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## Key findings from a multidisciplinary examination of integrated coastal management process sustainability

Patrick Christie\*, Kem Lowry, Alan T. White, Enrique G. Oracion, Leila Sievanen, Robert S. Pomeroy, Richard B. Pollnac, Jason M. Patlis, Rose-Liza V. Eisma

*School of Marine Affairs and Henry M. Jackson School of International Studies,  
University of Washington, 3707 Brooklyn Avenue NE, Seattle, WA 98105, USA*

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### Abstract

This article synthesizes findings presented in this theme issue from a multidisciplinary research project on factors influencing integrated coastal management (ICM) process sustainability. The generation of social and environmental benefits that are equitably distributed among constituencies is a key factor in ICM process sustainability. Participatory processes, while challenging to manage and under growing scrutiny, remain the most effective manner to engage broad constituencies and ensure that benefits match expectations. The scaling up of many local initiatives in the Philippines and Indonesia is well underway and warrants ongoing support and monitoring. Attention must be paid to legal and institutional frameworks that support integrative planning on local and national scales. Impartial and rigorous research on ICM is offered as a way to support these changes and to assess future challenges and emerging management models. While frequently a volatile process, the authors conclude by affirming their commitment to ICM as a potent and balanced planning process. © 2005 Elsevier Ltd. All rights reserved.

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\*Corresponding author. Tel.: +1 206 685 6661; fax: +1 206 543 1417.  
E-mail address: [patrickc@u.washington.edu](mailto:patrickc@u.washington.edu) (P. Christie).

Integrated coastal management (ICM) is a multifaceted undertaking tailored to specific objectives and contexts. ICM has multiple definitions that represent distinct perspectives and focus. At the general level,

ICM is a process by which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources and space. The process is designed to overcome the fragmentation inherent in single-sector management approaches (fishing operations, oil and gas development, etc.), in the splits in jurisdiction among different levels of government, and in the land–water interface. [1, p. 1].

A commonly cited alternative definition has a distinct developing world perspective:

ICM is a broad and dynamic process that . . . requires the active and sustained involvement of the interested public and many stakeholders with interests in how coastal resources are allocated and conflicts are mediated. The ICM process provides a means by which concerns at local, regional and national levels are discussed and future directions are negotiated. [2, p. 66].

Lastly, in the Philippines, ICM is defined in the following manner:

ICM comprises those activities that achieve sustainable use and management of economically and ecologically valuable resources in coastal areas that consider interaction among and within resource systems as well as interaction between humans and their environment. [3, Guidebook 1, p. 24].

These definitions, while consistent in their suggestions of integration and multi-sectoralism, are distinct in their relative emphasis on rational planning, resource allocation, and conflict mediation. We suggest that in the context of the Philippines and Indonesia—our research project’s focal countries—the colonial history, low formal institutional capacities partly due to chronic fiscal crises [4], weak faith in the rule of law and systemic weaknesses in legal systems [5,6], high incidence of poverty, and the high and direct reliance of coastal inhabitants on coastal resources [7] tend to elevate the importance of an ICM based on participatory and conflict resolution processes. As highlighted in the introductory article to this theme issue [8], ICM is a management model that has garnered considerable financial and institutional support.

We have, over 3 years of field research, explored the factors that influence the sustainability of ICM planning processes over time, especially beyond the influence of external financial and technical assistance. Early in this research endeavor we came to define ICM sustainability in the following manner:

A sustainable ICM process is one that supports sustainable coastal resource use beyond the termination of an ICM project. It is adaptive and multi-sectoral as appropriate and is supported by a stable source of financial and technical resources.

Examining ICM process sustainability allowed for a multifaceted, but manageable, evaluation of ICM, a topic that concerns a wide array of people. The approach of

focusing on one, relatively uncontroversial matter, allowed the researchers to explore other, sometimes controversial, associated issues as diverse as institutional design, inter-constituency group dynamics, conflict, enforcement regimes, and the role of science in planning.

