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# THE BAREFOOT ECOLOGIST'S TOOLBOX

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C H A P T E R T W O

# THEORIES OF CHANGE : COMMUNITY SCIENCE FOR REFORM

## Introduction to Theory of Change

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Fisheries scientists, and the fishers they work with, are commonly more interested in the biology of fished stocks or the catching of them, than they are in the people and fishing communities that depend upon them. That is just the way fisheries biologists and fishers are built, most of them would not be doing what they do otherwise. Most fishers view others within the horizon as competitors, and sometimes it feels similar in the field of fisheries science. Look around and you'll even see quite a few misanthropes (human-haters) in this field.

This sort of personality trait is not a helpful starting point when it comes to managing fisheries. Fish just do what they have evolved to do, struggling to survive long enough to produce the next generation; that's their biology we define with their Life History Parameters (LHPs). The sad truth for those of us who would rather go fishing than sit around and talk to our neighbors, and colleagues, is that fisheries management is about changing human behavior so that the fish can keep doing what evolutionary processes have programmed them to do. If we want to change the behavior of fishers, we need to understand something about social dynamics, the way community change occurs and can be facilitated.

This chapter provides readers with the theoretical underpinning that supports the human side of the SPS approach to reforming fisheries management. The side which involves using the results of LBSPR to inform communities, supporting community dialogue about the SPR results, and turning those results into prescriptions for reforming management and taking action.

Education and communication programs seeking to address the challenge of changing community norms must move from the simple transmission of information and facts, and from focusing on the behavior of individuals, to establishing on-going learning processes that empower individuals to work together in social groups to transform themselves as part of a process of working towards broader social change (Clover & Hill 2003; Clover et al. 1998).

Beyond the normal bounds of fisheries science, a wide body of ideas have been developed about how change occurs

## Heuristic Thinking

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In their book; 'Nudge' Thaler, and Sunstein (2008) propose that many of the everyday choices that end up determining a society's health, welfare and cumulative impact on the environment, are primarily made instinctively and emotionally, without being thought through rationally and logically. Called 'heuristic' thinking, and often referred to colloquially as 'community norms', this deeper 'hidden' way of thinking saves mental energy by making countless little everyday choices easy and automatic, and is largely inherited unconsciously without introspection from the surrounding community, family, friends and church as communal standards or traditions. Heuristic thinking can cause people to behave in ways that are unhelpful or destructive, to themselves, the wider society and the planet as a whole.

Attempting to impose a new standard of behavior that conflicts with the personal heuristic reality of a community is unlikely to result in successful change. To successfully manage change it is important to understand and explicitly address existing heuristic frameworks, otherwise programs of change will simply be absorbed without a trace, like a stone thrown into a pond, as societies continue thinking heuristically and acting instinctively and 'normally'.

Rather than arguing for change with pure logic, rationally supported by external scientific sources as suggested by our scientific training. It is important that we first understand how local fishing communities heuristically think about key aspects of their local overfishing problem? Which elements of their heuristic framework are helpful, or unhelpful, to sustainably managing local fisheries? As much as we might wish otherwise, unhelpful aspects cannot just be bull-dozed over with more facts, and emphatic arm waving from the front of a meeting. They need to be identified and made explicit for communities in ways which are emotional and experiential, for them to be discussed and directly addressed by communities.

It takes a whole village to bring up a child, as well as to embrace new and apparently counter-intuitive ways of doing things. Piling scientific facts higher and deeper will not cut it, heuristic frameworks cannot be ignored.

in society, how it can be facilitated and managed. Rather than attempting to be exhaustive or prescriptive, the aim of this chapter is to provide something of a primer, a basis from which readers can start to develop their own skills, methodologies, elaborations and styles, for applying the SPS approach. Whatever works best for your own community.

We start with theories around changing individuals and communities before expanding our horizon to ideas of how change that may start with individuals (heuristic thinking and nudges) and single communities or businesses (Change Management) can be extended to entire societies (Communities of Practice and Diffusion theory).

I imagine that some readers, will well skip over this chapter, in search of their more immediate questions about applying LBSPR to data. In reality, those readers probably have the most need for this chapter, but you will do what you do.

## Heuristic Thinking about Fish

Like almost all Pacific islanders, the Palauans I first started developing this SPS methodology with in 2012, are 'fish people'. I immediately felt at home with them, because they all talked like fisheries biologists with deep knowledge about fish behavior and where and how to catch them. Most Australians think you're on the spectrum if fish is all you can talk and think about, but that makes you normal in Palau. Even though many of the species in Indo-Pacific reef fish assemblage are very much alike, and in other countries local names commonly group species with similar appearance, in Palau every species has its own name, and many parrotfish have juvenile, female and male names. Everyone was aware of, and worried about the declining stocks. I was stunned to discover that despite liking to eat the roe (eggs) of many species the Palauans could not cut a fish open and see if it was immature or adult, there was little concept of big and small bodied species maturing at different sizes, and most importantly they did not connect declining stocks with overfishing. Since that first surprise, in Palau, I have come to realize that this gap in perception is not peculiar just to Pacific Islands, I have seen it more generally through artisanal fishing communities. Most, but not all, fishers can apparently extract good tasting roe from fish without thinking too much about what they are looking for.

