

COLLABORATIVE PHILIPPINE-CANADIAN ACTION CYCLES FOR STRATEGIC INTERNATIONAL COASTAL ECOHEALTH

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ABSTRACT

Canadian-Philippine linkages on multi-year coastal Action Research and learning cycles are detailed within established participatory development strategies. Philippine sustainable development is further considered as a function of inter-jurisdictional considerations, and reflexive role shifts for academe. An organizational process is outlined to enhance partnerships and communication between the public and Philippine authorities. Public participation evaluation is suggested through a community-based consideration of goal attainment, social process and ecological assessment. Positive change is demonstrated for a related Action Research cycle in one of six marine bioregions. Action Research is further considered as a career strategy for sustainable development and global equity goals.

Keywords: Sustainable development, ethnoecology, transition-economy, participation, curriculum, early-careerist

INTRODUCTION

Research Objectives

Global challenges emerging through issues such as population growth and climate change place pressure upon academe to be more reflexive. Recently Action Research (AR) has been applied to career development in African development settings (McCullough, 2010), while sequential AR cycles have been previously considered as a global development strategy (Volunteer Services Overseas [VSO], 2004). Aspiring students and early-careerists face a daunting task to become engaged in research, due to limited opportunities (Gibney, 2013) which are further reduced when considering sustainable development (SD) and global

equity. Examples of longer-term AR cycles, career shifts and collaboration development may be of use in supporting early-careerists in their global aspirations. The current work details a successful 2011-2013 Philippine coastal AR cycle. Culturally relevant steps in the transformation of local government and academic institutions along a marine bioregion led to unprecedented consensus on priorities. Secondly, the aim herein is to put results into a broader career and participatory perspective for the early-careerist by projecting back on prior (macro) AR cycles by the two authors. Both personal and public development (VSO, 2004) are considered through a series of progressive AR learning cycles (Figure 1).

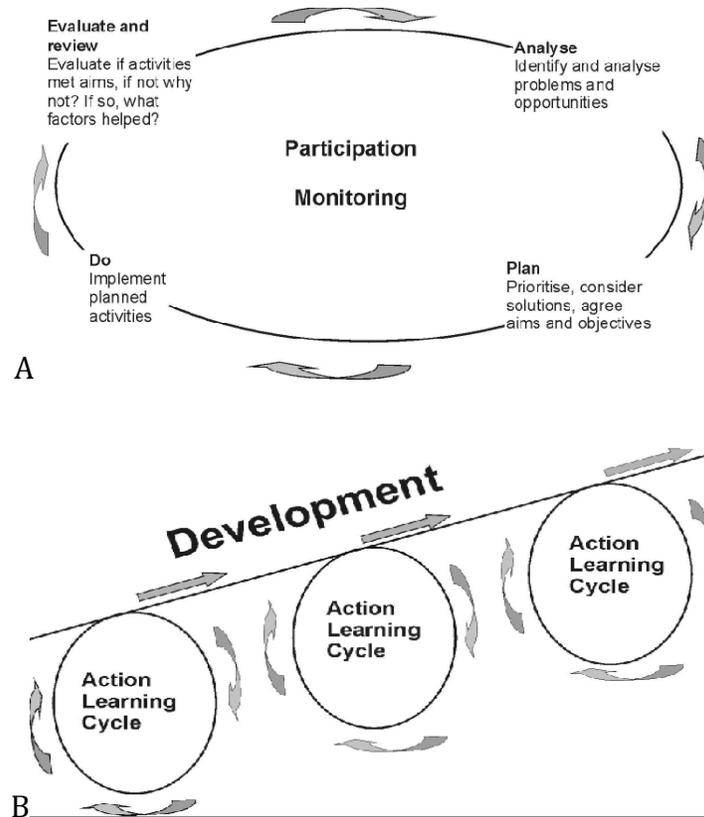


Figure 1. *Linked Action Research and Learning Cycles for Development, adapted from Volunteer Services Overseas, 2004. A – one project action/learning cycle; B - project action cycles linked where analysis leads to plans and development is advanced.*

Sustainable Development and Global Equity

The modern development era began with *Our Common Future* (Brundtland Commission, 1987) including questions as to who should participate and how (Malley, & Watts, 1987). Although AR is over half a century old (Lewin, 1948), significant linkages to community and SD are on-going (MacDonald, 2012; Pajaro, M., Watts, P., & Ampa, J., 2013b). The current work considers a trans-disciplinary SD approach for marine systems through iterative AR cycles. In support of global equity, Canada has committed 0.7% of GDP to official development aid. As of 2011, Canada had reached 0.31% with no schedule to meet the 0.7 goal (Anonymous, 2012). Through the Canadian Association of the Study for International

Development, the suggestion has been made to focus on Canada's strong performance in tertiary education collaboration to meet these international commitments (Watts, 2013). The current work can perhaps provide one example for that development.

