

## A Brief Note of Lato (*Caulerpa racemosa*) Harvest at Solong-on, Siquijor, Philippines

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### Abstract

Nearly 30 years since an assessment on the local harvest of *Caulerpa racemosa* at Solong-on, Siquijor, we conducted a similar study in November 2013. Present CPUE of *Caulerpa* is significantly lower than it was in the 1980s. Probable factors attributing to this decline are briefly enumerated and discussed.

**Keywords:** seaweed, lato, harvest, Siquijor, Philippines

### INTRODUCTION

The green alga of the family caulerpaceae represented by the single genus *Caulerpa*, are found worldwide from the shallow water tropical to the subtropical marine habitats. All species which are traditionally separated by their distinct morphologically possess a rhizome that produces erect blades and rhizoids that penetrate sediments. The natural product at least 14 species have been studied and most species produce the sesquiterpene and caulerpenyne as a major metabolite.

*Caulerpa* is one of the most distinctive genera of seaweeds, being identifiable solely on the basis of its habit. The thallus, a nonseptate siphonous structure, consists of a creeping rhizome that produces tufts of colorless rhizoids downward and photosynthetic branches (assimilators) upward. A thin layer of cytoplasm, containing countless numbers of each type of organelle, is appressed to the wall. The assimilators assume many different forms. This distinctive habit was recognized as a generic character in 1809 by Lamouroux, who

initially placed eight species in the genus, including five that had previously been described as species of *Fucus*.

In addition to its habit, *Caulerpa* has a distinctive suite of anatomical, cytological, and biochemical characters, including reinforcement of the siphonous structure by anastomosing strands of wall material (trabeculae), division of labor between photosynthetic chloroplasts and starch-storing leucoplasts (heteroplastidy), presence of siphonaxanthin and siphonoin as photosynthetically active pigments, and replacement of cellulose by xylan as the skeletal constituent of the wall. While these characters are of great importance in relating *Caulerpa* to other siphonous genera, they are not demonstrably useful in infrageneric taxonomy.

There are about 75 species of *Caulerpa*. Many of them exhibit polymorphism, showing different growth forms in different habitats which makes them difficult to identify. *Caulerpa racemosa*, *C. Laeteviren* and *C. peltata* form a species complex. A number of forms and varieties for *C.*

*racemosa* are listed but further study is needed to clarify their exact phylogenetic relationships. (Sato et al, 1992)

There are many variation of *C. racemosa* found around the world. Some of them are variable in composition, which make it uneasy to identify the species without examine it under a microscope for its cell structure. This species is very specific and unique for the performance perfectly round in individual clusters, look like a grapes on a vine. For example most varieties of *racemosa*, it can easily be cultivated in a tank, so that to limit the size of this plant, care must be taken.

It grows in the intertidal zone in the shallow water depend on the moderate to high currents to supply the essential nutrients required for growth. *C. racemosa* should be closely monitored in the tank as it is well known for releasing spores under the tank conditions.

The green algal genus *Caulerpa* (Lato) is among the most prolific and widespread group of seaweeds. In fact, some species have invaded some marine waters such as in the Mediterranean, Australia, the USA, and Europe partly due to the aquarium trade and caused ecological and economic disasters (Cebrian & Ballesteros, 2009; Walters, 2009).

In some countries, such as in the Philippines, some species of *Caulerpa* (*C. racemosa* and *C. lentillifera*) are consumed locally (Calumpong, 1984; Belleza & Liao, 2007). In Mactan, Cebu, central Philippines, *C. lentillifera* has been farmed in ponds for export (Belleza & Liao, 2007). The first detailed study on Philippine *Caulerpa* was by Gilbert (1942), who reported 10 taxa but only *Caulerpa serrulata* var. *typica* f. *lata* was recorded as occurring in Mactan and Cebu Islands, Central Visayas. Later, Taylor (1966) listed two varieties of *Caulerpa racemosa* from Cebu Island.

However, the bulk of the work on algae from Central Visayas was done by Reyes (1972, 1976), who collected from the islands of

Negros and Siquijor and described 11 taxa of *Caulerpa* from this region.

Calumpong (1984) studied the yield of *Caulerpa racemosa* (locally called *lato*) harvested by the locals from the wild. Since then, however, no follow-up study has been done despite the commercial value of *Caulerpa*, which are usually shipped to Dumaguete and sold at a higher price. This study was conducted to determine the present status of this local seaweed harvesting.

## RESEARCH METHODS

We conducted intermittent interviews with the local collectors of *Caulerpa* in sitio Solong-on, Barangay Tambisan, Siquijor from November 5-7, 2013. During interviews, the following information were asked: 1) Name of collector; 2) number of basket harvested; 3) number of hours spent harvesting (including cleaning); and 4) price/basket. These data were used to compute CPUE (catch-per-unit effort) expressed as the number of basket/man/hour and IPUE (Price in Philippine Pesos multiplied by the CPUE).

