

Community leadership in coastal management

Short Report on Winston Churchill Fellowship Travel

April and May 2016

Peter Lawless

(Reviewed and edited by Marilyn Hunt Phoenix Facilitation Ltd)

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1 SUMMARY

This short report summarises the learning, conclusions, and recommendations from Winston Churchill Fellowship travel in 2016. A full report (94pages) can be found on the Winston Churchill Trust and the following websites associated with the work of the author at:

- www.phoenixfacilitation.co.nz/
- www.thelawlessedge.co.nz/
- www.teamkorowai.org.nz/
- www.marinebiosecurity.co.nz/
- www.marlmarinefutures.co.nz/

The core hypothesis of this study was that, by comparing experiences of involving communities in protecting and restoring areas of the marine environment, generally applicable lessons could be found that could enhance New Zealand's capacity to be effective in marine protection.

Four well established models were selected:

- Australia's Great Barrier Reef, the "grandfather" of large marine parks around the world;
- Nova Scotia's The Gully Marine Reserve, the longest established marine reserve over a continental submarine canyon;
- East Coast USA's Chesapeake Bay, the largest and oldest restoration of an enclosed area of the sea;
- Monterey Bay Marine Park, a multi-zoned marine park that includes near-shore to submarine canyon depths.

British Columbia's co-governance of the marine environment with the indigenous people was added after the initial itinerary was set.

The Great Barrier Reef Marine Park displays world best practice in creating and refining a very large, multiple use marine protected area. Despite this it is failing to achieve its core purpose due to factors beyond its boundaries. The principal threats are climate change and nutrient input from the land. This shows that it is critical to understand and include the full context that affects the formation and management of marine protected areas if the objectives for which they were formed are to be achieved with any degree of certainty. This means going beyond what we think we can tackle to what we really need to tackle.

The Gully Marine Reserve shows the importance of sustaining processes of influence to capitalise on initial success and the change in mode required when the general political environment changes. Policy, networking, methodology for Marine Protected Areas formation are all weak because of the Harper Government's cutting of programmes for marine protection over the previous decade¹. The targets set by the Liberal Government², of 10% of the marine area in MPAs by 2020, are impractical without a brutal top down approach that would offend against its other principles of collaboration.

Conversely, the British Columbia experience is quite different. Here a Provincial leadership cut across the Federal *neo-colonial style conservatism* to make what progress it

¹ <http://o.canada.com/news/harper-government-cutting-more-than-100-million-related-to-protection-of-water>

² <https://www.liberal.ca/realchange/trudeau-announces-plan-to-protect-canadas-oceans/>

could in integrated marine management under its own authority. This now leaves British Columbia in a much better position to respond to the window that has opened. The issue will be the capacity of the federal administration to be responsive to the policy shift, and change its own culture quickly enough to capitalize on the opportunity.

Everyone interviewed in the USA, on both seaboard, was talking about political polarisation, and the effect on their work and what could be achieved. The sheer scale of the human impacts on the sea, both positive and negative, and political complexity were defining aspects of marine protection on both coasts. It is very hard for any participant to comprehend the whole. There are strong homeostatic forces at play, meaning that any action draws compensating responses that tend to lead to outcomes of delay, or of cosmetic protection that appears to satisfy the wishes of environmental stakeholders while achieving little in practice.

Processes of collaboration can only be successful when the unifying forces exceed the divisive forces. Therefore, we see small gains, like those described by Paul Michel for the Sanctuary programme, where division is avoided by leaving out the key area of conflict, in this case fishing. Equally, in enormous programmes like the Chesapeake Bay restoration, there is slow headway despite the resources and skills applied.

Large, diffuse, highly conflicted systems with long time delays require great unifying forces and highly effective catalyst processes that reduce transactional costs to the parties. These catalyst processes are the technologies of dialogue, synthesis, and collaboration. Chesapeake at \$5B a year is at the top end of subnational processes of this type.

Smaller, localised, less conflicted systems with shorter feedback loops can produce enduring solutions with modest efforts, BUT the solutions are vulnerable to being overwhelmed by signals from larger systems. The Californian marine reserves at a state level is at the top end of such approaches with a cost of \$14M.

2 METHODS

The approach was an iterative exploration through semi-structured interviews, each of which was immediately analysed in a process that developed as insights were gained. Text relevant to each informant was copied to them so corrections and additions could be made, and thus the text in the report is agreed by the informants as a true and correct record. The respondents were offering personal opinions and insights which were not necessarily representative of the views of the agencies or organizations with which they were affiliated. Respondents emphasized that the opinions that they expressed were solely their own, and should not be construed as some sort of statement of agency policy.

While the principal focus was the social process, the biophysical context was also important, and was documented in relation to place. Published and unpublished materials were gathered and analysed both during the study tour, and subsequently, to inform the overall conclusions.

The results are to be applied in marine protection initiatives in New Zealand (particularly the 7,250 square kilometre Marlborough marine area), in training facilitators and in contribution to law and administrative reform.

The frames of reference applied in analysis included: Senge's system theory, Scharmer's Theory U, Moreno derived sociodrama as interpreted by Hamish Brown for application to

analysis of social forces, realist analysis, organisational analysis for stratified systems based on the Requisite Organisation of Jacques and the seven S McKinsey model. Inherent in the approach was comparison to experience gained through thirty years of practice in environmental protection, particularly with marine spatial project including: Te Korowai o te Tai o Marokura, Marlborough Marine Futures, Hauraki Sea Change, and Nelson Biodiversity Strategy and Partnership.

This work has been done from my frame of reference as a “facilitator”. This is an emerging professional role with a wide range practice and theory. To facilitate is to “make easy” and the focus of my work is enabling collaboration (literally, to labour together). References to “facilitation” in the report include all activities purposefully assisting groups to achieve a purpose.

3 ANALYSIS

The key insight from this study, was the implication of the systemic linkages between the science, stakeholder, and political/administrative processes in determining whether marine areas will become protected, or timely action taken to restore them.

Understanding these systemic dynamics and identifying effective ways of reducing the time and increasing the effectiveness of interventions and actions is the critical work to emerge from this study. The application of three analytical frameworks is proposed - realist evaluation, sociometric analysis of social forces and systemic analysis as proposed by Senge using archetypes. It is suggested that, using insights from these analyses, skilled interventions can be proposed to enable windows of opportunity to be identified, created if necessary, and exploited.

3.1 GREAT BARRIER REEF

The Great Barrier Reef experience shows that even world best practice in marine protected area formation and management is not on its own sufficient to ensure that the values of outstanding areas will be sustained. Based on the Great Barrier Reef, the necessary elements would appear to be:

- Identify the values.
- Understand the conditions necessary for their continued existence.
- Assess the contribution of each of the suite of anthropogenic stressors now and in the future.
- Set limits for each stressor in the context of the whole including synergistic effects.
- Explore options for containing each stressor.
- Select policy mix for stressor limitation.
- Implement.
- Monitor.
- Adapt management based on observations.