Climate shift confirms the critical SD need to enhance linkages for humans within ecosystems. Research areas such as, ethnoecology and Traditional Ecological Knowledge (TEK) can be significant for marine resource management (Berkes, Huebert, Fast, Manseau, & Diduck, 2005) and sustainability. The term ethnoecology can uniquely also encompass the broader human condition in cities and perhaps be useful in clarifying sustainability. Globally, work on large marine ecosystem sustainability has focused on bioregional approaches. However, Philippine history includes isolated local governments and education mandates that have not previously been focused upon a marine bioregion, anywhere in the country. The Philippine accomplishments detailed in the current bioregional approach, emerged from previous AR career cycles. Results are organized specifically around the portions of the AR cycle represented by the terms: *Plan*, *Do*, *Evaluate*, and *Analyze* (Figure 1) which are repeated throughout the manuscript in italics for figure reference. The Canada-based AR cycle aimed at SD through ethnoecology in the Hudson Bay bioregion, as described below.

Convergence of Action Research in Ethnoecology

The *plan* to initiate the Hudson Bay Ethnoecology program received an innovation award at the University of Manitoba, Canada in the mid-1990s, based upon recruitment of co-instructors from each of the four indigenous cultures of the region. The program was based in Churchill, Manitoba which uniquely has an Inuit, Athapaskan, Algonquian, Metis and non-indigenous heritage. The program was co-sponsored by the Institute of Arctic Ecophysiology, the Faculty of Science, University of Manitoba and Keewatin College. *Implementation* involved a series of smaller AR cycles involving students annually examining the barriers/opportunities to culturally-relevant SD. After ten years, program *evaluation* indicated that program sustainability was the primary challenge. *Analysis* indicated resistance to Ethnoecology demonstrated by university-level Science leadership (Moffat, Penner, Taylor, & Watts, 2011). Divisions within Canadian academe funding appear to make a programmatic transdisciplinary approach somewhat difficult. Further *analysis* indicated that an ethnoecology program might be better suited for developing countries focused on resource sustainability and poverty alleviation. The first author joined Volunteer Services Overseas to pursue this potential.

During the same timeframe, the second author was focused on a parallel large-scale AR approach with Philippine fisherfolk. The *plan* was to help empower fisherfolk identified by their TEK, through a process of initiating a national alliance. This was *done* through national coordination of fisherfolk marine protected area (MPA) Managers from 120 communities across the country through a series of smaller, often annual AR processes. This national PAMANA alliance (www.pamana.50.web) was formally recognized through the Philippine government and initially funded by international partners. The *evaluation* phase of initial alliance *implementation* indicated that on-going development was in part dependent upon better local government science support and a more applied linkage

between fisherfolk and science. *Analysis* indicated that there was a need to look at new forms of international collaboration. As a result, the second author relocated to Canada to pursue a related mid-career doctoral program. Beginning in 2005, the two independent AR approaches were merged to focus on Philippine marine sustainability and poverty reduction. Effectively the *analysis* of the two independent AR cycles was used to *plan* the first collaborative AR cycle. The 2005-2010 AR cycle resulted in formal international recognition of the PAMANA group (Anabieza, Pajaro, Reyes, Tiburcio, & Watts, 2010) and initiation of *plans* for related and programmatic approaches to ethnoecology in the next 2011-2013 AR cycle. Prior to describing the 2011-2013 AR cycle, the following outlines an applied Philippine participatory paradigm. Participation is central to all of the work detailed herein, based upon ethical guidelines of all supporting agencies and consistent with recent specifics on research ethics (Hammersley, & Traianou, 2012).

PARTICIPATORY SUSTAINABLE DEVELOPMENT: COASTAL PHILIPPINES

National Philippine Development Profile

The Philippines has a small middle-class and large differences between the rich and the poor; demonstrated through a *GINI Index* of 43, higher than China, Indonesia, Thailand and many other less developed countries (World Bank, 2014). Advances in Philippine GDP have however led to a significant decrease in international funding. Challenges continue regarding poverty alleviation. Small-scale marine fisherfolk are pivotal to poverty alleviation, having a 60% poverty rate, about twice the national average (Israel, 2004). Significantly, the Philippines are responsive to international strategies as represented by their SD response to the 1992 UN led Agenda 21.