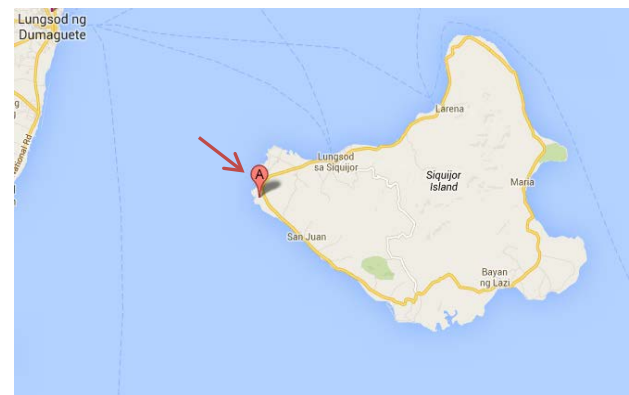


Figure 1. Location of the area of research Solong on Barangay Tambisan Siquijor Island, Philippines

## RESULTS AND DISCUSSION

In this study, only 15 persons (versus 13 families in the 1980s as documented by Calumpang, 1984) were found to harvest *Caulerpa* regularly. Harvest ranged from ~0.1 to 3 baskets (mean:  $1.67 \pm 0.64$  S.E. baskets/man). CPUE was estimated at  $0.53 \pm 0.21$  basket/man/hour. Each basket weighs about 10 kg. It should be noted that in the 1980s, the basket used by the gatherers were bigger than the present, which contained 30-40 kg each (Calumpang, 1984). Each basket-full of lato are sold at Php 70-80.00/basket. IPUE was estimated at  $41.23 \pm 17.22$  Php/man/hour. We found a strong discrepancy between the local buying price (Php 80.00/basket) and the retail price in Dumaguete City at Php 250.00/basket from the middle sellers. Local vendors in Dumaguete Market then sell lato at Php 5.00 per clump (tapok), each weighing about 100g. This would mean that middle seller earn about Php 170.00/basket while each vendor could still earn at least Php 250.00/basket. It should be noted that the gatherer's income of Php 80.00/basket has to be deducted by tricycle fare of Php 5.00/basket (from Solong-on to Siquijor Wharf) and boat fare of Php 12.00/basket (Siquijor to Dumaguete).

Given these information, it is probably safe to suggest that the amount of *Caulerpa* harvested by the locals may have declined. There are some factors affecting seaweed beds; those are climate change, water temperature, nutrients, and grazing. The monsoon-generated waves and storm affect to some extent the seaweed bed. The activities of grazers affect the distribution and abundance of the rooted brown algae. The influence of grazing generally changes abruptly at the

boundary between the intertidal and subtidal zones. Even on shores where the abundance of herbivorous gastropods (such as limpets and trochids) is high, their distribution tends to end at the zone of dense algae (normally fucoids) found in the immediate subtidal area. Herbivorous gastropods are normally the major grazing invertebrate. Herbivorous fishes may also affect the subtidal algal assemblage. Some herbivorous invertebrate organisms can graze heavily on new fronds and broken-ends of old fronds of brown algae. Abalone and sea-stars may have some small-scale effects upon algal abundance *Laminaria* forests. Small crustaceans may be very abundant in algal turfs and may be major grazers of algal spores, thus influencing recruitment in the seaweed bed.

Sea urchins may have dramatic effects on kelp assemblages, on most temperate shores, in both hemispheres. In areas where sea urchins are abundant, their effects have been generally documented in three categories: (1) whole-scale removal of algae; (2) the alteration of species diversity via feeding preferences and selective removal of algal species; (3) the provision of cleared primary substratum suitable for kelp recruitment. It is commonly observed worldwide that dense aggregations of sea urchins may remove large tracts of algae, creating barren ground.

During the 1980s to early 2000s when Tambisan and Solong-on wharfs (about 7 pumpboats regularly travel from Siquijor to Dumaguete daily) were still in operation, the local gatherers paid only a minimum boat fares and sometimes the burden of boat fare were of the middlemen and not of the gatherers.

It can be assumed that that this situation will be still going on and on and its need to be taken into consideration for the

departement of fisheries and the local government of Siquijoras a part of their duty to increase in livelihood income of the local fishermen. There are some things that need to be consider an by the local governments in Siquijor island is about the maintenance of the coastal environment as part of an effort to preserve the environment by encouraging the Barangay coastal village that is making MPAs with the support of the local community. It also takes account after pumboat traffic arrangements in and out of the village on a particular track so it does not destroy marine life , especially seaweed that exist around their waters. Most areas of Siquijor already have MPA ( Marine Protected Area) , respectively . However a motivation undertakings and even advocacy of the MPA and the support from the university in Siquijor region less Siquijor implemented by local governments. This makes many coastal communities pessimistic with their presence even result in increasingly severe economic downturn.

