

# Sustainable marine conservation, baselines, and systematic monitoring—a few lessons from coastal resource management in the Philippines

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## Abstract

This review shares lessons learned from the establishment of early marine protected areas (MPAs) in the Philippines about the need to establish baseline information, do systematic monitoring of the status of the marine environment, and to progress towards more integrated forms of management that involve key stakeholders in coastal areas. The tendency for human society to change its perception of what is “normal” through the phenomena of “shifting baselines” is pointed to as a reason why more concerted action is not taken to stop the downward trends of Philippine coastal resources and environment. The small MPAs of Apo, Sumilon and Olango Islands as well as the large Tubbataha Reefs Natural Park, are cited as examples of how the establishment of baselines and the implementation of effective monitoring over time for both biophysical and governance parameters, has been instrumental in maintaining and improving the quality of the marine environment and bringing benefits to people. The development of integrated coastal management and coastal resource management programs within local government units is explained as a way of harnessing local institutions to lead the way towards improved management and stewardship of coastal resources and provide tangible benefits to coastal communities. And, the role of national government is highlighted as a facilitator and a source of technical support to local governments in the implementation of marine conservation and coastal resources management. Finally, the significant influence of Dr. Angel Alcala in marine conservation in the Philippines is noted through his research and related conservation efforts for small-island and fisheries management and his mode of sharing results with local communities and governments so that they could learn from their own mistakes and successes and become better stewards of their resources.

**Keywords:** Apo, community, coral reefs, Sumilon, tourism, Tubbataha

## Introduction and connection to Angel Alcala

When I first came to the Philippines in 1978 as a U.S. Peace Corps Volunteer, I was fortunate to work at Silliman University with Dr. Angel Alcala and colleagues. My mission at Silliman was marine conservation after having served for almost a year with the Marine Parks Task Force to establish marine parks under the National Environmental Protection Council (NEPC) led by Dr. Gavino Trono of the University of the Philippines. Landing in Dumaguete and working with Dr.

Alcala was like a dream come true because it brought me to the field sites of Sumilon and Apo Islands where I could explore what makes marine conservation tick at the community level. I learned from and documented all aspects of the local coral reef ecosystem, peoples' use of reef resources and, most importantly, how marine resource stakeholders perceive their environment, and what motivates them to conserve, or more often overexploit, their natural marine resources.

This article shares a few lessons learned over the years about the need for monitoring and evaluation of marine ecosystems and their governance that can guide our efforts to objectively measure change over time that leads to sustainable marine conservation. An important aspect of monitoring change is to put a realistic perspective on the phenomena of “shifting baselines” whereby people quickly adapt to the new status quo and forget what came before. For example, how many of us know that fish biomass in important fishery bays in the Philippines declined on average by up to 88% between 1950 and 1996 (Stobuztski et al. 2006a, b)? This information required having a baseline and doing monitoring. But such data is not

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known to most resource managers either due to a lack of research, or more often, because good baseline data never existed in the first place. And, even if there is baseline information, consistent monitoring through time using replicable methods is usually absent (De Leon and White 2005). In addition, poor information uptake, education and dissemination can also be blamed. And, an important lesson to help avoid this phenomenon among stakeholders, and attributed to the work of Dr. Alcala, is that we must integrate our scientific monitoring work and results with the human communities that depend on the ecosystems and the resources they produce (Raymundo and White 2004)<sup>1</sup>. Dr. Alcala shared his work locally in the Visayas with communities and this process has contributed to some of the best locally managed marine protected areas (MPAs) in the Philippines. His research and sharing also helped to elevate the level of awareness of the need for marine conservation among many people (White and Vogt 2000).

<sup>1</sup>This reference provides a comprehensive review of the contribution of Dr. Alcala's research in relation to the planning for and protection of the Apo Island marine reserve.

### Lessons from early marine protected areas in Philippines

Since the 1970s, over 1,600 MPAs have been legally established throughout the Philippines at the national and local government level (White et al. 2014). However, it is unfortunate that less than 20% of these MPAs are fully enforced or considered under "effective" management (Maypa et al. 2012; White et al. 2014). But, the MPAs that are well managed and protected such as Sumilon and Apo Islands, Tubbataha Reef Natural Park and a host of others have benefitted from baseline data collection and monitoring since their establishment so that objective measures exist to evaluate the efforts to protect these areas and also the benefits derived from their management.