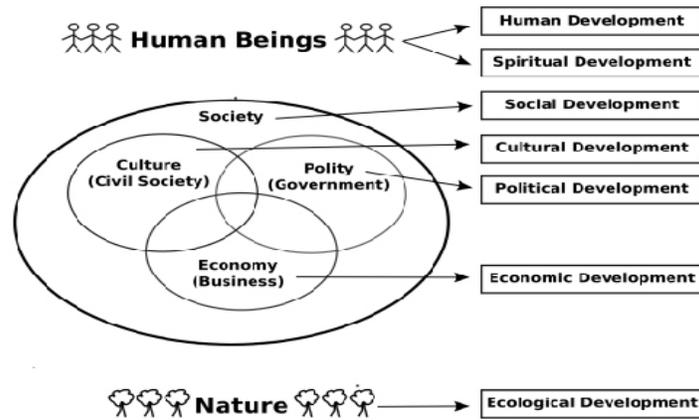


Figure 2. *Agenda 21: Philippine Sustainable Development (SD) profile, adapted from Over Seas, 2001.*

Agenda 21 is a consensus-based SD plan developed at the 1992 UN Conference on Environment and Development. Subsequently, the Philippines developed a national holistic version (Over Seas, 2001) with seven dimensions (Figure 2). The RP Local Government Code of (1991) implies that local government units (LGUs) should prepare their own

Agenda 21. However significant marine limitations include deficiencies in both local staff expertise and budgets. The connection between the national Agenda 21 and LGUs remains problematic, particularly for fisherfolk communities.

The Philippines depends both upon marine resources and poverty stricken fisherfolk themselves for protein. However, there is no financial/academic system in place to provide marine-mandated local government units (LGUs) with expertise. As a transition economy, the Philippines are increasingly required to place emphasis upon in-country funding and improved LGU knowledge transfer systems. Restructuring of budget allocations is currently a significant and ongoing process in the Philippines; challenged by the complex governance system (Bass, Dalal-Clayton, & Pretty, 1995).

The Philippines is divided into 17 Administrative Regions; 80 provinces, 1500 municipalities, and the smallest LGUs consisting of 40,000 *barangays*. *Barangays* are characterized by strong similarities between people through genetics, livelihoods and culture. The Philippines is renowned for an ability to focus on local relief efforts following in-country calamities; typhoons, landslides etc. In 2012, the Philippines even made significant contributions to hurricane Sandy relief in the U.S. However, LGUs have limited expertise to manage their marine resources mandates extending seaward 15km. The 90+ million Filipino people are dependent upon fisherfolk providing an annual 3 billion kg of marine fish for protein. Filipinos consume an average of 36kg/person/year of marine fish; the highest rate for large SE Asia countries (Silvestre, & Pauly, 2004). The country is arguably the most coastal dependent in the world, with a coastline to land mass ratio exceeding 120m/km² and over 80% of the country's provinces having coastline.

A Public Participation (PP) Approach to the Philippine Coastal Challenge

Philippine heritage and geography pivot around the isolation of coastal *barangays*; an isolation that sometimes extends to the larger local government units (LGUs), regions and even national organizations. When the first people arrived in boats they are thought to have remained locally independent, perhaps due to the abundance of natural resources. This initial isolation is sometimes echoed by a lack of collaboration between different agencies and jurisdictions; although goals are linked. Municipalities have the strongest LGU mandate, coordinated by 80 provinces; but the *barangays* represent the participatory imperative. Philippine families are focused on *kapwa* or relationships (Jocano, 1999), based upon *pakikipagkapwa* or cooperation, when extended to communities, or; *bayanihan* for companionship and mutual aid. There is a need to build formal and informal and institutions that encompass these positive cultural traits. This can be accomplished by nurturing the development of local communities of practice as described for other settings (Theodorakopoulos, Perciado, & Bennett, 2012). The recent AR cycle considered this challenge by looking at local and particularly national legal instruments that support need to be developed.