Because marine protected areas are social, rather than biophysical phenomena, the keys to their success lie in the elements of the social realm. In New Zealand, we label these predominantly as political, economic, social, and cultural processes, and these are linked within a full social fabric. Australian marine protected areas are predominantly legally defined, and thus are a product of formal political processes. It was evident that there

was a time delay of one or more decades from recognition that something should be done to protect the Reef from particular threats and the emergence of effective action.

Political decisions create legal instruments and allocate public resources. In the context of politics, the health of the marine environment, even an icon like the Great Barrier Reef, is a small feature in the political landscape. In politics, natural environments do not matter for their own sake, but only because some influential group with political influence cares about them.

Within social processes, people's actions are mediated by their belief systems, their knowledge and what they experience. This is as true of those with political power as anyone else. It is the belief system that is the central driver. When new data arrives, it is processed in the light of the prevailing mental model. This means that most of the incoming information is rejected if it conflicts with the belief system of the recipient. Therefore, the environmental administration in Queensland has turned to social marketing as its mode of activity to effect social change for the good of the Reef. Experience has shown that adding more information on its own changes the behaviour of few people.

Taken together with the huge raft of competing political priorities, it is thus not surprising that political action on dealing with environmental stressors facing the Reef has lagged far behind the realisation by knowledgeable stakeholders that action is needed.

In Australia, the dominant political groups over recent years have held a mental model that gave primacy to economic development. This mental model led decision makers to reject a huge amount of credible science advice on matters like climate change. In such a context, science advice itself generally takes on a more limited role in all political decision making. Stakeholders that value political action on environmental issues turned to social marketing of their own, but turned it onto the political process. This successfully moved the political process against the dumping of port capital dredging inside the Reef.

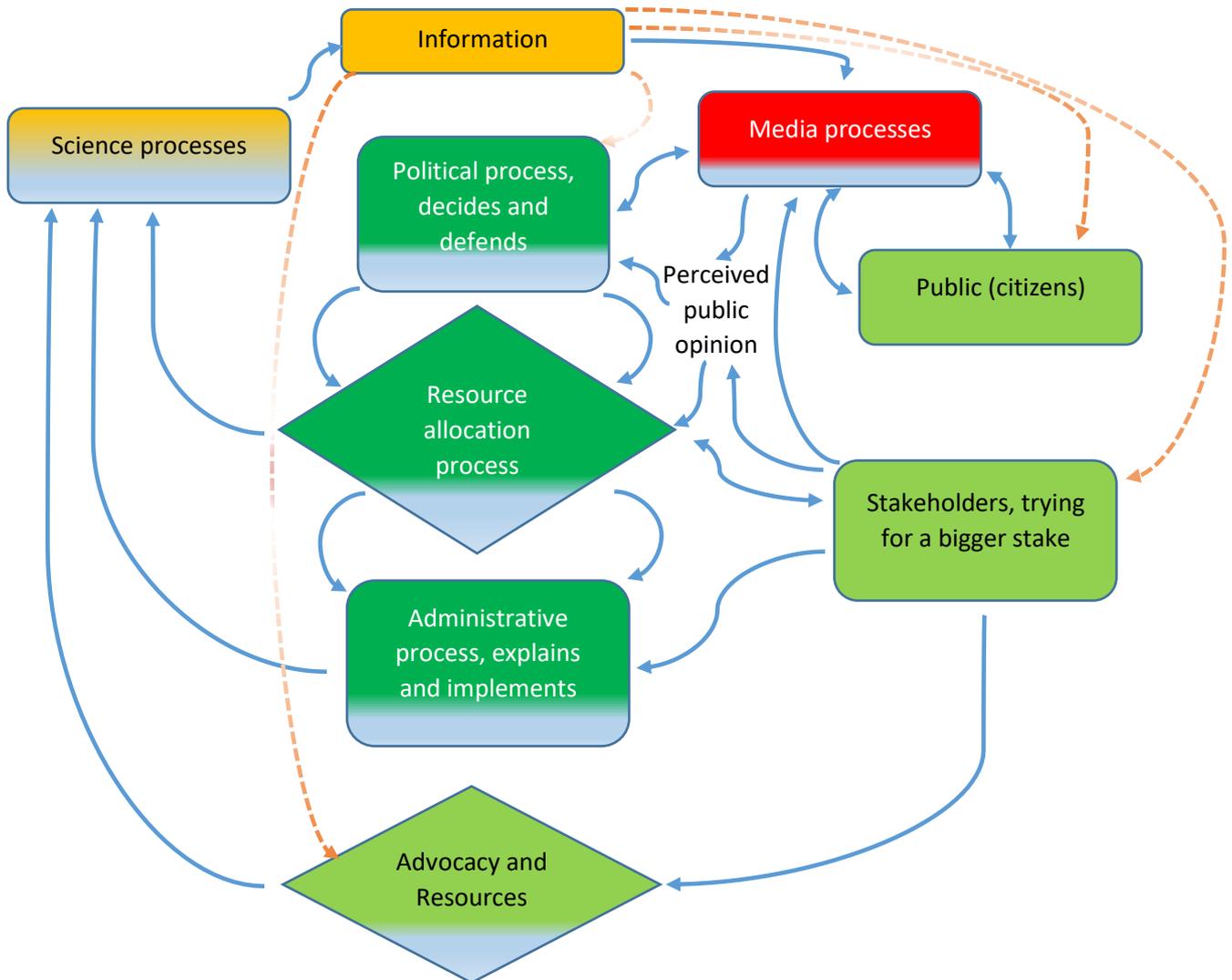
Uncertainty plays an important role in these processes. When the incoming information conflicts with the prevailing mental models there is a call for greater certainty. Science itself is comfortable with uncertainty, even as it works to reduce it. Scientists are trained to be rigorous in identifying uncertainty and seeking data that would disprove their current hypotheses as they seek for more general explanatory power. In the political process, however, this works against action being taken and resources being allocated. Uncertainty is a reason not to act on this issue, or at this time, freeing resources and favours for other competing interests.

This leads in turn to changes in the behaviour of the science community. There was noticeable tension between battle-hardened older scientists who had modified the way they expressed things to speak with more certainty to influence decision making, and younger scientists who held more strongly to science conventions as they sought to build their credibility with their peers.

The biophysical world is also full of surprises and apparent discontinuities. These include the outbreaks of Crown of Thorns Starfish, bleaching events, and cyclones. Where prevailing wisdom has been built on linear models, these events can lead to insights that management actions have been grappling with wrong or insufficient things. This has been seen in a sequence for the Great Barrier Reef - oil and gas, tourism, fishing, sediment and nutrient and most recently global warming and sea acidification. These events can also be dramatic opening windows of opportunity in the social/political process. Such openings

are called Overton windows³. Applying this to the Great Barrier Reef experience we get the system below:

Figure 1 Great Barrier Reef political and information processes



Note that the weak (red dashed) flows are the results of the science process, while the strong flows (blue solid) are strongly influenced by stakeholders trying to grow their valued stake in the system. The media mediates the interaction with the wider public, but the stakeholders endeavour to directly insert themselves to change perceived public opinion and influence the political process. In the case of the Great Barrier Reef, the Worldwide Fund for Nature with its letter writing campaign was particularly effective.