In the case of the well-studied Apo Island, conservation work began in 1979 under the direction of Dr. Alcala with objectives to develop environmental awareness among the island residents and to begin the establishment of a municipal marine reserve (Raymundo and White 2004). Operational tenets of non-formal education were applied. These included the (1) help of local leaders—elected and non-elected, (2) the winning of villager support and commitment, and (3) the adoption of effective communication systems and methods. In particular, techniques such as focal group discussions, presentations and forums were used to engage the community (Cabanban and White 1981; White and Vogt 2000). Non-formal education was a useful tool to these objectives as shown by the considerable success achieved in cultivating environmental awareness,

understanding and approval of the establishment of a marine reserve by island residents in 1985. This initial program was followed by the Marine Conservation and Development Program of Silliman University (1984-86) which brought rigorous coral reef and fisheries monitoring to three islands (Apo, Balicasag and Pamilacan) together with onsite community organizing and assistance with planning and municipal government support for the island MPAs all of which included no-take areas as agreed to and enforced by the communities (MCDP 1985; Savina and White 1986; White and Savina 1987; Vogt 1997). The lessons from these islands on the value of well enforced small no-fishing areas have spread throughout the Philippines over the years, but many of the core messages of community engagement and careful assessment and data collection have been lost as donors and non-government organizations have tried to speed the process without building a sound foundation through baseline studies and monitoring (Ferrer et al. 1996; Pomeroy and Carlos 1997; Christie et al. 2003; White et al. 2005).

Research on the coral reef and its fish biomass and fish yields to local fishers from Sumilon Island coral reef in southern Cebu has also informed the development of MPAs throughout the Philippines. The Sumilon case offered well-documented benefits of a no-take "sanctuary" on one side of the island whereby the coral reef fish yield was monitored over more than 20 years through the work of Alcala, Russ and others (Alcala 1981; Alcala and Luchavez 1981; Russ 1984; White 1980; Russ and Alcala 1996; Russ et al. 2004). The key and simplified lesson from Sumilon Island is that if fishing is stopped on a relatively healthy coral reef that has been overfished, the fish biomass will bounce back quickly and also supply fish yield to fishers outside the no-fishing zone (White 1988; Maypa et al. 2002) when certain criteria for protection are achieved and essential reef environmental parameters are present. The other important lesson from Sumilon is that local politics is very unpredictable and can easily work against marine conservation even if only the best intentions are involved (White 1987; Oracion 2003). The entire history of Sumilon is long and somewhat complex, but in brief, the towns of Oslob and Santander in Cebu, represent an example of local government complexities and in the 1980s their leadership led to the demise of the marine protection on Sumilon Island that had been initiated in the mid-1970s by Silliman University under the direction of Dr. Alcala (White 1987). In recent years, this has been reversed and Sumilon Island and reef are now managed with a healthy reef and fish biomass due to tourism investments in the area (White et al. 2010). Again this knowledge is only possible because of consistent monitoring of conditions over time so that the "shifting-baseline" bias is avoided.

## Evolution of Coastal Resource Management (CRM) programs

In 1991 the Philippine government shifted many coastal management responsibilities to local governments and fostered increased local participation in the management of coastal resources (Eisma et al. 2009). In their delivery of what came to be referred to as “integrated coastal management” or ICM, many local governments have achieved increasing public awareness of coastal resource management (CRM) issues (Courtney and White 2000; Lowry et al. 2005). The push for more integrated forms of CRM beyond the implementation of MPAs began in the early 1990s with the “Fishery Sector Program” (1990-1998) for the Philippines whereby bay-wide management was attempted for fisheries and coastal resources that included fishery management zones and small MPAs (White and Lopez 1991). Then in 1996, the Coastal Resource Management Project (CRMP) (1996-2004) spearheaded the involvement of municipal and city governments in the planning for and implementation of CRM or ICM plans that included a range of interventions to address the needs of marine areas under municipal/city jurisdiction to 15 km offshore. This heralded ICM as a “basic service of local governments” and similarly for the initiation of MPAs, required that each local government participate in a baseline assessment to establish the extent and status of resources, the spatial distribution of resources and their use patterns, as well as the primary issues to be addressed to stabilize the resources in municipal waters through a CRM or ICM plan. The process for local governments in coordination with national agencies was articulated in a set of “ICM” guidebooks published in 2001 (DENR, DA-BFAR and DILG 2001). One criterion of a complete CRM/ICM plan was to include one or more MPAs that contained no-take zones for fisheries improvement and to contribute other potential benefits such as protection of critical habitats, provide attraction for tourism and others. The CRMP worked in the southern Philippines in about 100 coastal municipalities (out of 832 nationwide) and established a formal system for evaluating CRM/ICM plans and their implementation as well as a system for evaluating the quality of governance of MPAs within local government jurisdictions (CRMP 2004; Maypa et al. 2012). To make the system functional, yearly assessments were needed to measure progress against a baseline of governance and the status of the coastal resources (White et al. 2006).

