



PRELIMINARY RESULTS ON MACRO-INVERTEBRATES STUDIES OF STO, TOMAS COVE, LA UNION, PHILIPPINES

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ABSTRACT

Macro-invertebrates usually inhabit coastal areas. Being numerous in the shallow zones, they provide readily available food source. Mostly immobile or slow moving, they are exposed to high fishing pressure.

*Results of the two-year survey from 2013 August to 2015 July, on the status of macro-invertebrates collected by a modified trawl net (locally known as Karkar) at four established stations in Sto. Tomas cove are presented. The species composition, abundance, distribution and implication of the catch are described. Four groups were identified: Molluscs, Arthropods, Echinoderms and Cnidarians. Of these, the molluscs were most diverse and widespread group and common throughout the sampling months. It consists of three groups: Bivalves, Gastropods and Cephalopods. Two species *T. terebra* and *A. pleuronectes* represented the abundant taxa. Arthropods were also frequent in the samples and consisted primarily of important species of portunid crabs *Scylla serrata*, *Charrybdis* spp. and prawns (*Penaeus* spp) and shrimps (*Metapenaeus* spp.). Except for *S.serrata* all were collected in less quantity. Echinoderms were less common and represented by two species of sea cucumber, starfishes and a sea urchin. Cnidarians may come from other source and carried by water currents into the cove. They may also have entered the cove in search of food. They were few in the samples.*

Samples collected are now scarce compared to their status earlier, before the introduction of Karkar. Considering the catch trends of these resources, a need for an immediate action towards conservation of resources and sustainable use of the cove is necessary.

Keywords: macro-invertebrates, species composition, assessment, Sto.Tomas Cove, Karkar,

Introduction

Sto. Tomas Cove, also known as Raois Cove, is an important body of water located at the southwestern part of the municipality of Sto. Tomas, La Union. Philippines. It is about 600 ha of fertile seascape, receiving water from Lingayen Gulf and intermittently from seasonal runoff.

The cove is surrounded by 9 barangays, extending from the southern end of Brgy. Damortis to the eastern side of Brgy. Narvacan. Mostly shallow along its banks, Sto. Tomas cove not only provides foods for these villages but also supplies fresh sea water to vast tract of fishponds, a major industry of the municipality. The cove is also a navigational highway for the coastal communities, as shelter for fishing vessels, and unloading dock for supplies.

Table 1. Number of individual collected at each station during the study.

SPECIES	STATION 1	STATION 2	STATION 3	STATION 4	TOTAL
A. MOLLUSCS					
<i>Anadara antiquata</i>	2	3		3	8
<i>Amusium pleuronectes</i>	26	22	16	39	103
<i>Atrina pectinata</i>			1		1
Bivalve spp.	6	1	4	17	28
<i>Bursa rana</i>	3	3	2	5	13
<i>Conus sp.</i>	1	1	2	2	6
<i>Conus radiatus</i>	1	1			2
<i>Cypraea miliaris</i>				1	1
<i>Facilaria filamentosa</i>			1		1
<i>Loligo sp.</i>	12	2	2	2	18
<i>Octopus sp.</i>	1	1			2
<i>Sepia sp.</i>	1		2		3
<i>Mitra sp.</i>	3	1		3	7
<i>Nassarius olevaceus</i>	1	10	4	5	20
<i>Nassarius sp.</i>		2	3	1	6
<i>Phos senticosus</i>	1	1	2	1	5
<i>Placuna placenta</i>	1	1	1		3
<i>Strombus canarium</i>			2	1	3
<i>Strombus sp.</i>		1		1	2
<i>Turitella terebra</i>	160	93	73	201	527
Gastropad spp.	1	1		2	4
B. ANTHROPODS					
<i>Carpilius maculatus</i>				1	1
<i>Scylla serrata</i>	22	26	26	49	123
<i>Metapeneaus ensis</i>	13	6	2	5	26
<i>Penaeus monodon</i>	2	2	2	3	7
<i>Penaeus sp.</i>	11	5	12	17	45
<i>Podolphtalmus vigil</i>	1	5	1	5	12
<i>Portunus pelagicus</i>			1		1
<i>Portunus sp.</i>	5	17	5	1	28
<i>Squilla mantis</i>	6	13	4	6	29
<i>Thalmita crenata</i>				1	1
<i>Cherybdis ferratus</i>	1	1	2	3	7
<i>Cherybdis sp.</i>	5	6	13	23	47
<i>Portunus sanguinolentus</i>			1		1
Arthropoda spp.	14	16	13	23	66
C. ECHINODERMS					
<i>Echinoderm spp.</i>	6	4	4	5	19
<i>Ophiuroidea sp.</i>	1				1
<i>Holothuria ocellata</i>	4	4		5	13
<i>Holothurian scabra</i>		1	1	1	3
<i>Asrtopecten sp.</i>		4	1	1	6
<i>Sea urchin sp.</i>				1	1
<i>Asteroidea sp.</i>	2		1		3
D. CNIDARIANS					
<i>Aurelia sp.</i>	5	1	4	5	15
<i>Cnidarian spp.</i>	10	12	23	13	58
TOTAL	328	267	230	452	1276

