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How Digital is What Divides Us? Global Networks of Practice for Coastal Management

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How Digital is What Divides Us? Global Networks of Practice for Coastal Management

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Learning is an essential element for building capacity and achieving tangible results to advance marine and coastal management in developing countries. Networks of practice are emerging to take advantage of information technology, with the notion that virtual communities might be a low cost way to share information and overcome some of the barriers to good governance and sustainable development by enabling leaders to become more effective. Fostering networks of practice across regions and continents is motivated by the need to reduce the profound isolation that practitioners feel as well as to build their personal knowledge and social capital. However, active networks are based on engaging in joint activities and building personal commitment and trust, and technology by itself cannot supply these essential ingredients. There is no substitute for face to face contact in the generation and transmission of knowledge that is most relevant to leaders working in the unique circumstances of every coastal ecosystem. A review of recent literature and experience reported by large international organizations provides the backdrop for an examination of the success and challenges of a network of Latin-American coastal managers and a network of mariculture professionals in East Africa.

Keywords community of practice, digital divide, information technology, social capital

Introduction

This article explores the strategic and practical challenges facing emerging regional networks of leaders and experts in marine and coastal management developing countries. These networks are attempting to create and share information about governing coastal

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ecosystems and attaining sustainable use, in the light of the growing body of literature on communities and networks of practice. Two examples of voluntary networks of practice are examined in detail, the Regional Network of Latin American Coastal managers (EcoCostas) and an emerging group of mariculture experts in East Africa, the Western Indian Ocean (WIO) Mariculture forum. The focus is on understanding the challenges and limits of technological approaches to support these endeavors in light of current literature on knowledge sharing through networks in place-based and virtual community settings. We first examine recent findings on the nature of communities of, or more appropriately, networks of practice. Then we briefly trace international thinking and experiences in such networks by organizations actively supporting ocean and coastal management projects and policy reforms such as the U.S. Agency for International Development (USAID) and the World Bank. These insights are applied to the EcoCostas Network and the Western Indian Ocean (WIO) Mariculture Forum. The article concludes with some reflections on the need to attain the right mix of face to face and virtual networking that is sustainable, effective, and supportive of learning.

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Knowledge Sharing through Documentation and Face to Face Contact

The Importance of Learning in Governing Ecosystem Use

The knowledge needed to govern the use of natural resources and ecosystems must foster transparency, increase public awareness of coastal resource use problems, attain an inclusiveness in the reporting of facts about the nature of these problems, and attend to the issues of groups that often have little voice, such as women and minorities. Knowledge about personal and social values and scientific uncertainty can be difficult to address but has a place in policy discourse. Know-how about the processes of governance and adoption as well as overcoming resistance to policy and best use practices needs to be captured and shared. Leaders have a special responsibility to take on the challenge of clarifying what knowledge is needed to address an issue right now. They also need to play a role in building social capacity to address similar problems at different scales and locations through knowledge accumulation, updating, and dissemination.

Without knowledge sharing, we end up "reinventing the wheel"—wasting time and resources, making hasty or poorly informed decisions, and demoralizing staff by undervaluing their role as a source of knowledge. Armitage et al. (2008, 86) point out that "Despite widespread support of learning as a normative goal and process, core concepts, assumptions and approaches to learning have been applied in vague and sometimes uncritical ways. Greater specificity with respect to learning goals, approaches and outcomes is required." The authors give voice to many interested in attaining good governance in developing coastal nation settings (87): "Collaborative forms of governance are best viewed as dynamic, problem-solving processes in which learning about social–ecological change is an essential component. Learning in turn provides a basis for the joint action required to respond to social–ecological feedback."

The U.S.-based Heinz Center (Heinz, 2004) showed how far even the United States needs to go in this regard. An extensive review of how U.S. coastal managers are, and should be, sharing knowledge found that learning networks of various kinds were crucial, even in the United States where coastal management emerged more than four decades ago. Four characteristics that greatly influence whether networks will foster and

diffuse innovation are: organizational culture and leadership, resources, roles, and network connections.

Communities of Practice as a Strategy for Knowledge Sharing

The challenge of knowledge sharing is particularly acute for coastal managers dispersed and isolated from each other in developing countries. Professionals are part of various, but not always well linked, networks of organizations and people committed to advancing coastal stewardship worldwide. These organizations would benefit by having ready access to the explicit knowledge of each other, which they gain access to through their participation in one or more networks. Experience has raised doubts about how helpful information technology solutions are to knowledge management and sharing. Borgatti and Foster (2003, 997) put it bluntly: "knowledge creation and utilization are fundamentally human and above all social processes." "Tacit knowledge" is generally considered to be the sought-after ingredient in knowledge sharing, since knowledge on paper or in digital form can be accessed directly. Huysman and Wulf (2005) argue the need to look beyond the simple view of information flow as the transmission of facts and artifacts. Tacit knowledge sharing is a core function and advantage of membership in communities of practice.

Many writers argue that communities of practice (CoP) are the principal way organizations manage their knowledge (Kimble & Bourdon, 2008). Wenger et al. (2002, 4) define this commonly used term as follows: "Communities of practice are groups of people who share a concern, a set of problems or a passion about at topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis." A *community of practice* develops its capabilities and exchange knowledge, is self-selected, and exhibits passion, commitment, identification with the group. As long as there is interest, the group will stay together. A *work group*, in Wenger et al.'s definition, delivers a product or service and could be defined simply as all those people who report to a manager. The work group's goals are tied to job requirements, it interacts continuously and endures until a different group is formed. A *project team* is set up to accomplish a task, is assigned by management, involves a variety of skills and disciplines and its purpose is to carry a project through its entire cycle, and thus is time-limited (Cohen & Bailey, 1997). An *informal network* acts to pass along information, probably involves friends or business acquaintances and exists as long as there is a reason for that set of individuals to exchange information.

Social network analysis begins with graph theory, with an individual represented as a node and the connection between individuals as lines, which can vary in thickness if data is collected on relationship strength. Distance between nodes or people is measured as the count of the line segments separating them. Social network measures include "information centrality." The more direct and indirect connections a person has, the more information they can obtain and send out without interference if they so choose. Individuals that are multiple steps away from each other also are involved in transmitting messages, and indeed sometimes the shortest path for a certain kind of message to be received may have a long path. Individuals vary in the amount of information they are positioned to receive (Wasserman & Faust, 1994, 196), and network analysis can be used to compute the proportion of all the information in a social network that is controlled by an individual, with more distant pathways contributing a proportionally smaller amount. Humans may not be faithful or reliable transmitters, due to poor memories or malicious intent.

Hirscheim et al. (1991) point out that different approaches to information systems development can contribute in negative as well as positive ways to a successful process, by aiding in reaching consensus or fomenting disagreement and resistance. Individuals or groups

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may resort to distort communications, or simply never fully reveal their concerns, which can increase the chances of failure in system development. In addition, non-articulable knowledge is not subject to being communicated easily using electronic means or through telephones. Face to face contact, events such as meetings, and continued proximity may all be required to create both the opportunity and level of trust needed for tacit information to become articulated and revealed. In-betweeners, those with relatively loose or weak ties, and the propensity to link otherwise separated groups, can play a bridging role in a positive sense to help each field make more effective contributions to the other (Fernandez & Gould, 1994, in particular their concept of brokerage roles: liaison, representative, and gatekeeper).