Without the skill of being able to distinguish immature from mature fish through internal examination of fish gonads fishers do not perceive the growing rarity of adult fish, or that the species that mature at the largest size are the first species to disappear. In fact, they tend not to think at all about fish needing to reproduce and sustain themselves.

One of my collaborators, the one responsible for the SPS communication materials, Scott Radway of cChange, tells me that humans in general have a blind spot when it comes to marine conservation. Apparently repeated focus group testing in many countries reveals the same thing, people just do not connect to marine conservation in the same way as they relate to the need to conserve terrestrial animals and plants. They do not perceive of marine species needing to breed and propagate themselves in the same way they naturally think of humans and terrestrial animals needing to breed. Perhaps, it is because so much about

the marine environment is hidden from view, where as we see directly and participate in what is happening on the land.

## God Will Always Provide

For fishing communities fishing is the one great constant of their lives. They struggle to comprehend how much has changed over time. Human memory is short, change is gradual and anything that happened more than a generation before (about 40 years) is all but forgotten. People in fishing communities think about sustaining fish stocks in the same way they think about sustaining the air they breathe and the water they drink. Which is to say that they hardly think about it all. The fish, air and water are all taken for granted. Fish have always been there for food, and people have always fished for food. This is summed up by the Pacific wide saying of 'God will always provide', which is short hand for thinking that fish have always been there, so they probably always will be.

From my experience, at the same time as re-assuring themselves by saying; 'God will always provide', fishing communities are also universally, deeply aware and concerned about, the decline of their local marine resources. They clearly see all the symptoms of overfishing: having to go further afield to maintain catches, having to fish deeper and deeper, fish in the catch getting smaller, and prized fish getting scarcer. They are experiencing and seeing food webs being fish down (Pauly et al. 1998). In the coral reef fisheries, fishers observe the big bodied, higher order predators like the groupers and sharks disappearing first, followed by the larger parrotfish, snappers and emperors, and then all the prized medium bodied species and then even the smaller bodied species, until eventually only the fish that once no-one wanted to eat are left and people start eating what was once considered bait. The communities we work with, are inevitably aware of all this, they are not in denial, but, prior to our intervention with SPS, they generally do not recognise these changes as symptoms of their own overfishing of local stocks.

We find that, apart from a few elders, community members are generally unaware how much new fishing gears, the

modern ability to keep fish cool and transport them to market, have changed traditional fishing practices, let alone the extent to which this has allowed fishing pressure to escalate. Prior to our programs, we find community members generally associate observed declines in local resources with any other environmental changes they see or hear about. Sedimentation from building the ring road in Palau, unsustainable forestry practices in the Solomon Islands, the destruction of juvenile habitat from mangrove cutting, destructive fishing practices and coral bleaching caused by climate change in many places. I do not mean to imply here that these many other 'ecosystem level threats' are not having an impact, only that the primary factor, and the one most amenable to being addressed by fishing communities themselves, local over-fishing, is normally not recognised by the fishing communities.

### Small Fish Have the Sweetest Meat

In my experience the fishers heuristic framework for thinking about fish is one of 'waste-not-want-not' and is about making the most of what they have. It is primarily concerned with not wasting food, and is encapsulated by a saying widespread across the Pacific which is, "the smallest fish have the sweetest meat". A saying that is echoed in almost every other part of the world I have been lucky enough to have had these conversations. This is the metaphorical equivalent of the 'European' expression that; "the sweetest meat is closest to the bone". Both are used to exhort (young) people not to waste the smallest, or last bit of meat, and to foster the 'waste not want not' way of thinking; 'Do not to give that chicken bone to the dog, until you have eaten every last bit of meat off it' or 'be prepared to tongue through a mouthful of sharp small fish-bones, and suck out the last bit of fish meat'.

With this element of a fishing community's heuristic framework, no small fish is ever released to finish its growing and start breeding. That would be a nonsensical waste of good food. Ten small fish are just as good, perhaps better, than one fish with the weight of the 10 smaller fish. The more the better, regardless of size.

These then appear to be the unconscious heuristic thought

processes we need to recognize and work with through our program of community facilitation and science:

1. Fish stocks will always 'magically' replenish without our help i.e. 'god will always provide',
2. Observed changes in local fish stocks are being driven by external causes other than over-fishing by local communities,
3. It is wrong to waste good food in the form of undersize fish,
4. To the limited extent the breeding of fish is considered, all fish starting breeding at some undefined similar small size.

This is the context for our workshops and our materials that explicitly identify trends in local fisheries as symptoms of over fishing. We outline the reasons overfishing is happening now, rather than in previous millennia. At that stage we commonly find workshop participants asking what the answer is to the overfishing problem they are beginning to perceive for the first time. Our answer is that we need to change old ways of thinking which are no longer fit for purpose, and at that point we unpack and confront their heuristic concern about wasting good food by releasing or not catching juvenile fish. We then remind communities about familiar concepts of gardening and animal husbandry which involve nurturing juveniles and maintaining sufficient reproductive capacity, consciously extending those principals to fisheries.

Later in our workshops we teach fishers how to measure the size of fish and ascertain their maturity. With these skills they begin to perceive for themselves the difference between small and big bodied species and why bigger bodied species have become rarer than smaller bodied species as the local food-web has been fished down.

