

Note

Is Lagonoy Gulf is a special breeding ground for Yellowfin Tuna?

Background

The question whether Lagonoy Gulf is a special breeding ground for Yellowfin Tuna came up in the context of a public-private partnership project, implemented in Lagonoy Gulf and Mindoro Occidental, trying to achieve Marine Stewardship Council (MSC) certification for the Yellowfin Tuna handline (large) fishery in the Gulf.

Originally it was assumed that the establishment of a special fisheries management zone would be a pre-requisite for MSC certification. This was a misconception. However, in preparation for this special management zone, literature search and ample discussions with stakeholders in the tuna fisheries revealed not only the uniqueness of Lagonoy Gulf in the Philippine fisheries but also underpinned the necessity to ensure that benefits derived from these fisheries are actually benefitting the fishing communities surrounding Lagonoy Gulf.

This note is intended to deepen the discussion on the management of Lagonoy Gulf fisheries based on scientific facts about the Gulf, its fisheries and, specifically, the biology of Yellowfin Tuna in the Gulf. In this regard special emphasis was given to Philippine publications. The following elaborations deal with the bathymetry of Lagonoy Gulf, its productivity, the availability of juvenile Yellowfin tuna, migration of Yellowfin Tuna, the spawning season of Yellowfin Tuna and other highly migratory fish species, and one study on larval abundance outside the Gulf of Lagonoy.

Bathymetry

The bathymetry of Lagonoy Gulf is compared to its neighbouring bays and gulfs unique. Lagonoy Gulf has a water depth of up to 1300m with a very narrow continental shelf area, dropping down to a few hundred meters close to the shore. Consequential, there is upwelling of nutrient rich waters in the Gulf in addition to a nutrient runoff from surrounding land areas, resulting mainly from agriculture.

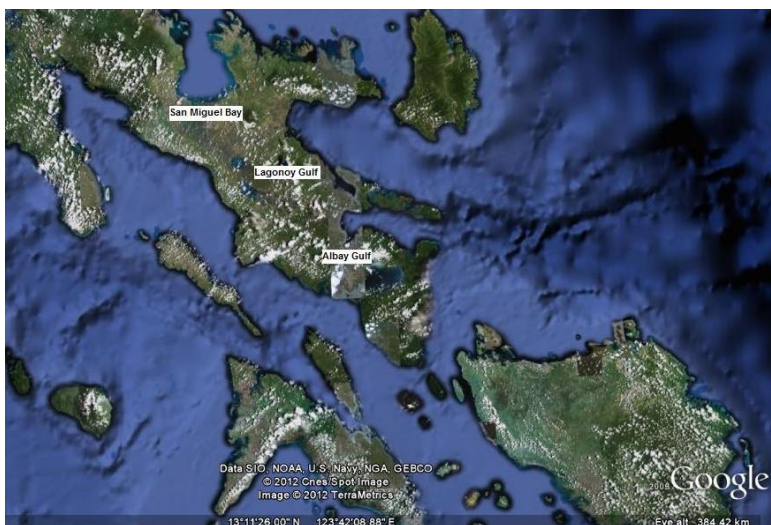


Figure 1. Bathymetry of Lagonoy Gulf.

This specific bathymetry with deep waters and narrow shelf areas is one main trigger for highly migratory fish species to enter the Gulf.

Consequential upwelling and nutrient runoff from surrounding land areas make Lagonoy Gulf a highly productive area which forms the base of a rich food chain for highly migratory fish species as top predators, including Yellowfin Tuna and Blue Marlin (see below).

Production

In the literature the Gulf of Lagonoy has long been identified as rich fishing ground (for example: Virginia L. Olaño, Marietta, B. Vergara, Fe L. Gonzales 2009; R. West *et. al* 2011; G. Bradecina *et. al.* 2011). Commercial as well as municipal fisheries targeting, among others, Skipjack and Yellowfin Tuna, Bonito as well as other small pelagic species for local consumption. Table 1 provides an overview on main fish species targeted in Lagonoy Gulf from 1997-2002.

As shown in Table 1, the list of fish species comprises exclusively of pelagic species, including valuable highly migratory species, like Skipjack Tuna and Yellowfin Tuna as dominant catches in Lagonoy Gulf. The fact that also their prey, i.e. round scads and smaller mackerels, are in the top ten of fish species caught, underpins the importance of the Gulf for these highly migratory fish species.