Burt (1992) says that we invest in relationships for information and control purposes. Our investments in these relationships are efficient when we maintain the fewest number of connections with a group while reaping the benefit of sales or knowledge. Control comes from the fact that we create these relationships and at the same time exclude or constrain others from them. Burt as well as Huysman and Wulf advocate for cognitive analysis to understand what is shared, that is, the "know how" of people within a network. Wenger et al. (2002) point out that a community of practice is voluntary, may have fuzzy boundaries, and can evolve or end of its own accord. Teigland (2003) notes that all members of a network are connected, but in a CoP relationship distances are shorter (ties are closer) than typically found in organizations. Communities of practice also have a greater density of ties but do not act as cliques. Group process is an additional component in networks of practice with a learning function. Forsyth (2006) sets out a formulation based on stages. *Forming* is the orientation stage of discovery/imagination—leadership is key as the group members get to know each other. *Storming* might involve conflict as the group incubates. Tensions can emerge, possibly including antagonism toward the leader. *Norming* occurs as the group structure focuses and expands. Cohesiveness grows, trust increases and stewardship is evident. *Performing* finds the group actively at work, with members feeling ownership, exhibiting openness, having a high task orientation. *Adjourning* is the dissolution phase. Members let go, and live on. There is a termination of roles and withdrawal from the CoP. Orlikowski (2002) observes that sharing "knowing how" is important (271). "It is a process of helping others develop the ability to enact—in a variety of contexts and conditions—the knowing in practice." Sharing know-how is in large measure a social act.

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Sticky Knowledge and the Need for Leaky Knowledge Sharing Systems

Social settings and dynamics matter in knowledge sharing. Businesses need to focus on increasing knowledge assets and making sure they "stick" to the firm as a competitive advantage over time, which means making tacit, practice-based knowledge explicit and transferred to others, and eliminate "leakiness," that is, the loss of trade secrets and proprietary knowledge (Brown & Duguid, 2001). To maintain learning and increase capability in public policy settings, we want organizations to establish, maintain, and increase their organizational capability, but in addition to internal transmission of "sticky" knowledge, we want to foster "leakiness." Most of this kind of knowledge is tacit, used only by the individuals or small work groups, derived from their experience, but not articulated so that others can understand and utilize it. As knowledge moves from tacit to explicit, more people in the group can benefit from it, and take it on as their own. This is often difficult to do, as some of the most important knowledge, such as "know-how" is best conveyed face to face in the location where it is to be applied.

Knowing in Action

Communities of practice may emerge as an informal counterforce to the current procedures of an organization, almost constituting "organizational misbehavior" (Cox, 2005). Businesses and organizations are accustomed to such behavior and rivalries and are structured to address and channel them, while efforts to foster social change and governance reform by a broad range of stakeholder groups may be stymied. Cox (2005, 533) identifies a number of factors at work that undermine the formation of communities, arguing that "the conditions of much, perhaps most twenty-first century work inhibit sustained collective sense-making, leading to fragmented, rather individualized appropriation of tasks." Cox and other writers seek to avoid the concept of "community of practice" becoming diluted and confused in its meaning and, more broadly, transformed into a managerial approach to co-opting and controlling the workers producing its intellectual capital. Fortunately, Amin and Roberts (2008) have come to our aid by clarifying the confusion and more importantly focusing attention on the idea of four varieties "knowing in action": craft, professional, epistemic and virtual.

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Craft and Task-Based Knowing. This has a strong kinesthetic component where repeated practice is essential. This fits traditional discussions of how tailors, midwives, musical instrument makers, roofers, and so on carry out their work and pass on their knowledge to novices face to face. Tacit knowledge is revealed through specialized language and encountering and mastering the many specific situations a craftsperson is expected to solve. Knowledge changes over time, but not radically so.

Professional Knowing. This involves much more education and training for the "know-what" element, and face to face location is important at least initially as a way to demonstrate how something is done, the "know-how" element. Professional knowledge has a relatively long life and is subject to formal codification, involves standards of conduct, might be innovative but remains within the bounds of the concept of profession. Regardless of the size of the organization, membership might be restricted.

Epistemic and Creative Knowing. This is developed through short lived encounters and spatial, or relational, closeness. Trust among practitioners in this realm is based on personal reputation, and weak rather than strong social ties, that is, participants are strong minded individuals with wide exposure to the people engaged in the practice domain whose loyalty is to the problem, not each other.

Virtual Knowing. Amin and Roberts (2008) define this as situated, social knowing. The examples relevant to us (363) involve "innovation-seeking projects that can involve a large number of participants, and secondly, relatively closed interest groups facing specific problems and consciously organized as knowledge communities." It is the latter that are more likely to succeed in generating new knowledge, subject to factors such as "participant commitment towards the endeavor, the clarity of purpose and rules of engagement, and the qualities of leadership and intermediation." The authors conclude (364) that "virtual knowing seems to work best when technological and human intermediaries are available to help cultivate a 'net' sociality building on purposefulness, social interaction, and affective commitment." Communities of practice, acknowledges Cox (2005, 534), "are seen as necessarily virtual, not unreasonably so if the object is to tie together disparate individuals

from across a large multinational organization. . . . The issues then become the choice of technology, scale and the balance of face to face and virtual meetings."

Support to Knowledge Creation and Sharing

Kimble and Bourdon (2008) consider communities of practice as one of the two dominant models for knowledge management (KM). The first is comprised of indexing, codification and storage, facilitates access, and reuse. The second involves social networking and interaction, as exemplified by the types of knowing in action described earlier. This represents (462) "a customized approach to KM [that] focuses on the links between individuals for the exchange of knowledge." This perspective is confirmed by van den Hooff and Huysman (2009), who tested a formal model of knowledge sharing that places information and communication technology in a secondary role to similar factors of organizational culture and structure. Wasko and Faraj (2008) examine how fully electronic networks of practice can function in generating and sharing both tacit and explicit knowledge. While individuals may have trouble gaining access to a community of practice, a network of practice, by definition (497), "is emergent and based upon the voluntary participation of individuals rather than mandated or controlled by contractual obligations or formal hierarchical authority." The asynchronous nature of electronic communication also has an important impact on how sharing takes place, the level of restriction in access matters, and as the scale of the network expands, the possibilities for sustaining personal ties diminishes and generalized exchange takes over.

While we have made much so far about the setting (proximate or virtual) and the support systems (electronic, organizational, personal resources) another recent stream of research suggests that, quite simply, personality traits matter in whether and how tacit knowledge is shared. Matzler et al. (2008) studied the self-reported information sharing behavior of the staff of a large international engineering firm. *Conscientious* individuals are more likely to document their knowledge, *agreeable* individuals more willing to help others by sharing, and *open* individuals more interested in the experiences and problems of others as well as have a positive attitude toward learning new things.

Knowledge Management and Sharing in Marine and Coastal Management in Developing Country Settings

Support to the Emerging International Community in Marine and Coastal Management

Information written by and for international coastal management practitioners began in the 1980s through the first international periodical newsletter, Coastal Area Protection and Management (CAMP) Network in 1986, originally edited by John Clark, reaching a peak audience of 1,200 subscribers in 117 countries (Clark, 2000). This was renamed the Intercoast Network newsletter in 2001, and published by the University of Rhode Island (URI) Coastal Resources Center (CRC) until 2004, distributed as a traditional printed newsletter to about 2000 readers. Its subscriber-written approach accounted for its readability and broad acceptance. CRC was established in 1971 as an institutional response to the call for marine research institutions to create "coastal laboratories" to bring scientific knowledge to bear on the nation's coastal environmental and economic challenges (Stratton Commission, 1969). It prepared the Rhode Island Coastal Management Program, the first plan to be submitted for approval under the U.S. Coastal Zone Management Act of 1972. Since 1985

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CRC has also carried out a wide range of projects in developing countries with funds from the U.S. Agency for International Development and other donors.

The U.S.-led biennial Coastal Zone Conferences began to orient themselves to international practitioners in the 1980s, coinciding with the USAID's pioneering effort in 1983 to create an assistance initiative in ICM for Ecuador, Sri Lanka, and Thailand. USAID launched one of the earliest major international assistance program for coastal management as early as 1983, the Coastal Resources Management (CRM) Program establishing in effect a network of three countries creating national coastal management programs incorporating local management planning as well, managed by the URI's Coastal Resources Center. It subsequently created an additional, well-documented program in the Philippines (CRMP, 2003). The CRM effort was extended to include a total of six countries (Ecuador, Sri Lanka, Thailand, Indonesia, Mexico, Tanzania) by the mid-1990s, supported the Intercoast newsletter and documented through articles by country project leaders in *Crafting Coastal Management in a Changing World* (Olsen, 2003). Individual country experiences were documented in more detail in *Eight Years in Ecuador, the Road to Integrated Coastal Resources Management* (Robadue, 1995) and *Capacity Building and Strategic Innovation: Conserving Coastal Resources in Mexico* (Robadue & Rubinoff, 2003).