In the 90's, a noticeable decline in landings was observed. Particularly after a smaller version of trawl net, suited in coastal areas, was introduced. Locally known as “karkar”, the gear is very effective in collecting bottom fauna. Several of these gears are operating in coastal areas of the province. Years after its introduction, landings of fishes and other fauna started to decline. It takes added efforts to fish some for family consumption.

Other anthropogenic causes also contribute to the decline in catch. Examples are the on-going operations of fish cages and the use of the cove as docking area for cargo ships and fishing vessels such as trawlers. Excess foods from fish cages may alter water quality while wastes from water crafts may find their way into the cove during their landings or de-loading of supplies.

Long before, good quantity and quality of prime fishes and invertebrates abound in the area. Various resources, from high value fishes such as groupers, seabasses, siganids, and breams to the lowly pony fishes were abundant. Invertebrates were dominated by important crab species, sea mantis, echinoderms and various species of mollusks. They were numerous then and of good sizes. However, the increasing populations of coastal villagers have exerted too much pressure on these resources. With gear improvements and absence of regulations, resources of Sto. Tomas cove are rapidly decreasing. Small fishes such as the leiognathid species, mugilids, apogonids, all less valuable are dominating the ichthyofauna. Invertebrates are also becoming scarce, with catches consisting mostly of non-commercial species.

Resources of the cove have been the subject of studies by students of various institutions. These studies are usually unpublished, fragmented and often carried out in short durations. Among these are the assessment of commercially important fish fry (Nidoy, R. et. al., 2002); macrobenthic organisms (Japson, J. et. al., 2001); catch composition of fish pots (Cabutotan, R. et. al. 2004); taxonomic composition, abundance and distribution of shrimp fry (Caiquiep.B. et. al. 2003), species composition of seashells (Estacio, S. et.al. 2008), and assessment of shrimp caught by modified push net (Bulldozer type) Quesada, R.L. (2007).

Concern on the future of the cove and its sustainable use, this study was conceptualized. This work aims to provide a picture of the present composition of invertebrates and their status in this important body of water.

Objectives

To provide information on the status of macro-invertebrate resources of Sto. Tomas cove: their species composition, abundance and distribution.

1. Provide species list of the present invertebrate fauna.
2. Determine their abundance and distribution.
1. Provide information necessary for the management of the cove.

Methodology

Sampling stations were established at Brgy. Damortis-Tubod (Stn. I, N16° 14.208', E120° 23.377'); Brgy. Casantaan-Ubagan (Stn. II, N16° 13.736, E119 49.905'); Brgy. Narvacan-Sungyot Point (Stn. III, N16° 14.25' E120° 23.256') and Brgy. Tubod-Damortis (Stn. IV, N16° 15.142' E120° 23.219').

A once a month sampling at four established stations was conducted using a modified trawl gear, locally known as karkar. It is similar to the trawl fishing gear but much smaller. The gear has a mesh size of #8 for the wings, #10 for the body and #14 for the bag. It is also equipped with wooden boards to facilitate spread of the wings.

The net was dragged twice at the bottom for a distance of 500 meters. Collected samples were emptied into plastic containers and brought to the laboratory for sorting, identification and measurement. Representative taxa were preserved in five percent buffered seawater formalin to verify identification.

Abundance is expressed as average number of two runs at each station.

The data presented was for a period of two years, starting from August 2013 to July, 2015 (Table 1 and 2).

Table 2. Number of individual collected during the sampling months from 2013 to 2015.