Fish caught in Lagonoy Gulf is not only used for local consumption, but contributes to the food supply of the nation and has been used in the past also for export purposes to earn foreign exchange earnings. This was documented in interviews with older fishers who recall the rules of a South Korean company on Yellowfin Tuna handling in the early 1980ies.

Table 1. Species composition and percentage of catch from all fisheries in Lagonoy Gulf, 1997-2002. (Virginia L. Olaño, Marietta, B. Vergara, Fe L. Gonzales 2009).

| No. | Species | Family | Common English name | Percentage total catch (97-02) |
|-----|--------------------------------|---------------|-------------------------------|--------------------------------|
| 1 | <i>Katsuwonus pelamis</i> | Scombridae | Skipjack tuna | 29.75 |
| 2 | <i>Thunnus albacares</i> | Scombridae | Yellowfin tuna | 16.30 |
| 3 | <i>Selar crumenophthalmus</i> | Carangidae | Bigeye scad | 5.85 |
| 4 | <i>Istiophorus platypterus</i> | Istiophoridae | Indo-Pacific sailfish | 4.34 |
| 5 | <i>Rastrelliger faughni</i> | Scombridae | Island mackerel | 2.91 |
| 6 | <i>Coryphaena hippurus</i> | Coryphaenidae | Common Dolphinfish, Mahi-mahi | 2.77 |
| 7 | <i>Stolephorus</i> sp. | Engraulidae | Anchovies | 2.55 |
| 8 | <i>Euthynnus affinis</i> | Bonito | Scombridae | 2.22 |
| 9 | <i>Decapterus russelli</i> | Carangidae | Indian Scad | 2.15 |
| 10 | <i>Decapterus macrosoma</i> | Carangidae | Shortfin Scad | 1.81 |

Lagonoy Gulf's fishery production has been subject to significant scientific research, including the use of the fish caught and the socio-economic impact of the fisheries on surrounding fishing communities. Although particularly the socio-economic studies underpin the necessity to protect and support local fisheries in the Gulf, this is not subject of this note.

Although a lot is known about the productivity of Lagonoy Gulf, detailed information about the individual catch in each of the various commercial and municipal fisheries has not been published. This is particularly true for the tuna fisheries. In light of the currently implemented separation of 'handline small' and 'handline large' separation by the WCPFC in their yearbook covering 2011, this specific catch data is urgently required for proper management decisions, since both fisheries are competing in Lagonoy Gulf.

Spawning season

Based on the fisher's information that in the month of May adult Yellowfin Tuna cannot be caught by handling gear in Lagonoy Gulf, although the fish is seen jumping, this study was initiated. The lack of sufficient quantities of adult Yellowfin Tuna in May has also been confirmed by Manila exporters, stating that in May tuna quantities are very low, and the few fish caught were of poor quality.

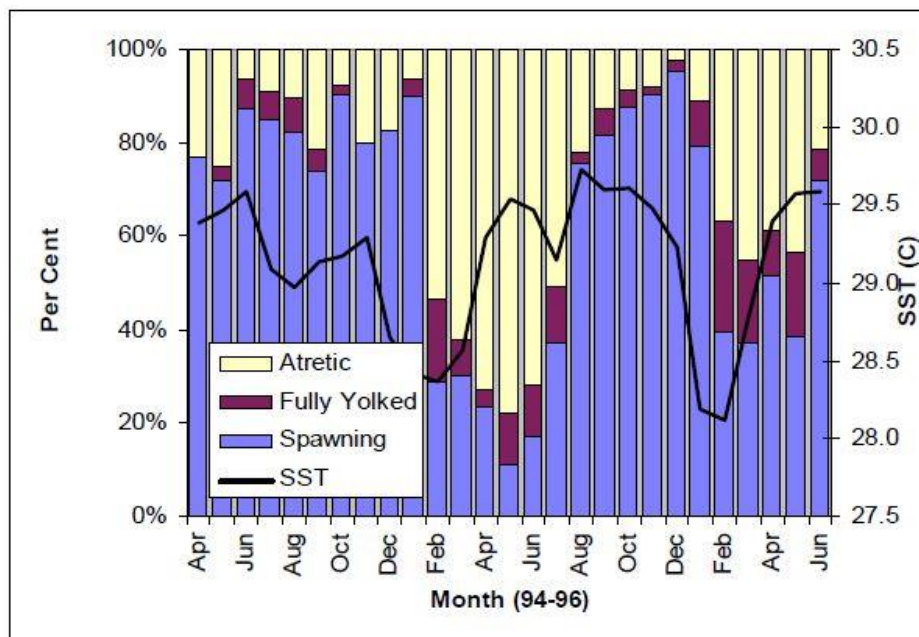


Figure 2: Proportion of mature yellowfin in fully yolked, spawning and atretic condition by month for samples from the Philippine handline fishery with mean monthly SST (EC).

