

The Collapse of Donkey's Ear Abalone (*Haliotis asinina*) Fishery in Siquijor, Philippines

Billy Theodrus Wagey *

Faculty of Fisheries and Marine Science, Sam Ratulangi University

Manado Indonesia 95115

Email: bwagey@yahoo.com;

* ORCID NO. 0000-0002-7059-8701

Abstract

We briefly describe the localized abalone (*Haliotis asinina*) fishery in Siquijor Island, central Philippines and discussed the possible reasons of the sudden collapse in local trade and fishery. The lack of management system may have contributed to over-exploitation of abalone leading to closure in 2012. Prior to the collapse in 2012, abalone gatherers spent an average of 4.18 ± 0.15 hours/day/site with catch-per-unit-effort (CPUE) of *H. asinina* ranged from 0.1 to 0.6 kg/person/hr with mean value of 0.25 ± 0.03 (SE) kg/person/hr. Recommendations to revive and sustain the abalone fishery of Siquijor Island are also provided.

Keywords: abalone, fishery, overharvesting, Siquijor

INTRODUCTION

Recent trends in abalone fisheries around the world have shown increasing but then falling as abalone stocks were overfished (Cook & Gordon, 2010). Illegal exploitation of abalone has contributed to population crashes and often to the complete decommercialization of abalone fishing industries (e.g. Karpov et al. 2000; Gordon & Cook, 2004; Cook & Gordon, 2010).

The abalone industry in the Philippines, which solely depends on harvesting natural stocks (mainly of the Donkey's Ear Abalone *Haliotis asinina*, Figure 1), began in 1971 with volume and total export values reaching more than 400

tonnes and US\$ 5 million in 1997, respectively (Maliao et al. 2004). Although mariculture techniques have been developed (Capinpin, 2012) based on the biology of abalones (Fermin et al. 2000; Capinpin, 2012), the bulk of the supply is derived from natural stocks.

In Siquijor, intensive harvesting of abalone probably began in early 1990s, which was originally done by overturning rocks and massive coral colonies and searching in rock crevices and holes, with the aid of hooked iron wire called "ganso" (pers. obs.), such harvesting practices are sometimes destructive to the coral reef (Maliao et al. 2004). Because of the lack of detailed documentation of the abalone

fishery in Siquijor, we present this paper with the primary aim to provide insights on the collapse of trade and fishery.



Figure 1. Donkey's Ear Abalone (*Haliotis asinina*), a heavily exploited gastropod in Siquijor

RESEARCH METHODS

We conducted several informal interviews with local abalone gatherers in western Siquijor Island (Figure 2) covering the barangays of Tambisan (9° 11' 10.16"N, 123°27'14.01"E), municipality of San Juan to the north of Cang-alwang (9° 13' 32.13"N, 123°27'55.81"E), municipality of Siquijor, and a local buyer in Solangon, San Juan, Siquijor where all abalones from the entire province were landed. Abalones were mainly gathered in coral reef areas of about 175 ha from Paliton to Cang-alwang, with identified sites as shown in Figure 2. Local gathering and processing techniques used by the locals were also observed and described.

Catch per unit effort (kg/hr/person) of abalone prior to closure in 2012 was computed and compared with published CPUE in the early 2000 as published by Bendijo et al. (2004).

Informal interviews with local gatherers were also conducted by the junior author and his local field assistant to elucidate the possible cause of the collapse of this local but important fishery. This would also reveal some traditional ecological knowledge (TEK) that might help the local government units (LGUs) of Siquijor to implement management measures and potentially re-establish this local fishery (see Capinpin, 2012).

RESULTS AND DISCUSSION

Harvesting techniques

There are three main gathering techniques used by the locals. The first technique is by over-turning rocks and massive coral colonies (*pangukab*) with the use of either bare hands or with the aid of hooked iron hook (*ganso*) which appears the most destructive. In some occasions, massive coral colonies (e.g. *Porites*) called *manonggol* or *binagong* with diameter of about 2 meters were destroyed into 2-3 parts. When the abalone is spotted right after over-turning the rocks, a smaller *ganso* made out of wire is used to detach the foot of the abalone from the rock surface.