In speaking of “stakeholders”, I am distinguishing sectors with interests greater than the public generally. These include both the organized, such as WWF and the farmer lobbies, and the unorganized such as recreational fishers. High levels of organization and/or sophistication cause some stakeholder groups to exercise high levels of influence on the

³ <https://www.mackinac.org/7504>

political process, while others exercise far less influence than objective measures of effect would militate. The indigenous people of the Great Barrier Reef exemplify the latter category.

3.2 THE GULLY AND BRITISH COLUMBIA

The Gully Marine Reserve is another good example of the interaction of a sophisticated stakeholder, again the WWF, with a political administrative process at a point ripe for demonstration of the effectiveness of new policy. In this case, however, the stakeholder became distracted, and the administrative machinery encountered a political move to the right that disabled further progress.

This shows the importance of:

- Sustaining processes of influence to capitalise on initial success;
- The change in mode required when the general political environment changes.

In this case the WWF moved its attention to a representative Marine Protected Areas system, just at the time the political process became unreceptive to initiatives that might adversely affect the interests of the productive industry stakeholder sector. How then could the administrative part of the system respond productively?

Given the role of Overton windows the best response is two-fold:

First, limit the damage of the adverse political process on valued outcomes by slowing policy processes and arguing for better policy.

Second, prepare for the opening of the next window.

The less the public service is politicised the more possible are these approaches. Canada has been experiencing strong political pressure on the public administration and is looking to the New Zealand model for a remedy⁴.

Now, with a change in Government a window has opened. However, the Department of Fisheries and Oceans in Nova Scotia does not appear well placed to implement these policies. It has spent so long resisting, or responding to, environmentally adverse policies it is not well positioned to respond to the opportunities being offered. Policy, networking, methodology for Marine Protected Areas formation are all weak, and the targets set by the Liberal Government are, in any case, impractical without a brutal top down approach that would offend against its other principles of collaboration.

Conversely, the British Columbia experience is quite different. Here a Provincial leadership cut across the Federal *neo-colonial style conservatism* to make what progress it could in integrated marine management under its own authority. This now leaves British Columbia in a much better position to respond to the window that has opened. The issue will be the capacity of the federal administration to be responsive to the policy shift and change its own culture quickly enough to capitalize on the opportunity.

3.3 CHESAPEAKE BAY AND MONTEREY

Everyone interviewed in the USA, on both seaboard, was talking about political polarisation and the effect on their work and what could be achieved. The sheer scale of

⁴ <http://www.cbc.ca/news/politics/top-bureaucrats-met-to-resist-partisanship-imposed-on-public-service-1.3294972>

the human impacts on the sea, both positive and negative, and political complexity, were defining aspects of marine protection on both coasts. Figure 2 attempts to capture the system of political complexity, and reduce its role in marine protection to something understandable. It is very hard for any participant to comprehend the whole and there are strong homeostatic forces at play, meaning that any action draws compensating responses that tend to lead to outcomes of delay or cosmetic protection that appears to satisfy the wishes of environmental stakeholders while achieving little in practice.

4 CONCLUSIONS

4.1 KEY INSIGHTS

4.1.1 Indigenous people

The societal gap between indigenous culture and settler culture in Australia and Canada is larger than in New Zealand. There is a lot of good will at an organisational level, but little idea about what good practice would look like.

Beginning with the Treaty relationship (if it exists), or recognition of sovereignty, is fundamental to enduring solutions for marine management and protection.

The indigenous people's world view needs to be understood as a gift needed by the world to live in harmony with its environment. This should cause decision makers to go beyond seeking *buy-in*, beyond *consultation*, and beyond *engagement* to true *collaboration*.

4.1.2 Catalysing marine protection

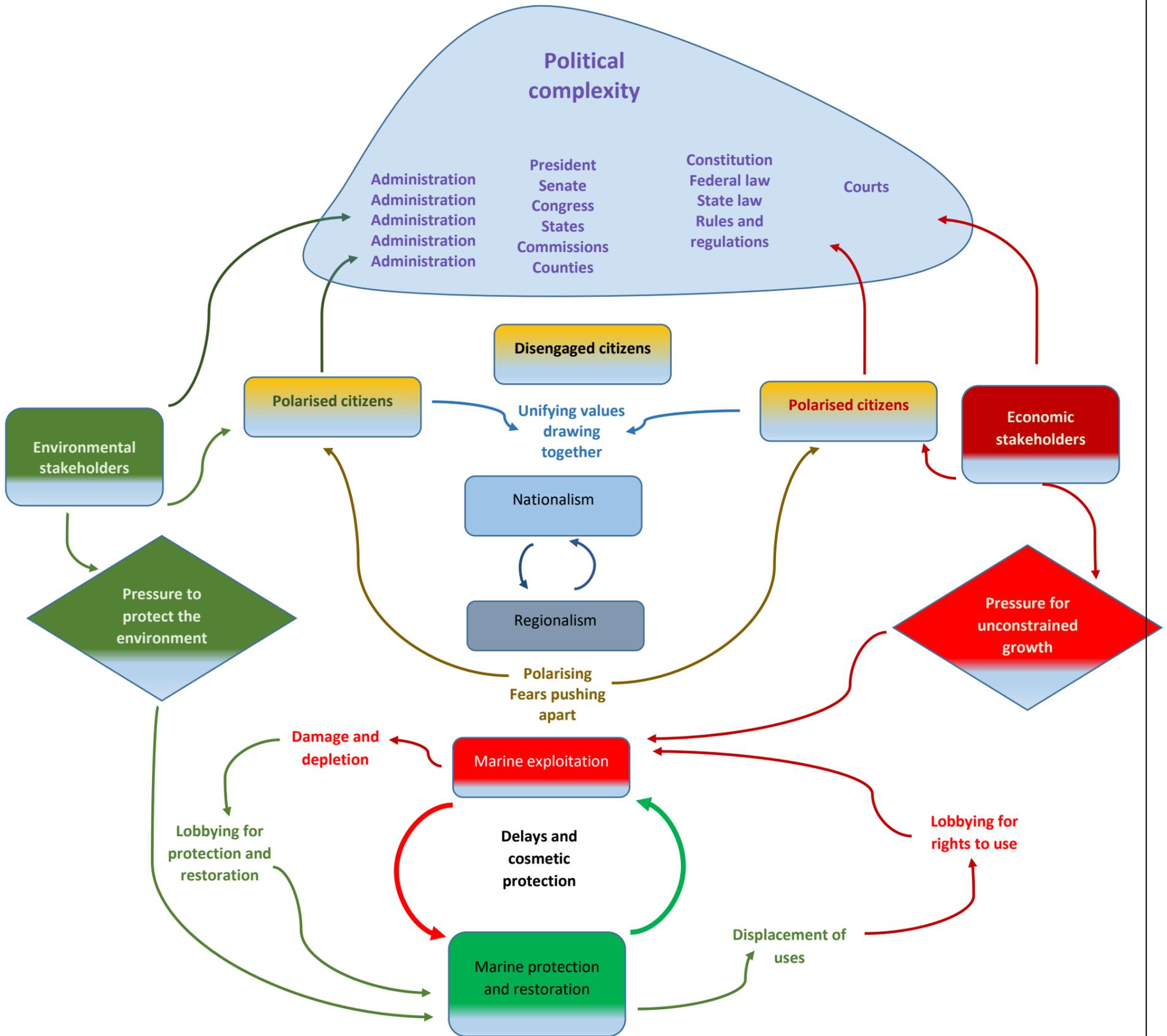
The process of constructing the thing is the thing. There is no magical end point to be reached. Strategies, plans and lines on maps are artefacts, marking phases in a community coming to care for its place.

