A short history of gleaning in Mabini, Batangas (Region IV, Subzone B, Philippines)\textsuperscript{2}

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Abstract

In this contribution, we attempted to present a historical overview of gleaning in 10 coastal barangays (villages) in Mabini, Batangas, Philippines. The results of our interviews with 111 fishers, 10-84 years of age, indicate a general decreasing trend over 8 decades in the amount of catch, from an average of 2-2.5 kg·hour\textsuperscript{-1}·gleaner\textsuperscript{-1} or an average of 5.2 kg·day\textsuperscript{-1}·gleaner\textsuperscript{-1} in the 1950s to 0.5 kg·hour\textsuperscript{-1}·gleaner\textsuperscript{-1} or less than 2 kg·day\textsuperscript{-1}·gleaner\textsuperscript{-1} in 2012. Furthermore, the distance fishers needed to walk while gathering edible seafood has increased from about 0.5 m to about 30 m along the shoreline in an average of about 4 hours. The catch by gleaning, notably in the 1950s and 1960s, did not contribute much to what was sold; rather, the sole purpose of gleaning then was for subsistence. In addition, during those decades, gleaners picked only what was needed and did not spend time perusing potential saleable items. While gleaning still is a source of subsistence, this has now been reduced to opportunistic gathering often for the purpose of selling (notably seashells), primarily because there is not much left to glean. Moreover, the area left for gleaning has decreased since the construction of levees meant to protect the shoreline owned by diving resorts and private houses, which has effectively cut the access of the local community to the shoreline. Finally, improvement of roads and transportation access to the landing sites and markets in Anilao in the 1980s has made it possible for inhabitants of these communities to go to the market more easily and thus decrease the need for gleaning. The tourism (diving) industry boosted by the establishment of small manageable marine sanctuaries along the Mabini coastline as well as the expatriation of many female and some male members of these communities has resulted in increased per capita income of the area. Thus, we conclude that though still of fundamental value to a coastal community, gleaning evolved from being a survival resource to a lux mainly recreational activity in the last 60 years.

Introduction

Gleaning, in many cultures, is a traditional source of subsistence, e.g., seafood gathered along the shore line without or with very little use of fishing gear (Vunisea 1997; Ablong et al. 1999; Whittingham et al. 2003; Teh et al. 2007). Harvesting of seafood is conducted in a variety of coastal habitats, i.e., reefs, sandy-muddy intertidal areas and mangrove stands (LeBlanc 1997; Freire, et al. 1998; Parras, 2001; del Norte-Campos et al. 2005; Dolorosa, 2011) usually at low tide (Craig, et al. 1993; LeBlanc 1997; Freire, et al. 1998; Austin, 2003; Samonte-Tan et al. 2007; Brown et al. 2010; Aldon, et al. 2011). It is a typical activity in fishing communities (Schoppe et al. 1998; Lizada, 2010), and in many cases, an essential source of protein. Most often, women with their children and the elderly (Vunisea 1997; Whittingham et al. 2003; Gonzales and Savaris, 2005; Aldon et al. 2011), and only rarely men (Primavera et al. 2002;
Subaldo, 2011), engage in gleaning. Traditional ecological knowledge facilitates species-specific capture by hand-picking or with simple equipment like sticks or rods (Craig, et al. 1993; Vunisea 1997).

There are different activities associated with gleaning. A major one is trading, i.e., gleaning and selling commercially used species, e.g., mollusks, crustaceans and sea cucumbers (Mendoza 1986; Maliao et al. 2004; Primavera et al. 2002; del Norte-Campos et al. 2005; Montenegro et al. 2005; Brown et al. 2010; Lizada, 2010; Villarta and del Norte-Campos, 2010; Subaldo, 2011). Harvest of a particular species for commercial purposes is based on two things: market appeal and abundance (del Norte-Campos et al. 2005). For example, the abalone population of Sagay, Negros Occidental, Philippines, exploited both by a fishery and by gleaners, has a market accepted shell length of 30 mm, i.e., larger than the size of a sexually mature abalone – males mature at 26 mm and females 23 mm (Maliao et al. 2004). In Guimaras Island, Semirara (Antique) and in Eastern Panay, also in the Philippines, a wide range of species are gathered (mollusks, crustaceans and a brachiopod), but only those with high catches (mollusks) are brought to the city to be marketed (del Norte-Campos et al. 2005; Nievales, 2008; Lizada, 2010). In some cases, catches are bartered for rice and other products (Sampang, 2007).