Another technique is by feeling (*pangoot*) abalones with just bare hands in holes and crevices in rocks and ledges. This technique is potentially dangerous to the gatherer. In several instances, the junior author who was once a gatherer himself from 1995-1999 had observed gatherers with fingers bitten by large morays (*Gymnothorax* spp.) and conger eels (*Conger cinereus*). He also experienced having been inflicted by venomous fishes

like scorpionfishes and lionfishes (Scorpaenidae) and catfish (*Plotosus lineatus*). In most cases, the first two

techniques were implemented as one but ability may differ from person to another.



Figure 2. Map of Siquijor Island showing the location of the abalone collecting sites (Source: GoogleEarth, 2013).

The third technique which appears more convenient is by searching at night time in holes and ledges with the use of improvised underwater flashlights (12 Volts with halogen bulbs). However, this method allows the gatherers to exploit the abalone. In fact, prior to the collapse in 2012, this harvesting technique was rampant throughout the island of Siquijor. Each gatherer had an average duration of 2 hours each trip but may operate twice (after dusk 6:30-11:00 PM and early dawn 4-6:00 AM).

Experienced gatherers developed certain techniques in locating possible crevices or holes occupied by abalones. One of which is to identify features of abalone's

foraging range such as foraged turf algae with some excreta in the vicinity (about 10 cm wide from the opening). It is also of interest to note that gatherers observed that the Striped Catfish (*Plotosus lineatus*) preyed on juvenile *Haliotis asinina*. This observation has certain implications. For example, Nañola et al. (2010) suggested that the catfish *P. lineatus* could serve as an indicator of a heavily fished coral reef. If this fish preys on juvenile abalones, then abalones might be subjected to both direct impacts from overharvesting and indirect effect by increased predation. In addition, the practice of over-turning rocks and boulders might further expose juvenile

abalones to other predators such as wrasses (e.g. *Thalassoma* and *Halichoeres* species).

One of the abalone gatherers called the attention of the junior author of the presence of *H. asinina* in wave-formed ledges of seagrass rhizomes (mainly *Thalassia hemprichii*). At least 5 individuals were collected in just 3 patches of seagrass beds. These abalones appear whitish but the rest of the features indicate that they belong to the same species. They probably took shelter underneath seagrass rhizomes during southwest monsoon as the shallow reef flats are exposed to heavy wave action brought about by the monsoon and storms.

Catch-per-unit-effort (CPUE)

Prior to the collapse in 2012, abalone gatherers spent an average of 4.18 ± 0.15 hours/day/site and catch-per-unit-effort (CPUE) of *H. asinina* ranged from 0.1 to 0.6 kg/person/hr with mean value of 0.25 ± 0.03 (SE) kg/person/hr. An overall estimate on annual catch maybe best estimated based on observations made by our field assistant (Noe Bucol, one of the abalone gatherers) in the only landing site of the entire island (Solangon, San Juan). The usual weight of abalone bought by a local buyer on a daily basis was about 2 ice boxes (each contained about 45 kg) during the first two weeks of the southwest monsoon (*habagat*) when extensive algal beds of *Sargassum* and *Padina* are removed thereby increasing the detectability of abalones at night time. This was then followed by a gradual declined to at least 1 box per day throughout the rest of the year. Using above figures, it is probably safe to extrapolate that an annual catch would be around 8,550 kg (~8.55 metric

tons/year). Given the prevailing price of Php 400.00/kg, an annual income Php 3.42 M is estimated. Throughout the island there were about 47 regular gatherers (from 2010-2012) distributed in the following harvesting sites: Tambisan (7 persons), Cang-alwang (10), Cang-asagan (10), Maria (10), and Lazi (10). Bendijo et al. (2004) reported roughly 1.0 kg/person and an estimated annual catch of 1.0 metric ton based on a about 100 gatherers.