Results and Discussion

Groups/Species	Aug.- Sept. 2013	Oct.- Dec. 2013	Jan.- Mar. 2014	Apr.- Jun. 2014	Jul.- Sept. 2014	Oct.- Dec. 2014	Jan.- Mar. 2015	Apr.- Jun. 2015	Jul.- Aug. 2015	TOTAL
A. Molluscs										
<i>Anadara antiquata</i>	1		1		1	1	2	2		8
<i>Amusium pleuronectes</i>	9	11	4	39	14	14	1	9	2	103
<i>Atrina pectinata</i>		1								1
<i>Placuna placenta</i>			1	1			1			3
Bivalve spp			12	10			5	1		28
<i>Bursa rana</i>	1	3	4		2			2	1	13
<i>Conus sp.</i>	1				2		1	2		6
<i>Conus radiatus</i>		1				1				2
<i>Cypraea miliaris</i>		1								1
<i>Faciolaria filamentosa</i>								1		1
<i>Mitra sp.</i>	1	1			1	1		3		7
<i>Nassarius olivaceus</i>		3		2	8		3	4		20
<i>Nassarius sp.</i>						2			4	6
<i>Phos senticosus</i>			1				2	1	1	5
<i>Strombus canarium</i>					1		2			3
<i>Strombus sp.</i>					1			1		2
<i>Turitella terebra</i>	1	40	4	11	49	191	58	147	26	527
Gastropod spp.			1	1	2					4
<i>Loligo sp.</i>	1	3	4	1		8		1		18
<i>Octopus sp.</i>				1			1			2
<i>Sepia sp.</i>			1		2					3
B. Arthropods										
<i>Carpilius maculatus</i>		1								1
<i>Scylla serrata</i>	46	20	9	13		10	8	4	13	123
<i>Podophthalmus vigil</i>				2	4	1	2	1	2	12
<i>Portunus pelagicus</i>								1		1
<i>Portunus sp.</i>	7	4				2		2	13	28
<i>Thalamita crenata</i>								1		1
<i>Charybdis ferratus</i>			1	3			1	2		7
<i>Charybdis sp.</i>				14	18	7	4	4		47
<i>Potunus sanguinolentus</i>				1						1
Arthropoda spp.			33	26	1	6				66
<i>Metapenaeus ensis</i>	6	9	4		1	3	3			26
<i>Penaeus monodon</i>			7							7
<i>Penaeus spp.</i>	2		21	3	6	13				45
<i>Squilla mantis</i>	9	2	5	2	3	2	4	1	1	29
C. Echinoderms										
<i>Holothuria ocellata</i>	4	4	2	1	2					13
<i>Holothuria scabra</i>		1		1	1					3
<i>Echinoderm spp.</i>	1			3	2	8	2	1	2	19
<i>Astropecten sp.</i>				5						5
<i>Asteroidea sp.</i>				1	1	1				3
<i>Ophiuroidea sp.</i>						1				1
<i>Sea urchin sp.</i>				1						1
D. Cnidarians										
<i>Aurelia sp.</i>			1	5	3	5	1			15
<i>Cnidaria spp.</i>		10	11	15	4	3	8	2	5	58
TOTAL	90	115	127	162	129	280	110	193	70	1276

Species composition

Various species of invertebrates were collected in the cove. About 1276 individuals were gathered from 2013 to 2015 samplings (Table 1). The invertebrates were classified into four major groups: Molluscs, Arthropods, Cnidarians and Echinoderms and about 39 species. The number of invertebrate species may be even more. There were many unidentified species in the samples.

Samples collected were from areas reached by Karkar, usually at depths of about 1 meter to 10 meters or more. Thus, near shore areas (less than 1 meter to shore) were not effectively sampled. This explains why the tailed mussels, blood cockles, carpet shells, etc. were few in the collections.

The molluscs were the most specious and abundant in the samples. About twenty species were identified. Seven species were from the bivalves with *Amussium pleuronectes* (Moon shell) dominating the group; ten from the gastropods with *Turitella terebra* (True augers) the most abundant; and three from cephalopods, with *Loligo* sp. as the common species while the other two: (*Octopus* sp. and *Sepia* sp.) were rare in the samples.

T. terebra is eaten as delicacy. It is easily sold in the community and local market while *A. pleuronectis* is the most important and expensive species. Several sizes of the species are found in the cove.

Majority of the molluscs species are eaten and therefore there exist fishing pressure on these resources. Gleaners flock to shallow areas during low tide to gather whatever is edible while seasonal species from deeper areas are collected by karkar. These activities resulted to the rapid decrease of invertebrate resources. As such, invertebrate fauna near shores and in other stations are now few, occurring sporadically in the samples. Cephalopods are considered as luxury food items, much relish by the fishermen and are often eaten immediately when caught.

The Arthropods ranked second in abundance and in number of species. Twelve species were identified, eight species of crabs, three of shrimps and prawns, one mantis shrimp and many unidentified decapods. Of importance were the shrimps and prawns (*Metapenaeus spp.* and *Penaeus monodon*) and portunid crabs (*S. serrata*, *P. pelagicus*, *P. sanguinolentus* and *Charybdis* spp.). Some in the unidentified samples are not eaten. Among the crab species, *S.*

serrata was the most abundant and generally collected as juveniles, similar with the other portunids. This observation may reflect the importance of the cove as nursery area for these species.