## Adult Education, Active Learning & Citizen Science

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### Adult Education

The vast majority of fishers are adults so the SPS methodology must specifically aim at educating communities of adults. Knowles (1977) first coined the term Andragogy to describe a model of teaching aimed specifically at assisting adults learn within formal and non-formal settings identifying four principals that distinguished adult from childhood education:

1. In contrast to younger learners who require teaching personalities to motivate and direct learning, adult learners are self-directed;
2. Adults have accumulated, over time, experiences that can be used as a learning resource for oneself and others;
3. Adult learning tends to be aimed at social rather than individual development;
4. Adults value knowledge that is immediately applicable in 'real-world' situations.

Being people of the sea and fish, community members are generally extremely interested to learn new things about fish and to talk about fishing. We regularly receive strong positive feedback from fishers about how much they enjoy working with our SPS projects, because they learn and see more in their fish, and fishing, than they did before, and that they find their new way of understanding, interesting and stimulating.

Much of the success of the SPS approach, that we serendipitously discovered along the way, can be explained as being well recognized elements of good andragogical (adult learning) theory:

**PRINCIPLE 1:** While adults attending SPS workshops are initially told what to do during workshops, their initial attendance and how they apply the information afterwards is entirely self-motivated.

**PRINCIPLE 2:** The SPS workshop extensively utilizes collaborative adult group activities in the break out groups, construction of fish measuring boards and the initial training to measure fish, gauge maturity and record data. The importance

of this cannot be overstated. Collaboration is the catalyst to the creation of an educational climate where all involved adults can meet as equals, work with one another and share already acquired lifetime knowledge. In the context of the SPS workshops collaboration it is particularly important in collectively confirming that symptoms of overfishing are being observed.

**PRINCIPLE 3:** The entire context and purpose of the SPS program is facilitating community wide change to solve the over-fishing crisis.

**PRINCIPLE 4:** For adult education to be successfully taught the theory and technical detail should be immediately applicable to the real world and adult's lives. Knowles (1977) stated that there is an explicit need for the detail to be applied into practice and that learning strategies should be aimed to be immediately applicable to the real world and adult's lives. "Environmental adult learning is directly grounded in immediate problems and the expressed needs of individuals living within a sociocultural-economic context, educators must participate in real-world activities and work with local people to create concrete, constructive action" (Belanger 2003). The SPS workshop applies this principle with great success as information presented within the workshop is applied immediately within a real-world demonstration, which can then be transformed into ongoing practice.

### Active Learning

In the field of adult education, the benefits of facilitating students to learn actively (Active Learning) rather than passively are widely recognized and have been described in detail. Most individuals learn best by practice, rather than as passive spectators listening to teachers, watching others perform, or simply reading. The fact that this came of something of a revelation to me, merely illustrates my own ignorance of educational theory, and propensity to learn my own lessons actively through the good-old, hands-on, process of 'trial and error' or 'learning by doing'. In the early stage of developing the SPS methodology and applying it for the first time in Palau I have to confess, that with my own scientific researcher's hat pulled

firmly down over my eyes, I started off entirely fixated on the scientific aspects of collecting the data needed to produce the first LBSPR assessments and some management advice. It was only over time that I was struck by the educational and change facilitation benefits that flowed naturally through the process of 'active education' I had inadvertently started by engaging with fishing communities to collect the data needed to make those first LBSPR assessments.

Now, having lived that experience many times, and having read the background research and learnt the technical jargon, I am firmly convinced of the major benefits of teaching the data collection skills, even if the data were not required. Simply because the process of learning to measure the fish, and gauge the state of maturity, enables community members to see for themselves, what is that is going on with their own local fish stocks.

## Community-based or Citizen Science

Beyond the education of individual community members, the goal of the SPS workshops is to initiate and maintain community-based data collection programs, that will enable local fisheries to be assessed with LBSPR, and scientifically based management strategies developed. The concept of using basically trained community members to engage in scientific data collection has been called 'citizen science' or 'community-based science' and its benefits have been widely described.

Druschke & Seltzer (2012) list the following mix of educational, research and change facilitation benefits that typically come from these programs, which we will refer to simply as 'community science':

- Cost effectiveness;
- Making community processes more democratic;
- Empowering communities to become more involved in managing their own futures;
- Building community cohesiveness and capacity;
- Creating a sense of ownership of change;
- Developing community skills;

- Opening up more effective dialogue between communities and science; and,
- Fostering accountability within communities.

## Learning for Sustainability

The combined utility of virtually all the components of the SPS methodology are neatly described by Tilbury & Cooke (2005) of the Australian Research Institute in Education for Sustainability (ARIES) who conducted a review for the Australian Government Department of the Environment and Heritage. The following section is quoted directly from that source in which they define the essential components of the types of learning needed to facilitate sustainability as being:

- Mentoring provides individuals and groups, who are grappling with sustainability with support, advice and understanding so they can engage with this concept. The process allows people to critically examine opportunities for change within their home, community or workplace.

- Facilitation encourages learning to be driven by the learner. It equips the learner with the necessary skills and knowledge to take action and participate in change and decision-making. It develops the ability of people to 'critically' reflect on their existing practice and identify the changes necessary. The process encourages people to engage in open dialogue and eliminates inequitable power hierarchies as it does not rely on expert knowledge.

