Identification and Establishment of Fisheries *Refugia*: Experience in the Philippines

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Abstract

The process of identifying and establishing fisheries *refugia* is discussed in this paper, where "fisheries *refugia*" is an approach that integrates fisheries and habitat management to improve fisheries management in terms of space and time for sustainable use of fish stocks and protection of habitats. Also presented in this paper are site specific studies that showed the source and sink of fish eggs and larvae used in identifying the spawning and nursery *refugia*. Success of fisheries *refugia* depends on the actions at the local level where the level of community support depends on the involvement of local stakeholders in actions. Harnessing local knowledge is critical for good site selection and establishment of management measures. Science based management measure is most acceptable while education, information and communication is very helpful in terms of community acceptance of the fisheries *refugia* approaches. Other resource enhancement and management described in the paper are the closed fishing season for sardines in Zamboanga Peninsula, and closed fishing season for small pelagic fishes in the Visayan Sea and Davao Gulf. The effects of these management measures are seen in increased number of fish species as well as fish production.

Introduction

The concept of "fisheries *refugia*" was discussed and defined by the technical fisheries working group of the fisheries component on "*Over Exploitation of Fisheries in the Gulf of Thailand*" under the project on "*Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand*" funded by the Global Environment Facility (GEF) and implemented by the United Nations Environment Programme (UNEP). The fisheries component project focused on the connection between integrating habitat and fisheries management. While the project was designed to have an agreement to establish a regional system of fisheries *refugia* in order to sustain trans-boundary fish stocks in the region, in-country or national activities were also carried out focusing on the establishment of country's fisheries *refugia.* The participating countries of the fisheries component were Cambodia, Indonesia, Philippines, Thailand, and Viet Nam.

Fisheries refugia as defined by the fisheries component are ***"****spatially and geographically defined, marine or coastal areas in which specific management measures are applied to sustain important species [fisheries resources] during critical phases of their life-cycle, for their sustainable use."* The features of *fisheries refugia* are: (a) specific areas of significance to the life-cycle of fish species; (b) should be defined in space and time; (c) should NOT be no-take zones; and (d) should serve to safeguard spawning aggregations, nursery grounds and migration routes.

National activities of the fisheries component were implemented by responsible government fisheries agencies in Cambodia, Indonesia, Philippines, Thailand, and Viet Nam. Their Governments nominated their respective focal points for fisheries, and later comprise the members of the Regional Working Group on Fisheries focusing on *Fisheries Refugia* supported by experts from UNDP, UNEP, FAO, and SEAFDEC, among others. **Fig. 1** shows the priority types of fisheries *refugia.* As defined, fisheries *refugia* are sites of importance to the critical stages of the life cycle of fish species which are also reflected in **Fig. 1**.

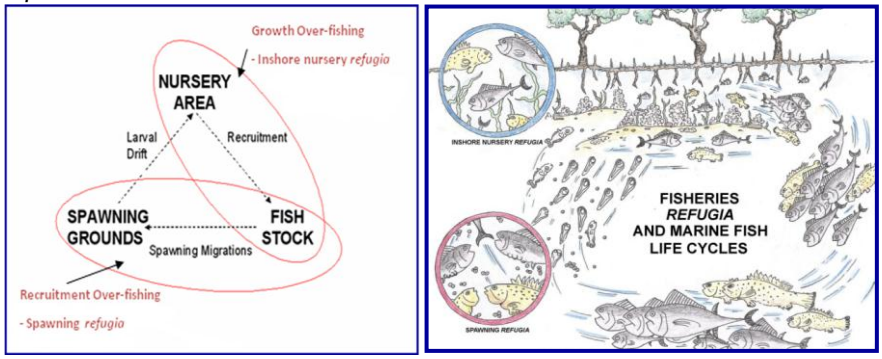


Fig. 1. The fisheries *refugia* concept and priority types
Left: spawning refugia (sources, function)
Right: nursery refugia (sink, function)