Republic of the Philippines (RP) legislation requires that inter-jurisdictional considerations and professional actions be integrated through the local government code (Republic of the Philippines, 1991). Coastal municipalities have an additional marine resource mandate out

to 15 km, but also share larger ecosystems with multiple jurisdictions. In theory this would be best organized by bioregions through spatial planning (Douvere, & Ehler, 2009; Ehler, & Douvere, 2009; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2009). The Philippines made extensive commitments to marine spatial planning through the Convention on Biological Diversity at the Nagoya, Japan UNEP meetings with a declaration dated, October 29, 2010. In general, SE Asia has been slow to initiate spatial planning, perhaps due to communication and coordination challenges for isolated fishing communities. Effective PP strategies may be critical to the future wellbeing of coastal communities in the Philippines and resultant models may be of use elsewhere in SE Asia.

One approach to these challenges is through an Ecohealth (www.ecohealth.net) transdisciplinary lens, focused upon the linkage between human and environmental health. Ecohealth is a rapidly growing approach within an ethnoecology context; focused on the nexus between human and environmental health. Transdisciplinarity evolved from Action Research paradigms (Lewin, 1948; Reason, & Bradbury, 2008) where researchers work towards consensus-based collaborative goals. Comparatively, Philippine marine education programs emerged from western models of expertise, thus primarily providing competent scientists for international communication, not graduates to meet the development needs for LGU mandates, nor reflexive strategies. Progress on coastal and marine programs can best be pursued and measured by incremental action research project cycles. This represents a culturally acceptable approach for *evaluation* and *analysis* as part of an iterative process. Applying AR cycles through ecohealth allows for *evaluation* and modification of PP strategies focused on the marine SD need.

In general, iterative AR cycles can promote movement from what Rosener (1978) considers a disparity in knowledge and consensus on goals. The current work involves the development of a bioregional conscience through local PP *evaluation* matrices (Rosener, 1978) balancing social, environmental and economic considerations (Fung, 2006). Specific expertise inclusion should perhaps encompass: aspects of governance, ecological capacity, technology development, education, public engagement and international exchange. Dwindling international support to the Philippines places emphasis upon in-country partnerships combined with a strengthening of academe. Local review of specific goals, perhaps within a participatory evaluation process as suggested by Rosener (1978) could be considered, but counterparts external to the communities are required. Many coastal advances emerge from strengthening paraprofessional networks associated with MPAs (Anabieza et al., 2010) into a community of practice.

In addition, we suggest establishing targeted tertiary education actions, research, extensions, and; reflexive marine training for LGU employment (Watts, Macose, Angara, & Pajaro, 2010). Process within participatory goals is critical for resource-based economies (Irvin & Stansbury, 2004; Reed, 2008) and in the Philippines requires systematic interventions. Philippine protocol requires a system of *courtesy calls*, briefing the provincial governor prior to proceeding to the municipalities for similar meetings with mayors and then the Barangay Captains. This can take months, repeated visits and requires renewal after elections. To skip this first step will often result in polite non-engagement of

LGU staff and no further endorsement to work with the barangay-based fisherfolk. Currently, the Philippine discipline of Development Communication is being adapted to meet the goals for this approach (Pajaro et al., 2013b). For cultural success, we suggest a rotating, strategic leadership based upon an iterative integration of situational forces and activities (Murphy, 1941). Fisherfolk, provinces, municipalities, barangays and academe can all share leadership based upon a complex goal and common agendas. Established relationships, e.g. through the PAMANA fisherfolk alliance allow direct community/sector engagement. The need for the courtesy-call process is delayed however, not removed. If there are significant advancements, courtesy calls need to occur or elected officials may perceive that they have been avoided for political reasons. Good relationships are critical in the Philippines, as repairing a perceived slight can be insurmountable. Sequential and rotating leadership on a shared agenda may be a way of avoiding blocks in PP that can often result from what Arnstein (1969) refers to as *attempts to redistribute power*. In the current work this is being attempted by empowering impoverished fisherfolk communities. Further, it is best to secure even minimal counterparts from the provinces, municipalities and barangays to promote these partnership progressions.

Effective PP can, and arguably should be measured through accomplishments by and for the citizenry. Arnstein (1969) initially considered citizen control as the primary PP goal, ranking partnership with authorities third; somewhat ignoring technical leadership and educational needs (Reed, 2008). Choguill (1996) proposed that partnerships in PP for lower income countries are of a higher value than had been previously considered. In the current work, researchers have focused on working in partnership with all stakeholders to establish and meet goals through collaboration. Doubts have been raised in Indonesia (Perdana, Matakos, & Radin, 2006) and Uganda (Golooba-Mutebi, 2004) regarding assumptions and effectiveness of PP. The call for more in depth critical socio-economic analysis of PP (Cleaver, 1999) should be widely and regularly repeated in the Philippine setting. The current work facilitated subsidiarity and a decision making process appropriate for local needs (Irvin, & Stansbury, 2004; Reed, 2008).