In addition to subsistence, gleaning is also a form of recreation (Cullen, 2007) and social networking (Gonzales and Savaris, 2005; Sampang, 2007). It provides an opportunity for women to be together away from the house (and thus from chores) and also facilitates the integration of newcomers to the community, indirectly reducing conflict by enhancing a sense of community through cooperation and sharing (Whittingham et al. 2003). At times, groups consist of entire families, father, mother and their children from grade school to their early teens (del Norte-Campos et al. 2005; Gonzales and Savaris, 2005; Sampang, 2007).

Gleaning can indeed be a source of income (Ablong et al. 1999; Santos et al. 2003; Beger et al. 2005; Gonzales and Savaris, 2005; Lizada 2010). It supplements fishing as the main source of livelihood, but we know little about how it functions because of the emphasis on what is believed to be more valuable near- or offshore fishing (Weeratunge et al. 2010). In addition, gleaning is an activity of women and children, and as such, remains unreported and undervalued by government and non-government institutions (Campos et al. 1994; Siason, 2001; Santos et al. 2003; Weeratunge et al. 2010). Children can be asked (and some are forced) to glean to earn income for the family, sometimes to the extent of incurring numerous absences from school, discouraging the youngsters to continue their education (Gonzales and Savaris, 2005). Wives glean mainly to supplement their husbands’ income from other fishing activities (Gonzales and Savaris, 2005).

Species groups often harvested are those deemed to be of less value than fish, for example, shells, crustaceans, cephalopods (Schoppe et al. 1998; Siason, 2001), sea cucumbers (Brown et al. 2010), echinoderms (Cruz-Trinidad, et al. 2009) and sometimes ornamental fishes (Gonzales and Savaris, 2005). Mollusks, an important everyday source of protein for most Pacific islanders (Munro 1994), are usually dominant in gleaned catch (del Norte-Campos et al. 2005). This is reflected in the words used to describe gleaning in some areas of the Philippines where shellfish is the target species group, e.g., ‘paninihi’ in Tagalog (spoken in southern Luzon), derived from the root word ‘sihi’, i.e., shellfish; ‘kinhas’ or ‘panginhas’ in Cebuano, derived from ‘kinhason’, i.e., shelled mollusk.

Catch by gleaning forms a major part of subsistence and artisanal fisheries especially in developing countries (del Norte-Campos et al. 2005). But because landings of gleaned species are unreported (FAO, 2007), it is difficult to evaluate catch and abundance trends, even of the more valued mollusk and echinoderm species (Munro 1994). A number of studies in some coastal barangays of islands in the central Philippines (Savina, et al. 1986; Samonte 1992; Schoppe, et al. 1998; Salazar et al. 1999; Parras, 2001; Primavera et al. 2002; Santos et al. 2003; Montenegro et al. 2005; Samonte et al. 2007; Picardal et al. 2011) and in Palawan (Sampang, 2007; Pido et al. 2008) provide insights on the importance of
Results

A total of 111 respondents were interviewed, 46% females and 54% males, 10-84 years old, mostly (77%) born and raised with long family histories in Mabini (Figure 2A). Only 19% of these respondents engage in fishing as their primary livelihood, 51% are in other jobs (tourism, livestock and agriculture, local government units, etc.), and 30% do not have jobs (66% females; Figure 2B). Of these, 86% engage in gleaning for at least 1 hour per low tide day, 3-5 days a month. Respondents started gleaning at an average age of 7 years. In general, males stopped gleaning as soon as they reached high school...
(approximately 13 years old) or started to work (as fisher or elsewhere). Females continued gleaning on the average to 50 years old, and often with their children who are not yet in school (4-7 years old).

Catch from gleaning is mainly consumed for food; some is occasionally used as a toy or as an ornament (Figure 2D) and is rarely sold (Figure 2C). Usually, half of the catch is given away (see Figure 2D) to family and/or neighbours, notably when some of those people cannot go gleaning, usually for health reasons but sometimes because they work or go to school. Sometimes, species are harvested because they are amusing (e.g., sea stars) or because they have never been tasted before (e.g., some littoral gastropods). However, once cooked, these species may not please the taster and are thrown away and considered ‘of no use’.

The results presented in Figure 2 span the 8-decade temporal categories used in the questionnaire, i.e., there was agreement between respondents that these observations remain true from when they were young to the present. It is interesting to note that on one hand, the 50-80 age group respondents agreed that in the 1950s and 1960s, people gathered only what they needed for food (and only the species which they preferred, e.g., abalone) because it was easy and it did not cost anything. On the other, the younger respondents indicated that they often would gather whatever is exposed (partly because they do not know what these can be used for) and if of commercial value, they will not think twice to sell. Some respondents indicated that at very few occasions, they gathered specific shells (usually gastropods, e.g., cowry shells) and were paid for their effort.