We believe that constructive scrutiny is appropriate and helps ensure that ICM will continue to adapt and mature. While both practitioners and donors evaluate ICM projects, there is considerable room for external, objective, comparative assessments of long-term processes over time. There have been few, multinational, multidisciplinary, comparative, empirical evaluative research projects focused on ICM. Those that have been conducted [9], while valuable, did not employ detailed, multidisciplinary field research. In short, the ICMSRP was a unique endeavor representing an ambitious effort to evaluate the ICM model and one of the most frequent barriers to its success—the lack of long-term sustainability—which, in turn, led to a consideration of a broad suite of associated topics.

We chose to pursue this investigation in the Philippines and Indonesia for various reasons. These are challenging contexts at the center of marine and coastal biodiversity with several decades of ICM experience. Historical colonialism—resulting in weak institutions, lack of government institution accountability, cynicism toward government agencies, debt, and poverty [4]—inhibit the institutionalization of ICM. Using the Philippines as an example, indicators of social and environmental well being have worsened at a national scale since the initiation of our research effort in 2001. Fisheries catch-per-unit-effort is declining in most places [7,10]. Coral reefs, mangroves, and water quality are being degraded in many locations [11–13]. The rising national Gini Index, now at 48 out of 100 and one of the highest in the world, indicates that wealth is becoming increasingly concentrated in fewer hands. Poverty, now directly affecting about 40% of the Filipino populace, continues to rise. Increasing pressures on the environment are coming to bear—partly due to increased population growth (at approximately 86 million people in a country roughly the size of Arizona and increasing at 2.2% annually), but also resulting from pressures to export valuable natural resources to service external debt (58 billion USD or 3.8 times the annual national budget). Conditions in Indonesia are equally challenging. The Indonesian population of approximately 238 million is growing at an annual rate of 1.49% and approximately 27% live under the poverty threshold. The Gini Index was 37 in 2001 and external debt was at approximately \$135.7 billion in 2003 (or 3 times the annual national budget) [14].

While conditions worsen and ICM is rarely self-sustaining, we feel it important to express our overall support for the ICM model and the role of evaluative research. The general lack of ICM process sustainability does not, in our opinion, indicate the failure of this management model or suggest that divestment is an appropriate policy response. Rather, we believe it suggests that commitment by national and international entities to ICM in these locations is often sporadic, that contexts are challenging, and that ICM project design could be improved. Complex causal webs underlying each proximal reason for ICM collapse. Critiques of ICM as ignoring social justice considerations [15], while serving as important reminders of the danger of blind faith in any model, are neither adequately grounded in broad under-

standings of context and the multiple objectives of ICM, nor are they constructive. Many Filipino and Indonesian practitioners view ICM as part of their long-term engagements in social movements to improve the lives of the most marginalized coastal inhabitants who rely on coastal resources and suffer due to environment-damaging practices. Our research demonstrates that participative, rewarding, and just ICM processes, conducted in a supportive legal-institutional context, are capable of improving environmental conditions while maintaining services to society. ICM represents an appropriate middle ground between those advocating mainly for social and economic justice and those advocating mainly for environmental preservation.

A local constituency for ICM seems to be forming in these countries. Surveys demonstrate that a growing number of leaders, scientists, and citizens of the Philippines and Indonesia recognize the critical importance of sustainable resource use and multi-sectoral planning [16,17]. The new Ministry of Marine Affairs in Indonesia and the Coastal and Marine Management Office (CMMO) (within the Philippine Department of Environment and Natural Resources) demonstrate a national commitment to ICM and integrated planning. This commitment is likely to grow as food security becomes increasingly critical and other coastal dependent sectors such as tourism grow [18]. Tragedies such as the December 2004 landslides in deforested coastal mountains of Luzon resulting in more than 3000 deaths and the 26 December Indian Ocean tsunami vividly demonstrate how human communities become increasingly vulnerable through environmental degradation (see [www.coast-almanagement.com](http://www.coast-almanagement.com)).

ICM functions at the difficult interface of development and environmental management. Despite growing interest in sustainable resource use, complex problems such as overfishing and deforestation continue to expand in the region. These tragedies and dwindling resources remind everyone that a great deal of work lies ahead to improve the lives of coastal inhabitants, while maintaining functional and biodiverse coastal and marine habitats. We suggest that there is a need for a renewed, and expanded, long-term commitment to ICM, and other forms of long-term planning and environmental management. With the current state of developing world economies, the financial commitment will need to come primarily, but not exclusively, from developed world donors and citizens who value the existence of these environments and the communities who reside there. If long-term commitment to ICM and environmental management is the target, this assistance must be carefully implemented by the cooperative efforts of national governments, NGOs, and civil society who have growing experience with ICM.