Activities and Results

Initial Review of Data and Information Requirements to Identify Refugia

Information from available studies, literatures, and other possible sources were compiled for the project. Prospective members of the Technical Working Group (TWG) were requested to provide their confirmation on the data compiled. After their confirmation, the National Focal Point convened the meeting of the TWG and discussed with the members the project. The information from available studies, literatures and other sources of data gathered were also presented at the TWG meeting. The TWG then convened a workshop participated in by stakeholders coming from the academe, research institutions, government agencies, fisherfolks, and Local Government Units (LGUs) that would host the proposed *fisheries refugia*, as well as representatives from Non-Government Organizations (NGOs), to validate the data and information compiled. Traditional knowledge on the seasonality, monthly sizes of fish observed by the fishers was very useful in identifying the fisheries *refugia*. The same activities were conducted in the different project sites.

Establishment of Fisheries Refugia

The following activities were considered in the process of establishing the fisheries *refugia* in all the project sites:

a. Study of the life-cycle of the species for which the fisheries *refugia* are being established;
b. Identification of the type of fisheries *refugia*;
c. Identification of the location of natural refugia and suitable sites of the fisheries *refugia* to be established;
d. Establishment of goals, objectives, and guiding principles for the fisheries *refugia* at the local level;
e. Development of priority fisheries *refugia* types, definition of the problems and concerns that will resolve the anticipated challenges in the establishment of fisheries *refugia;*
f. Study of the national and local level competencies in the implementation of fisheries management measures and spatial approaches to fisheries management and planning in establishing and managing *refugia;*
g. Identification of the actions needed at the national and local level to establish fisheries *refugia* like legislative, policy and administrative requirements and support.

Once all the above processes have been done, the steps in the formal establishment of the fisheries *refugia* could be carried out. Some examples of the studies conducted to support the establishment and implementation of fisheries *refugia* are shown below.

Lessons Learned from Two Case Studies: Busuanga in Palawan and Zamboanga Peninsula

- Success of fisheries *refugia* depends on actions at the local level. Sustained support of local communities is very important in sustaining the established fisheries *refugia*.
- Level of community support depends on involvement of stakeholders in the actions. A well informed community about fisheries *refugia* concept encourages their full cooperation and support.
- Harnessing local knowledge is critical for good site selection and establishment of management measures. Local knowledge of the fisherfolk reduces time, effort and money in conducting the survey where fisheries *refugia* would be established. Fisherfolks know where the small fish species are found during certain months of the year, the fish species, and the abundance of fish among others.
- Science based management measure is most acceptable and are easily understood when data are presented to the community;
- Education, Information, Communication (IEC) is very helpful. IEC campaign can deliver the messages easily to the community like, some aspect on the biology of the fish, the spawning time, and growth among others, in relation to fisheries management.
- Follow-up technical assistance/monitoring/ communication with Local Government Units is also very helpful in the implementation of the management measures at the local level. Once the fisheries *refugia* is established a regular visit to the site by the national government agencies can boost the sustainability in the operation of the management of fisheries *refugia*

<u>Case Study 1</u> - Busuanga, Palawan: Modeling fish egg dispersal and larval settling in the Philippines

Case Study 1 (Busuanga, Palawan)

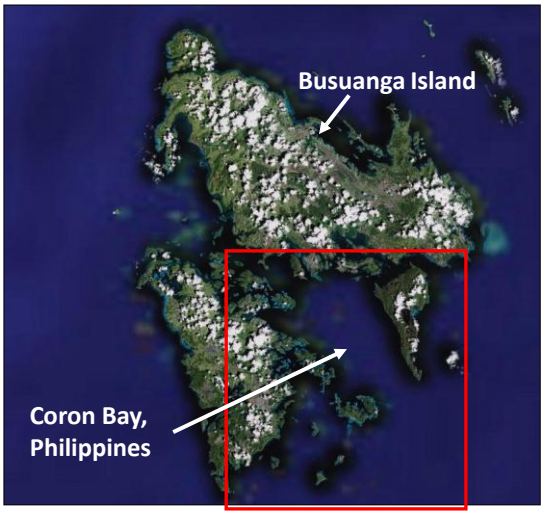
Modelling fish egg dispersal and larval settling in the Philippines