Working with the emergent is the only way to go. Processes developed in one place and time cannot be blindly applied to another with any strong likelihood of success. Only by sensing into the field can a practitioner find the catalyst actions that will move whole communities to a new level.

In dealing with large dispersed issues, a productive approach is to deconstruct them into short term not-dispersed things. At the same time, only whole system solutions will be robust, even when the whole system is the whole planet.

We tackle what we can tackle based on current knowledge and social conditions, even when we know this to be insufficient in the long run. This yields short term gains, but, as seen with the Great Barrier Reef, even something as big as fixing the land run-off may be overwhelmed by climate change.

Figure 2 USA political complexity



Taking readouts of the trust level in a long-term group could provide useful information on the efficacy of interventions.

Recruiting allies bears fruit in the long run. These large complex problems have long times frames and working to increase the net friendliness in the system makes collaboration possible.

Being rigorous with yourself as a facilitator builds recognition of integrity. People are used to being disappointed, and crave trust. Taking responsibility earns authority.

The realist analysis process asks the question *what works for whom and how*, rather than proceeding from a pre-set idea of what “works” looks like. This frees the analysis to encompass the full range of perspectives.

It takes time to refine objectives, build trust, develop governance mechanisms and secure commitment and resourcing. Good facilitation, creating relational capacity, and commitment to a common direction is critical. This means that it is vital to be realistic with people at the outset that this is a marathon, not a sprint.

Leadership is an emergent property of the collaboration, rather than a role attaching to a person. Consequently, requisite leadership is built rather than discovered, and may emerge at a range of places and times as the process unfolds.

Collaboration requires the parties to be prepared to modify their goals to achieve a shared purpose. Cooperation merely requires them to find common ground for agreement. Some parties may become full collaborators in the core process while others may just need to cooperate sufficiently for an enduring solution to be found.

Direct engagement with stakeholders by individuals with a deep understanding of their realities is a key part of creating effective collaboration in marine protection. This means involving individuals with a wide range of experience, expertise and perspectives.

Even though conflict peaks in the formation process, so does engagement. When undertaking a process, you should be prepared for the way that apparent conflict increases as the enduring solution is approached. This is because parties are trying to secure maximum gains before the system moves from a labile to a meta-stable condition.

Boundaries can be set for marine protected areas and values recognised before issues identification and solutions generation commences. The Great Barrier Reef model, for example, succeeded. However, it is important that the founding legislation and administration contains the seeds and powers necessary for an adequate solution to emerge.

4.1.3 Socio-political processes

More locally based initiatives have a higher rate of success than federal processes in federated polities. This is seen in all three countries in the study tour. A rich appreciation of the local system of relationships, perspectives and natural and social systems are required to construct a sufficiently nuanced solution to gain acceptance by all critical stakeholders and to endure over time.

Creating funding streams enables a strategic approach without building a large administrative superstructure. The Foundations for Chesapeake Bay leverage influence through strategic analysis and investment. This leverages at multiple points: with the donor, the recipients and those involved in the projects.

At present, the simplicity of the New Zealand approach in focusing just on no-take marine reserves may be more effective in getting such areas than large marine parks with

cumbersome legal processes that lead to zoning. Focus really matters. This is pertinent to the current discussion in New Zealand about new legislation for marine protected areas.

Sophisticated social marketing may prove to be an effective tool for behaviour change in a dispersed and conservative stakeholder community. Creating a set of strategies based on stakeholder perceptions is a powerful approach, and the use of piloting allows things to be tested and refined before full scale implementation. Conversely, the emergent properties of systems at different levels of scale may render piloting approaches ineffective in some systems.

Micro-segmentation and careful selection and targeting of opinion leaders can be highly effective avenue for influencing bipartisan political outcomes. This can be particularly important in foundation stages when wide support needs to be garnered, or in implementation stages when behaviour change is needed from many stakeholders.

The people who get out in the marine environment are the ones who truly know it. It is easy to be seduced by sophisticated stakeholders skilled in dealing with political or administrative “realities”. The people who get out into the environment are the ones with a felt sense of the place and its dynamics. They are also likely to have generational commitment to the place. Getting their voices heard is a critical task for catalyst practitioners.

4.1.4 The role of science

Lack of science is not the problem in developed societies. Calls for more science are usually driven by stakeholders who want to slow processes down, or by scientists touting for business. The “problem” is closing the gap between what is known and doing something about it. That said, well presented good science is vital. Evidence-based, soundly analysed information allows an agreed and robust set of facts to emerge on which action can be based with some probability that the results of the action might have something to do with the aligned goals of the participants.

Independence in science advice can counter embedded vested-interest game playing. People, rightly, have come to distrust science sourced from vested interests. The lack of ability of scientists to create a firm ethical base for their advice means that new structures and processes are needed for science to play its most useful roles.

An engaging academic can be a major force in driving protection if allies are available in the administrative and political spheres. Academics have more independence than other “experts”, and through their work with students must develop skills in communication. This gives them a place to stand, resources, and capability to move hearts and minds. Bill Ballantine is the exemplar of this in New Zealand marine protected areas.

Monitoring is key to assessing the effectiveness of management. Marine protected areas seldom do what their founders thought they would do. Temptation to set outcome targets should be resisted, as the results can bring marine protected areas into disrepute when they fail to “deliver”. However, because of this difficulty in prediction, it is normal that management needs to be adapted over time to achieve foundational and emergent goals. Adaptive management works best when based on data. Monitoring is one way, but not the only way, of getting such data. Monitoring works better when harnessed to research, survey, and integrative processes. It should be noted that developing systems of sharing observatory/monitoring information that resource managers will use is a complex task. New technologies mean that automated data collection vastly increases information available on systems. Citizen science can be effective with adequate systems and training.

This increases the pool of information and the people who will appreciate the meaning of the data at the same time.

Information on its own does nothing. “State of the Environment” reporting in the form of simply presented report cards and indices can unlock action by agencies and communities.

4.1.5 Administering marine protected areas

Marine protected Areas are only as good as their implementation. The more people using the marine protected areas, the more implementation that is required to be effective. Many marine protected areas investigated in the study tour were so poorly managed they risked putting the whole concept into disrepute.