## **1. Meeting research implementation and technical assistance goals**

The ICM Sustainability Research Project had three main goals—to conduct multidisciplinary applied research, to advise ICM projects/organizations, and to train people in multidisciplinary evaluative research. An important first conclusion is that complex, multidisciplinary research conducted by academics and ICM practitioners from a variety of disciplinary, epistemological, and cultural back-

grounds is possible, fruitful, and dynamic. Valuable mentoring relationships were formed that were challenging, productive, and capitalized on long-term subject engagement and fresh perspectives.

Providing technical advice to ongoing ICM efforts proved to be a greater challenge. To begin with, there is little precedence for such interactions between ICM researchers and practitioners. Providing timely and adequate advice to practitioner organizations was difficult partly due to mistiming of the ICMSRP and partner ICM project implementation schedules, emphasis by academic incentive structures on written production over in-the-field training, and a lack of compelling incentives for ICM programs to incorporate findings into action. Some practitioners may feel that most findings were apparent. Others may be disappointed that it is impossible to identify a simple menu of actions or policy prescriptions that will ensure ICM success and sustainability in most contexts. Nonetheless, we are confident that if ICM programs and governments adopt our empirically-grounded findings and recommendations, that the sustainability of ICM processes will increase. Despite these shortcomings or unrealistic expectations, requests for educational materials that include concrete suggestions have been strong [19]. Effective adoption of our recommendations will require that practitioners and policy makers use these findings and educational products to begin a process of self-reflection and internal program assessment. Critical findings derived from the ICMSRP's research activities have already provided useful guidance to ICM design and implementation processes within the Philippines and Indonesia [20], and are likely relevant to other tropical contexts. We hope that this theme issue represents a useful contribution toward fostering a learning agenda for ICM and we suggest that future collaboration between academics and practitioners should be vigorously pursued and supported.

Following the suggestion of Sneddon et al. [21], we are committed to representing the multiple methodological and epistemological positions of the various researchers and practitioners involved in this effort. Therefore, rather than force analyses into a common framework we summarize and synthesize findings within the following major categories relevant to ICM program design—effectively managing ICM-derived outcomes, reaffirming participatory management, integration in difficult contexts, long-term commitment as essential to success and sustainability, and continuing the evaluative and adaptive process. We frequently return to the central questions that framed our inquiry: How is ICM crafted to respond to complex and challenging contexts? What factors tend to support and undermine sustained planning processes? How is ICM functioning on multiple scales to address large socio-economic and ecological processes without derailing critical local engagement? How to improve the craft of ICM and the skill of its practitioners? How should ICM be supported with technical and financial assistance to help ensure success without creating unsustainable dependencies? This synthetic article reflects the overall design of this research project [8] and collection of papers by identifying important themes constant across Philippines and Indonesia contexts, but draws to a greater extent from research in the Philippines.

## 2. Improving ICM project design to foster sustainability

### 2.1. *Effectively managing ICM-derived outcomes*

Considerable environmental improvements have been realized through ICM, and associated marine protected areas, in particular locales (e.g., Batangas, Philippines and Bunaken National Park, Indonesia) [22]. Certainly, as demonstrated by declining coral reef conditions in some ICM sites, improvements are not guaranteed and consistent commitment is required [23].

Our empirically grounded findings add certainty to the principle that the improvement of economic and environmental conditions fosters ICM success and sustainability. Research in nine sites in two countries demonstrates a direct link between perceived economic improvement and ICM process sustainability [24]. Pollnac and Pomeroy [25] make it clear that early involvement and participation in ICM are influenced by initial project benefits and perceptions of benefits. This involvement enhances the chances that ultimate benefits will be those desired by the target population. Also, achievement of these benefits stimulates continuing involvement in the activities, sustaining the ICM process. It is important to emphasize that their findings indicate that it takes both community involvement and achievement of desired benefits to impact ICM sustainability.