**Figure 2.** A: Age group of respondents (n=111) from 10 coastal barangays of Mabini, Batangas, Philippines interviewed during focus group discussions on the history of gleaning. B: Livelihood of respondents (LGU=local government unit); note 66% of unemployed respondents are housewives and children and the 3% in the tourism industry usually work as boatmen or operators of dive boats. C. Disposition of gleaned catch by respondents; note that selling of gleaned catch is mostly opportunistic. D: Use of gleaned catch by respondents; the category ‘of no use’ indicates species gleaned because they were available or fun to pick but could not be consumed for food because of their taste.
During 1950-1970, 54% of the respondents gleaned primarily for food. Harvested products in excess of 50% (i.e., consumed by the family) were either given away or bartered for other food items, e.g., rice or vegetables, with the neighboring mountain-based (i.e., farming and/or cattle raising) communities. Selling of harvested products was rare and very opportunistic. For instance, one of the oldest respondents, Mr Pablo Mendoza of Barangay Ligaya, recounts that he accepted requests to harvest certain types of seafood when he was a child, e.g., 50 Philippine centavos worth of shells (which would have weighed 2 kg) or 2 PHP worth of *lapu-lapu* (a grouper which would have weighed about 1 kg per piece). Lola B (her name cannot be provided), a 76-year old respondent from Barangay Gasang also mentioned bartering gleaned shells for *bukayo* (a caramelized coconut candy). Selling of harvested products was mentioned only in 1 barangay (Solo) and only recently (1990-present). In the 1990s, some Solo respondents indicated that a liter of gleaned shells (approximately 2 kg) was sold for 20 PHP. At present, a handful of shells (approximately 0.5 kg) will sell for 30 PHP.

There is overall agreement between respondents that the catch composition of a harvest depends on the habitat. That is, gastropod species are dominant in both rocky and sandy habitats, squid and cnidarian (sea anemone) species are rare in rocky habitats and sea cucumber and sea snake species are rare in sandy habitats. Gleaning is rare in reef habitats, e.g., only when the tide is very low and the reef is exposed, are fish, sea urchins, crabs and other reef associated species accessible. And if gleaning did happen in reef habitats, it is usually in waters deeper than 1 m and involved swimming or skin diving (usually aided with a mask). Mollusks (gastropods, bivalves, univalves and cephalopods) are preferred by respondents in all

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**Figure 3.** Summary of the catch by gleaning of coastal inhabitants in Mabini, Batangas, Philippines (Region IV, Subzone B) obtained from structured interviews of 111 respondents in 2012. A: Species composition of the gleaned catch showing importance of shell animals in the subsistence catch. B: Depth of water waded (dots) and distance walked from shoreline (solid line: maximum; broken line: minimum). C: Time spent harvesting (solid line) and the weight of harvest (kg·gleaner⁻¹·hour⁻¹) indicating a decrease in the catch given the same time spent harvesting. Year here is the middle year of a decade, 1955 for the 1950s, 1965 for the 1960s, etc. D: Average catch (kg·gleaner⁻¹·day⁻¹) with minimum and maximum values indicating a 1950 baseline of 5.2 kg·gleaner⁻¹·day⁻¹.

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**Table 1.** Summary of the catch by gleaning of coastal inhabitants in Mabini, Batangas, Philippines (Region IV, Subzone B) obtained from structured interviews of 111 respondents in 2012. A: Species composition of the gleaned catch showing importance of shell animals in the subsistence catch. B: Depth of water waded (dots) and distance walked from shoreline (solid line: maximum; broken line: minimum). C: Time spent harvesting (solid line) and the weight of harvest (kg·gleaner⁻¹·hour⁻¹) indicating a decrease in the catch given the same time spent harvesting. Year here is the middle year of a decade, 1955 for the 1950s, 1965 for the 1960s, etc. D: Average catch (kg·gleaner⁻¹·day⁻¹) with minimum and maximum values indicating a 1950 baseline of 5.2 kg·gleaner⁻¹·day⁻¹.
10 barangays, making up half of the average gleaned catch (Figure 3A). Coastal habitat also limits the surface area of the exposed shoreline, and thus, of the surface area that is available for gleaning. Respondents agree that conditions have deteriorated over the last 3 decades with respect to the distance walked and the amount of gleaned catch. A gleaner now has to go more than 30 m from the shoreline to catch consumable seafood (Figure 3B), and, for the same amount of time spent gleaning (e.g., in an hour), the catch has decreased by almost 90 % (Figure 3C). Considering the maximum and minimum amount of time spent per gleaning day and the average harvest per gleaner per hour, we estimated a high of more than 5 kg·gleaner\(^{-1}\)·day\(^{-1}\) during the 1950s and a low of less than 2 kg·gleaner\(^{-1}\)·day\(^{-1}\) in 2012 (Figure 3D). Assuming an average of 5 gleaning days in a month, a gleaner will likely go out collecting for food on 60 days in a year. In the 1950s, a gleaner would have brought home a little more than 0.3 t of edible seafood to share with family and neighbors in a year, while in 2012, the take home catch would be just a little over 0.1 t, a decrease in catch of about 70 %.