- Participative Inquiry is the engagement with, and deep exploration of, sustainability questions, which stimulate new ideas for further interrogation and action. Participatory inquiry offers a new way of understanding and engaging with the community and organizational change. It requires participants to collectively strive to understand a question that is important to them by freely examining their existing ideas and practices.

- Action Learning is a process designed to build capacity using a form of reflection and assessment. The ultimate goal is the improvement of practice. The process involves the participants developing an action plan, implementing the plan and reflecting on what they have learnt from this. A facilitator or mentor assists the participants to develop their plan and learn from their experiences.

- Action Research is a research method that pursues action (change) and research (understanding) at the same time, through a cyclical process of planning, action, observation and reflection. It aims not just to improve, but to innovate practice. Action Research provides a valuable process for exploring ways in which sustainability is relevant to the participants' workplaces and/or lifestyles. It views change as the desired outcome and involves participants in investigating their own practice.

At this point we conclude reviewing theories about how individuals and communities think and learn about issues of sustainability and turn to ideas about how communities and societies can be changed.

## Change Management

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Kotter's (2007) theories of change management developed from his observation of the shared characteristics of programs that successfully created change provides a framework for conceptualizing our work within specific communities. In successful programs of change management Kotter identified a necessary series of stages that build on each other, and cannot be rushed or skipped. He observed change commonly failing because people conceived of it happening in a single 'event', instead of through an on-going process.

Kotter identified eight stages with people first seeing and feeling, then trialing and testing in a step-wise process that if successful builds broader support across a community as the capacities needed for change grow, and transparent processes for monitoring and evaluating progress are developed, establishing the social framework needed to support successive cycles of on-going trial and adaptation to improve the outcomes of the change.

### **KOTTER'S EIGHT STEP CHANGE MODEL CAN BE SUMMARIZED AS:**

1. Establishing a sense of urgency – The initial step is to motivate communities to support change by developing their understanding that the crisis confronting them if they preserve the existing situation and resist change is far worse than their future if they embrace change.

2. Forming a powerful guiding coalition – Assembling a group with enough power within communities to lead the change effort and encouraging the group to work together as a team. get the right people in place with the right emotional commitment, and the right mix of skills and societal levels.

3. Get the vision right - get the team to establish a simple vision and strategy, focus on emotional and creative aspects necessary to drive service and efficiency.

4. Communicate for buy-in - Involve as many people as possible, communicate the essentials, simply, appeal and respond to people's needs. De-clutter communications - make technology work for you rather than against.

## Coordinating Bottom-Up and Top-Down Processes

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The overfishing crisis is first and foremost a social crisis and to solve it we must clearly recognize the dynamic interdependence of individual and structural/social transformation (Fien 1993). It is important not to over emphasize the individual's role, or the role of individual communities in creating the current overfishing crisis, or their ability to solve it, as its causes and solutions lie in the larger context or system of which the individual is just a small part (Rogers 2003). Individuals and communities within any social system have only limited ability to change themselves and their societies through individual actions taken alone. They are limited by external barriers such as their current lack of understanding about overfishing and of sustainable fishing practices, as well as their continuing reliance on currently broadly used fishing practices for their day-to-day subsistence. They remain heavily influenced by their social context, in this case the general practice of all fishers to catch as much as they can and keep whatever they catch. Their well-founded belief that individual action is futile discourages pre-emptive personal change.

Solutions need to confront the dysfunctional practices in our social, governance and economic systems. Particularly in countries where the capacity of central government is relatively weak fisheries reform cannot happen through purely top-down processes. Nor can artisanal fisheries management be achieved by changing individual values or lifestyles, or through structural changes alone. Reform requires bottom-up and top-down processes to be coordinated across regions and nations. Local mind-sets need to be changed to support new local ordinances, and create political demand for regional and national reform. Sympathetic and supportive central government need to respond to, and support grass root demands for complementary and enabling national legislation and regulation reform, backed up by compliance and enforcement by national agencies, together with the provision of ongoing education to the officials charged with administering the reforms.

5. Empower action - Remove obstacles, enable constructive feedback and lots of support from leaders - reward and recognise progress and achievements.

6. Create short-term wins - Set aims that are easy to achieve - in bite-size chunks. Manageable numbers of initiatives. Finish current stages before starting new ones.

7. Don't let up - Foster and encourage determination and persistence - ongoing change - encourage ongoing progress reporting - highlight achieved and future milestones.

8. Make change stick - Reinforce the value of successful change via recruitment, promotion, of new change leaders. Weave change into culture.

Our SPS approach fits squarely within Kotter's model for achieving change. The communication package and program of community science described in this and subsequent chapters provide the structure and a forum for supporting the first five of Kotter's steps, which can occur relatively autonomously within specific communities. The education provided with the workshops, the results of the community science, and the forum for discussion provided by the Spawning Potential Surveys; develops a shared sense of urgency, assembles a guiding coalition with a shared right vision, and begins the process of getting broader buy-in and empowering communities to change.