The challenges identified through the CRMP were the need for financial sustainability, inadequate capacities, weak law enforcement, and lack of integrated and collaborative efforts. To address these challenges, a CRM certification system was developed to improve strategies and promote incentives for

local governments to support ICM (DENR-CMMO 2003). This system was adopted in 3 regions in the southern Philippines and was applied by local governments to guide the development and implementation of ICM in their jurisdiction. The CRM benchmarks required for a local government to achieve the first level of certification were: budget allocated, CRM related organizations formed and are active, CRM plan developed and adopted, shoreline management initiated and two or more best practices implemented (e.g. mangrove conservation, MPAs, user fees etc.). Implementation provided tangible benefits to communities through enhanced fisheries production associated with MPAs, revenues from user fees and enhanced community pride through learning exchanges and involvement in decisions, among others (Courtney and White 2000; Courtney et al. 2001; White et al. 2005, 2006). Such benefits as perceived by the communities and their local governments depended heavily on having monitoring programs in place so that credible data could inform local decision makers on the status of their resources.

One ICM site under CRMP was Olango Island, Cebu, where extensive economic cost-benefit analysis was done to justify the investment on the part of the local government in active management and protection of their mangrove and reef resources. The results of this effort have paid dividends to the communities through tourism revenue and the rehabilitation of coral reefs that were previously devastated from destructive uses and overfishing. The economic model was understood and endorsed by the mayor and city council at the time and investments were made (White et al. 2009). Such stories highlight the potential of ICM that addresses the concerns of local stakeholders and local governments (Samonte et al. 2016). The Olango Island case was complicated by multiple economic and political interests but the unifying factor over the years has been having a baseline of information on the condition of the coral reef and fisheries in the area which was objectively executed and thus communicated to and informed interest groups with facts they could not ignore (White et al. 2009). The Hilutungan Marine Sanctuary, on one end of Olango Island, was protected by vigilant local community members and champions of marine conservation who understood the condition of the reef, the value of having good fish biomass that attracted paying divers and snorkelers to the area.

## Monitoring the status of MPAs and Tubbataha Reefs Natural Park

In 2001, the Coastal Conservation and Education Foundation, Inc. (CCE Foundation) initiated an MPA Project to help increase the number of functional MPAs in the Philippines. The MPA Project developed the Marine Protected Coast, Reef

and Management Database (MPA Database) system to provide a basic framework for monitoring and evaluating effectiveness of MPAs. This system was pilot tested in 16 selected MPAs that now have substantially better management and are improving ecologically, as compared to the beginning of the project in 2001 (White et al. 2004). Wider application of this system was achieved in collaboration with national government agencies, all major non-government organizations, academic institutions and coastal development projects which were all working in coastal resource management in various locations around the country. With their participation, over 170 additional MPAs were surveyed in 11 provinces. The MPA database is currently managed by the University of the Philippines Marine Science Institute in collaboration with multiple partners who contribute data<sup>2</sup>. Feedback through the MPA database highlights the challenge in sustaining management operations after the establishment phase. In most cases, MPAs have difficulty in sustaining management efforts due to the lack of technical support, insufficient budget, and weak law enforcement (White et al. 2002; Gill et al. 2017).

The Tubbataha Reefs Natural Park (TRNP) offers an example of coral reef conservation success amidst the general trend of declining corals and reef fish populations, poor management, and lack of political will in many areas in the Philippines and worldwide (Dygico et al. 2013). Located in the middle of the Sulu Sea, the Tubbataha Park consists of the two atoll reefs and the submerged Jessie Beasley Reef to the north (Arquiza and White 1999). The no-take park covers 970 km<sup>2</sup> and is surrounded by a 10 nautical mile wide buffer zone. Initially protected as an MPA in 1988, and declared a World Heritage Site in 1993, the more recent TRNP Act of 2009 lays out the governance arrangements for the park. The Tubbataha Management Office (TMO) undertakes the day-to-day operations in the park, in line with the management plan. Enforcement is undertaken by about 8-12 rangers comprising park employees working jointly with Philippine Navy, Philippine Coast Guard and the *Bantay Dagat* (Sea Guardians) of the Cagayancillo municipality which has political jurisdiction over the area.