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Regional Networks

The UN Conference on Environment and Development held in Rio de Janeiro in 1992 ratified Chapter 17 of Agenda 21 on protection of oceans and coasts (Marine Law and Ocean Policy Center, 2007). Since then regional ocean and coastal networks of professionals, stakeholders and authorities have emerged and evolved in Europe, Asia, Africa, and Latin America. Chapter 17 is considered by many to have given international marine and coastal management a major boost. Section 17.120 addresses the requirement for knowledge contributions and sharing mainly from the perspective of what needs to happen, rather than how: "States should, where appropriate: (a) Promote exchange of information on marine and coastal issues; (b) Strengthen the capacity of international organizations to handle information and support the development of national, sub-regional and regional data and information systems, where appropriate." An example of promoting this kind of exchange on a regional basis was carried out during the preparation of *Central America's Coasts: Profile and an Agenda for Action* (Olsen & Foer, 1992) a workshop organized by CRC, bringing together 64 experts from the six countries of Central America as well as others representing coastal management experiences in the Latin America and Caribbean. Capacity-building and sharing knowledge were high on the agenda for action. The immediate example of the kind of place-based training that was in mind were the series of two-week courses run in Spanish based on the Ecuador experience initiated by the collaboration between Ecuador and USAID that began in 1985. This embodies *knowing in action,* recognizing the importance of places as a locus for creating practice, codification and documentation, to preserve memory and allow for the exchange and distribution of documented experience, and training, but in a form that recognizes the emergence of understanding and creates the social settings for the exchange of tacit knowledge. There are elements of *craft*, *professional knowledge*, *epistemic/creative* knowledge generation, especially related to the creation of new locations of concentrated effort, and perhaps the precursor to *virtual knowing* as embodied in the technology of the time, which remained in the form of printed and mailed newsletters.

USAID partnered with the Central American Commission on Environment and Development, to fund a regional program from 1995 to 2006. The first phase included

PROARCA-COSTAS, and focused on conservation and management issues bi-national coastal sites, while the second phase emphasized support to marine and coastal sites in the Mesoamerican Biological Corridor. Evaluations of both phases were mixed (Ochoa et al., 2001). Olsen (2002) points out, for example (342) that "it is therefore not surprising that our documentation of experience at each PROARCA site reveals fragments of management cycles funded by a variety of donors . . . [these] would have produced greater progress toward the goals of coastal management if they had been integrated into a coherent and sustained effort." The Nature Conservancy (TNC), a key partner in both the first and second phases of PROARCA COSTAS did publish a frank analysis of its role in support for an alliance, or network, of 18 organizations involved in its work in the region (Sáenz et al., 2006). It found difficult issues related to the strong central power exerted by TNC in its relationships with local partners, and recommends shifting the balance of power in such working relationships. The analysis also pointed out the need to codify (systematize) knowledge and show greater respect for locally generated knowledge. Forgetting or failing to share lessons learned on sensitive subjects and weaknesses in internal management in this case cannot be solved by memory aids such as knowledge management and networks of practice. As Camacho (2008) argues, the balance of power and appropriation of the learning based approach to governing ecosystem use is also at stake. Program design and consistency of effort over longer periods of time are needed that reflect thinking in governance cycles rather than project cycles go hand in hand (Olsen et al., 1998).

USAID funded the Coastal Resources Management Project in the Philippines over a longer interval more in tune with the cycles of governing in the Philippines, 1996–2004, at a time when that country had begun to decentralize coastal management to local governments (CRMP, 2003, 2004). The project began working in what it called six learning areas involving 29 coastal municipalities, and ended up surpassing its targets by helping 101 local government units meet all ICM capacity targets. The target areas covered 3,187 km of shoreline, representing 13% of the country's coast line. A central part of the project's strategy was to document experiences and lessons learned so that other projects that follow it could be improved. Its initiatives to foster leadership were (2004, 48) "supported and reinforced by training, capacity building, learning by doing and showcasing." The Philippines CRMP website, www.oneocean.org, has delivered on its promise to supply documentation on the outputs of the project as well as information on the marine and coastal issues facing the Philippines. It incorporates many of the features of an ideal regional program as specified in *Central America and its Coasts*, adopting both the concept of learning, and collecting information to track progress in terms of process and outcomes, The program also had the advantage of central direction and long term funding, and took place within a single nation under a common legal regime.

The Inter-American Development Bank (IADB), which serves Latin America and the Caribbean, has long had an interest in marine and coastal management. Its regional strategy (Lemay, 1998) calls for applying good practices for sectoral coastal management by strengthening regional and national networks of practitioners as well as universities, research institutions, and laboratories conducting marine sciences with a development focus. The IADB is also interested in strengthening professional networks for coastal and marine resources management. The IADB has recently helped design a Global Environment Facility (GEF) project for these nations, Integrated Management of the Ecosystems of the Gulf of Fonseca involving the governments of El Salvador, Honduras, and Nicaragua. The project design (Lemay, 2007, 20) notes that "El Salvador, Honduras and Nicaragua are at distinct stages of devolution of environmental and natural resources management responsibilities to local governments. Common tools, such as information systems,

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monitoring networks and regional models are lacking." Indeed, the Gulf of Fonseca program plans to create networks and share information of all types, including an environmental monitoring network, a network of coastal ecosystems, clean production industry network, stakeholder network, as well as professional and academic knowledge sharing. The Gulf of Fonseca proposal incorporates implementation of mechanisms to ensure coordination between projects and donors within the Gulf, and a feasibility study for the establishment of a Sea Grant–type model involving a formal partnership (and grant mechanism) among the academic/scientific institutions of the Gulf, government and private industry for coastal and marine resource education, research, and extension. The Sea Grant model has long been advocated as a robust approach to engaging and sustaining the involvement of stakeholders in moving beyond planning to required behavior changes (Wilburn et al., 2007).

The GEF Scientific and Technical Advisory Panel selected Alan White, Chief of Party for the Philippines Coastal Resources Management Project, to conduct an independent review of the Gulf of Fonseca project design. In one quick step, the GEF was able to make a rapid connection to a large body of relevant experience largely unknown to the Gulf region. In his review, White (2007, Annex C, 4) observed: "the local government role needs to be fully reflected in the Gulf of Fonseca. Past projects that were too heavily controlled by the national government (including national marine protected areas) in the Philippines have failed in many areas because of poor or unenthusiastic participation of the communities or local governments."

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Examples of Knowledge Sharing and Knowing in Action by Large International Organizations

We can look to the experiences of large international organizations who fund ocean and coastal management investments to give us some further insights into what it really takes to capture and harness the knowing-in-action of the thousands of staff, consultants, and partners they employ. The World Bank has made a major investment in knowledge management and sharing, including communities of practice. One initiative has involved supporting a network of distance learning centers in 80 countries for its Global Development Learning Network.[1] An assessment of the early experience (Romiszowski, 2003) indicated that it was becoming a network of networks, currently with 120 partners worldwide. The World Bank, in casting itself as the "knowledge bank," has established more than 100 communities of practice, with most Bank staff located in at least one Thematic Group. Gwin (2003) sets out how central knowledge sharing has become to improving internal operations within the World Bank, conceptualizing it as a key results chain that will help the Bank meet its primary objective. She identifies (9) three remaining challenges: "linking more directly to core operational work; capturing lessons learned and good practices more systematically; and strengthening content management to ensure the quality and operational relevance of distributed knowledge." Gwin found two important shortcomings in the Bank's first years of effort. The World Bank did not provide enough support for task teams in their operational work, a capability that takes three to five years to establish. In addition, Gwin found little indication that bench-marks and monitoring of knowledge sharing were incorporated as a key part of country and project strategies to allow for making adjustments along the way.

