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Community − Local Government and Academe Partnership in Coral Restoration: Does it work?

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Abstract

The declining state of coral reefs necessitates immediate rehabilitation and conservation efforts deemed crucial for ecological, biological and economic recovery reasons. To accomplish this, it does not need science alone but also active participation of stakeholders. The present works in San Fernando, Masbate (Ticao Island), demonstrate a concrete example where partnership among key stakeholders resulted to a successful coral restoration project. Results showed its effectiveness, cost efficiency in coral restoration. The technology made use of 'corals of opportunities' (COPs) reared in coral nursery units (CNUs) for six months and then out-planted inside an MPA to ensure protection and increase coral cover. The fragments were attached using epoxy or tied in concrete nails using cable ties. A 1cm growth per month and 70% survivorship performance two months after transplantation was achieved using *Acropora, Seriatopora, Pocillopora*, and *Stylophora.*

Key words: Coral restoration, coral reefs, coral nursery units, coral of opportunity, MPA, LGU

Introduction

Coral reefs are declining at an alarming rate. The fact is, they are degraded faster than they can grow and reproduce is a reality we cannot ignore. In the Philippines, reports from various organizations (i. e., academe, NGOs, DENR and BFAR) have shown that over 70% coral reefs are in a poor state (0-25% living coral cover) and less than 5% are in excellent (75-100%) condition (Licuanan and Gomez, 2000). In Bicol Region, Mendoza et al., (2004) showed that living coral cover in marine protected areas (MPAs) ranged from 30-60%. Unfortunately, they are continuously declining. This situation has led to the development of several strategies to rehabilitate degraded coral reefs and its associated fishes and invertebrates. Establishing MPAs during the 80's have been thought as a means for faster recovery of coral reefs and its associated organisms because of the protection it offers from heavy pressures of anthropogenic activities (Alcala 1988, and Alcala and Russ 1989). However, Maypa et al., (2012) reported that MPAs showed slow recovery and in some cases no recovery at all while others had decrease of living coral cover, thus, the conceptualization of coral restoration through transplantation as an "active" means of rehabilitating coral reef areas with low or degraded living corals as opposed to the "passive" process using MPAs. The idea revolves around the principles from MPAs (Alcala 1988, 2004) and coral transplantation (Edward and Gomez 2007 and Edward 2010) with the active participation of all stakeholders (i. e., community, LGU and local Universities), coral reefs recovery is perceived to be effective which is main subject of this article. This partnership proved crucial in achieving common goals and objectives of coral restoration.

On the basis of the above context, the author explored the prospects of a community-LGU-academe partnership in coral rehabilitation management scheme utilizing coral fragments reared in nurseries taking into considerations the experiences from the practices of the National Coral Restoration Program.

The Site

The study was situated in the municipality of San Fernando, Ticao Island, Masbate (Fig 1). The area is characterized by high dependence on the coral reefs for both food and livelihoods. In addition, upland activities were also

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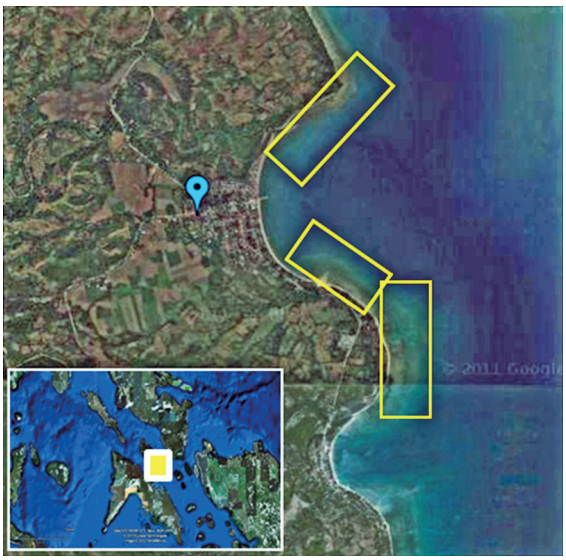

Fig.1. Map of San Fernando, Masbate, Showing the Sites for coral nurseries

observed to have high impacts on the reefs as evidenced by heavy siltation especially during rainy season. Destructive fishing methods such as dynamite fishing, poisoning and active gears is also prevalent as indicated by the presence of damaged corals and rubbles. This site was chosen on the basis of the following; 1. There is an existing MPA, 2. There is a high degree of coral degradation caused by anthropogenic activities, 3. Willingness of LGU to manage coral reefs resources, and 4. The existence of high community participation in resource management. In summary, these key aspects cited by the author are the development points that can bring about change for better and successful restoration project.