Abalone processing

In the early 1990s until 2000, gatherers directly deliver live abalones. Injured individuals were either priced 50% lower or considered rejects. Processing of abalones was done by the buyer to ensure quality. However, beginning in 2001 until 2012, gatherers were allowed to process abalones by themselves. Certain modifications of the usual process of boiling abalones were developed by the gatherers. For example, before boiling, fragments of tobacco (from cigarette) were used to gradually kill the abalone, thereby avoiding contraction of the abalone's foot. In 2012, certain gatherers cheated by injecting seawater in boiled abalones to gain more weight. These were probably rejected by buyers in Cebu City, which then caused huge deficit on the local buyer. It is possible that this was due to dwindling wild population of the abalone *Haliotis asinina*, which caused gatherers to adopt desperate ways to achieve targeted catch. On the other hand, it may also be viewed as a simple cheating problem. Nevertheless, both cases are possible manifestations of the lack of a

management system leading to the collapse of the abalone fishery.

CONCLUSIONS

In this study, we describe a case history of the failed abalone fishery in Siquijor Island. However, the lack of regulation and management system led the closure in 2012.

RECOMMENDATIONS

We recommend that a stock assessment be conducted to determine whether or not the wild stock population of *Haliotis asinina* is at present suitable for exploitation. In addition, certain local ordinances regulating the harvesting of abalone be enacted and implemented. Existing marine reserves should be well-protected because these have been proven to enhance wild populations of *H. asinina* (Maliao et al. 2004). Although there are at least 16 marine reserves around Siquijor, these were declared for conservation of corals and reef fishes. It is important to consider protecting portions of the site where abalone gatherers collect abalones because it is most likely that these are possible sites for larval settlement (see Capinpin, 2012).

ACKNOWLEDGMENTS

We thank the following institutions and individuals who supported our study on selected artisanal fisheries in Siquijor. The United Board for Christian Higher Education in Asia (UBCHEA) supported the

first author's scholarship. The Tambisan Fisherfolk Association (TFS), especially to its President Mr. Abner and Noe M. Bucol assisted us in conducting interviews with abalone gatherers.

LITERATURE

- Bendijo RG, Alcala MLR, Dolumbal ER, Amor AK. (2004) Coastal Environment Profile of Siquijor, Philippines. Siquijor Coastal Resource Enhancement Project (SCORE), Siquijor, Philippines. 104p.
- Capinpin EC.Jr. (2012) Using local ecological knowledge and environmental education in resource management of abalone in Carot, Anda, Pangasinan. Science Diliman (January-June 2012) 24(1): 43-55. Available Online: <http://www.journals.upd.edu.ph/index.php/sciencediliman/article/viewArticle/3458>
- Cook PA, Gordon HR. 2010. World abalone supply, markets, and pricing. Journal of Shellfish Research 29(3): 569-571. Available Online: <http://www.bioone.org/doi/abs/10.2983/035.029.0303?journalCode=shre>
- Fermin AC., Buen SM. (2000). Feeding, growth and survival of abalone (*Haliotis asinina* Linnaeus 1758) reared at different stocking densities in suspended mesh cages in flow-through tanks. Philippine Scientist 37: 31-41. Available Online: <http://agris.fao.org/agris-search/search.do?f=2002/PH/PH02008.xml;PH2002000575>

- Gordon HR, Cook PA. (2004). World abalone fisheries and aquaculture update: supply and market dynamics. *Journal of Shellfish Research* 23(4): 935-940. Available Online:
<http://www.biomedsearch.com/article/World-abalone-fisheries-aquaculture-update/132270241.html>
- Karpov KA, Haaker PL, Taniguchi IK, Rogers-Bennett I. (2000). Serial depletion and the collapse of the California abalone (*Haliotis* spp.) fishery. pp: 11-14, In: Campbell, Alan (Editor). *Workshop on Rebuilding Abalone Stocks in British Columbia*. Available Online:
<http://www.nrcresearchpress.com/doi/abs/10.1139/9780660182926#page=26>
- Maliao RJ, Webb EL, Jensen KR. (2004). A survey of stock of the donkey's ear abalone, *Haliotis asinina* L. in the Sagay Marine Reserve, Philippines: evaluating the effectiveness of marine protected area enforcement. *Fisheries Research* 66(2): 343-353. Available Online:
<http://www.sciencedirect.com/science/article/pii/S0165783603001814>
- Nañola Jr., Aliño CLPM, Carpenter KE. 2011. Exploitation-related reef fish species richness depletion in the epicenter of marine biodiversity. *Environmental Biology of Fishes* 90(4): 405-420. Available Online:
<http://link.springer.com/article/10.1007/s10641-010-9750-6>