A review of the Bank's experience in the Mediterranean Development Forum (Johnson & Khalidi, 2005) confirmed the importance of voluntary membership and community leaders, up to date content as well as follow-up after face to face encounters. If, for example, members fail to communicate using e-mail, its not likely more elaborate Web-based tools would work. Kim (n.d.) reflects on the contribution of information technology

to the full range of World Bank knowledge sharing efforts: "While we are all members of many associations, networks, and other formal or informal groups, genuine communities of practice and, as a corollary, virtual communities of practice, are very rare." He favors the popular, low-tech electronic mailing list, listserv, as a primary tool, since it is simple to use and clearly requires member contributions to be successful.

The International Union for Conservation of Nature (IUCN) is a global network of more than 1,000 government and nongovernmental organizations (NGOs), 11,000 volunteer scientists in 160 countries, supported by 1,000 professional staff in 60 offices, plus hundreds of NGO and business partners.[2] By the early 2000s it found itself in need of a major rethinking of its approach to knowledge generation and sharing (Creech, 2004). A review of 70 IUCN programs found (6) that "projects were not adequately connected to a policy framework, and that knowledge management and learning strategy frameworks were not in place to synthesize, share and disseminate best practice." Creech places special emphasis on reaching young professionals worldwide through networks.

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Insights from Experiences in Small Scale Emerging Networks of Practice in Latin America and East Africa

The Sustainable Coastal Communities and Ecosystems (SUCCESS) initiative funded by the USAID and carried out by CRC at URI, supports regional learning networks in Latin America, the EcoCostas Network,[3] and in East Africa through the Western Indian Ocean (WIO) Mariculture Network.[4] CRC also provides global support through websites that include an electronic newsletter created by partners and practitioners and webpages incorporating substantial explanatory text and annotations on the ICM documents it serves up.[5]

This section examines two contrasting cases in the spirit of the conversations and interactions that the members themselves engage in regarding the issues and ideas that motivate their continued participation. The EcoCostas Network is the most complex and ambitious of the undertakings, relying on the support of a regional NGO, several funded projects, and a prodigious amount of dedicated voluntary effort from its members. We provide a view of what is going on inside the network using social network analysis and examine the interplay between face to face encounters and electronic forms of communication. The WIO Mariculture network is relatively recent and has not yet attained the level of activity of EcoCostas. Its leaders reflect here on the factors which seem to foster or interfere with the emergence of the network of practice, and these observations are tied to some of the theoretical and practical problems faced by such networks everywhere.

CRC staff has long term practical experience in advancing coastal management in Spanish-speaking Latin America. CRC has carried out technical assistance programs in many of the countries of EcoCostas participants, working to create the Ecuador Coastal Resources Management Program beginning in 1985 with substantial funding from USAID, and then designing and helping to implement larger scale implemenation effort in Ecuador, financed through the Inter-American Development Bank. CRC also worked in Central America and Mexico on multi-year programs funded by USAID, the Packard Foundation, and other donors.

The Regional Network of Latin-American Coastal Managers

Formation of the Network. In the late 1990s Olsen, director of CRC, led a series of formal evaluations of GEF projects addressing marine and coastal issues (Olsen, 2002). Among

the findings (340) that explain the difficulties and failures encountered is the fact that "periodic events that draw together those responsible for funding and administering the project rarely address what is being learned and how the project's resources can best be adjusted as opportunities and challenges shift during a three- to five-year period." Further, innovative, ambitious efforts to transform how coastal ecosystems are governed are being carried out with an excessive degree of isolation of its leaders. In the Patagonia coastal management program for example, Olsen and Tobey (1997) point out that there was a consensus among the program participants that "the project was engaged in work that had not been previously attempted in Argentina and that the process was one of discovery. Those involved are unaware of Coastal Zone Management (CZM) experience in other nations and ... there is very little awareness within the existing team of management practice and the process by which public policy is negotiated." One of those team member reports on the benefits of subsequent contact with the members of the emerging EcoCostas network (Caille et al., 2007) in Argentina: (1) learning and mutual inspiration, (2) the value of collective local action among as few as three associates, (3) the tangible benefits of creating social capital through networks among people associated with the coastal ecosystem. In the Patagonia coastal zone, leaders responded to the early critiques of their planning work and the recommendations of members of the EcoCostas network to work in subsequent stages to create greater regional awareness of Patagonia's natural values, increase the number of agreements among stakeholders and key actors, and make major strides to engage the private sector in actions such as certification of the sustainability of local fisheries.

In 2003 EcoCostas drew together a network of professionals involved in coastal stewardship initiatives underway in a wide diversity of settings in eleven countries in the region with funding from the AVINA Foundation whose mission is to "contribute to sustainable development in Latin America by encouraging productive alliances based on trust among social and business leaders and by brokering consensus around agendas for action."[6] The 17 founding members are mid-career leaders associated with local coastal ecosystem management initiatives and include several alumnae from the training courses offered by CRC and its partners in the 1990s based on Ecuador's experience in coastal management. The Director of CRC, S. Olsen, is an officer in EcoCostas. In October, 2004 the first EcoCostas Assembly issued the Guayaquil Declaration, pledging to engage actively in collaborative action and learning. Fundamental to this network is the fact that the members participate as individuals and volunteers, and not as representatives of their employers or organizations. Among their priorities is to engage in a collaborative knowledge generating and sharing effort to documents the features of the locales, trace the trajectory of ecosystem change, and characterize the existing governance system as this is revealed by past and current responses to selected priority resource management issues, and to engage their peers in developing new ideas and strategies moving forward. In May 2007 the network agreed to partner with the USAID-funded SUCCESS project operated by CRC to jointly develop a certification program directed at ICM practitioners operating at the municipal scale. The certification events carried out in 2007 and 2008 involved a mix of training, and peer collaboration on the analysis of their sites, in particular on testing methodologies that would allow meaningful comparisons of governance issues and strategies across each unique site. (Olsen, 2002; Caille et al., 2007). This has involved a number of new individuals and in fact, more than 50 staff, members, and event participants have been involved.

The Key Role Played by Information Technology. The EcoCostas Network uses up to date Internet-based communication and information technology for archiving, retrieval, and analysis technology to support its Spanish-speaking membership. Webpages contain

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content generated by members and serve as a key outreach component. All of this is supported by a skilled webmaster who assists the members utilize the interactive features of the data-base-driven site, and continually expands both the available features and content. The EcoCostas website utilizes search engine optimization to insure that its content and landing pages are easily found (highly ranked) by people using search tools such as Google or Live Search.

EcoCostas' Function as a Network of Practice Exemplifying "Knowing-in-Action". Members highly value the face to face contact that occurs through periodic meetings and joint projects within sub-regions as well as major events that bring together the membership as a whole on an annual basis. The network is engaged in sustaining and aiding each other as leaders, plus a systematic effort to understand, communicate, and learn from governance challenges they face, and attend to the need for recognizing current and fostering new leadership through a regional program to certify marine and coastal management practitioners. These projects focus and energize the group and provide a pathway for expansion.

EcoCostas is simultaneously trying to maintain all four kinds of network of practice based on "knowing in action" as described by Amin and Roberts. Since members are mostly professionals trained mainly in the biological and natural sciences, this exposure to planning and governance concepts and analytical frameworks adds to their *professional* development. Knowledge creation focused on detailed documentation of nine on-going coastal management initiatives has the EcoCostas network also serving as a knowledge generation repository, and the analysis of these cases, along with deliberations on the methodology to create and update them, as an *epistemic* community of practice. Some aspects of the training which places network members in simulations and role plays of difficult decision-making situations, or advisory help in their home settings as in the case of Patagonia offers the kinesthetic equivalence of a *craft* network. Finally, the reliance on the webpage, listserv, and internal electronic communications finds EcoCostas serving effectively as a *virtual* network. All of this is taking place outside the framework of the large organizations profiled in the previous section, such as the World Bank, IUCN, or the Inter-American Development Bank, who themselves are struggling to generate, retain, and share their own knowledge within as well as externally.