From: The Reproductive Biology of Yellowfin Tuna (*Thunnus albacares*) in Hawaiian Waters and the Western Tropical Pacific Ocean: Project Summary David G. Itano SOEST 00-01, JIMAR Contribution 00-328

The fisher's observation of jumping tuna and that fish is not taking any bait in May is a strong indication of breeding activities of Yellowfin Tuna in Lagonoy Gulf. The same seasonality coincides with published data, stating that the Philippine Yellowfin Tuna has a dominant

breeding season around May and a smaller second breeding season around November (V. Aprieto, 1995, Itano, 2001, see Figure 2).

Juvenile Tuna

The presence of juvenile Yellowfin Tuna is well documented and is subject of heavy exploitation due to excessive fishing, mainly by commercial fishing activities fishing illegally in municipal waters, due to the closeness of the continental slope to the shore. These commercial fishing activities by fishing vessels, many not originating from Lagonoy Gulf, fishing undersized and immature fish, is a key problem in the development of the fishery sector around Lagonoy Gulf (see below section Problems).

SM: 74.9-134.5 cm (TL) Lmax: 280 cm (TL)

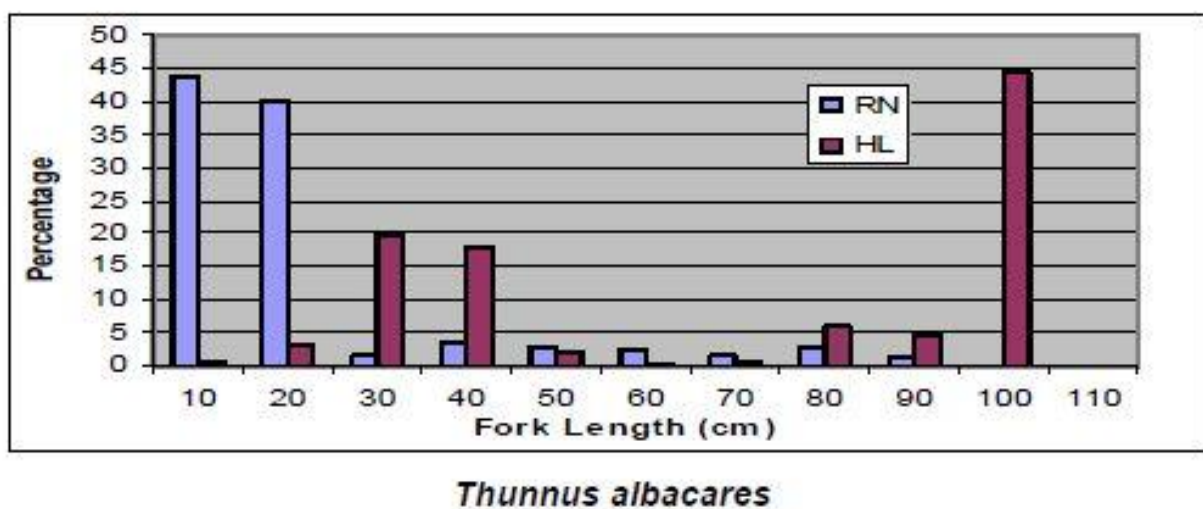


Figure 3. Fork length of Yellowfin Tuna caught in Lagonoy Gulf by handliners (HL) and ring netters (RN) (1997-2002), Virginia L. Olaño, Marietta, B. Vergara, Fe L. Gonzales, 2009.

Figure 3 shows the size distribution of tuna caught by handliners and ring netters in percent. It shows clearly that all size classes of Yellowfin Tuna are caught in Lagonoy Gulf and that ring netters mostly catch juvenile, undersized Yellowfin Tuna.

Soliman (pers. com.) confirms that during the months June to August substantial amounts of juvenile tuna are caught in small-scale commercial fishing activities (bag net fishery) and sold in local markets. In addition, local fishers report their observation of lots of “very small” Yellowfin Tuna in the waters west of Catanduanes and Bacacay.