Sustained management solutions are needed. Often more effort is put into establishment than into implementation.

Doing something profoundly new in a country takes more time and energy and has more hurdles than any of the practitioners or the players realise when they set out. Every time you set a precedent it will impinge on someone’s territory and they spring from the background when you might least expect it. The actual work of creating a marine protected area is thus far more complex than lobbyists realise. Conversely, in a place with experience of establishing marine protected areas in a particular form, the learning permeates the system and can make subsequent efforts go more easily. Models of success matter.

Single focus entities have more chance of making a real difference. Regularly reviewing management actions and adapting to new information is essential. Critical success factors are the skills and commitment of the agency leaders in leadership, political processes, and committing resources. The Great Barrier Reef provides a model of all the necessary elements.

A statutory advocacy role is a key activity for a marine protected area to be able to deal with impacts that relate to offsite activities. Every marine protected area has boundaries, and the flows from land to sea and within marine environments means that capacity to influence activity beyond the borders is essential to maintain the health of any marine protected area. Equally within the marine protected area boundary effective regulation and enforcement are key elements of success. The need for legal enforceability comes because, in many cases, effective protection action can have a material and adverse effects on the interests of a set of stakeholders.

Visitor services are best embedded in a system for which the role is core business, but excellent staff will create excellence regardless. Providing infrastructure and interpretation have become highly skilled and professionalised areas of activity. Agencies and organisations that do a lot of this work will do it better than those for whom it is a one-off project.

Trained volunteers can vastly increase the outreach of administrative agencies. This was a major feature in the USA and is much less evident in New Zealand.

4.1.6 Biosecurity

New Zealand is way ahead of other jurisdictions in taking practical steps to reduce marine biosecurity risks. Most jurisdictions are either unconscious of the need for action, or are contemplating it rather than doing it. At the same time the scientists around the globe are on the ball and well networked. The gap between knowledge and active risk reduction is a critical factor in achieving effective action on marine invasives around the world.

Global warming is opening new vector routes through the Arctic in a complex international political environment that will make management difficult. This phenomenon may have parallels in other parts of the world.

4.2 GENERAL CONCLUSIONS

Processes of collaboration can only be successful when the unifying forces exceed the divisive forces. Therefore, we see small gains, like those described by Paul Michel for the Sanctuary programme, where division is avoided by leaving out the key area of conflict, in this case, fishing. Equally, in enormous programmes like the Chesapeake Bay restoration, there is slow headway despite the resources and skills applied.

Large, diffuse highly conflicted systems with long time delays require great unifying forces and highly effective catalyst processes that reduce transactional costs to the parties. These catalyst processes are the technologies of dialogue, synthesis, and collaboration. Chesapeake at \$5B a year is at the top end of subnational processes of this type.

Smaller, localised, less conflicted systems with shorter feedback loops can produce enduring solutions with modest efforts, BUT the solutions are vulnerable to being overwhelmed by signals from larger systems. The Californian marine reserves at a state level is at the top end of such approaches with a cost of \$14M.

5 APPLICATION

5.1 CONTRIBUTION TO FACILITATION IN NEW ZEALAND

The learning from this Fellowship advances the practice of facilitation of community leadership in caring for the marine environment. It has enabled the development of insights and tools that can be applied to large scale collaborations currently being applied to environments such as the Hauraki Gulf, Waikato River, Marlborough Sounds, and the south-eastern coastline of the South Island. These tools can also form the basis of training facilitators active in these fields.

5.2 CONTRIBUTION TO MAINTENANCE OF THE COMMONWEALTH AS A BENEFICIAL INFLUENCE IN WORLD AFFAIRS

In the course of this Fellowship travel, well attended presentations were given at the Bedford Institute in Nova Scotia, the Smithsonian Institute in Annapolis, and the Monterey Sanctuary in California. These allowed case studies and learning from New Zealand to be shared with leading researchers and interest groups in these locations. The New Zealand approach to working with indigenous people was of interest and has led to requests for further contributions, including from aboriginal people.

5.3 APPLICATION OF LEARNINGS

Learning from the Fellowship has already been applied to integrated management in the Marlborough Sounds, resolving coastal access issues around Nelson, advising on priorities for the Kaikoura Coastal Guardians and developing links between indigenous groups in different countries. The outline of a book has been developed and key insights will be shared with policy makers in central and local Government. Further steps will involve publication and integration of learning into training facilitators.

The learnings from this Fellowship are directly applicable to:

- The marine protected areas legislation review.
- The work of a wide range of organisations engaged in marine protection.
- Facilitation professionals.

Steps are underway to contribute to all of these.

5.4 SHARING LEARNINGS

- All 50 contributors to this study were provided with the full report in draft and many contributed responses to the insights provided.
- A half day workshop on collaboration was run at the Environmental Defence Society conference on wild places and one of the contributors came from Australia as the key note speaker.
- Presentations have been made to: the Nelson Biodiversity Forum, Forest and Bird, Kaikoura Guardians, Marlborough Sounds Integrated Management Trust, and TOS Marine Biosecurity Partnership.

6 RECOMMENDATIONS

The key recommendations from this study are addressed to the Ministers of Conservation, Environment, Fisheries, and Biosecurity. They are that:

1. Collaborative processes being embedded in policy and legislative instruments need to be more carefully set out to enable the full value to be realised by communities and by the country as a whole;
2. Large scale, multiple-use, zoned marine parks of the form adopted for the Great Barrier Reef should be provided for in any new marine protected areas legislation;
3. The historic underinvestment in marine biosecurity needs to be corrected as a matter of urgency, and the new provisions for pathways management implemented nationally as soon as possible.

7 ACKNOWLEDGEMENTS

I would like to sincerely thank all those that made this study tour possible. First, the Winston Churchill Fellowship for its generous funding. Second, all those that provided information, resources, their time, and passion for the marine environment. Third, people that organised meetings, talks and itineraries including Janie Waterhouse in Brisbane and Townsville, Maxine Westhead in Nova Scotia, and Lisa Wooninck in Monterey. Fourth, all the wonderful new and old friends who provided accommodation, vehicles, local knowledge and opportunities for rest and recovery in a frenetic programme: Janie Waterhouse in Brisbane, Jon Brodie in Townsville, Beth Guerrera in Boston, Lucy Barber in Washington DC, Cathryn Jones in Vancouver, and David Bomberger in California. Fifth to institutions that hosted me for extended visits including the Bedford Institute, NOAA Monterey Marine Sanctuary, and Maryland University. And finally, those that got me out and about in their unique environments including Yongalla Dive on the Great Barrier Reef, Paul McNab in Nova Scotia, Cathryn Jones in British Columbia, and Phil Sammet in Monterey Bay.

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Figure 1 Anemone Monterey Bay



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1 EXECUTIVE SUMMARY

The core hypothesis of this study was that, by comparing experiences of involving communities in protecting and restoring areas of the marine environment, generally applicable lessons could be found that could enhance New Zealand's capacity to be effective in marine protection.