NORTHERN PHILIPPINE SEA: PROJECT ACTION CYCLE 2011-2013

Plans within the 2011-2013 Action Research Cycle

The *plans* for this intervention were both unique and at a large scale for the Philippines. The approach considered both the isolated nature of the communities and provinces as well as the objectives. These objectives were however based upon realistic *planning* that took into consideration the international support available for ecohealth and ethnoecology as well as applied participatory paradigms, established academe disciplines and national considerations; as discussed above.

Action Research Objectives 2011-2013:

- 1) Complete development of a curriculum outline for national and SUC review; identifying courses that would require participatory LGU input.
- 2) Initiate LGU needs assessment across 10 NPS provinces and develop a Municipal prototype for action.
- 3) Initiate participatory curriculum development with stakeholders.

- 4) Assess further funding partnerships needs and initiate processes.
- 5) Establish an approach to a jurisdictional communication strategy.
- 6) Draft a reflexive Republic Act for consideration by elected officials.
- 7) Assess jurisdictional programmatic use of marine data.
- 8) Assess budget required for full development: B. Marine Sc. Program.
- 9) Solidify Aurora Ecohealth partnership with Department of Health.
- 10) Solicit letters of endorsement from potential lead partners in developing the NPS Bioregional program.

Promoting the Bioregional Paradigm: Action, Review and Evaluation

The work *done* included a minimum of two working meetings for each of 20 potential partners across the NPS; 10 provinces and their designated SUC. Travel was by bus, jeepney and motorcycle driven tricycles. Many of the locations required several days to reach. Although all provinces have internet, email use was found to be inconsistent, landline telephones generally non-existent and no established provincial or SUC protocols for answering cell phones. Thus, often the work meant arriving at a SUC or government office on speculation and attempting to schedule a future visit based upon face-to-face contact with staff. Courtesy calls to the Governors often required in person scheduling, multiple visits and in one case remained problematic after four trips. The initiative covered 8 months of fieldwork involving three staff members, with wages accounting for half the budget. By request, needs assessment/best practice transfer down to the municipal level was initiated for three provinces as part of the program endorsement process. From the outset, provincial offices requested their SUCs to share leadership; thus defining a collaborative approach. The Bachelor Marine Science program concept evolved and was eventually defined by plans for students to study at their home institution for both the first year as well as for research-oriented courses in later years.

Given the strong coastal mandate of municipalities, the current initiative also focused on one prototype. The Aurora Province municipality of San Luis was given intensive attention to develop a framework for comprehensive coastal management. The four isolated barangays of this municipality were engaged in a development process focused specifically on existing challenges and enhanced leadership by women (Pajaro, Raquino, Tangson, Tiburcio, Valenzuela, & Watts, 2013a). As part of that initiative; the development of a Municipal-wide approach to coastal science included four grade-level symposia held at the inland San Luis National High School. Survey results of participants were further considered in terms of cultural consensus (Romney, Weller, & Batchelder, 1986). The quantitative cultural consensus approach could be one way of overcoming, the perception that AR is not a rigorous science (MacDonald, 2012). Eight hundred survey responses previously reported (Pajaro et al., 2013a) were further analyzed using factor analysis (Rummel, 1970). The results indicated by student consensus that the symposia were successful in helping students link science to daily life.

Communication Leadership Evaluation: Colleges and Universities

The 2011-2013 AR cycle included a systematic *evaluation* of the regional State Universities and Colleges (SUCs), both individually and as a group. Compared to other least developed

countries, the Philippines have a relatively high attendance rate for tertiary education at 30% of the population. The SUCs all aspire to quality roles in teaching, research and extensions, yet desired institutional strengthening marine management (Silvestre, & Pauly, 2004) remains problematic. The current work found the SUCs best positioned for action on the Northern Philippine Sea (NPS). Education renewal and culturally based social-networks have also been previously considered significant for PP (Rosener, 1978). The sometimes hidden environmental imperative within sustainable community development is critical for fisherfolk and would perhaps be best led by SUCs for the NPS. Marine development programs might best be supported by SUCs developing a secretarial/research coordination function based upon their existing information technology (IT) strengths. There is a need for SUCs to not only teach the use of computers, but also to lead on providing computer-based extension services, as suggested generally (Timmis, Joubert, Manuel, & Barnes, 2010). The development of such roles may require considerable facilitation from outside the institutions to help refocus tertiary education mission, vision and responsibilities.