**Discussion**

Mabini municipality’s current economy is made up of income from the following sources, in decreasing order of importance: Overseas Filipino Worker (OFW) remittances, manufacturing, tourism, agriculture, services, cottage industry and mining (see footnote 1). However, Mabini was traditionally (and probably remains) a fishing-based community, relying on part of the Batangas Bay which in 2002, contributed over 17,700 t (10 %) of the total marine municipal fish catch from the province of Batangas (A.C. Hamoy-Obusan, WWF-Philippines pers. comm.).

The rich marine fauna of Mabini is evident in amateur spear fisher photos taken in the 1960s (courtesy of Robert Yin\(^94\), underwater photographer) showing large groupers, lobsters and other reef associated fishes (carangids and snappers) from Anilao and the Batangas Pier (Figure 4). In the 1970s, fish pens (‘baklad’) catching hundreds of tonnes of large pelagic species, including marlins and tunas were installed along the Mabini coastline (Pablo Mendoza, an octogenarian resident of Ligaya, Mabini pers. comm.). A few of these baklads still existed in the 1980s according to Jay Maclean and Roger Pullin, former senior staff members of the International Center for Living Aquatic Resources Management. One of these fish pens was near Seafari resort in San Jose, and another was installed on the opposite shore in Anilao proper. The presence of several offshore diving spots in the area introduced tourism (White *et al.* 2005) and Mabini rose to become one of the most popular and accessible diving areas in the Philippines (Saguin, 2008). By the 1980s, Mabini was suffering from an excess of migrant fishers and a range of destructive fishing methods (e.g., blast fishing) that jeopardized the booming dive tourism industry (personal observation, by M.L.D. Palomares, who was on field work in Balayan Bay for her M.Sc. thesis in the mid-1980s). A concerted effort to save the reefs of Mabini was launched in 1988 by Haribon Foundation and continued by a series of initiatives organized by international NGOs (World Wildlife Fund Philippines, Conservation International Philippines) in the 1990s and 2000s, respectively, with the first marine sanctuary established in 1991 (White *et al.* 2005). A suite of conservation projects followed, including seeding of giant clams, *Tridacna gigas*, by the Haribon Foundation in the 1990s, setting up of buoys for dive boats in the early 2000s by the Bantay-Dagat (Aida Mendoza, Bantay-Dagat pers. comm.) funded by Conservation International, and consecutive beach cleaning initiatives organized by some dive resorts and dive clubs employing the help of groups of divers enthusiastic about saving the marine life that inspire them to dive in these waters.

This unique history shows that the fisher community of Mabini evolved from coastal gleaners/farmers/cattle herders to offshore industrial fishers to fish pen operators to dive/tourist boat operators and dive masters and/or overseas/migrant workers. The discontinuation of gleaning as a primary food gathering activity, largely the opposite of their Visayan Islands counterparts (see Cabanban *et al.* this

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\(^94\) http://www.robertyin.com/
Philippine Marine Fisheries Catches: A Bottom-up Reconstruction, 1950-2010, Palomares, MLD and Pauly, D (eds.)

vol.), is seen as a result of several factors, enumerated here in decreasing order of perceived importance: 1) loss of access to shoreline; 2) increasing number of gleaners/gatherers due to migrant fishers (including gathering for fun by game fishing and beach tourists) and thus decrease in the amount of available resource; and finally 3) improved economic status (mainly due to foreign remittances by expatriated family members). Another limiting factor to gleaning, not mentioned by the respondents, is the small tidal range of this coastline, i.e., the intertidal areas and beach fronts are narrow and the fringing reefs cover small areas with drop-offs to 300 m in Balayan Bay. Though still existing, gleaning for food has become a treasured past time, especially by older women who wish to get their feet wet with excursions to the beach at least once a year reminiscing the good old days of their childhood. This and the continuing efforts to maintain the small yet effective marine sanctuaries (see Figure 1) punctuating the Mabini coastline over the last 3 decades led to a partial recovery of the denuded coral reefs of the late 1980s. These reefs are now the Mecca of divers (local and foreign), underwater photography enthusiasts and even more recently, of marine biologists aspiring to discover new species of mollusks (e.g., nudibranchs; see photos by Dr T. Gosliner of the California Academy of Sciences).