Caille et al. (2007) point out some of the resulting challenges in operating the EcoCostas network, in part due to its ambitious mission. Mixing its analytical, epistemic role, with knowing for immediate action causes a cleft between the less time bound act of reflection and analysis, with urgency leaders feel to gain new tools they can put to use immediately. The essential presence and face to face contact needed for craft knowing and tacit knowledge articulation and exchange, which is maximized at the high energy events conducted by EcoCostas is not satisfied by the reliance on low cost virtual contact at most other times. The costs of bringing leaders to a common location are high, both in terms of logistics and opportunity for individuals who have high levels of responsibility in their own countries. EcoCostas needs a strategy to share its members' benefits to a much larger pool of professionals and leaders in coastal ecosystem management in the region. The EcoCostas community would also benefit by reaching out to new audiences who share the desire to learn from the experience of others and can help along the way as they press for reforms in coastal resource governance.

EcoCostas network members have found the periodic regional meetings and site visits from network members to one another's locations vital. There is a strong, place-specific nature to how coastal ecosystem governance unfolds, frequently expressed using the metaphor of "tailoring" (Olsen & Foer, 1992; Lemay, 1998; Olsen et al., 1998; Olsen, 2002). The

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network's Declaration of Guayaquil itself sets out that "each plan of action is tailored to the unique bio-physical characteristics and societal needs of its place. This requires documenting the trajectory of societal and ecosystem change, the responses to such change and the resulting outcomes; such histories are an important expression of the heritage of each place."

This notion of place-based craft is to some degree in an interesting tension with the general concept of virtual networks of practice, which is why the EcoCostas knowledge management system is focused on documenting and analyzing the cases of its associates, nine of which are published on-line.[7]

The Dynamics of Use of Technological Supports for the Regional Network. The development and use of on-line communication technology is aimed at taking advantage of its low cost and the fact that a potentially large number of unaffiliated professionals can gain access to a larger measure of tacit and previously unpublished information about the planning and political processes that are unfolding in each place. We examined the patterns of use of the EcoCostas' main website and communication tools used by members. As stated in the first section, the structure and on-going processes at work within a group play a major role in how, and what degree of success, the group will attain. These group processes benefit from the technical support system.

Information about utilization of the EcoCostas web site was collected on external visits to the public areas of the website. The communication patterns among members are revealed through activity on the listserv. We then explored some of the characteristics of the network itself and relate its social structure to the use of communication technology. Visits to the website in 2008 included 11,397 visits of all types from 813 cities, with the main locations the Spanish speaking countries of Mexico, Central and South America, and the Caribbean, as well as Spain. The daily pattern of visits, which originate mainly through Web searches on Google and direct access, shows a substantial increase in traffic over the first full year (2007) as shown in Figure 1. Members actively use the site for posting materials and obtaining news and materials related to network activities. Spanish search terms such as *manejo costero (coastal management)* and *manejo ecosistemas costeros (coastal ecosystem management)* yield a link to www.ecocostas.org or network related links to www.crc.uri.edu within the first search pages of Google. This is because the webmaster has designed the site to optimize its visibility to search engines.

One of the important, very simple electronic tools that supports network members is the EcoCostas listserv called Eccred, which is a closed access list. We examined the frequency and volume of postings by individuals as well as overall patterns. Figure 2 shows the volume of postings by member each month for 2007 and 2008. A total of 1,336 messages and responses were recorded. There is a noticeable cyclical pattern represented here. During and after each face to face event, or on-line activities such as member polling and the launching of the upgraded EcoCostas network portal sees a considerable increase in listserv message posting, followed by a period of relative inactivity. In April and May 2007, EcoCostas held its annual assembly and conducted on-line voting. The first training event of the network's Certification program was held in November 2007, accompanied by a large pulse of postings. The same occurred during the second and third events, held in April and November of 2008.

Not all members of the network choose to actively contribute to the on-line discussion. This includes some members who are perceived to be among the most central. There is strong, although not entirely consistent, relationship between active utilization of channels such as the listserv, and measures of member centrality within the network. We examined degree centrality (the number of connections a member of the network has to all others)

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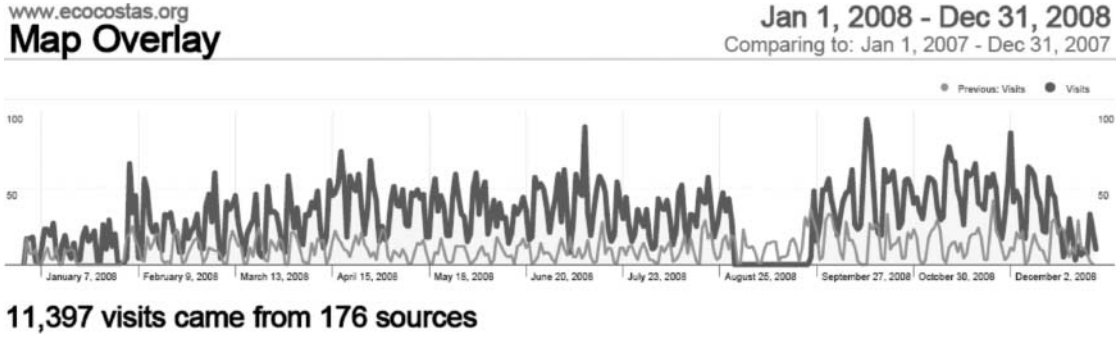


Figure 1. Daily visits to EcoCostas website, comparing 2007 (lower line) and 2008.

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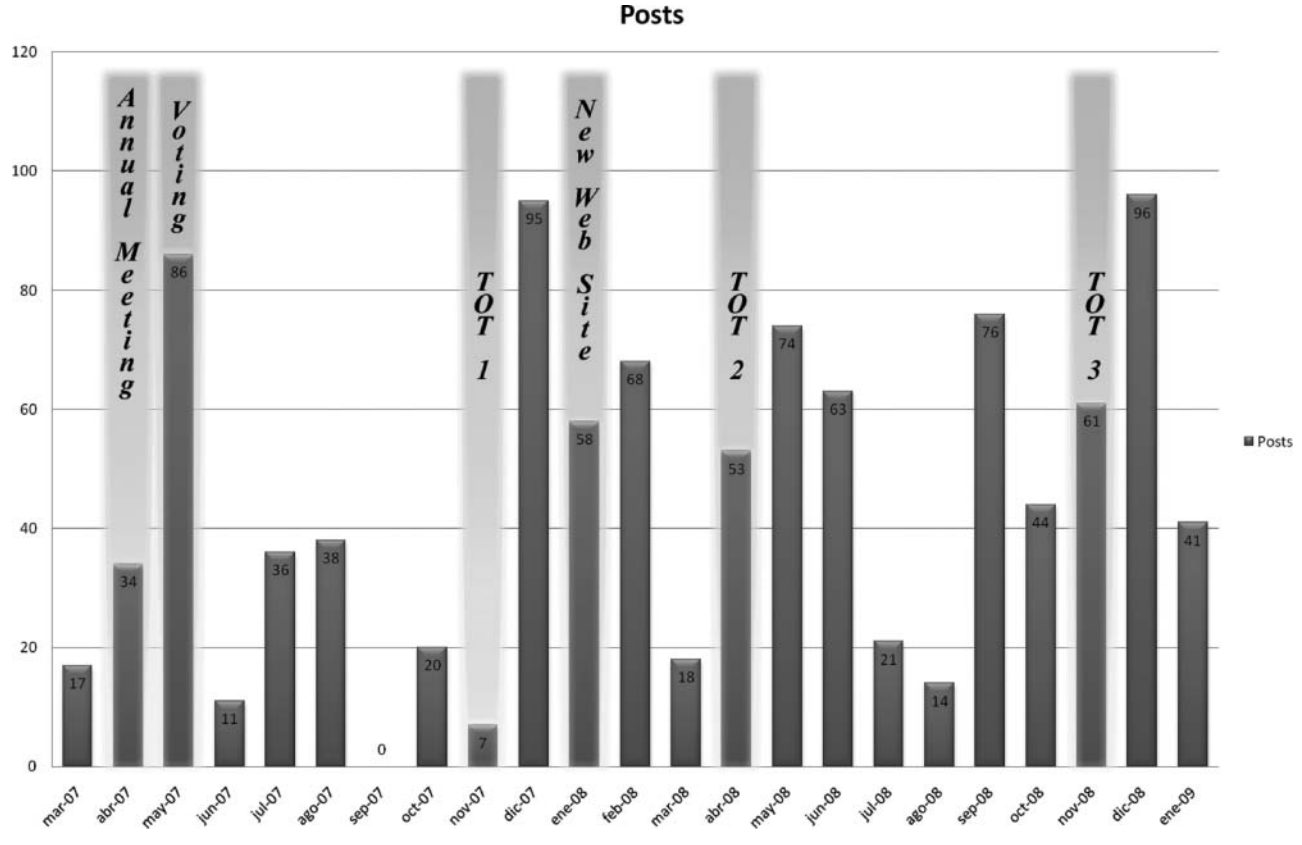