Migration

For Lagonoy Gulf a seasonal migration pattern has been observed. Fishers confirm high catches of Yellowfin Tuna in the months of February to March/April, before the catches go down in May.

Figure 4 (R. West et al. 2011) confirms this observation. They describe: “It is observed from the above data that the CPUE for Yellowfin Tuna has fluctuated over the duration of the port sampling. The CPUE ranged from 0.5kg to 6.5kgs/trip-hour. There was a noticeable increase in

the CPUE during the months of February and April 2010, while low catch rates have been experienced from September to November 2010, with the exception of albacore catch.”

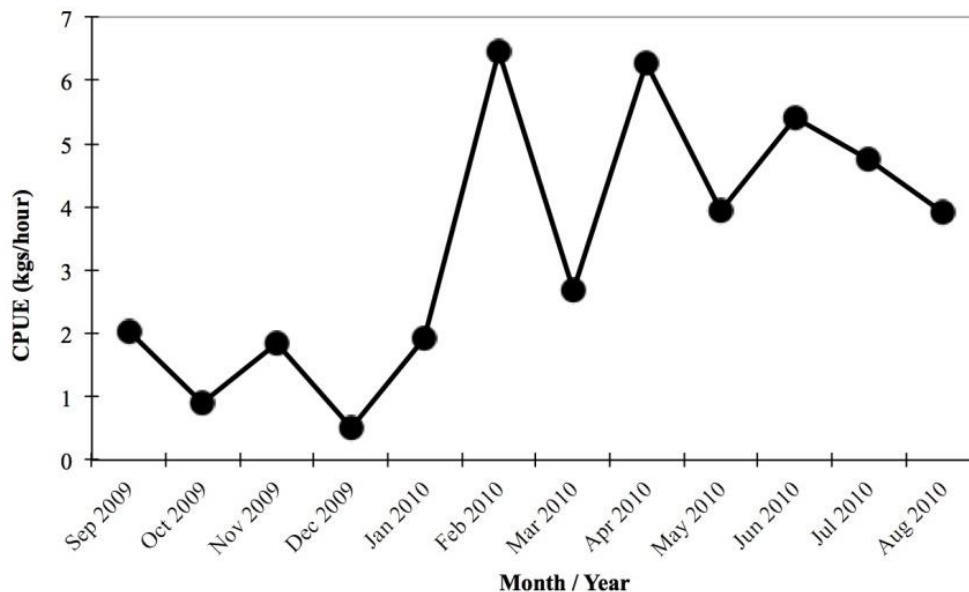


Figure 4. Monthly Yellowfin Tuna CPUE for Simple Handline Fishing Gears, Region V, Sept. 2009-Aug. 2010 (R. West, M. A. Palma, N. Barut, E. Garvilles, D. Ayanan Jr.; 2011: Preliminary Assessment of the Handline (Banca) Fisheries in the Philippines.)

In addition to the increased availability of Yellowfin Tuna in March/April, there is a local fishery on Blue Marlin in Catanduanes catching adult Blue Marlin on their way from the Pacific into Lagonoy Gulf during the months March/April. It is likely that also this species utilises the riches of Lagonoy Gulf as nursing ground for their species.

Larval Abundance

The author could not find any larval survey conducted in the Gulf of Lagonoy. The closest larval survey found was conducted in the Pacific Ocean during South-West Monsoon (Figure 5). The results do not confirm increased numbers of tuna larvae in ocean waters bordering Lagonoy Gulf. Taking the predominant wind direction during that larval survey (see yellow arrow in figure 5) into account, which pushes fish larvae further into the Philippine archipelago, the results of the survey in the Pacific Ocean are not surprising and do not contradict Lagonoy Gulf as special breeding ground for highly migratory fish species, including Yellowfin Tuna.