In addition, resolving the LGU need for expertise to meet coastal mandates appears dependent upon new undergraduate marine science programming. The SUCs have a combined mandate of teaching, research and extensions that is optimal for responding to coastal knowledge transfer needs and were targeted by each provincial government for leadership on the current initiative. This requires an overall leadership role based upon process (Murphy, 1941), also representing the global need for a shift in a tertiary education focus from management towards more holistic leadership that includes innovation, as suggested for other settings (O'Brien, 2012). However, funds are not built into the system for reflexive program development, as for the current proposed Bachelor Marine Science (Watts et al., 2010). Developing bioregional programs (including fund raising, needs assessment, program design etc.) will in part depend upon the activities of non-government organizations (NGOs) and committed individuals, until reflexive programs are operational.

The coastal SUC role needs to also involve fisherfolk and fisherfolk leaders as they provide a unique opportunity for the integration of social and marine ecological systems. Capturing TEK is as important as disseminating national and international knowledge; together they represent a culturally relevant AR approach that encompasses the needs, aspirations and national contribution of the fisherfolk themselves. However, national funding systems for SUC extension programs are specifically focused on the dissemination of agricultural technologies; not marine management. New programs to train both fisherfolk and marine scientists are needed to both facilitate participatory resource management and social-process through paraprofessional networks.

Scaling-up for Biodiversity and Better Communities

The 2012-2013 intervention included a *review* of the needs and approaches associated with scaling-up ecologically. Individual Philippine fisherfolk protect the seas and the future of the people, sometimes quite heroically and even leading to fatalities. The formation of organizations is one way of scaling up these local activities over larger areas (Watts et al.,

2010). However, the Philippine needs regarding the scaling-up of marine management approaches are large (Christie, Fluharty, White, Eisma-Osoria, & Jatulan, 2007) and involve the crisscrossing of political and jurisdictional considerations to forge more progressive and ecologically programmatic approaches.

One 2011-2013 objective was to encourage further engagement of elected officials to sponsor marine bioregional science capacity at the LGU level. Ong, Afuang and Rosell-Ambal (2002) established the 6 Philippine marine bioregions and identified 44 specific biodiversity conservation priorities along the NPS. Particularly for politicians in less developed settings, it is important to consider the economics of any action and thus helpful to put fisheries in that perspective. As part of our collaborative *evaluation* with the LGUs we compared individual provincial incomes to the economic impact of marine fisheries to help the jurisdictional leaders to see the value of supporting sector development. Considering landed fish value statistics (<http://countrystat.bas.gov.ph>) and calculating economic impact from an Asia determined multiplier (Dyck, & Sumaila, 2010); collaborative *evaluation* and *analysis* indicated that the provinces visited have marine fisheries that generate an economic impact as much as 10 times that of the entire provincial government income. However, considering for example Aurora Province; the LGUs together (province, municipalities and barangays) have perhaps 2000 employees. None of these employees have advanced training in marine science, a situation generally repeated throughout the NPS and the country. However, based upon long-term trust relationships in Aurora the common goal of better communities led to the quick establishment of a strategic partnership with Aurora health.

A related challenge of quantitative analysis is to bring statistics to the LGU level and to get agreement on what statistics will be used for programmatic development, as theoretically suggested by Rosener (1978). In part this process should encompass political parties and elected representatives as suggested for Philippine development (Hutchcroft & Rocamora, 2003). Considering poverty alleviation, the NPS coastal communities are particularly challenged. Fishing is the primary, if not the only source of income for many Pacific Seaboard (NPS and Southern Philippine Sea) fisherfolk, more so than elsewhere in the Philippines (Samson, & Licuanan, 2002). Further, Philippine fisherfolk are generally considered to be the poorest Philippines sector, with poverty rates perhaps double the national average and reaching 60% (Israel, 2004).

Livelihoods and economies across the NPS are significantly dependent upon tuna, species with a range extending over 1500km across the bioregion and into international waters (Schaeffer, Fuller, & Block, 2007). However, the Philippine Pacific Seaboard has a lower tuna catch than other countries more central to this tuna fishery (Hampton, 2000) and there is concern about the collapse of these Pacific Ocean food chains (Sibert, Hampton, Kleiber, Maunder, 2006). Future sustainability and improvement of the fisherfolk communities along the NPS may depend upon scaling-up collaborative discussions on harvest partitioning for international consideration. Currently, the NPS does not have a voice in discussing the future of Pacific tuna fisheries, although many provinces are significantly dependent upon the resources. The Philippines has been recognized as the

global hotspot for marine biodiversity conservation (Carpenter, & Springer, 2005) however, in general past funding has focused more on the taxonomic than the systems aspect of biodiversity. The establishment of bioregions (Ong et al., 2002) is only a starting point for Philippine marine spatial planning commitments made under the convention for biodiversity conservation.