The Echinoderms had two species of sea cucumbers: *Holothuria ocellata* and *H. scabra*, an unidentified form of echinoderm, three species of starfishes and a sea urchin. Except for the *H. scabra*, all are unimportant. *H. scabra* in the locality are dried and sold as “trepan”, a very expensive delicacy in Chinese cuisine. *H. ocellata* is considered as nuisance species but may be utilized for some nutraceutical products.

Cnidarians comprised the jellyfishes in which two species were identified. All are predators of young fishes and other zooplankton.

Abundance and Distribution

Of the molluscs, two species were found to be abundant and widely distributed. *T. terebra* occurred in all stations and in large numbers, particularly at Stns. I and IV. The species was collected year round but was most abundant during the wet season (Table 2).

Amussium pleuronectes was also widespread but was more abundant in stn. IV. They were collected year round but were higher in number during the onset of the rainy season.

Other species were common while others occurred intermittently during the samplings. Some were rare being present once or thrice in the samples (*Atrina pectinata*, *Cypraea miliaris*, *Paphia undulata*, *Phos senticosus*, *Strombus sp.*).

As stated earlier, the sampling gear used can only be operated in depths of 1 meter to about 10 meters or more. Those reported here as few (Table 1) were quite abundant near shore and were more accessible to gleaners in the locality. Among the near shore species were *A. antiquata*, *Nassarius sp.*, and some *Conus spp.*, *P. undulata* and other gastropods. Even those collected at the sampling stations were also abundant near shore, implying a wider depth distribution of the species. Examples are the *Bursa rana* and *Nassarius olivaceus*. *T. terebra* and *A. pleuronectes* were found in deeper and muddy area, accessible to Karkar.

The arthropods ranked second in terms of abundance and number of species. The mudcrab, *S. serrata* was found in high number during the onset of the rainy season. Other important crab

species were the *C. ferratus*, common during summer, and *P. sanguinolentus* which were few in the samples. *Podophthalmus vigil* was common during the rainy season. Prawn and shrimps were also collected in most months but in less quantity. The mantis shrimps were common in most sampling months but in low numbers. Other species of arthropods were common during the rainy season.

The predatory cephalopods occurred frequently and may have been brought to the area during the incoming tides or they may have entered the cove in search of foods.

The echinoderms are inhabitant of the cove and frequently collected by Karkar. Of the two species of sea cucumber, only *H. scabra* is important. The cove supported a sea cucumber industry in the 1980's with *H. scabra* as the main species. However the introduction of karkar led to its rapid depletion. About 9 individuals per hectare was reported in the study conducted earlier (Mamhot, J. et. al. 2013). *H. scabra* are sold as fresh or processed commodity in Manila market. *H. ocellata*, however, was most common. The fact that there is no use for this species in the area it is often thrown back to the water when collected. This explains why the species is abundant. Other species of echinoderms were found intermittently during the study.

Implications of the results of the study

The presence of varied species of macro-invertebrates implies high productivity in the area. However, in terms of economic importance and commercial availability of the resources, the cove is now in poor condition. Only few resources dominated the macro invertebrate fauna. Among the molluscs, only two species (*T. terebra* and *A. pleuronectes*) are important and are still present in viable quantity. Other species were few and occurred sporadically.

Though quite abundant in the samples, the several species of crabs were usually juveniles. Their adult stages were seldom collected. Adult stages may have been inhabiting other areas (outside the cove), while the younger stages feed inside the study area. The shrimps and prawns, *Penaeus spp.* and *Metapenaeus spp.* were common but few in numbers. Other unidentified species (grouped under Decapod spp.) were also abundant and common in the samples.

Except for *H.scabra*, all the echinoderms collected in this study are of no commercial values. This species is effectively caught by the sampling gear and sold as fresh or processed

commodity. Other species of echinoderms such as the starfishes and sand dollars proliferate in the cove because they are of no importance and are returned to the water when collected.

Near shore areas are used as source of food by coastal communities. Gleaners, in particular, harvest resources from shallower reefs, flats, mud flats, sandy to rocky areas, sea grass beds and mangrove areas (Nieves, et. al. 2010). Some excavate the substrates to get the burrowing species while others overturn boulders to see what lies beneath. More substantial results may therefore be achieved if catch data from gleaners are included in this study.

The present use of the cove as mariculture site for finfishes, docking areas for fishing boats, navigation, oysters farm are all important activities in the coastal areas. They add to the coffers of the municipality which in turn are used to improve living standard of the populace. However, majority of the coastal dwellers are artisanal fishermen who rely much on the cove on day to day basis, exerting high fishing pressure on its resources. It is at this point that serious studies be done, efforts exerted and initiatives be implemented to manage the remaining resources and maintain or improve the present condition of Sto. Tomas cove.

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