## Beach-Head Communities

This necessity of course expands the spatial scale of our challenge, beyond just changing individuals and a few isolated communities, to achieving behavioral change across whole regions, complete societies and nations. We must confront the reality of the broader spatial scale required to manage marine resources and work across multiple communities, engage with regional and national legal frameworks to provide the enabling enforcement environment. Few resources are localized enough, or communities isolated enough, to make management by a single community effective. Even then, such a community is going to want a broader legal framework to limit the extent to which free-riders from outside their community can come in and raid their managed resource without being subject to local management regulations. And of course, there are too many fishing communities across the Pacific, or any other region, in need of small-scale fisheries management reform, to think of running educational and awareness raising programs of citizen science with every community. Supplying the full community-based science delivered program described in the following chapters, to every fishing community is not a feasible model for achieving geographically.

The SPS approach is to select a relatively few ‘beachhead communities’ in each jurisdiction, or region, to work with intensively, the aim being to initiate and support broader longer terms processes for change, that can be expanded up to national levels, far beyond the boundaries of those initial few beachhead communities. Beachhead communities are strategically selected to begin the broader process of developing understanding and support in a new country. To provide an initial base for assessing local fish stocks, growing awareness, and to begin developing the first community and governmental change champions, who will go on to work together beyond their beachhead communities for broader national reform (phase 1 in figure 1).

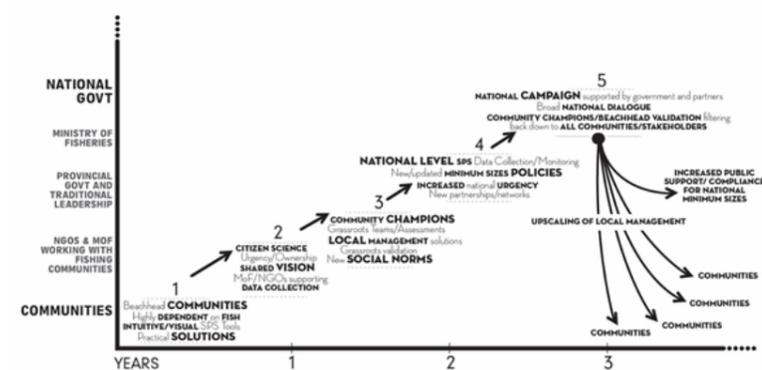


Figure 1. An illustration of the theory of change which the Spawning Potential Surveys methodology is based upon. The y-axis is indicative of levels of society and the x-axis indicates the time-scale over which our Fijian project progressed. The Spawning Potential Surveys process is initiated with a few beachhead communities (1) conducting programs of data gathering community science (2). Engagement in the community science programs develops a team of change champions (3) to support national adoption of the management policies developed on the basis of the data gathered by the community science programs (4). Finally, with national government adoption an on-going program of national implementation can be planned and implemented (5).

In each country we begin by scoping out the right communities, community leaders and agency staff most suited and enthusiastic to engage with our SPS program. We then engage with them and their communities and agencies to deliver our training and conduct initial assessments, while simultaneously providing repeated and ongoing briefings of our activities and intentions to surrounding communities, other agency staff, along with policy and decision makers. To be successful the process of change we are initiating with the beachhead communities will eventually need to be supported by broader nation-wide change processes. In fact, in our ongoing dialogue with the members of our beachhead communities there inevitably comes a time in their development, when they will point out that with all the best intentions in the world, they have limited capacity to rebuild fisheries by themselves. If at that point, we cannot respond by telling them of the ways we are already working more broadly with agency staff and policy makers beyond their communities, our relationships and process in the beachhead community will begin withering and dying. Their enthusiasm and ongoing support for the SPS project in their community is inextricably linked with their intention to achieve broader reform and must be supported at that level.

Fortunately, our experience has been that supported by the briefings we provide, the broader activities, relationships and roles of the community leaders, fishers, and agency staff engaged with each beachhead community project, the projects conducted in just a few communities go onto to impact whole regions and nations. The conceptual framework of how broader ‘scaling-up’ processes occur is provided by the concepts of

'Communities of Practice' and 'Diffusion Theory'.

## Communities of Practice

The communities-of-practice concept emphasizes how knowledge built up amongst a few practitioners in any field will tend to spread laterally amongst fellow practitioners and it provides a paradigm for how new knowledge and practices developed in one community will tend to flow more broadly out through societies.

Beyond physical communities based on living within a shared locality, and in traditional cultures some degree of inter-relatedness, a looser form of community also forms amongst people sharing a profession or 'practice', even when they do not live in the same physical community. These informal communities of practice commonly cut across the formal boundaries of organizations and communities, allowing some forms of information to flow freely. These are informal groupings of people that share similar concerns, problems and interests, referred to in this context as a 'domain'; which in our context is fishing. While in some senses members of a practice may be competitors with each other, fishers racing to maximize individual catches, rather than co-workers, by interacting with each other, rubbing shoulders together on a day-by-day basis at landing sites or fish markets, they build long-term relationships and some sense of community. Through shared practices they learn from each other and develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems.

The community of practice idea is to recognize and foster these groupings with the specific aim of facilitating them identify and solve their shared problems by inventing new practices, and then effectively sharing those solutions through the networks of the community of practice. Some development agencies now see their role primarily as conveners of such communities, rather than as educators and providers of new knowledge.