Four well established models were selected:

- Australia's Great Barrier Reef, the "grandfather" of large marine parks around the world;
- Nova Scotia's The Gully Marine Reserve, the longest established marine reserve over a continental submarine canyon;
- East Coast USA's Chesapeake Bay, the largest and oldest restoration of an enclosed area of the sea;
- Monterey Bay Marine Park, a multi-zoned marine park that includes near-shore environments to submarine canyon depths.

British Columbia's co-governance of the marine environment with the indigenous people was added after the initial itinerary was set.

The Great Barrier Reef Marine Park displays world best practice in creating and refining a very large, multiple use marine protected area. Despite this, it is failing to achieve its core purpose due to factors beyond its boundaries. The principal threats are climate change and nutrient input from the land. This shows that it is critical to understand and include the full context that affects the formation and management of marine protected areas if the objectives for which they were formed are to be achieved with any degree of certainty. This means going beyond what we think we can tackle to what we really need to tackle.

The Gully Marine Reserve shows the importance of sustaining processes of influence to capitalise on initial success and the change in mode required when the general political environment changes. Policy, networking, methodology for Marine Protected Areas formation are all weak because of the Harper Government's cutting of programmes for marine protection over the previous decade¹. The targets set by the Liberal Government², of 10% of the marine area in MPAs by 2020, are impractical without a brutal top down approach that would offend against its other principles of collaboration.



Figure 2 Fishing boats Peggy's Cove, Nova Scotia

¹ <http://o.canada.com/news/harper-government-cutting-more-than-100-million-related-to-protection-of-water>

² <https://www.liberal.ca/realchange/trudeau-announces-plan-to-protect-canadas-oceans/>

Conversely, the British Columbia experience is quite different. Here a Provincial leadership cut across the Federal *neo-colonial style conservatism* to make what progress it could in integrated marine management under its own authority. This now leaves British Columbia in a much better position to respond to the window that has opened. The issue will be the capacity of the federal administration to be responsive to the policy shift and change its own culture quickly enough to capitalize on the opportunity.

Everyone interviewed in the USA, on both seaboard, was talking about political polarisation and the effect on their work and what could be achieved. The sheer scale of the human impacts on the sea, both positive and negative, and political complexity were defining aspects of marine protection on both coasts.

It is very hard for any participant to comprehend the whole and there are strong homeostatic forces at play, meaning that any action draws compensating responses that tend to lead to outcomes of delay or cosmetic protection that appears to satisfy the wishes of environmental stakeholders while achieving little in practice.

Processes of collaboration can only be successful when the unifying forces exceed the divisive forces. Therefore, we see small gains, like those described by Paul Michel for the Sanctuary programme, where division is avoided by leaving out the key area of conflict, in this case fishing. Equally, in enormous programmes like the Chesapeake Bay restoration, there is slow headway despite the resources and skills applied.

Large, diffuse highly conflicted systems with long time delays require great unifying forces and highly effective catalyst processes that reduce transactional costs to the parties. These catalyst processes are the technologies of dialogue, synthesis, and collaboration. Chesapeake at \$5B a year is at the top end of subnational processes of this type.

Smaller, localised, less conflicted systems with shorter feedback loops can produce enduring solutions with modest efforts, BUT the solutions are vulnerable to being overwhelmed by signals from larger systems. The Californian marine reserves at a state level is at the top end of such approaches with a cost of \$14M.

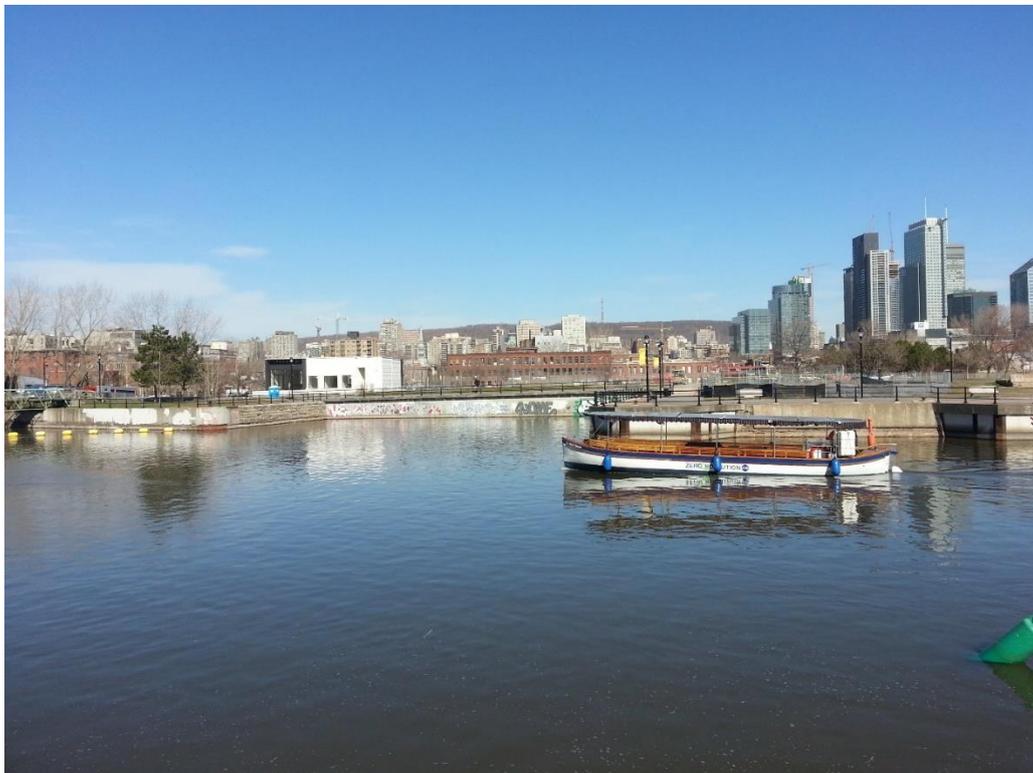


Figure 3 Montreal

2 METHODS

The approach was an iterative exploration through semi-structured interviews each of which was immediately analysed in a process that developed as insights were gained. Text relevant to each informant was copied to them so corrections and additions could be made, and thus the text in the report is agreed by the informants as a true and correct record. The respondents were offering personal opinions and insights which were not necessarily representative of the views of the agencies or organizations with which they are affiliated. Respondents emphasized that the opinions that they expressed were solely their own, and should not be construed as some sort of statement of agency policy.

While the principal focus was the social process, the biophysical context was also important, and was documented in relation to place. Published and unpublished materials were gathered and analysed both during the study tour and subsequently to inform the overall conclusions.

The results are to be applied in marine protection initiatives in New Zealand (particularly the 7,250 square kilometre Marlborough marine area), in training facilitators and in contribution to law and administrative reform.