Only two activities are allowed in the park – research and tourism—and these are currently confined to three months of the year because of the remote location and weather constraints. As a premier diving destination in Southeast Asia and rated among the top ten dive sites in the world, the park receives 2000-3000 visitors a year. Tourism is the main source of income generation through user-fees and operators permits so that the live-aboard boats that ply the waters in April-June generate some 30-50% of the park's revenue, the rest coming from national government subsidies, grants and donations.

The TRNP is one of the best enforced large no-take areas in Southeast Asia based on management evaluation and monitoring results (Dygico 2013). Unusually for such remote reefs, we are confident that this is an objective judgement of effective management, thanks to the regular monitoring work undertaken by the TMO and also by visiting expeditions such as the Saving Philippine Reefs (SPR) project of the Philippine NGO, The Coastal Conservation and Education Foundation (CCEF).

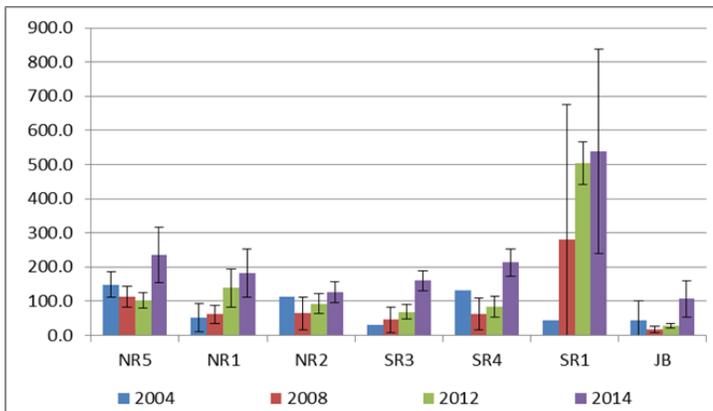
In April 2018, the eighth SPR monitoring expedition was made to the TRNP, previous visits having been made regularly since 1984. The methods used follow the monitoring protocol provided by Uychiaoco et al. (2010) that builds on the methods recommended by Dahl (1981) and English et al. (1994) that are similar enough so that comparable methods have been used on all visits, with minor modifications. Data collected include:

- Bottom cover of living coral, and living and non-living substrates (broad categories)
- Fish species diversity and abundance (volunteers with more experience collect this data)
- Abundance of indicator species such as giant clams, lobster, crown-of-thorns starfish, etc.
- Presence of large marine life (e.g. Whale sharks, Mantas, Sea turtles, Sharks, Cetaceans)
- General information on threats, visitors and conservation efforts within the area
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The 2014 and 2018 expeditions found that the living coral cover is stable and higher than it was prior to the ENSO bleaching event in 1998 so the reef is very healthy and there were few signs of disease or damage. The biomass of fish recorded was higher than it has ever been recorded, although the density of fish (number/unit area) appears to be declining which reflects the increase of larger, predator type fish on the reef. The number of smaller fish has declined while large predatory fish are more abundant than in the 1980s and 90s (White et al. 2012, 2014, 2018)<sup>3</sup>.

Monitoring over the last 15 years has also shown that the live coral cover has been stable after the bleaching of 1998, when coral cover declined by about 22% (Maypa et al. 2004). The combined biomass and density of families belonging to commercially important fish families (e.g. Acanthuridae, Labridae, Lutjanidae, Scaridae, Siganidae and Serranidae) show an increasing trend from 1998 to 2014, which also helps to confirm that that fishing activities are absent or very minimal (Dygico et al. 2013; White et al. 2014, 2018).

An important lesson from the protection of the Tubbataha Reefs is that it is a multi-faceted operation that requires vision,



**Figure 1.** Fish biomass has been monitored at 7 locations in Tubbataha since 2004 and is shown to be higher in 2014 than in past years (White et al. 2014).

planning, coordination, political will, funding, dedicated staff, and more. But, the one consistent part of the puzzle that cannot be changing with human perception and values is that of systematic and objective monitoring of the status of the resources and changes over time so that cause-effect relationships can be shown. In the case of Tubbataha, there are clear correlations between the decline of human abuse and the improvement of coral reef ecosystems in the Park. And, this story can only be told through rigorous quality monitoring using consistent methods that are easy to replicate through time so that human variability in the process is minimized. While there are few examples of this in our marine world, Tubbataha can pass the test of time to avoid the tendency for the perception of a “shifting baseline”. As a visitor to Tubbataha in the early 1980s, my perception of a baseline is very different from what I would perceive in 2018 upon seeing the reef. And, I can only fully appreciate the positive change from 1984 to the present through the analysis made possible through the monitoring data (Figure 1). Such reef monitoring has played a significant role in the “adaptive” management of the Park and refinement of management through the years (Arquiza and White 1999; Dygico et al. 2013)

<sup>2</sup> <https://database.mpasupportnetwork.org>

<sup>3</sup> It is noted that the monitoring of Tubbataha Reefs was also done by researchers under Dr. Alcala to help determine the contribution of the Tubbataha reefs to fish larvae in the Sulu Sea. This data together with other survey reports was used to help support the acceptance of Tubbataha Reefs as a World Heritage Site in 1993 while he also served as the Secretary of the Department of Environment and Natural Resources (DENR).