Equally important is the complex process by which benefits are realized and shared within and between constituency groups. Potentially contentious relations between fishing communities and tourism operations [26,27] or interactions between ICM-related livelihood schemes and fisheries [28] are explored and warrant more attention. The uncritical assumption that benefits will be equitably shared among multiple stakeholder groups—despite considerable power differentials and interests—deserves skeptical review [26,29]. Initially successful management processes are undermined in the absence of robust institutions to ensure equitable distribution of benefits and conflict resolution mechanisms to resolve inevitable tensions. Such dynamics are compounded when project engagements are short. These findings were derived independently by three research teams within the ICMSRP using multiple research methods applied to distinct social groups in both Philippine and Indonesia study sites [25,26,29]. A growing body of independent research supports these conclusions [30]. Poorly managed conflict can result in further marginalization of resource user groups, cynicism regarding resource management, and, eventually, declining environmental conditions [31].

While requiring greater investigation, the links between environmental improvement and motivation to support ICM appears to be strong for self-described environmentalists and coastal-dependent business owners (e.g., dive tourism brokers) [26,32,33]. Most coastal inhabitants expect environmental improvement through ICM, especially as manifested in increased and sustained fish yields and the meeting of basic needs [33]. Interestingly, resource user perceptions of environmental conditions do not always correlate with direct field observations, thus suggesting that both need to be measured [22]. Perceptions, while sometimes dismissed as

ungrounded and inconsequential, underpin actions by donors, decision makers, and resource users.

## 2.2. *Reaffirming participatory management*

These conclusions highlight the importance of participatory management processes. While preparing this theme issue, the perennial debate is once again heating up between proponents of participatory integrated models aimed to meet social and environmental goals on relatively small scales, with those advocating large-scale interventions aimed principally at biodiversity conservation [34–36]. Our research has direct bearing on this important debate. While community-based and local government-led management regimes are frequently far from ideal from an ecological perspective, they remain a critically important approach considering the socio-economic and institutional conditions in Southeast Asia.

While criticism of community-based approaches is common, we suggest that critics respond to the following difficult questions. What are viable and tested alternative models in the developing country context? And what institutional structures are in place to support large-scale interventions? We suggest that the crisis of declining biodiversity does not provide a clear justification for turning our backs on participatory, community-based models in favor of large-scale protected areas managed under command and control, enforcement-heavy models [36]. In addition to important ethical matters, pragmatic dimensions should also be considered. While command and control conservation models may result in rapid progress toward predetermined goals and initial improvements in environmental conditions if effectively implemented, our research suggests that sustaining such interventions over time will be exceedingly difficult and costly.

This research provides both quantitative [25] and qualitative [26] evidence supporting early community participation and achievement of desired benefits as defined by various constituency groups to attain ICM process sustainability. This might explain some of the failures associated with projects that involve participation but produce no desired benefits for participants. These conclusions are also supported by two decades of practical experience with ICM in Southeast Asia. In the Philippine context, the leading models of ICM have long been and continue to be grounded on a participatory, locally led process [37–39]. Initial attempts in Indonesia have generated promising outcomes [17]. The scaling up of these efforts and incremental introduction of ecosystem principles is what we offer as the most tenable path forward to addressing the ecological shortcomings of these efforts. That over 100 municipalities and cities in the Philippines have adopted some form of ICM as a basic service in the last decade (representing about  $\frac{1}{6}$  of the Philippine coastline) suggests that considerable progress toward scaling up is underway [16,40]. Such a tradition is not as well established in Indonesia but the recent dramatic decentralization of legal and coastal and marine governance structures provide some impetus for future progress. As discussed in the final section of this essay, the scaling up of the local government and community-based programs remains a management and policy challenge that will require careful experimentation and evaluation.