- **Oceanographic information and fish egg and larvae data used to identify spawning *refugia* (sources) and nursery *refugia* (sinks)**

Following slides illustrate:

- **Circulation pattern**
- **Simulated dispersal**
- **Density Distribution of fish eggs and larvae**

in Coron Bay, Philippines

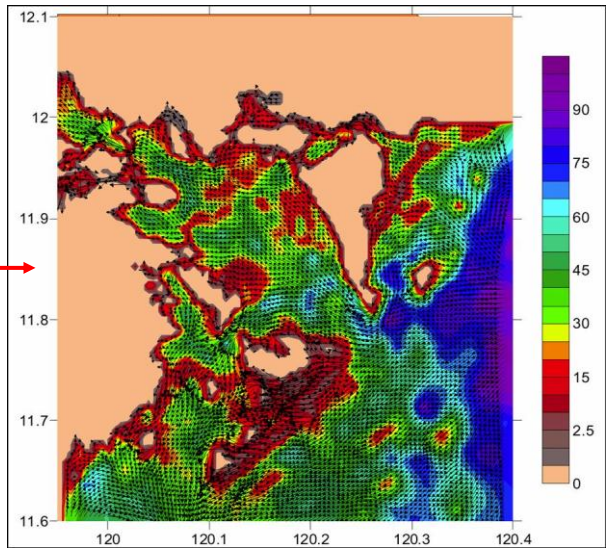


Source: USAID FISH Project

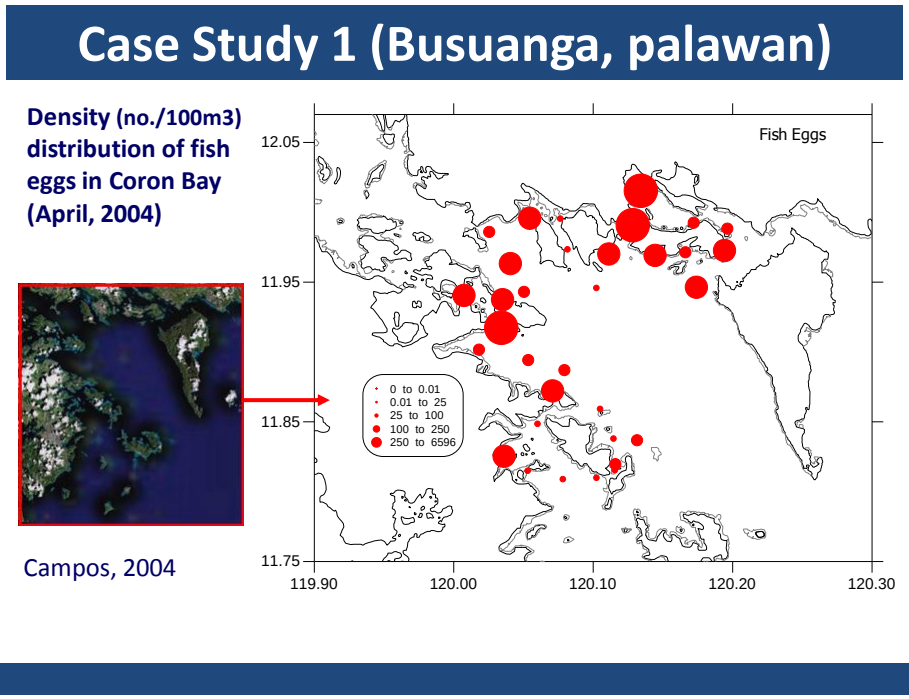
Case Study 1 (Busuanga, Palawan)