## Conclusions

Monitoring and evaluation of coastal management and coastal resources are keys for sustainability and a major theme of our times (White 2016). Without more effective baseline

information, monitoring and feedback, we cannot move towards sustainable use of our coastal resources or know what we have gained or lost (Christie and White 1997; White et al. 2014). One major lesson from the examples described is that effective monitoring and evaluation can lead to adaptive management which translates to long-term coastal resource and thus people management. The long-term prognosis for the MPAs described (e.g. Sumilon and Apo Islands and Tubbataha Reefs) is quite good primarily because baseline information and monitoring have been used to measure change over time for biophysical, governance and socioeconomic factors and this information has been translated into adaptive management and used to influence local policy makers. Management plans have evolved and in the TRNP, a national entity, the management regime has responded to the needs, adapted and has a management plan which closely reflects reality. This attests to the collaboration among government bodies and the private sector, but it also attests to the important role of the monitoring data which reminded all concerned that their common resources (e.g. the Park and its reef and fish) was doing better as a result of their collaborative management efforts (Dygico et al. 2010).

Economic incentives for local stakeholders through ecotourism and other means are another important force in making marine conservation viable through time (White et al. 2000). Olango and Apo Islands, and again, TRNP, provide a window of what works in the Philippines for marine tourism involving key stakeholders when effective protection translates into monetary returns for local stakeholders. These successes are also a measure of local governance systems working and tend to reflect well on government employees with responsibility to guide or implement actions. Local leadership can be encouraged through positive outcomes from coastal resource management as a basic service of local government whereby they adopt and implement municipal and city coastal resource management plans. These plans can include the establishment and effective management of marine reserves and sanctuaries in their jurisdictions as well as other best practices as shown by these and other examples (DA-BFAR 2004; White et al. 2005).

National institutions need to see their responsibility to support local government initiatives in coastal management and undertake joint institutional audits of performance and results in relation to coastal management (ADB 2003). National agencies, led by the Department of Environment and Natural Resources (DENR), should continue to improve and expand a national certification and incentive system for local CRM plans and programs and needs to publish a national report on the state of the Philippines’ Coastal Environment using credible baseline data that serves to satisfy the information and technical assistance needs of national and local governments.

Given that marine conservation and coastal resource management are multi-sector endeavors, it is critical to establish a regular multi-sector review system to identify and resolve overlapping, conflicting, and inconsistent policies, laws, and programs related to CRM (Christie and White 1997). Review and assessment of all municipal or city CRM or ICM plans that include MPAs, fisheries management, the status of municipal fish stocks, marine water quality, and coastal habitats is essential to assist local governments and assisting organizations in managing their coastal resources (ADB 2003). And, it is governments' role to increase public awareness of environmental related responsibilities for coastal resources.

This may seem like a lot to ask, but what are the consequences of not heeding these lessons learned? What will the Philippines be like, if its coastal heritage is damaged or lost? Very simply, it will become a poorer nation with per capita wellbeing declining (White et al. 2000). The natural resource base of the Philippines is the main source of income for millions of people, either directly or indirectly. As this resource base erodes, so will the fundamental economic base and individual and collective wellbeing. Stemming such erosion and loss is tied to having solid baseline information and monitoring systems in place. And, as I recall, these are the same issues that concerned Dr. Alcala in 1978-79 when I joined the Silliman University Sumilon Island experiment and research project. We have come a long way since then but in reality, many of the fundamental issues for marine conservation are still with us and in some ways even become more complex. Let's learn from and build on the many lessons learned since the early years of marine conservation in the Philippines, a few of which are highlighted herein. These lessons offer us guidance to halt our 'shifting baseline' perceptions and focus on solving fundamental issues going forward which means being "objective" about the reality we have.

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<sup>4</sup>All references cited that were published through projects in the Philippines (e.g. CRMP, DENR, DA-BFAR etc.) are available on the website: [www.oneocean.org/](http://www.oneocean.org/)