Technical aspect of coral restoration

Coral Nursery Unit (CNU)

The author made use of CNUs to rear COPS as shown in Figure 2. The CNUs measures 3 m x 1 m x 1 m (L x W x H) made of 0.5" PVC pipe with 10 mm iron rebar internal framing as structural support. The whole length consists of 18 series of No.12 nylon rope running the whole length spaced at 10 cm and is fixed to the pipe at both ends with plastic cable tie. The coral nubbins are attached into the gap between two nylon ropes with a 16 mm tie wire. The 3-dimensional space in the gap allows healing recovery for the fragments. The CNU is fixed with two pegs (10 mm iron rebar x 45 cm length sheathed inside 0.75 inch pipe). Each CNU can accommodate 500 coral nubbins. In the San Fernando, a total of 40 CNUs containing 20,000 corals nubbins was set and deployed.

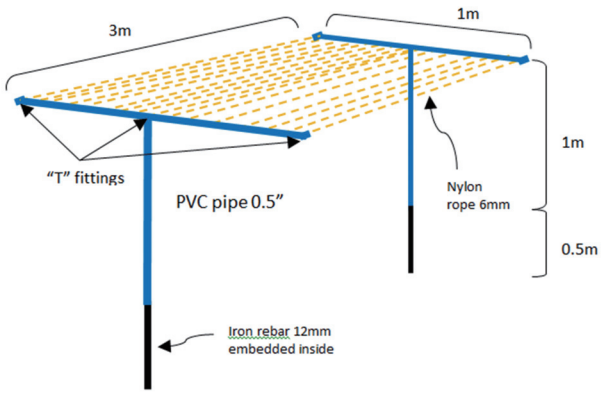

Fig.2. Details of the coral nursery unit (CNU)

Collection of Coral Nubbins

The coral nubbins are collected from areas with abundant loose or detached or dislodged corals as a result of anthropogenic activities (Monty, *et al*., 2006) and natural calamities (typhoons). To ensure best practice, the collection of coral fragments from intact coral colonies is not allowed. The collected COP is transported and secured to the CNUs to ensure higher survival. While in the CNUs, the coral fragments has time to recover from collection stress, fragmentation and healing of lesions caused by cutting or other physical damage.

Attachment, Deployment and Monitoring

The coral nubbins are tied firmly between two ropes of the CNU using 16 mm G.I. wire and they should remain submerged during tying. After securing all the coral fragments in the CNU, they are transferred to deeper area at a depth of about 20 − 35 feet for rearing up to 5 months. The CNUs are also secured by tying them on to boulders, rocks or iron bar pegs as anchors. To avoid stress during transport, CNUs are established near the COP areas.

For this particular case, a total of 20,000 coral fragments were secured in CNUs. Growth and survival monitoring was done in 4 CNUs involving 240 coral fragments. Simultaneous with monitoring, maintenance cleaning was undertaken by moderately moving the frames of CNUs to remove sediments and debris. Fouling organisms (e.g., algae, sponges), coral predators (e.g., starfish, snail) and other unwanted materials and organisms were removed to enhance growth and survival rate of corals.

Growth increments were monitored monthly by measuring the linear and lateral increments using a fiberglass tape measure using SCUBA. Linear growth (axial) was

measured from the G.I. wire to the tip of coral fragments while lateral growth measured from the axial portion of the nubbin to the tip of the lateral branch. Survival was calculated by counting the live coral fragments in the designated sampling areas within the CNU.

Coral Transplantation

After 3-6 months rearing in the CNUs, transplantation in the rehabilitation site commenced, using concrete nails, cable ties and aqua epoxy to secure the fragments. Prior to transport, the rehabilitation site is assessed for the living coral cover and associated reef fishes and commercially important invertebrates. In this case, the rehabilitation site is situated in a fish sanctuary and therefore, the newly transplanted coral fragments are well secured and protected.

Community and LGU participation and Support

To define responsibilities and forge collaboration, a Memorandum of Agreement (MOA) between the Local government Unit (LGU), represented by the Mayor and the Congressman, Community-represented by MFARMC, Government Agency-represented by Department of Science and Technology (DOST) and Bicol University (BU)), was prepared and subsequently approved.

With MOA in place, the LGU is responsible of providing logistics, manpower and security for the project. The Municipal Fisheries and Aquatic Resource Management Council (MFARMC) helped LGU in terms of security and manpower while the Department of Science and Technology (DOST) provided funds for the project, and BU, the technical support. This institutional arrangement's paved the way for the successful project implementation.

During the project implementation, MFARMC, Bantay Dagat members and some of the MAO's employees regularly participate in all project's activities from collection of coral fragments, preparing the CNUs, securing the coral nubbins to CNUs, rearing and transfer to the rehabilitation sites including the provision of security.

To strengthened support and awareness as well as disseminated output among stakeholders, the Office of the Municipal Agriculturist initiated a regular presentation of project updates at the Barangays and Sangguniang Bayan. In addition, comics, flyers, stickers, posters and billboards were made for information, education and communication (IEC) campaign.