## Benefits from Communities of Practice

Communities of Practice improve the quality and sustainability of projects, the potential for innovation and organizational change by:

- Enhancing networking
- Providing access to relevant knowledge, both explicit formal knowledge from institutions and the informal knowledge learnt through individual experience;
  - Facilitating uptake of new knowledge because information received through the network comes from trusted tested sources;
  - Providing access to experienced persons in the respective domain;
  - Quickly finding common ground for identifying and solving problems as well as implementing solutions.
    - It is the combination of the three elements of shared, domain, community and practice that constitutes a 'community of practice', and enhancing those elements in parallel cultivates such communities boosting their capacity to effect change. However, if Communities of Practice are to be effective in facilitating change, underlying the three obvious 'structural' elements of, domain, community and practice, there must also be three less obvious essential ingredients; motivation, mandate and an active structure.
- The issue to be addressed must be of interest and a priority for the members so that they are motivated to address it.
- The issue must lie within the practice of the community so that its members feel that they have a mandate to address it together. While they may share concerns about issues outside their community, they are less likely to work together to address them if the concerns are felt to be beyond the shared mandate.
  - The Community of Practice must exist in reality and not just in theory or name, meaning there really are effective, regularly used structures, or networks of relationships. linking members both horizontally and diagonally, cutting across other organizational units.

Fortunately, these less obvious ingredients are almost inherent to our context of managing small-scale fisheries.

## The Basic Structure of a Community of Practice

Most communities of practice tend to have a kind of a threefold circle structure even though it is commonly informal and remains relatively undefined; a core group, an inner circle and an outer circle. The core group acts as a kind of self-appointed, but widely recognized and acknowledged managing group or executive that initiates and coordinates activities and undertakes the role of a secretariat. The inner circle is a broader group of confidantes that acts naturally as a steering committee. Individual members of the inner circle often work closely with, and so maintain regular contact with, one or other of the core group, but the core group and inner circle will only rarely come together naturally by social occasions, perhaps as little as once or twice a year. The outer circle consists of interested but more peripheral members who do not have the same level of expertise and recognition as the inner circle and core group. They may have moved into the profession more recently, or remain less well socially connected within the community of practice, at different times they may contribute to group conversations, or simply be informed by its discussions and decisions.

## Phases of Problem Solving

Communities of Practice are informal and ephemeral groupings brought together for a time by shared bodies of experience and concern. It is generally a mistake to attempt formalizing their organization with the aim of turning them into permanent entities. Rather their informality and fluidity should be accepted and enlisted to assist with change campaigns, that are likely to proceed through characteristic phases. The Swiss Agency for Development of Cooperation (SDC) (2009) recommends developing Communities of Practice by facilitating members through six characteristic stages:

- Initiation. Someone in a role of natural leadership perceives a problem and begins one-on-one discussions with peers to ascertain their perception of the issue, initiating a series of parallel conversations, which uncovers an area of actively shared concern and interest.
- "The holy swear", an organized meeting of at least three

core members, in which they openly agree on the nature of the issue facing them, and agree to act together as a founding group to jointly address the shared concern.

- Lobbying by phone, mail, meetings, informal talks during and around organized and chance meetings and social gatherings that serve to draw broader attention to the issue, raising the level of interest and growing the group actively involved with the topic to form the inner group around the initial core.
- Structured interactions, presentations and discussions around pre-existing forums and in e-mails then engages the outer circle, and drives the issue towards some intermediate results or conclusions. The core, inner and outer groups develop some structure and begin broad agreement about solving the problem.
- Workshops and face-to-face meetings convened specifically to focus on the core topic derive concrete results that can be implemented together to solve the issue.
- Phasing out after agreements have been reached and solutions implemented. The mission is accomplished, and achievements can be celebrated with a final event so that members of the Community of Practice can return to normal life.

## Cultivating Communities of Practice.

Wenger et al. (2002) recommends seven principles for cultivating Communities of Practice:

1. Communities Evolve over time, therefore design for evolution - Start with minimal structure, for example with some problem-solving meetings, or appointing a community coordinator.
2. Open a dialogue between inside and outside perspectives - Insiders have a good understanding of the groups' potential to develop and outsiders have ideas about what groups should achieve and help to see new possibilities.
3. Invite participation at different levels - coordinator, core group, active group, peripheral members, and interested

outsiders. Remain fluid and let members change their level of involvement over time.

4. Ensure a wide range of interactions by using a range of public and private spaces, media and platforms that facilitate both communal and one-on-one interactions. A common mistake is to have too many public meetings.

5. Focus on value to members by creating events, activities and relationships that allow the value of the group to emerge.

6. Combine familiarity and excitement by offering a range of familiar activities/ tools, but also provide divergent thinking and activity

7. Create a rhythm for the community with regular meetings, teleconferences, discussion and meetings online, but find a balance, not too fast and intense so that it overwhelms members and not too slow or members will lose interest because they believe little is being achieved.

## Challenges for Communities of Practice

Because of their fluid complex nature Communities of Practice inevitably experience many challenges, which those working with them should be mindful and proactive about, especially because they cannot be entirely avoided.