Table 1  
Integrated planning at institutional levels in the Philippines and Indonesia

	Village	Municipal government	National government
Philippines	Numerous examples of village-level ICM efforts focused mainly on the establishment of MPAs; limited multi-village planning efforts; village-level ICM supported by municipal governments	Few examples of multi-municipal government ICM planning efforts; early experiments underway in historic and ongoing ICM project site areas (e.g., South Cebu); municipal government-level ICM supported by branch offices of national government agencies	Adoption of ICM by national environment agency; establishment of Coastal and Marine Management Office to encourage integration; limited joint planning by key national-level sectoral offices; national agencies provide limited support to village and municipal government-level ICM through regional offices
Indonesia	Limited numbers of village-level ICM efforts; few examples of village-level MPA establishment	Few examples of multi-local village or municipal level government ICM planning efforts	Recent establishment of Ministry of Marine Affairs and Fisheries; limited joint planning by key national-level sectoral offices; national agencies provide limited support to village and municipal government-level ICM through local branch offices

### 2.3. *Integration in difficult contexts*

ICM also depends on integration within and between multiple governance scales—a tremendous challenge in the Philippine and Indonesian contexts. As an illustration, Table 1 highlights general progress toward the ambitious goal of integrated planning at various institutional scales in these countries.

Our research documents that institutional and legal frameworks that mandate governance reform are lagging behind the pace of ICM project evolution—to the point that sustained progress is being undermined [5,6,20,41]. In the Philippines, laws that would encourage sustainable resource use are increasingly adopted and enforced at local levels, but remain underdeveloped at the national level. When laws and policies are developed at the national level, they do not always strengthen local management efforts. In fact, they may even contradict local initiatives that are successful. There are few clear incentives for networks of national institutions to adopt ICM as an overarching framework and to collaborate across sectoral lines [41]. In both countries, the divisions between municipal and national agencies and between various national sectoral agencies remain largely intact and limit the expansion of ICM across these institutional boundaries.

#### 2.4. *Long-term commitment as essential to success and sustainability*

Commitment takes place at multiple levels—at the model or institutional level, the project level, and the individual level. The perennial issue of project time horizons and adequate resources emerge as fundamental to sustained progress [8,20,25]. Short project time horizons are not conducive to sustained ICM processes beyond project termination. The development of a clear direction and effective staff requires approximately 2–3 years. The most recent Philippine ICM project, the Coastal Resource Management Project, “reached its stride” and accomplished a tremendous amount in years 3–7 of an 8-year effort, but necessarily focused on wrapping up field efforts in their last year. New ICM projects, even those sponsored by the same donors, usually focus on new sites. The rationale behind site changes is not always clear.

While perceived as valuable by national and local leaders and NGOs, ICM will not likely become a government budget line item on par with health, education, and poverty reduction expenditures anytime soon. Experiments in establishing internally-generated financing are limited, but important, examples of sustainability. Municipal and city governments in the Philippines are dedicating at least a portion of their budgets to ICM efforts [20,42]. Diver fee collection systems in the Philippines [43] and Indonesia [44] have the potential to support protected areas. In line with our other findings, we conclude that management of these financial resources needs to be consistent, efficient, transparent, and equitable [42].

Finally, while ICM requires institutionalization and financial commitments, it also depends on the long-term commitment of national and expatriate leaders. Interestingly, the successes of individual ICM efforts can usually be traced directly to relatively small groups of committed individuals who have dedicated their careers to this effort. Investment in capacity development in project staffs, local and national agencies, and NGOs are resources well spent [20,41]. The development of capable staffs and institutional linkages is a slow process requiring years of attention. If ICM program sites are to be changed, the maintenance of a cadre of dedicated ICM experts from project to project, as in the case of the Coastal Resource Management Project and the Fisheries Improved for Sustainable Harvests (FISH) project ([www.oneocean.org](http://www.oneocean.org)), is essential. Successful ICM programs in Ecuador have suffered from repeated gaps between projects and staff turnover (Christie pers. obs.). One policy reform worth considering is for donors to make long-term commitments to particular international and national practitioners of ICM in developing countries (similar to the Pew Fellowships for Marine Conservation offered by the Pew Charitable Trusts).

In summary, this research has identified particular key factors associated with sustainable ICM processes. Table 2 captures some of the most significant factors that were uncovered by multiple investigators working at various scales and locations within the Philippines and Indonesia. Most of these same factors are applied to ICM projects in White et al. [20].

Information in Table 2 suggests that there are significant barriers to fully adopting the factors associated with sustained ICM by the three key levels of government.