Figure 2. Monthly postings to EcoCostas listserv, Eccred, March 2007 to January 2009. Key events in the network coincide with pulses of message traffic.

in two ways. The first way simply involves listing all the participants affiliated through participation in any "event" sponsored by the network, which includes the six face to face meetings, official membership in the network, membership on the board of directors, member of the staff of EcoCostas or the CRC. The second way is much more specific. Those members present at the first certification event in November 2007 were asked to name the five people they were most in contact with. That generated only 27 names compared to the fifty that are captured by the total number of affiliations but the information is a direct report of a relationship, rather than an inference as is the case with analysis by affiliation. Even so the members' self-reporting of relationships and the relationships as detected simply through affiliation in events generate similar views of the network. Members of the network most active in posting to the listserv account for more than half of all postings during this time period, as shown in Figure 3.

The level of postings is presented in rank order from most to least active member. The cumulative fraction curve is based on all of postings that each member contributes over the two- year period. The most central members (based only on the November 2007 self-reporting), all of whom are from different countries, are generally the most active in using the listserv. The least central members are also the least active.

Two additional views of the information generated simply by examining affiliations and the snapshot of group reported contact illustrate qualities of the network that probably would not be present if it were exclusively virtual. Figure 4 shows a map of the network, based on only the self-reporting of who the members are most in contact with, taken from a workshop exercise by participants during a major network event in November 2007. Each circle, or node, is a member. Several members have strong ties to each other independent of the fact that the leadership is viewed as the most well-connected and central. The size of the circle represents degree centrality, reflecting the number of people who identified that individual as one they had most contact with. We can assess the strength of the network by asking the question of what might happen if the most central actor, labeled as EM_O in Figure 4, was no longer present. For EcoCostas, this would not cause a complete collapse because members GU_S, GU_C, CA_S, and MA_B all have high centrality. Figure 5 shows a representation of all the people affiliated in some way with the EcoCostas network. It was generated simply by gathering the lists of names affiliated with different events held

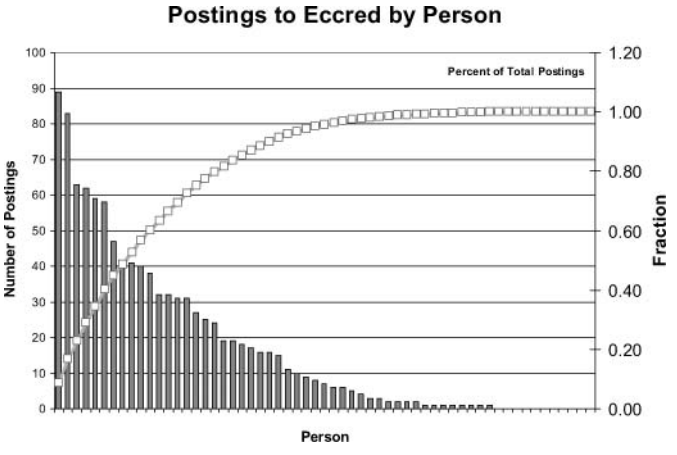


Figure 3. Total postings to Eccred listserv by members of the network.

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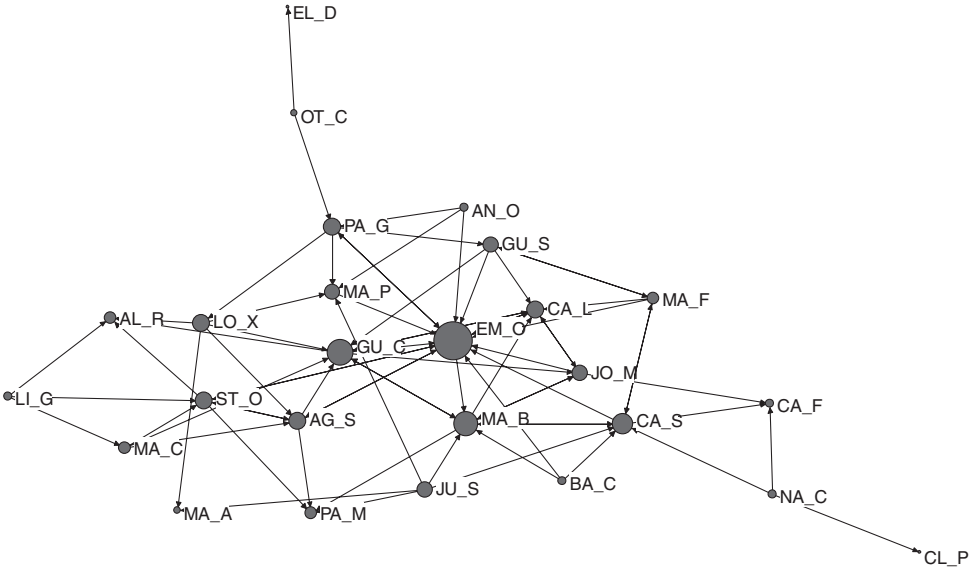


Figure 4. Self-reported most frequent contact among members. Node size reflects degree centrality. Numerous members maintain relationships outside of the most central members.

by the network, including meetings (October 2004, February 2006, April 2007) and the training events (November 2007, April 2008, and November 2008) along with their status as formal member of the network or with a role on the EcoCostas board or staff. This way of mapping the network reveals a history of relationships within the network, moving from left to right. The relatively isolate members on the left of Figure 5 were in fact most active in the formulation of the network such as early planning events. Those on the far right of the graph are relatively new to the network, most through their involvement in the three certification program events, either as participants or trainers.

The group in the center of Figure 5 is also represented by the largest circles (they are the most central, based on the affiliation analysis). These members have remained active throughout and are also generally most active in using the listserv and working on the detailed analysis of place-based cases. Members also highly value both the face to face contact in the periodic regional meetings, but also the visits they host when other members of the network come to the coastal ecosystem they are working in. For example, two of the three most recent events occurred in Guayaquil, Ecuador, enabling the network members to learn much more about the initiatives and making it easy for the Ecuadorian members to gain extensive access to leaders from other countries. A similar effect occurred in the November 2008 event held in Peru. Recently, sub-groups of network members carried out smaller events in the ecosystems they work in, for example Pichilemu, Chile, and Partido de la Costa, Argentina.