Although public awareness of marine ecosystems is very high, but government efforts to improve the lives of local fishermen still lacking. Some marine protection efforts coordinated by each Barangay not been able to synergize with incomes of fishing communities. Examples of the decline in the commodity seaweed (*Caulerpa*) also indicate weakness programs on the fisheries to the local community. This opportunity is taken by the midle of sellers who take advantage of the inability of local communities mnelayan memdapat less government and less attention on the development of information available . As one of the authors offer a solution that is a local government to seek the establishment of fisheries information center that serves as a place of discussion that may already exist, but

the provision of information centers with the help of computers and the Internet are already widely available throughout the Philippines can be used to open up horizons for local fishermen siquijor in coastal areas . Besides, it also needs to help the community by making periodic meetings with universities nearby to discuss for a solution on the coastal region. So that the public does not depend only on the efforts to develop the tourism potential but also to explore the marine fisheries in their area.

The use and management of coastal areas by the local community and regional level has not complied with most of utilization of natural resources conservation and sustainable development. This condition will affect directly to the condition and sustainability of coastal and environment areas. The cause of the degradation of the condition of coastal areas also indirectly caused by the natural resource management in the upstream that affect coastal estuaries.

Therefore the development paradigm of the coastal communities should be conduct naturally and holistically, ie development done a very thorough and integrated attention to spatial aspects, namely the development of environmentally sound, community -based development, the development of people-centered, sustainable development and institutional -based development.

To realize the holistic development of alternative needed a strategy, ie a strategy oriented resources or Resource Base Strategy(RBS), which includes the availability of resources, as well as the success factors of the learning process However, it is recognized that many fishing communities categorized as laborers fishermen, fishing communities are most often found in coastal communities.

Characteristic of them can be seen from the shackles of poverty that is always their lives, they do not have the capital or the proper equipment for productive enterprises. Generally they work as laborers/crew to skipper vessels with minimal income or they work and live on the coast belonging to their landlord. It is also likely to make people passive and do not dare to insist on their rights. but is expected with the new program of landreform will promote the coastal region of the community to be able to improve their lives.

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It is suggested that perhaps Siquijor local government may need to learn from neighboring countries, namely Indonesia and the program that are introduced to the coastal communities that called “Coastal Community Economic Empowerment Program”. This is the empowerment programs for coastal communities which should be designed in such a way not generalize from one faction to the other groups especially between the coastal region to the other. Empowerment of coastal communities should be bottom up and open the menu, but the important thing is empowering itself to be directly reached the target community. This program though is need to be evaluated but it was really showed that the government of Indonesia (State Ministry) is really working hard and tried to assist the local

community to improve their livelyhood. With the combining of the program from the Ministry of Education and Culture; the community service programs are disbursed each year in various forms such as Science and Technology in Society is very helpful for the academics and the public to interact together to find the best solution for the progress of the village target.

At the core of this program was done through such approaches;

#### (a) Institutional

In order to strengthen their bargaining position, they should be collected in a solid institutional , so that all their aspirations and demands can be routed properly. Institutions can also be a liaison (intermediate) between the government and the private sector. Besides these institutions can also be a forum to ensure the productive revolving fund among other groups.

#### (b) Assistance

The existence of a companion was felt very necessary in any development program . Society may not be able to walk alone because lack of knowledge, or perhaps the strength of their dependency level because not yet recovered their confidence as a result of development paradigms of the past. In spite of it all , the companion role is vital, especially accompany people pursue their business activities. But most important of this assistance is to put the right people in the right group anywayTherefore the problem Lato harvesting in Solong on Barangay Tambisan Siquijor, in can be regarded as one of the issues that are wrapped around the coastal communities. Furthermore, this is not a matter that can not

find a solution. However, the problem depends on the political will of the local government to obtain and initiate innovative programs to the community, especially the coastal communities and the ability of community resources that may wish to go ahead and make new breakthroughs in order to increase their welfare.

## CONCLUSION AND RECOMMENDATION

In this study, we report a decline in local harvest of *Caulerpa racemosa* compared to the data reported by Calumpong (1984). Such decline might be attributed to the difficulty in local transportation and to a lesser extent monopoly by middle sellers. It is probably too early to suggest overexploitation as one of the factors of decline due to the fact that *Caulerpa racemosa* are prolific and are abundant in Solong-on. Further studies are needed such as quantification of the species' biomass per unit area in the area. In addition, initial observations indicate another edible species *Caulerpa lentillifera* which has been grown for export in Mactan, Cebu (Belleza & Liao, 2007) also occur in the area and is more esteemed by the locals should be assessed as well. The intrudence of coastal resources management programs to the local Barangay in the Siquijor island are needed to improve their livelihood.

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