A program that is useful across the NPS or any bioregion must build a consensus that incorporates local needs and agendas. For example, one NPS province, Isabela, has a long coastline with little marine fisheries activity nor much economic activity of any kind; while nearby Cagayan Province has a similar length of coastline, yet a huge coastal economy. One province is looking to develop from almost nothing, while others have different LGU needs based upon established ongoing activities. A collaborative approach that considers and respects jurisdictional mandates and desires is required to best share the biodiversity resources through what Rosener (1978) would call a common understanding. The proposed Bachelor of Marine Science program for this bioregion balances courses in marine science, governance and participatory development (Watts et al., 2010) through province-by province participatory curriculum inputs. Recent additions to the curriculum have included a strengthening of the physics requirements leading into oceanography and a systematic consideration of mathematics as a component of marine spatial planning courses. Further, a skills-based adult education program has been designed that would allow fisherfolk to ladder into the program up to the second year diploma level based upon oral testing.

Evaluating the need for specific legal instruments, a draft Republic Act was created that builds off of the Fisheries Act (Republic of the Philippines, 1998), providing coastal LGUs with the responsibility to designate 1-2% of their development fund to hiring marine science staff trained to work on marine biodiversity/management considerations within communities. The draft suggests a system for establishing both marine expertise and related jobs and proposes co-ordination through the national marine centre of excellence: the University of the Philippines Marine Science Institute. Of note, the development fund represents 20% of the internal revenue allocation or about 15-18% of the LGU incomes. The draft Republic Act was circulated to two congress representatives and the next steps may include working with specific legislative committees to build consensus. The *evaluation* of statistical use found a critical need for common databases. In general, programmatic LGU use of marine data was found to be negligible.

The 2011-2013 Action Research Cycle: Analysis

The *analysis* of the 2011-2013 AR cycle was focused on identifying problems and opportunities that emerged from pursuit of the objectives listed above. Participation functionality, as outlined by Rosener, (1978) is focused herein on the optimal goal of having - (A) complete knowledge on the cause/effect relationship within a participation coastal strategy for the achievement of specific goals and (B) agreement on coastal program goals and objectives. In the current work it was *analysis* indicated that this could be best accomplished through a monitoring and participation evaluation matrix (Rosener, 1978) central to all parts of the AR cycle (Figure 1). Future AR cycle objectives could

include proposing this be coordinated by municipalities locally and across the bioregion through SUCs. Unlike Barangays, the infrastructure of municipalities usually includes internet capacity and college-trained staff.

The detailed Bachelor Marine Science curriculum outline that was created included a syllabus for each course. The prescriptive content for the curriculum could best emerge from further in-depth and local needs assessment. Development of a full curriculum outline was requested by several agencies at the outset of interaction. Often this occurred at the same time as the same agencies outlined a (somewhat conflicting) desire for a locally-driven context. A challenge and opportunity that emerged from the current *analysis* was through the realization that there is a need for buy-in regarding process. A marine needs assessment had not previously been initiated nor participatory curriculum developed. However, some felt that there should be a relevant program that could be quickly 'plugged in'.

The need for quality, dependable communication required to reach common goals was underestimated by many potential partners. However, some individuals including Governors and University Presidents realized that the process in itself was a significant pathway to community improvement. Some individuals clearly understood that facilitation would require in-depth assessment through further detailed communication. The SUC computer teaching programs have the technical potential to coordinate many levels of internet communication.

Programmatic consideration to protocols and patterns of use in digital communication has been considered one requirement for collaborative partnerships and transformation practices involving higher education (Timmis et al., 2010).

Projecting into the next related AR cycle, we have begun to investigate the potential of a partnership linkage through the new Philippine Telehealth program. This potential may require significant external encouragement to embrace role changes within SUC staff and perhaps the Telehealth program itself. The primary needs assessment revealed that the other provinces of the NPS are less developed in terms of marine science research infrastructure, when compared to Aurora Province. However, the five SUC universities all have infrastructure and other non-marine programs that appear more advanced than those in the NPS Colleges. These results indicate that complimentary coordination/leadership roles for both one lead university and one lead college could be appropriate.