Figure 4. Spear fishers, snorkelers and divers sampling fish off the Mabini coastline (photos courtesy of Robert Yin). Center photo: Divers in an outrigger boat off Mabini (c. 1966). The length of the lobster (most probably the ornate lobster, *Panulirus ornatus*<sup>96</sup>) seems to be as long as the woman's or about 60 cm in total length weighing 8.6 kg<sup>97</sup>. Clockwise from top: 1) Spear fisher with divers in Anilao, Mabini, Batangas. 2) Landings of outrigger (artisanal) fishing boats in Batangas Pier (c. 1966); note regular sizes of snappers (front, Lutjanidae, likely of the genus *Lutjanus*) and jacks (two rightmost individuals probably of the genus *Carangoides*), also just a little bit less than a meter probably weighing 15-20 kg a piece<sup>98</sup>. 3) Spear fishing divers and their grouper catch in Anilao (c. 1965). If the average height of a Filipino man is 1.6 m<sup>99</sup>, then the total length of this grouper is 0.8 m.

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<sup>96</sup> [http://www.sealifebase.org/summary/Panulirus-versicolor.html](http://www.sealifebase.org/summary/Panulirus-versicolor.html).

<sup>97</sup> Estimated from length-weight relationships for Brazilian stocks of *Panulirus argus* (a=0.0529, b=2.91, W=7.9 kg; Fonteles-Filho et al. 1988), *P. echinatus* (a=0.0369 and 0.0301; b=2.965 and 3.18, W=6.9 and 13.6 kg; Pinheiro et al. 2003) and *P. laevicauda* (a=0.098, b=2.70, 6.2 kg; Fonteles-Filho et al. 1988) available from SeaLifeBase (www.sealifebase.org; Palomares and Pauly 2013).

<sup>98</sup> Weight estimations based on data in FishBase (www.fishbase.org; Froese and Pauly 2013) for the family Lutjanidae (see [http://www.fishbase.de/PopDyn/LWRelationshipList_family.php?ID=1407&GenusName=Lutjanus&SpeciesName=argentimaculatus&fc=323](http://www.fishbase.de/PopDyn/LWRelationshipList_family.php?ID=1407&GenusName=Lutjanus&SpeciesName=argentimaculatus&fc=323)).

The issues besetting this coastline shifted from catch per unit of effort to solid waste management with discards by the numerous dive and beach resorts now polluting the reefs, leaving the most affected areas susceptible to crown-of-thorns starfish attacks\(^{100}\). The loss of and changes in the coastal habitats brought about by coastal tourism will be the next hurdle. If the people and local government of Mabini plan their moves well, we might dream of turtles, dolphins, reef and whale sharks and the occasional Napoleon wrasse (fauna that M.L.D. Palomares observed in the early 1980s, but which disappeared later in that decade) coming back to these coasts.

Friends who have houses by the coast and who frequently snorkel and dive these waters report some of this lost fauna returning. On two occasions in the last nine months, Jay and Margie Maclean report that a small pod of dolphins stayed for several hours near their place (between dive sites 8 and 9 in Figure 1) and that sea turtles and whale sharks are now being sighted. In November 2013, Jay Maclean reports that sea turtles nested and laid eggs on their beach front and that a small group of manta rays were sighted near Arthur’s Rock (dive site 7 in Figure 1). That is indeed rather exciting for residents like the Maclean and the Mendoza families whose lives revolve around marine life, on one hand as marine biologists and conservation advocates, and on the other as dive tourism operators.

It seems like the balance between sustainable use and protected areas via marine sanctuaries is finally being reached and paying off. It might well be that the particular set of factors affecting the Mabini marine ecosystem gives our story a positive note, an addition to the increasing number of success stories associated with marine protected areas. However, the Mabini story, is not typical of coastal ecosystems in the Philippines, where poverty among fisher communities is still the rule rather than the exception.

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References


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