Wenger et al. (2002) provides a list of the most common challenges that are likely to be encountered:

- Communities can become too cosy, and reluctant to critique each other, closing themselves off to new ideas and new comers.
- Communities can develop a sense of ownership over knowledge, leading to arrogance and the sense that their domain is more important than any other.
- Marginalized Communities can focus on shared discontent and gripes rather than enacting change.
- Some Communities can be consumed by internal wars and lose sight of problem solving.

- Communities can become too dependent on a coordinator or central leader making it vulnerable to the person leaving and diminishing the diversity of perspectives available to the group.

- When leadership is not shared, distinct classes can develop, undermining its shared identity and limiting the free flow of knowledge.

- A Community can become too large or dispersed to actively engage members so that while people may sign up they do not contribute in a meaningful way.

- Barriers to outsiders can develop when communities develop specialized methods and technical jargon.

- Some Communities can focus too heavily on documenting, where the group begins to see its purpose as producing documents.

- Other Communities do not document enough. Where ideas are continually re-worked and discussed leading to an unproductive group.

- A reluctance to change hinders groups, where they become set in their ways and are hesitant to accept outside perspectives.

## The Power of Storytelling in Communities of Practice

In all communities of practice much of the information that is transmitted through the network travels within stories, this is particularly true of fishing communities. A well-known anthropologist, Bateson (2001), argues that, “storytelling is fundamental to the human search for meaning” and is a common activity in our daily lives. Storytelling is increasingly used in business as an effective way of communicating a new idea to a skeptical audience. Denning (2005) suggests that, “an appropriately told story has the power to do what rigorous analysis cannot – to communicate a strange new idea easily and naturally and quickly get people into enthusiastically positive action”.

Use lots of story-telling with fishers. These days I flatter myself to think that the fishing communities I work with find me interesting to talk with. Thanks to my early hard-core

spearfishing and abalone diving days, recent travel history, and general knowledge about fish and fisheries. I feel like I have lots of stories I can now tell and which seem to go down well. It was different when I was young and green, and knew I had little of interest to say to my elders and superiors. It was much harder to tell a good story then, but I realize now, it was always kindly appreciated when I did make the effort. These days some of my own stories get relayed back to me, only slightly bent by the retellings. Some bits remembered and passed on, others not. That's the way it works. Dig deep and find a few good stories to tell, they don't have to be about you. And once you've developed a small collection, don't go beating everyone over the head with them all the time. Save them up for when you most need them; like when you are in room of salty old fishers.

Your SPS process will also generate its own stories that will carry information through the community. In Fiji we initiated SPS with a training workshop in the chiefly village of Naduri which was attended by representatives from 12 scattered communities. Soon after a WWF staff member working on a completely different project told me of the week, he had spent on the remote Kia Island. Every night around the kava bowl it had been the newly trained fish measurer who regaled his colleagues with what he had learnt at our workshop, and what he was seeing with his new skills in the fish he was measuring. While in Palau, after a week of fishing and measuring fish with my newly trained fish measurers, I estimated that 65% of the fish we had measured were immature and that became the story. When I last visited Palau, eight years later, I was still being told the problem with the fish was that 65% of the fish being eaten had never been given the chance to breed.

## **Communities of Practice and Spawning Potential Surveys**

In its essence the SPS approach is a way of sensitizing and informing communities of practice formed by local fishing communities about the issue of overfishing, and of empowering them to solve their problem. For that reason, I have provided more detail on this topic than any other. The information, ideas and skills provided by the workshops are effectively transmitted

through fishing communities and have effect. In the long run, the need becomes working effectively with government partners to develop their capacity to respond effectively to the reforms the fishing community can be expected to begin asking for.

## Social Diffusion

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The theory of social diffusion as expounded by Rogers (2003) explains “the process by which alteration occurs in the structure and function of a social system”, it emphasizes the need to simultaneously address individual, social and structural change. The argument being that social change occurs when new ideas, practices, or products are invented, diffused and either adopted or rejected, so that individual actions undertaken collectively help to create a ‘culture of possibility for everyone’ (Rabkins & Gershon 2007). It sees the role individuals play in social change being both to foster new norms of community/collective behavior, as well as building pressure for broader societal changes. The action of individuals taken collectively builds into a ‘grassroots groundswell’ (Rabkins & Gershon 2007) because, people’s sense that systemic change is possible, is influenced by the attitudes and behaviours of the people around them (Milbrath 1989). As Suzuki (1999) says, “each person, group or organization working towards a different world may seem powerless and insignificant, but all of them can add up to a force that can become irresistible” (phases 1-3 in figure 1).

In his book *Diffusion of Innovations*, Rogers (2003) breaks the process of social diffusion down into four key elements that influence the rate at which diffusion is likely to occur - innovation, communication channels, the innovation-decision process, and the social system.

### 1. Innovation

An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption; in our case fishing communities and fisheries agencies. An innovation can take various forms. The characteristics or attributes of an innovation, as perceived by individuals, influences its likely rate of adoption. These attributes are: relative advantage, compatibility, complexity, the ease of trialling and observability.

### 2. Communication channels

The way information about the innovation is passed from one individual to another through communication channels is at the heart of the social diffusion process. Communication

channels include mass media channels, such as radio, television and newspapers; face-to-face exchanges between individuals; and interactive social media platforms via the internet. The effectiveness of different channels depends on the innovation and its social setting. Mass communication channels are the most efficient way for spreading general information widely across well connected societies. However, more direct and personalized communication channels such as Communities of Practice are required to persuade individuals to take specific actions.