Finally, Figure 5 acts as a chronology of the network's dynamics. There is a continual shift in relationships and membership over time. The network leaders have an advocacy agenda of greatly improving the quality of governance of coastal ecosystems in Latin America by supporting effective leadership. EcoCostas needs to find the right balance of craft, professionalism, new knowledge, and free flow of information (the four types of community of practice for knowing-in-action as proposed by Amin and Roberts). The fact

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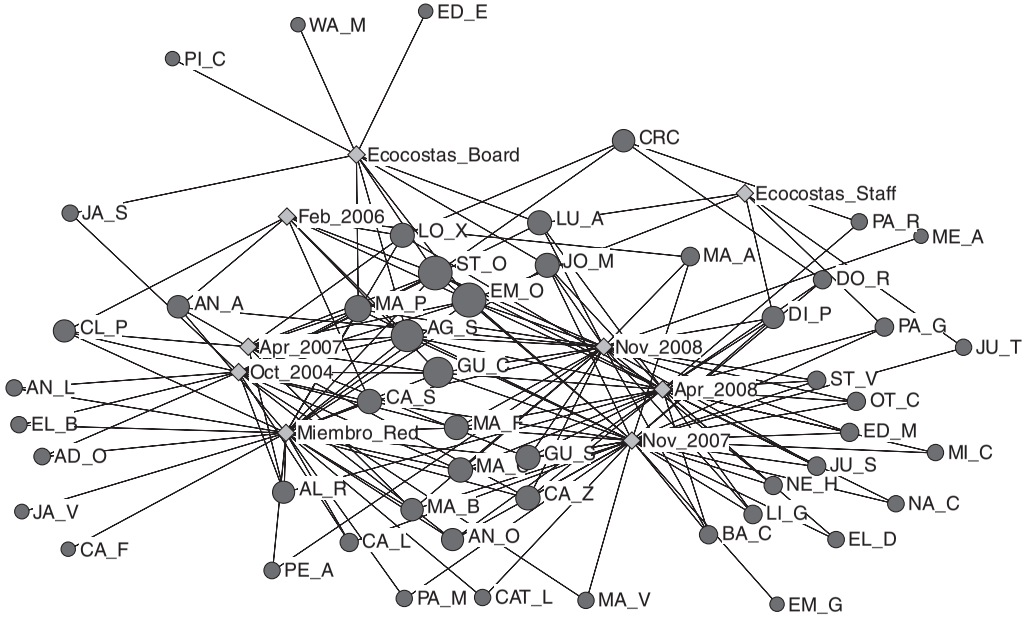


Figure 5. Relationships among members inferred by their affiliation with events and formal ties. Members involved mainly in early events are on the left, those involved throughout appear in the center, and those newest to the group appear to the right.

that relationship ties among members are observably strong and that there is a dynamic of involving new individuals works in its favor. Given the high personal and logistical costs of infrequent but big impact events such as the assemblies and training workshops, the EcoCostas network continues to foster a greater number of smaller, lower cost face to face encounters to member sites. Members are participating in a mix of events that maximizes personal contact, and increases the number of weak ties among more of the membership. Through its website, the members are continuing to build the unique knowledge base of all initiatives so that both network members and the Spanish-speaking community throughout the region can gain access to a continually updated record of the actions and reflections on tailoring progressive management approaches to the unique circumstances of each site.

Network members have found their engagement with the systematizing of their case situations, the assemblies and the events related to professional certification as important to themselves and their organizations. Participants engaged in research and planning in the Estero Real and its watershed in Nicaragua, located in the southern part of the Gulf of Fonseca and funded in part by USAID through a CRC program, have used the opportunity of working with EcoCostas network to disseminate information on the nature of the work they are carrying out with coastal communities, the lessons being learned from these efforts, as well as the conditions of the ecosystem, creating broader awareness of the needs of the region. Extensive, continuous direct contact with resource users such as shrimp farmers, shellfish collectors, and fishers is what builds trust and creates the pathway for bringing knowledge to the field.[8] In the Gulf of California region of Mexico it has proven essential to first have personal contact with network members, and only later do users become comfortable with electronic communication. CRC has carried out a series of projects in the region working with networks of business leaders, researchers, and leaders of nongovernmental organizations. It is a great advantage when the members of a network share a common vision and dreams, have problems in common, and are able to help articulate possible solutions. The exchange of experiences among members and the chance to collaborate in some ways is an important motivating factor, as well as the genuine sense of mutual appreciation and respect, limited mainly by the constraint of limits on the personal availability to take full advantage of the resource that it represents.[9]

As this article was being completed, the authors became aware of another network of coastal managers in Latin America, titled COASTMAN, funded by GTZ, the German foreign assistance agency between 2005 and 2007. This coincides with when the EcoCostas network was being planned and launched. Participants in COASTMAN noted a number of issues with the networking aspect of their program (Engelhardt-Wendt, 2007), perhaps most notably (18) "How can the network be sustained? We forgot to design an exit strategy!"

The Western Indian Ocean Mariculture Forum (WIO-Mariculture)

The WIO Mariculture Forum[10] aims to provide electronic communication support to its membership of mariculture experts in East Africa and is managed by the Western Indian Ocean Marine Sciences Association (WIOMSA). The need to develop a mariculture network and forum was voiced by mariculture practitioners in the region in 2005 at the WIOMSA biennial Science Symposium held that year in Mauritius, and also the subject of a special session of the 2007 WIOMSA science symposium held in Durban, South Africa, entitled "Knowledge Generation and the WIO Mariculture Network." CRC in partnership with WIOMSA supported the establishment of the (WIO) Mariculture Network, and in addition has carried out regional training courses and a long-term coastal management effort since 1996, the Tanzania Coastal Management Partnership. WIOMSA now hosts a website

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linked to a database of WIO mariculture projects, a directory of the people and experts involved regionally in the practice of mariculture, and an archive of publications generated by regional mariculture practitioners. An inventory of 28 regional small scale mariculture initiatives provides basic information on their status, identifies their achievements, challenges, weaknesses, and needs in their capacity and capability. A posted directory of 77 regional mariculture experts includes their qualifications, expertise, contact information, and the organization for which they work. The intent is that the data collected and made available on-line will help members of the WIO Mariculture Network carry out an on-going dialogue and analysis of the successes and challenges of small scale mariculture activities in the region.

The WIO Mariculture website operates a forum moderated by a team of mariculturists from the countries in the region. In fact, this network of practice operates mainly as a virtual network. It is still working to define its primary membership, as the network leaders are finding that there are key differences between the needs and interests of regional experts and those of locally based field extension agents. The network is still exploring forms of leadership to seed interchanges and sustain interest among a diverse group over a longer period of time, since contributions from members have been very low during its first year of operation. Effective extension in mariculture is based on face to face contact with farmers, while the emerging community of practice in mariculture itself is relying on information and communication technology.

The leaders of the WIO Mariculture network effort are experts in their scientific domains but not in the theory and research on networks of practice. Nonetheless they make a number of cogent observations and reflections about their fledgling experiences, most of which is congruent with what other practitioners and researchers are learning about networks of practice.[11] The following insights are based on interviews with some of these experts who are active in the WIO-Mariculture group.

What Helps in Getting the Network Started? Low cost or free information technology drives the attraction to starting a virtual network as a way to address the isolation and desire for access to expertise from peers. For most professionals the tools of listserv, forums, and interactive webpages are easily learned. Some individuals in particular just seem to "get it," are tech savvy, and their leadership style is communication oriented. The design of the virtual network has to take into account the topics and activities are relevant to managers and this in turn needs to be based on an understanding of the roles they play. A few good discussions at the outset will set a pattern for more participation. The WIO Mariculture network needs to move beyond the narrow topics that first attracted its initiators, and build up the value of the mechanism by selecting topics carefully, generously sharing information about one's own work, and thinking about marketing the tool to address needs from a big picture perspective.

Funding to jumpstart the effort is important. It might be wise to associate a network with programs in the East Africa region that have on-going funding and can just add the virtual network to its work plan. Starting up would also be easier if the network was seen as a sure way to gain access to experts outside the East Africa region. Many network members in mariculture are well trained but in fact new to the field. They hunger for access to what is happening in actual practice. The possibility and novelty of creating many "weak ties" with others, that is, their personal social capital is an important incentive to participate. Finally, there is no question that periodic face to face encounters in regional or local meetings would help close big gaps in feedback loops between senior and junior members working in field sites, who are seeking personally applicable guidance from the well of

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"tacit" knowledge they believe exists in trusted sources, that is, the senior members in the network.