Circulation pattern in Coron Bay

Villanoy, 2006



Source: USAID FISH Project



Source: USAID FISH Project

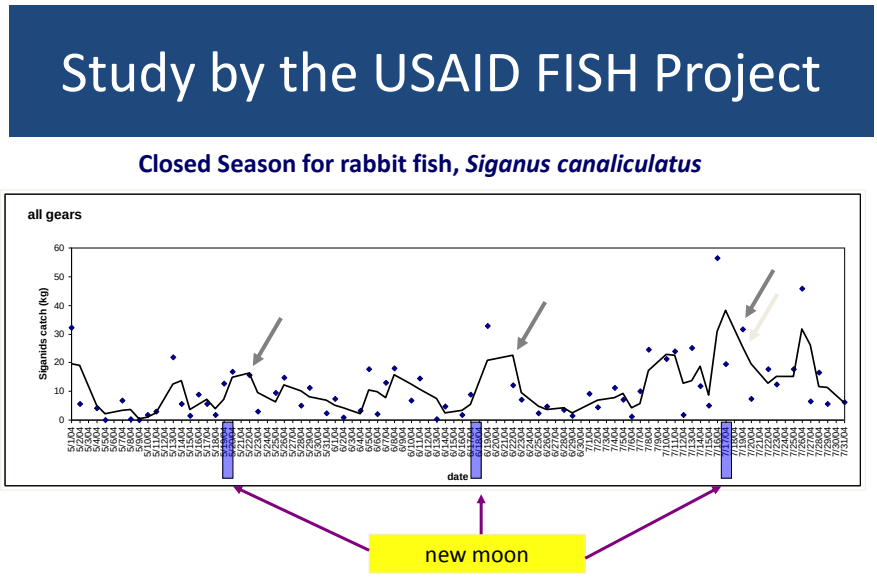
<u>Case Study 2</u> – Establishing close season for sardines in Zamboanga Peninsula, and other small pelagic fishes in Visayan Seas, Davao Gulf, and Bohol Sea, in the Philippines

Another activity in the Philippines that support resource enhancement is the close fishing season for some days or months as the case maybe. This close fishing season is anchored on fish biology particularly on reproductive biology of particular fish species of concern. In Zamboanga Peninsula, close fishing season for sardines is implemented from December 1 to March 1 every year. Studies on the reproductive biology of *Sardinella lemuru* showed that the peak spawning months for sardines is during December and from January to February majority of the sardines are still small in sizes.

Close fishing season is also observed in the Visayan seas from November 15 to February 15 every year. The species covered for this close fishing season are the small pelagic fishes such as mackerels, sardines and herrings. The ban is to protect the spawning populations of the fish stocks, the larvae, fry and the young fish.

In Davao Gulf, the close fishing season for small pelagic fish is from June 1 to August 31 every year. The target fish species are the big-eye scad, skipjack tuna, scad mackerel, and moonfish. The ban also aims to protect the spawning populations and the young individual fish.

In Bohol Sea, close fishing season is only for 3 days or nights per month for the whole year or certain months only. This is based on results of detailed studies conducted by the USAID Project on *Fisheries Improved for Sustainable Harvest* (FISH) where the peak specific spawning time per month of the target species rabbit fish (*Siganus canaliculatus*) had been determined. The fishing banned for rabbit fish is on the 4th, 5th and 6th day after the new moon monthly. Other management measures implemented is banning the use of fine meshed gears for catching rabbit fish and banning the sale of rabbit fish during the close season.



Catch monitoring data from various gears catching rabbit fish in Danajon Bank, Bohol from May to July 2004

Source: USAID FISH Project

Recommendations and Way Forward

Fisheries *refugia* is only one of the tools in fisheries management to enhance fishery resources production. To better improve the establishment and management of fisheries *refugia*, a more detailed study should be conducted to really determine the exact spawning time following the FISH project experiences.

However, more financial resources would be needed to conduct such study. Identification and establishment of more sites for fisheries *refugia* is a good activity for resource enhancement and fisheries and habitat management. The activity should be continued in other areas in the country.

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