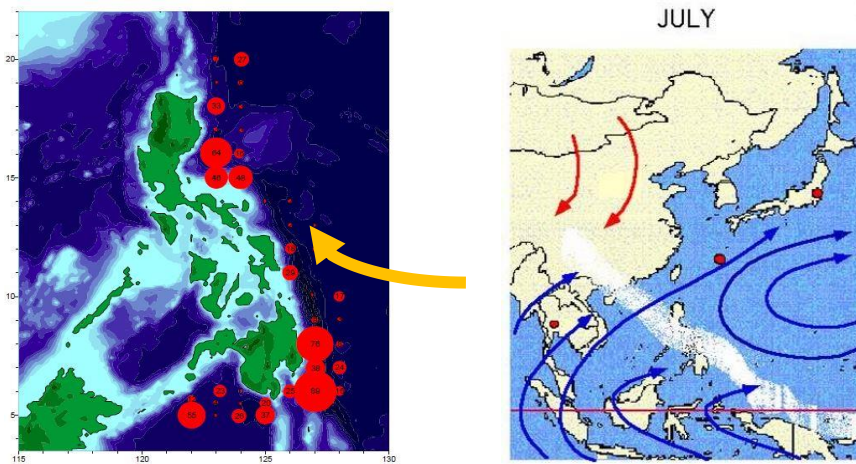


Figure 5. Larval distribution along the Pacific coast during South-West Monsoon, the time the larval survey was conducted (Servidad-Bacordo, R., A. Dickson, L. Nepomuceno , R. Ramiscal, 2012: Composition, Distribution and Abundance of Fish Eggs and Larvae in the Philippine Pacific Seaboard and Celebes Sea with Focus on Tuna Larvae (Family: Scombridae) WCPFC-SC8-2012/ SA-IP-03).

Summary

The following can be said to underpin that Lagonoy Gulf is a special breeding zone for Yellowfin Tuna:

1. The bathymetry of Lagonoy Gulf supports migration of highly migratory fish species into the Gulf.
2. Yellowfin Tuna is actively migrating in higher numbers into Lagonoy Gulf before and during main spawning season around May.
3. The productivity in Lagonoy Gulf supports tuna reproduction, the availability of all chains of the food chain of this top predator favours breeding activities.
4. Yellowfin Tuna breeding is documented by fishers' observations, reporting jumping Yellowfin Tuna and no catches during in the reproductive season.
5. The lack of larvae in larvae surveys in the Pacific Ocean outside Lagonoy Gulf during South-West Monsoon do not contradict reproduction of Yellowfin Tuna in Lagonoy Gulf.
6. The productivity of the Gulf favours the growth of tuna larvae as well as juvenile tuna.
7. Consistently observed high numbers of juvenile Yellowfin Tuna in Lagonoy Gulf waters as well as on local markets one or two months after the main spawning season indicate successful spawning.
8. The seasonal migration of other highly migratory fish species into Lagonoy Gulf underpins the importance of the Gulf for reproduction of highly migratory fish species coming from the Pacific Ocean.

Problems

This document purposely does not deal with socio-economic consequences of the commercial fisheries in Lagonoy Gulf, but focusses on the biological features resulting from the geographical/bathymetric conditions.

However, the fisheries resources in Lagonoy Gulf are “heavily exploited due to **excessive fishing** which is often closely related with **capture of undersized and immature fishes**. The alarming decline of fishery resources and the continuing environmental degradation due to intense fishing effort, **growth overfishing**, **rampant illegal fishing** on open access fishery, and other legal and institutional issues are the serious concerns in Lagonoy Gulf.

The plight of small-scale fishers in coastal areas stresses the need to properly employ efficient management and regulatory interventions to help resolve the dwindling productivity, stability and sustainability of Lagonoy Gulf.” (Assessment of the Fisheries of Lagonoy Gulf, VIRGINIA L. OLAÑO, MARIETTA B. VERGARA and FE L. GONZALES (2009))

“The most common concern amongst handline fishermen in the (Bicol) region is the decline in catch production caused by **overfishing attributed to** vessels using other gears such as **bagnets and ringnets**. Medium to large scale commercial vessels have been reported to **either fish illegally** in municipal waters, or **just outside the 15-km limit**, catching tuna which is supposed to be caught by handline vessels” (PRELIMINARY ASSESSMENT OF THE HANDLINE FISHERY IN BICOL REGION, PHILIPPINES, Report Prepared for the “Preliminary Assessment of the Handline (Banca) Fisheries in the Philippines” (FIS/2009/033), Project funded by the Australian Centre for International Agricultural Research (ACIAR) Prepared by the Australian National Centre for Ocean Resources and Security (ANCORS), University of Wollongong, Bureau of Fisheries and Aquatic Resources (BFAR) National Fisheries Resources and Development Institute, and BFAR Region V, July 2011).

The two studies above, both done with BFAR involvement, identify excessive fishing, often closely related with capture of undersized and immature fishes, mainly by commercial fishing activities fishing illegally in municipal waters, as the key problem for the development of the fishery sector around Lagonoy Gulf.