The frames of reference applied in analysis included:

Senge's system theory, Scharmer's Theory U, Moreno derived sociodrama as interpreted by Hamish Brown for application to analysis of social forces, realist analysis, organisational analysis for stratified systems based on the Requisite Organisation of Jacques and the seven S McKinsey model. Inherent in the approach was comparison to experience gained through thirty years of practice in environmental protection, particularly with marine spatial project including: Te Korowai o te Tai o Marokura, Marlborough Marine Futures, Hauraki Sea Change, and Nelson Biodiversity Strategy and Partnership.

This work has been done from my frame of reference as a "facilitator". This is an emerging professional role with a wide range practice and theory. To facilitate is to "make easy" and the focus of my work is enabling collaboration (literally, to labour together). References to "facilitation" in the report include all activities purposefully assisting groups to achieve a purpose.



Figure 4 Bay of Fundy

3 AUSTRALIA

3.1 THE GREAT BARRIER REEF MARINE PARK

Summarising from Day (in prep), the Great Barrier Reef is the largest coral reef ecosystem on the planet. The Great Barrier Marine Park covers 344,400km². Its western boundary is generally the mean low-water mark on the mainland coast of Queensland and the Park extends seaward between 80 and 250km offshore, well outside the outer reefs into deep oceanic waters to a depth of 1000m. The Great Barrier Reef was included on the World Heritage List in 1981. Informants say that the Great Barrier Reef has greatly influenced many subsequent marine protected area efforts around the world. It is regarded by many as 'the grandfather' of modern marine protected areas. The passing of a federal Act in 1975 provided for the protection and management of the Great Barrier Reef. It also established a special purpose body, the Great Barrier Reef Marine Park Authority to manage it. This has led to a zoned multiple use area where a range of activities are provided for within an overall conservation purpose.

3.2 RACHEL EBERHARD

Interviewed on Skype 17 March 2016.

3.2.1 Who is she?

Rachel is a facilitator and academic working with collaborative governance in the area around Brisbane where she is based.

3.2.2 What did she say?

Effective collaboration needs to emerge at the level of agencies as well as communities. Her work examines the nature of inter-organisational collaboration and governance.

I've used the concept of collaboration life cycles as part of collaboration training before and it helps people realise understand what they need to focus on now, versus all the things that need to be considered and negotiated. It also highlights that collaboration often has a natural end point - the object is achieved, or other priorities/processes overtake.

You can also think about it as a collaboration cycle, similar to planning or policy cycles, where the vision and purpose of collaboration periodically needs renewal. All the initial energy required to negotiate the collaborative arrangement up front settles down as implementation processes begin. This can be associated with a shift from higher level engagement i.e. CEO's, senior public servants, ministers, to operational staff. Internal or external events may then trigger a need to re-engage the higher-level to reconsider the ongoing need and purpose of collaboration. This has been very apparent with the Reef Alliance group that I have worked with over 10 years - major funding cycles and elections trigger re-engagement of higher-level individuals and all aspects of the collaboration can be up for renegotiation.

I did a quick mapping exercise of thinking through the initiation of several partnerships I've been involved with against your phases and leadership categories. A couple of things stood out:

** Some of these leadership roles tend to cluster together e.g. broker, facilitator, synthesising leader.*

** Some leadership roles are clearly shared i.e. champions from key groups progress the idea. This might be one in government, one in industry, one in community sectors. This was apparent in the testing the solution phase, but also brokerage.*

** I found the mandating stage / political leadership interesting, and difficult to place*

within the list. In many cases some mandate is required for a process to commence, and then more substantial mandate once the concept or proposal is more fully developed.

So, I think some of the roles can be merged some of the time, and the sequence is not necessarily linear, in reality it may contain multiple iterations, particularly for longer term collaborations. I think you list really highlights the stages in setting up a collaboration. Thinking about maintaining, adapting, and closing a collaboration are also important elements. I'd like to draw it as a circle (but that's often how I think).

Mandate and accountability is a really interesting question because it has many dimensions. I've attached a paper by Hertting et al that nicely summarises the multiple accountability perspectives in network evaluations - internal and external, horizontal and vertical accountabilities. These cover mutual accountability of network members to each other, accountability back to their own individual organisations, accountability to external stakeholders, and accountability to external governors or sponsors.

3.2.3 Key insights

The realist analysis process asks the question *what works for whom and how*, rather than proceeding from a pre-set idea of what “works” looks like.

It takes time to refine objectives, build trust, develop governance mechanisms and secure commitment and resourcing. Good facilitation is critical.

Leadership is an emergent property of the collaboration rather than a role attaching to a person.

Collaboration requires the parties to be prepared to modify their goals to achieve a shared purpose. Cooperation merely requires them to find common ground for agreement.

3.2.4 Analysis

If leadership is an emergent property of the collaboration, the nature of the requisite leadership at each stage of the collaboration can be distinguished. An emergent property will change with the conditions pertaining at each stage. This pre-supposes there are a standard repeatable series of stages in a collaboration. If this is so, there will be other emergent properties that could be distinguished. As a working frame the following stages of a collaboration are suggested and requisite leadership labels distinguished and are further elaborated in Appendix 1.

Stage	Requisite leadership
1. Idea	Thought leader
2. Inception	Initiating leader
3. Formation	Design leader
4. Establishing the ground of collaboration	Broker
5. Issue identification and problem solving	Facilitator
6. Creating a nuanced solution	Synthesising mediator
7. Testing the solution	Engagement leader

8. Refining the solution	Synthesising mediator
9. Mandating the solution	Political leader
10. Transition to implementation	Administrator

3.2.5 Resources provided

- **Realist Evaluation** Ray Pawson and Nick Tilley 2004
- **A collaborative approach to address the cumulative impacts of mine-water discharge: Negotiating a cross-sectoral waterway partnership in Bowen Basin, Australia** Eberhard et al Resources Policy 38 (2013) pp678 - 687
- **Adaptive management for water quality planning - from theory to practice** Rachel Eberhard A, H, Catherine J. Robinson B, Jane Waterhouse C, G, John Parslow D, Barry Hart E, Rodger Grayson F and Bruce Taylor B Marine and Freshwater Research, 2009, 60, 1189-1195
- **Using knowledge to make collaborative policy-level decisions in Australia's Great Barrier Reef** Cathy J. Robinson, Rachel Eberhard, Tabatha Wallington and Marcus B. Lane, Technical Report - January 2010, CSIRO
- **Complex acts of knowing: Paradox and descriptive self-awareness** Snowden, David Journal of Knowledge Management; 2002; 6, 2; ProQuest Central pg. 100
- **A Leader's Framework for Decision Making** by David J. Snowden and Mary E. Boone Harvard Business Review
- **Purposes and criteria in network governance evaluation: How far does standard evaluation vocabulary takes us?** Nils Hertting and Evert Vedung 2012, Evaluation 18:27

3.3 JON DAY

Interviewed on Skype 31 March 2016 and face to face 9 April in Townsville.

3.3.1 Who is he?

Previously one of the Directors at Great Barrier Reef Marine Park Authority from 1998-2014. Now a doctoral candidate at James Cook University with a long history in environmental planning and management including leading the re-zoning of the Great Barrier Reef Marine Park. Currently researching the re-zoning process to draw out the essential elements including the roles of leadership, science, and the political process.