Table 2  
Factors associated with sustained ICM at various levels of governance in the Philippines and Indonesia

Philippines				Indonesia		
Sustainability factors	Village	Municipal government	National government agency	Village	District/municipal (Kabupaten/Kota) government	National government agency
Stakeholder participation in ICM decision making process	Better in project sites, unstable	Mandated by law, some municipal governments foster	Convenes multi-sectoral planning for policy agreements	Varies widely, better in project sites but limited to village leaders	Varies widely, some districts mandating participation in decision-making	Significant improvements made in both legal requirements and regional implementation for participation
Improved economic returns and income generation	Varies, numerous MPAs provide opportunities	Rarely gain taxes from ICM activities, user fee systems spreading	Capture most ICM project grants together with selected local governments	Varies, better in project sites	Districts taking advantage of regional autonomy and finding new investment opportunities and returns	The Ministry of Marine Affairs, and new fisheries Law 31/2004 focused on alternative livelihoods and income generation
Equitable sharing of economic benefits	Rarely the case unless managed for	Rarely	Agencies tend to hoard resources, internal revenue allocation system	Rarely the case unless managed for	Rarely, with exceptions based on projects	Fisheries revenues divided equally across all districts based on financial equilibrium laws
Supportive legal and policy framework	Through village councils, not consistent	Law supportive, not always exercised	Historically in control, but role diminished to providing assistance to local governments	Historically weak, but with new authority for village laws, improving	Districts quickly developing their own frameworks under regional autonomy	Ministry of Marine Affairs promotes strong legal framework
Inter-governmental coordination mechanisms	Inter-village council planning within one municipality rare	Inter-municipal government coordination rare but increasing, mandated	Inter-agency coordination generally rare at national level, not mandated	Inter-village planning is rare, unless there are <i>adat</i> (traditional) mechanisms	Province has responsibility for coordinating among districts/municipalities	National Maritime Board weak, underfunded, but general coordinating processes underway

Table 2 (continued)

Philippines				Indonesia		
Sustainability factors	Village	Municipal government	National government agency	Village	District/municipal (Kabupaten/Kota) government	National government agency
Capacity for law enforcement	Growing capacity to stop illegal fishing	Growing, financing limited, laws enforced irregularly	Growing, financing limited, laws enforced irregularly	Informal, little authority, but growing programs for community patrols	Weak, general police authority at sub-district level, little authority for marine enforcement at district level	Marine enforcement held by Water Police and Navy, focused primarily on security issues
Institutional continuity beyond leadership change	Community-led processes frequently dependent on few committed individuals	Municipal elections every 3 years, some setbacks to ICM as result	Problematic at highest levels, relatively stable at mid and low levels	Village leaders may remain in place for many years, new laws require reporting to district	District leaders now elected directly, administrative staff tend to move frequently	Government stabilizing with recent, direct elections; while political leaders change, civil servants remain in place, promoting program continuity
Conflict resolution mechanisms	Informal	Depends on mayor and staff commitment	Not in place, do not facilitate at lower levels	Informal	Often delegated to subdistrict level	Limited on cases brought through judiciary
Education and awareness level raising	Varies widely, increased in project sites	Sporadic but increased in ICM sites	Awareness of ICM growing, agencies provide limited technical assistance	Varies widely, increased in project sites	Sporadic but growing under regional autonomy	Awareness of ICM growing, government programs funded by donors have been effective
Long term monitoring information management systems	Occurs informally	Rare, systems usually very basic	Monitoring data sporadically collected, data often not disseminated	Occurs informally	Rare, but growing under regional autonomy	Monitoring conducted by various agencies, data often not disseminated
Stable financial support	Rare	Financial support growing, new authorities for revenue generation	Funding limited but stable, based on pilot project grants	Rare	Financial support growing, new authorities for fund generation	Funding limited but stable, based on pilot project grants

Overarching barriers that cut across all these factors include: generally weak institutional capacities at all levels, competing concerns within each level of government for budget and personnel, lack of common understanding about the need or urgency for ICM, and the lack of monitoring and evaluation in any program, let alone for ICM. All these issues reflect institutional culture and practices that do not change rapidly and are embedded within many developing countries. But, on the other hand, local governments in both countries are increasingly endorsing ICM as an approach to deal with a multitude of coastal environmental and social issues because of their growing mandate and their closeness to the reality of the problems.