In many places the approach needs to be considerate of the rights associated with indigenous peoples (Republic of the Philippines, 1997). In the Province of Batanes, for example, all residents are recognized as indigenous *Ivatan* and a province-wide approach to traditional TEK is also required. Clearly, initiating the LGU needs assessment across the NPS requires a unique approach for each province, yet based upon a shared resource. The initiation of participatory curriculum development with stakeholders needs to involve the fisherfolk directly, particularly considering their contribution to local economies as

detailed above. However the process needs to systematically proceed through the jurisdiction levels first, before justifiably working with the barangay-based fisherfolk.

Projecting into the next AR cycle included consideration of the need for fisherfolk to have exchange between themselves and involving both jurisdictional and academic agencies. A new funding partnership was pursued leading to a 3 year USAID partnership titled: *Pathways for Indigenous Knowledge Engagement on Marine Biodiversity Conservation*. National (US) Science Foundation researchers working on education psychology and development are collaborating to help define optimal knowledge exchange strategies that maximize community improvement and related curriculum. The cultural consensus model (Romney et al., 1986) is being used to assist to capture TEK, help define reflexive curriculum as well as to measure cultural shifts in high school students perspectives, as discussed above. Significantly, this bottom-up fisherfolk approach is intended to balance the previous top-down design of the 2011-2013 AR cycle (Pajaro et al., 2013b).

The proposed new degree program that was advanced by the 2011-2013 AR cycle is focused on servicing the extensive LGU needs in marine science. The approach embraces the perspective that cultural transformation will not be defined by shared rules or norms but rather through an exchange involving many people considering significant complexities, inclusive of environmental interaction (Atran, Medin, & Ross, 2005).

Analysis of the situational requirements across the NPS allowed for a concrete consideration of the costs associated with full program development, which was a primary objective. Given the experience of the 2011-2013 action cycle, the required budget for full program development has been estimated at about \$64,000 US (P2.6 Million), including about one million for a conference and related publication to formalize the program. The equipping of an operational spatial planning laboratory in partnership with the National Mapping and Resource Information Authority (NAMRIA) was estimated at \$225,000 US (P10 Million). The cost for operation of the full four year program and province specific scholarships have yet to be calculated. Program operation costs would in part be dependent upon the counterparts provided by the partner SUCs. All 20 potential lead partners across the NPS (10 provincial governments and 10 SUCs) indicated support for the program. However, some ongoing challenges are: further details required for program review by SUC academic councils, and; inability to schedule courtesy visit with provincial leaders. As a result, only 16 of the possible 20 partners provided formal (written) endorsement for the development of the program, prior to the end of the active 2011-2013 project action cycle.

CONCLUSIONS

The project met the objectives set out in the *planning* process. Programmatic conclusions from the 2011-2013 AR cycle can be broken down into the following categories: community-based need for knowledge transfer systems; potential for shared leadership; marine management needs at the bioregional level; leadership requirements; and areas of partnership focus and program financing. Finally the paper perhaps provides some models for the development of early-career pathways for academics focused on sustainable

development and global equity. The programmatic conclusions are imbedded in the text above but are summarized below:

- 1) Coastal Philippine fisherfolk communities desperately need enhanced knowledge transfer systems to build capacity for dealing with challenges.
- 2) Leadership roles could best be shared; based upon collaboration between, fisherfolk, politicians, LGUs and academe.
- 3) There is a significant need for partnership focus on bioregional marine management. The current situation leaves under-serviced a fisheries mandate and economic outputs that arguably represent the potential for the complete collapse of the Philippine economy.
- 4) Bioregional marine development approaches represent an optimal investment possibility for future Philippine sustainable development goals.
- 5) The overall high level of Philippine focus on education could provide a framework for marine-related change through partnerships that include possible refocusing within educational systems.
- 6) The need for program funding appears to be negligible when compared to the significance of the coastal fisheries sector for the NPS provinces.

Finally, desire and passion to make the world a better place has been historically attributed to youth. However young-careerists focused upon sustainable development and global equity face a daunting set of challenges before they even have a chance to apply their skills, tenacity and energy. The current work demonstrates several periods of two careers where AR design was used to move towards specific large goals. These AR designs were integrated with thesis activities, volunteerism and personal relocation, uncharted personal and situational change. The global future may well depend upon their perseverance towards SD and global equity goals.

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