### 3. The innovation-decision process

The innovation-decision process is the means by which an individual (or other decision making unit) first learns of an innovation (knowledge), forms an initial opinion about the innovation (persuasion) and decides whether to adopt or reject the innovation (decision), and acts to apply the new idea (implementation) and confirm their decision to continue applying the innovation (confirmation). Differing targeted forms of education and communication can facilitate each stage of this process.

### 4. Social systems

Social diffusion occurs within a social system, “a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal”. The members of a social system may be individuals, communities, organizations or informal groups such as Communities of Practice. The structure of societies, communications and social norms can all impede or facilitate the social diffusion process. Social norms guide the behavior of individuals by setting standards for socially acceptable behaviors but often discourages risk taking reducing the willingness of individuals to be the first to make a change. The flow of information between individuals in any social system depends on the degree to which interacting individuals perceive themselves as similar (homophily) or different (heterophily). Diffusion occurs more quickly through uniform groupings, such as communities of practice, but may remain limited within that group. Information flows more slowly but thoroughly with heterogeneity because heterophily allows for a broader learning

and diffusion of new ideas or innovations across diverse and different groups (Moser 2007). Ultimately, effective social diffusion process requires a certain degree of both heterophily and homophily.

### The Bell Curve of Adopters

Another central idea of diffusion theory is that while each individual's willingness and ability to adopt an innovation depends on their awareness, interest, evaluation, and trials of the innovation, individuals in a social system characteristically adopt innovation at differing stages of the diffusion process. So that adoption follows the characteristic shape of a bell curve and adopters can be classified in five categories: innovators, early adopters, early majority, late majority and laggards. From this idea stems a key idea of social diffusion which is that identifying and working with a relatively few key people, in the SPS cases the beachhead communities, can be the precursor to influencing many. Early adopters are key individuals who are attracted to the innovation and who have a high tolerance for experimentation (Rabkins & Gershon, 2007).

Rogers (2003) also identifies two additional important categories of people in the diffusion process that to some extent may cut across the former categories of adoptees: 'opinion leaders' and 'change agents'. Opinion leaders are members of a social system within which they are able to exert some influence and may naturally fall into any of the categories of adoptees. While change agents are individuals who actively and effectively promote new ideas and behaviors and have a role in sensitizing the early adopters to the need for change. Once early adopters have recognized a need for change, change agents seek to motivate, and create an intent to change amongst early adopters. Once motivated, change agents seek to assist early adopters to translate their intentions into actions.

### The Adoption Curve and Achieving Critical Mass

Adoption and diffusion of an innovation, as new ideas, behaviors and products move through a given population, follows a pattern similar to the spread of an epidemic (Gladwell

2002). Starting from its source with an innovator, spreading slowly initially after its conception, pushed along primarily by the active promotion of change agents, until it reaches the 'take-off' phase. At this stage, a mass of interpersonal networks are activated, spreading peer-to-peer the subjective evaluations of many individual's begin dwarfing the individual efforts of the original change agents (phases 3 & 4 in figure 1). The key ingredient at this stage is the effect that one person has on the other: 'the influence of interaction' (Ball 2005). A critical mass occurs when 10% to 20% of the population in a system has adopted an innovation (Rogers 2003). After reaching this point, sometimes referred to as 'tipping point' (Gladwell 2002), the innovation's further rate of adoption becomes self-sustaining. Critical mass bears on the relationship between individuals and the larger system of which they form a part. During this stage peer-to-peer influence diminishes and an individual's perception of how many other individuals are thinking or behaving in a particular way becomes most important (Clayton & Brook 2005). After critical mass is reached, the new norm of the social system encourages further adoption by the remaining individuals within a system, the late adopters and laggards (Rogers 2003). Critical mass also puts pressure on decision makers to introduce policy and structural changes that will facilitate further diffusion and adoption (phase 5 in figure 1). After reaching critical mass, the S-shaped curve eventually reaches a saturation level, where virtually everyone who is going to adopt the innovation has done so (Rogers 2003).

## Spawning Potential Surveys

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Consistent with theories of change management (Kotter, 1996), communities of change (Wenger et al., 2002), and diffusion (Rogers, 2003) we assume that societal change requires the simultaneous and coordinated facilitation of top-down and bottom-up processes (Figure 1). For this purpose, we begin the SPS process in a country with programs of citizen science conducted with the selected beachhead communities in which staff of local collaborating NGOs and governmental agencies are embedded. The aim of the citizen science projects is both to assess the status of local resources, and develop teams of local change champions that span across communities, government and NGOs. Local champions are a critical part of engineering social change as they can lead broad shifts in social norms (Kotter, 1996; Wenger et al., 2002; Rogers, 2003), unlike international experts, building societal adoption towards the critical mass and tipping point needed to change society.

It is hoped that this book, and the other materials available on the biospherics.com.au website will equip you barefoot ecologists to become innovators within your own, natal or adopted, fishing communities and countries, and applying the SPS approach with beachhead communities you will be able to develop a cadre of change agents to work with you towards achieving the critical mass needed to achieve societal change.

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