### *2.5. Continuing the evaluative and adaptive process*

We suggest that research framed by multiple mandates, goals, and disciplines is essential to the improvement of ICM and coastal environments and societies. As with MPAs [29], we offer two general categories for equally important, and complementary, research efforts. Scientists, managers, and others working toward increasing society's acceptance of ICM are engaged in "mandate-responsive" research. This work focuses on the improving the "art" of ICM and monitoring of impacts. Equally important, and often ignored, is what we term "mandate-independent" research. Such research challenges ICM orthodoxies through the consideration of innovative science and management alternatives as well as the underlying goals and assumptions associated with ICM agendas. These researchers consider the ramifications of foreign NGOs, scientists, advisors, and donors promoting ICM in tropical countries with colonial histories and enormous disparities in income and influence. This particular research effort consisted of both mandate-responsive and mandate-independent research.

As highlighted above, our findings clearly demonstrate the importance of both tangible impact and equitable and participative management processes to sustained ICM. Ensuring the balance between impact and process requires ongoing monitoring of both social and ecological systems. Globally, monitoring and evaluation has emphasized ecological systems—especially for protected areas [29]—but multidisciplinary databases are growing and relevant socio-economic manuals exist [45,46]. ICM projects are increasingly investing in data management systems, and engaging local and national government agencies in self-monitoring exercises [20]. These self-evaluation data, supplemented by community-level participatory monitoring and science-based efforts, help track the impacts of ICM efforts and are increasingly used to ensure that ICM projects result in tangible and measurable third-order impacts [47] (see [www.oneocean.org](http://www.oneocean.org)). The Philippine benchmarking and rating systems of ICM and MPAs are important experiments in encouraging commitment and monitoring progress by local governments [48,49]. Pollnac [50] provides quantitative evidence that community monitoring is one of the principal predictors of both compliance and biological success of community based no-take areas in the Visayas, Philippines. Monitoring is a significant predictor of

ICM sustainability [51]. Hence, maintaining these systems is extremely important, as well as a challenge, and will require ongoing financial and technical support.

As with any research program of this nature, important and unanswered questions have emerged from our efforts. We sense that ICM, or any management model, will only improve to the degree that it is objectively, but constructively, reviewed. Below is a list of important, and largely unexamined areas of inquiry that we offer as the next logical suite of researchable themes:

- The interactions between emerging (e.g., ecosystem-based management) and established management models (e.g., community-based resource management, ICM) and how new models may be tailored to build upon past successes.
- Motivations for constituency groups to participate in management and how motivations are linked to worldviews regarding the environment and society's relation to the environment.
- Perceptions of the state of the marine environment.
- Impacts of conflict on management processes and culturally appropriate means to resolve conflict.
- The role of the international epistemic communities—involving scientists, donors, consultant firms, environmentalists, resource users—in setting long-term and global goals for ICM and MPAs.
- Whether donors are moving support from ICM to other models and, if so, their rationale.
- The response of ICM to external and large-scale events such as tsunamis, climate change, and coral bleaching.

### **3. Conclusions**

ICM was initially introduced through foreign institutions and individuals to Southeast Asia and has been adapted for the context over the course of the last two decades through a tremendous expenditure of effort. This process of interpretation is well underway in the Philippines, and is gaining momentum in Indonesia. As this theme issue demonstrates, a great deal has been accomplished, but there remain tremendous challenges ahead. The internalization of a context-appropriate for of ICM with a stable support infrastructure is one obvious challenge.

Even if processes and results are not as comprehensive and sustainable as one might hope, this research convinced the team that ICM remains a potent framework worthy of support. While evolution is normal, we believe that new frameworks should be introduced with caution. This is also not the time to develop radically new frameworks that are intended to replace ICM. The emergence of interest in ecosystem-based management and large-scale marine protected areas, while grounded in an appropriate concern for ecosystem function, should be introduced incrementally and with eye for determining how such models can build from the past successes. If there is one basic finding from our research, it is that institutions change

and adapt slowly. Thus, now that ICM is part of the scenario in Indonesia and Philippines, we should learn from and build on this model.

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