of Ecosystem Approach to Fisheries Management (EAFM). National-level coordination between various agencies is very much needed to implement this initiative. Fishers' cooperation is vital and the fisher's community will manage the fishery resource concerned through the EAFM approach. (Siow et al., 2020)

C. Harvest Control Measures

As Caddy (2015) observed, the critical motive for controlling fishing pressure on juveniles would be to improve survival to recruitment, not primarily to maximize the yield extracted.

Munprasit and Nootmorn (2021) summarized the current fisheries management measures in Thailand can be categorized into 4 groups with their enumerated actions as follows:

Fishing effort controls:

- Fishing licenses for commercial fisheries issued based on Total Allowable Effort (TAE), which depend on MSY and FMSY of the target species;
- Fishing days allocation for fishing vessels equipped with high-efficient fishing gear; and
- Restriction of sizes and characteristics for fishing gear.

Technical-based measures:

- Seasonal and spatial closures for protection of spawning stock and juveniles;
- Demarcation of fishing zones between small-scale and commercial fisheries;
- Reduction of fishing gear efficiency by mesh sizes restriction, e.g., 4 cm or over for trawls, 2.5 cm or over for purse seines, and 0.6 cm or over for anchovy purse seine;
- Ban of destructive fishing gears, e.g. set bag net, push net (except for acetes push net), elongate collapsible trap;
- Prohibition of some fishing in a particular area; and
- Fishing control by zoning (special case for anchovy fishery).

Fishery monitoring, control, and surveillance:

- Port in – port out measures;
- Port state measures;
- Vessel monitoring system (VMS) obligation for vessels of 30 GT and over;
- Establishment of Processing Statement System (PSS); and
- Establishment of Thai Flagged Catch Certification System (TF).

Measures for critical habitats:

- Marine Protected Areas (MPA) for complete protection, i.e., aquatic sanctuaries, non-hunting areas, marine national parks, mangrove swamps, coral reefs, seagrass bed, etc. – with the size of 79,756.72 km2 (25.23 % of total sea area in Thai Waters); and
- Reserved areas for particular purposes, e.g., coral reefs, seagrass beds, and mangroves.

From Thailand's example, it is clear that these control measures complement whatever conservation measures are in place, thus aiming for a reinforcing effect when these measures are taken up in tandem with all other initiatives focused on the fishery resource and its habitat.

D. Accelerated Research on Fish Life Cycle of Important Species

Essential to a successful Fisheries Refugia design is knowledge of critical habitat types and locations for the various life-cycle stages of fish stock species. This knowledge is rarely well understood and the lack of knowledge is exacerbated when fish life cycles cross national borders or include a pelagic stage in the open ocean. A collaborative compilation of existing datasets by experts is required to compile what is known about critical habitats for fish stocks. Gaps in knowledge can be identified and targeted efforts to prioritize refugia sites at the regional level can be made. Existing MPAs should be included, as should essential ecosystems

be needed according to fish species type. For example, a mangrove habitat is required for mullet, snapper, sea bass and tilapia species (FAO 1994). (IW:LEARN, no date)

E. Fisheries Information Management and Use of Indicators

As provided for in the ASEAN Guidelines, the improved use of statistics and indicators in identifying and managing fisheries refugia should be encouraged. In addition to their use in monitoring and tuning management action, statistics and indicators can be helpful in communicating with cross-sectoral agencies and have significant potential for use in community education and awareness programs.

Practical uses of indicator systems for fisheries refugia include identifying areas with high abundances of juveniles or spawning stock, and use by fishing communities to assess the performance of policy or regulations. However, a key constraint in using indicators in fisheries is the information required to drive them. Often this information is unavailable, pointing to the need for a limited number of fishery-specific indicators with some integrated properties (i.e., indicators reflecting the status of more than one fishery component). (SEAFDEC, 2006).

F. Community Rights-based approaches and Promotion of Alternative Livelihoods

The notion of rights-based approaches to managing the region's small-scale coastal fisheries is also gaining ascendancy. Examples of rights-based fisheries management systems are currently being promoted by the Southeast Asian Fisheries Development Center and governments in the region, with a notable case study being the communalization of fishing rights as developed in the inshore fisheries of Japan, where the use of community-based territorial use rights, reinforced by local modes of social regulation, have been successful in preventing over-exploitation. The use of use rights and collective choice rights should be promoted in the context of fisheries refugia management. (SEAFDEC, 2006)

G. Interface with Conservation Measures of DENR

In a policy study done for DA and DENR by Oceana in 2002, fishery reservations for the exclusive use of government, propagation, educational, research, and scientific purposes may be designated by the DA-BFAR under Sec. 80. On the other hand, Sec. 81 requires the establishment of fish refuges and sanctuaries in bay foreshore lands, continental shelf, or any fishing ground, which includes their being set aside for the cultivation of mangroves. Sec. 45 in the section on aquaculture further allows the DA-BFAR to establish reservations for fish sanctuary, conservation, and ecological purposes in areas already declared suitable for fishpond purposes.

These provisions essentially deal with the creation of marine reservations and protected areas in the general sense, and therefore may possibly intersect with DENR initiatives on protected seascapes and NIPAS areas; likewise, any existing reserves, sanctuaries, or mangrove rehabilitation or reforestation areas may also be affected.

VI. Timeline for Implementation

The refugia concept can be piloted in the identified areas and later scaled up via a Fisheries Administrative Order/ Fisheries Office Order that may be issued for the purpose.

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