What Slows Down or Stops Participation in the Network? Key people that should be involved in the WIO Mariculture network are already overloaded with work and responsibilities. It is hard for them to change their work flow and style to make communication with peers a priority. In some cases the idea of an open exchange of information about a program's activities also might conflict with the public relations objectives of the member's parent organization. The standard outreach "message control" approach of these organizations puts members in the difficult position of having to seek approval from a supervisor to make any contribution to the on-line community. This creates a "sign-off" bottleneck for the network. It would be better if members felt free to contribute more, even if they make mistakes in their statements from time to time because it would sustain the dialogue. But it is understood that people feel exposed and perhaps may believe that they face some undefined repercussion for having shared a news item or observation. In East Africa, access to the Internet and other forms of communication is still limited, especially at the field level where connections are hard to find, slow, and expensive. The timing of the launch of a network matters as well; it is important to be ready with enough material to be frequently seeding the conversation with new topics. There seems to be a threshold for facilitation of discussion. Too little intervention and the on-line conversation just fades away.

Knowledge sharing is not easy. In settings where knowledge and data are treated as source of power, it is not to be shared but used as a form of control, people are less likely to share freely. However, participation in a network of practice of this kind is by definition voluntary. The network cannot become fee-based. At the same time, it needs some incentives so that local experts engage with the group. In sum, the network needs to be providing something more substantial than just an exchange of success and failure observations on projects to sustain contributions.

What Could Help Sustain the Network? The purpose of WIO Mariculture is supporting mariculturists; however, there is a difference between farmers who own and work to get production from their ponds, on the one hand, and the scientists, experts, experimentalists, and extension agents who are trying to help them develop new businesses on the other. There is also a big challenge in moving from initial start up of a support system for innovative farms, and sustaining it so that its full value to the economy is realized. On-the-ground efforts in mariculture are different in each country and for a given species. Tanzania is showing rapid growth in milkfish, for example, stimulated in part by extension workshops led by SUCCESS. Materials related to this particular effort have been held back at times by network leaders, with the concern in the forum that it would dominate other communications or that it would not be relevant to members in other countries. The potential role of extension mainly should involve face to face contact with farmers.

Personality does matter. Individuals should be enthusiastic about communication and be strongly interested in practical aspects that extension agents and experts concern themselves with, and have the time availability. They also should be comfortable with, and regularly use, communication technology as part of their work. Discussion leaders should already be engaged in projects that include communication as part of their work. Affiliation with a group of longer- term projects would sustain the operations of the network. Also there is the question of the need for sufficient stature to communicate freely. A forum and community of practice cannot function if every on-line contribution of an individual has to be cleared by higher-ups. Indeed, the forum can make a change in the culture toward

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freer discussion one of its long-term objectives. It also should have policies or find ways to prevent any repercussions to individuals posting items.

If actual farmers were to get value from the website, forum, or other communication techniques, information needed on a daily basis should be included, such as weather forecasts, tides and meteorological data, and mariculture products market prices within each country. However, this would also require extra effort. The WIO Mariculture webpage has the beginnings of a collection of documents; however, much more can be done to compile links to, or encourage uploading of, relevant materials, and to compile and keep updated lists of farmers and producer contact, market price data for different species, and make it easy to subscribe to Really Simple Syndication (RSS) feeds from highly recommended sites.

Conclusion

Organizations and professionals working in coastal and ocean management, in developed as well as developing countries, feel a strong need to communicate with, learn from, and join together with their peers to advocate for conservation and sustainable use. This sense of urgency can only be more acutely felt in locations where isolated local leaders try to make progress but are dealing with governance systems that are nowhere near adequate to face the challenges of poverty, sustainable development, environmental degradation, climate change impacts, and imperiled public health.

Large international organizations such as the World Bank, USAID, and IUCN are making concerted efforts to move beyond information archiving toward learning and knowledge sharing both internally in their sprawling operations, and externally with the beneficiaries and contributors to their efforts. Regionally focused entities such as the Inter-American development bank are incorporating knowledge sharing within the design of large scale programs and also offering incentives for its country partners and implementers to contribute to improved practices and to sparing countries and project teams from reinventing the wheel in dealing with operational challenges. American coastal managers in 35 states with different sets of problems and approaches still aspire to find a coherent way to become more effective through knowledge sharing, and advocate its best solutions more effectively to stakeholders and decision-makers, and their European counterparts are hoping that their efforts at electronic communication and networks of practice can do the same. Leaving knowledge management and sharing to chance has proven to be a losing strategy for such large enterprises. The community or network of practice, with its voluntary, know-how dimension and fluctuating members, will probably not satisfy the requirements of institutions, who need to pursue more fundamental reforms of their work processes and structures to better tap in to the expertise of their members and employees.

Policy and social entrepreneurs in coastal places throughout the world, the leaders that are focused on coastal areas and marine ecosystems and who work only partially within the framework of government or donor projects, face even tougher challenges in connecting to their peers as well as getting the word out on their needs, insights, and advances.

Coastal management leaders must learn from their peers as fast as they can during those rare moments when they can attend a meeting or have a personal conversation, because most of their energy and time finds them working as hard as possible to transform the thinking, decisions, and behavior of their societies. To this, we want to add a further obligation that they reflect and share what they are learning to others who also are desperate both to know and to gain some encouragement and recognition. We have seen from both theory and recent practice that knowing in action can be aided by information and communication technology, but low cost and ubiquitous access and digital support, even if carried out

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effectively, would simply not be sufficient to address the real divide. Members of the EcoCostas and WIO Mariculture networks are not exaggerating when they point out the vital importance of place-based and face to face contact and context in generating and transmitting their knowledge. They also struggle to find the minimal resources needed to continue face to face exchanges. It would be both interesting and useful to see some systematic comparisons of how such networks overcome this limitation.

We used simple metrics to show how dynamic the EcoCostas network of practice is engaged in knowing in action, even over a fairly short period of time, in terms of the activity of members and the composition of the membership itself. As members build and access their social and intellectual capital, then each encounter of its members with another network or place-based project could yield dividends for the entire group as the trusted observations of the network member are shared. The intersection of expert Alan White and the Gulf of Fonseca program is an example of the speed and intensity at which relevant information can be transmitted from a relevant body of experience to another setting whose leaders have unanswered questions. We speculate that such an exchange would have even more impact if leaders from each region were to visit each other, and take the extra step of documenting their "aha's" and insights for others as well. However, networks may face skeptical responses from potential donors who are not interested in funding study tours and junkets. Arguments to favor such investments might employ some of the techniques briefly demonstrated in this article to show the benefits and impacts of creating and maintaining such on-going contact as a form of development assistance or investment in capacity-building.

The EcoCostas network provides significant benefits in the eyes of its members, and in light of the literature and world experience summarized here, simply because it is addressing a need that does not fit well in the conventional notions of community of practice, and is not served well by overemphasis on technological responses. Latin America and the Caribbean may in fact need multiple, messy, overlapping networks that suit the personalities, funding levels, and organizational constraints of its members. Perhaps it is acceptable that efforts like COASTMAN and EcoCostas live side by side, serving the needs of their particular memberships as long as there are at least a few weak ties between them. The members of WIO Mariculture need to find ways in addition to their virtual network to attain greater face to face contact. The social and intellectual capital of ocean and coastal management leaders will grow if enough ties among the members of the various networks of practice that are "forming," "storming," "norming," and "performing" emerge, so that social distance among people who have something to offer each other remains as small as possible, with as few blocked gateways and closed paths.

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Notes

1. http://www.gdln.org/
2. http://www.iucn.org
3. http://www.ecocostas.org
4. http://wiomariculture.org
5. http://www.crc.uri.edu
6. http://www.avina.net
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