Capacity building

As part of the technical backstopping, selected members of MFARMC, Bantay Dagat and LGU personnel were trained on the fundamentals of coral biology, coral assessment methodologies and coral rehabilitation and SCUBA diving lessons for purposes of monitoring and evaluation of the project as well as MPA.

Result and Discussion

The experiences in the coral restoration project in San Fernando, Ticao Island, Masbate have demonstrated that the participation of all stakeholders is crucially important in the successful implementation of coral restoration project. This partnership (Fig 3) was the key in achieving common goals and objectives. The LGU as the lead agency is mandated to protect, conserve and rehabilitate coastal resources, while the community, such as the FARMCs, has the moral obligation to help the LGU in achieving its goals and the academe has its social commitment and responsibility to promote good environment.

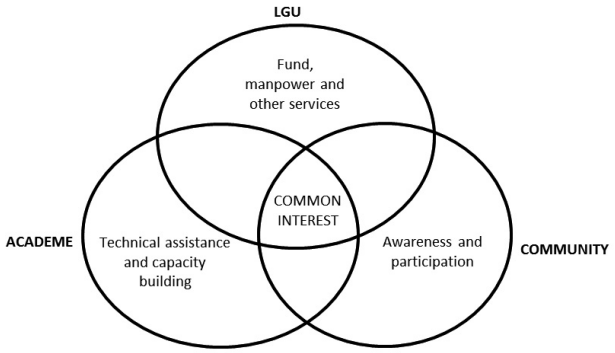

Fig.3. Roles in partnership LGU-Community&Academe

The interplay of these sectors, guided by shared vision and common interest produced the desired positive outcome and positive impacts. The author emphasized the given this partnership, all sectors shared their common understanding and collective action beneficial to the achievement of the goals of coral reef restoration. It is interesting to note that the project concept was conceptualize by the LGU-San Fernando and duly supported by the Congressman of the 1st District of Masbate. Bicol University Tabaco Campus (BUTC) for its part mobilized a pool of marine and fishery biologist to provide technical assistance in the conduct of coral restoration. From this, series of community meetings made by BU and MAO' s Office was conducted as a strategy to create community awareness and encourage their participation in the entire process. The distribution of IEC materials further improved their understanding on the importance of coral reefs in particular.

The above-mentioned processes were anchored on the

tenet that "*the welfare and/or condition of coastal communities are associated with the state of coral reefs*". With the high dependence of communities to the resources in the reef both for food and livelihood, resource users resorted to destructive and unsustainable means resulting to the rapid decline and damages to the reef ecosystem in general. As a strategy, the author capitalize on community participation as a strategy to inculcate and project "*sense of responsibility*" and onwards "*sense of ownership*" and later on, they can be all stewards of coral reef resources.

Gleaning from the partnership outcome, good growth of 1 cm per month and 70% survivorship performance two months after transplantation was achieved. This means that in a span of 4-6 months, the fragments can be used as source materials for coral restoration process. These observed growths in CNUs were comparable to the growth rates observed by Yap and Gomez (1985). However, with the use of CNUs, higher survivorship was attained in contrast to direct transplants. These promising results could be attributed to the active participation of community and the support of LGU and the presence of partner academe. The good chemistry between LGU, community and academe is an important ingredient in successful reef management.

Roll-out to other sites

Inspired by the success of San Fernando experience, the author proposes to replicate the same to other places, thus, BUTCs introduced coral restoration activity in the Sangguniang Panlalawigan of Albay and other municipalities in the Province of Albay for possible inclusion in their annual work and financial plans. For FY 2015, BUTC was successful in convincing three municipalities in the first district of Albay: Tiwi, Tabaco and Bacacay. Preliminary activities like information and education campaign and training on coral restoration including establishment of demo-site for coral nursery in Tabaco City is now on-going in cooperation with the Barangay Council together with BFARMC, Bantay Dagat and Women Sector as partners.

Conclusion and recommendations

The utilization of COPs and CNUs was proven as an effective means of coral rehabilitation activity to address the declining living coral cover. These techniques, combined with strong community participation, LGU support and the assistance of an academe partner trickles down to an efficient and successful coral restoration. Although there is no *one fits all method* in any coastal resources management, the experiences in San Fernando, Masbate coupled by the best practices in the national coral restoration project, can make a difference in coral reef rehabilitation and management in Bicol Region.

As a sustainability measure, it is recommended that after transplantation in the rehabilitation sites, continued monitoring and surveillance should be done to assess the impacts on reef associated organisms. This can be accomplished by institutionalizing the partnership between LGU, community and Academe such that even with a change in LGU leadership the same support mechanism will work. Furthermore, continued capacity building should be initiated in order to cope with the changing needs of time and CRM is a continuing process and that new skill should be acquired.

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