This is particularly tragic, because only 7 percent of the surface area of the Gulf are national waters. This small zone is used as an argument to fish commercially in Lagonoy Gulf, thus fishing substantial numbers of undersized tuna species, including Yellowfin Tuna,

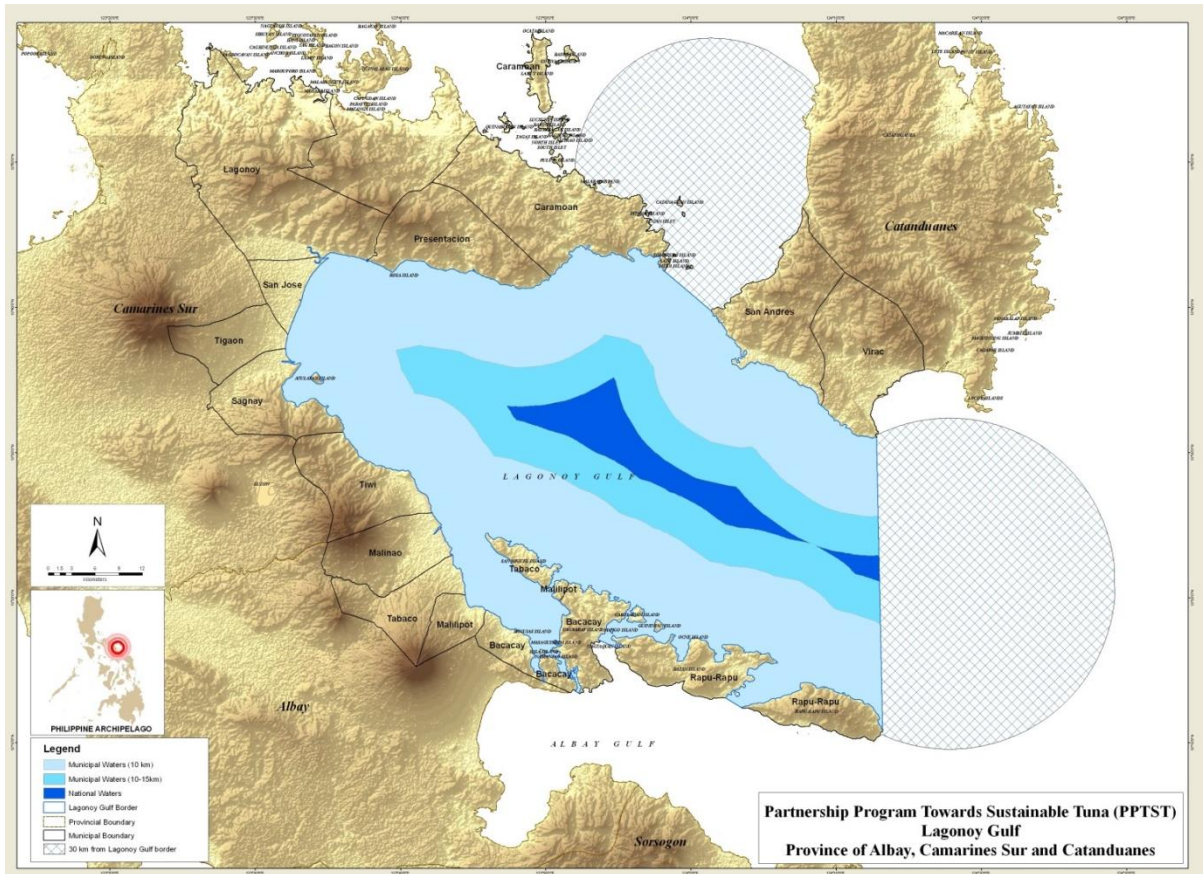


Figure 6. The 10 km and 15 km borders as well as national waters (dark blue) in Lagonoy Gulf.

Solution

The establishment of at least a seasonal closure for commercial fishing activities in and around Lagonoy Gulf at least from beginning of June until end of September would ensure successful passage of schools of juvenile highly migratory fish species in the Philippine archipelago as well as into the Pacific Ocean.

This measure would not only increase recruitment success of Yellowfin Tuna as well as other highly migratory fish species into the tuna fisheries throughout the Philippines, thus supporting the Philippine tuna industry, it would also provide growth at local level through increased landings of adult tuna not only for local consumption but also for urgently needed economic growth through landing site development and link to the national and international markets.

There are a lot more economic as well as socio-economic reasons to stop commercial fishing in Lagonoy Gulf, but these are not subject of this note.

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