3.3.2 What did he say?

In his draft book chapter Jon says:

A multiple-use approach across the entire Great Barrier Reef has the advantage of allowing the area to be managed as an integrated whole, not just a series of isolated highly protected areas within a surrounding 'sea' of unmanaged activities. In the highly connected 'fluid' marine environment, and certainly for larger marine protected areas, this approach is considered preferable.

Although zoning is a well-recognised form of marine spatial planning, it is not necessarily the most effective way to manage all ocean activities or impacts (Day 2015). Many issues facing marine protected areas cannot be effectively managed by zoning alone; Day (2015) lists:

- *Water quality - ocean zoning usually does not apply outside the marine area up onto the land where most water quality issues arise.*

- *Fishing impacts - zoning may assist by managing some, but not all, unsustainable fishing impacts.*
- *Climate change - zoning can help build resilience, but does not consider such factors as acidification or rising sea temperatures.*
- *Coastal developments, especially ports - zoning will not apply in ports if they are located outside the jurisdictional control of a Marine Park.*
- *Shipping and pollution incidents - a zoning plan may help by delineating shipping lanes but will not help to reduce ship groundings or marine pollution*
- *Increasing population growth and recreation - marine zoning will not deal with key issues unless it can help to curtail use or reduce some of the consequential impacts.*

Despite major threats and complex issues, the Great Barrier Reef remains a good working example of the ecosystem-based management approach. The long-term success of effective management in the Great Barrier Reef has been attributed to various factors (Day and Dobbs 2013; Day 2015) including:

- *strong political support*
- *a sound governance/legislative framework, with complementary legislation for all state and federal waters*
- *an ecosystem-level approach to management including management influence over a wider context than just the federal Marine Park*
- *widespread public support and consensus that the Great Barrier Reef is important, with many industries recognising that their future depends upon its health*
- *well-developed/integrated management with all relevant federal and state agencies*
- *planning at various scales for various purposes (and acknowledging that the Zoning Plan is only one layer of management)*
- *effective community engagement, good cooperation with most sectors and a strong educational focus*
- *effective research and monitoring programs, prioritised to provide information for management.*

The process of re-zoning the Great Barrier Reef Marine Park was a success story primarily because of the process adopted, effective leadership and positive politics. The principles for the re-zoning lifted marine protection from an ad hoc focus on coral reefs into a framework of representative protected areas across the full range of all known habitats (= bioregions).

The target was no less than 20% of each of 70 bioregions to be represented in fully protected no-take areas.

The process included extensive stakeholder engagement to socialise the idea of protecting a full range of representative areas and engage the stakeholders in refining the boundaries of the protected areas to minimize social impacts (mostly by restricting fishing) while not sacrificing the principles or the goals set at the outset of the process.

Over 31,600 submissions were processed, and a special procedure was developed for this which allowed tracking of each submission and the “family” of issues that it belonged to. The result was that more than 33% of the Park is now in IUCN Category Ia or II marine protected areas. In the process, public meetings were minimized in favour of well-advertised drop in sessions staffed by agency experts.

The key thing at such public meetings as were called by activated stakeholders was to have uniformed and senior agency staff dispelling misinformation from polarized stakeholders.

Indigenous people were involved in setting management rules for places of importance to them (TUMRA areas) - while this process was established during the rezoning, all TUMRAs have only come into place since the new zoning commenced in 2004. "White fella law implementing black fella lore".

In the 1990s Great Barrier Reef Marine Park Authority realised that it wasn't doing its real job. Coral reefs did not represent the range of biodiversity in the area. John had learnt from Professor John Roff in Canada what was required to divide a portion of the ocean into representative areas. Australia also had a strong track record on land with the CSIRO land systems mapping, and application, through the Land Conservation Council, in making good decisions about public lands in Victoria. Jon also understood the importance of public communications and excellence in submissions analysis.

In 1998 the holistic plan process began. The initial bio-regionalisation was prepared using groups of scientists and working with them on white boards onto which were projected layers of GIS data. The reef scientists worked initially separately from the non-reef scientists and the two groups of 20 were then brought together in a third session. Each session was two days long.

The results were exposed to public scrutiny and comments from fishermen who knew the area well and this resulted in revisions. Russel Rescheilt, who now heads Great Barrier Reef Marine Park Authority, provided an independent science review of the outcomes before it was deemed fit for purpose. The review by Fernandez said that the principles established at the outset were mostly achieved by the product. It was stated out the outset that the result would be more protection, not less.

In doing the submissions analysis all submissions were coded against themes and locations. Every reef had a unique identifier and even portions of reefs. The submissions were not a numbers game and some reflected a consensus reached in particular places. While these were given particular regard, decision authority was held to Great Barrier Reef Marine Park Authority. The process in total took five years. The systematic, precautionary approach has been validated when data has been collected from areas where there was little information.

The area involved is 2,500km of linear coastline and extends out to 250km from the shore.

Contrary to some reports MARKSAN did not zone the reef and had limited utility.

Analytical tools cannot design a representative network but they can tell you what you ended up with and what was sacrificed. Next time around Jon would like to see more pink zones, which are no-access areas. These are showing even more recovery than no-take areas.

All in all, the planets aligned for the re-zoning process, and the continuity provided by Virginia Chadwick CEO of the Great Barrier Reef Marine Park Authority), and the willingness of 3 Ministers to take her guidance, were critical.

3.3.3 Key insights

A critical success factor was the skills and commitment of the Great Barrier Reef Marine Park Authority chief executive in:

- Leadership that fully expressed the strategic role;
- Political processes;

- Committing the full resources of the organization when the scale of the exercise became apparent.

3.3.4 Analysis

The process that Jon describes is a highly effective example of transparent engagement, rather than being a full collaboration in Eberhard's terms. While the stakeholders had to modify their goals, they had no decision authority. Initiation and resolution were held to the Minister of the Federal government. The State government introduced complementary regulations when it saw the success of the process.

By engaging a lot of stakeholders in a transparent information-rich process it became possible to develop a solution that allowed representative and special areas to be protected, even where social costs could not be avoided.

In this case, *effective* means engaging all stakeholders on their own terms in processes where their informational needs are met and they feel respectfully engaged. This requires those doing the engagement to be credible to the differing stakeholders, for example using fisheries experts to engage fishers.

Engaging means informing and listening and using the information gained to modify proposed solutions.

Transparent means that principles and processes are disclosed from the outset and promises are kept.

Solution in this context means a spatial plan with legally enforceable rules, but Jon says that that is not enough for a robust solution (there are many statutory layers in the Great Barrier Reef management tool box).

Criteria included principles for defining biogeographic zones and how much protection was enough.

Information rich means good quality science and being real about the uncertainties. It also values the qualitative information held by stakeholders and their experiences.

Social costs involve sacrifices current or future opportunities for things that people value (such as the opportunity to fish).

Well supported means that most stakeholders support the solution even if they do not get everything they want.

Social sacrifices are inevitable because getting a truly representative network involves protecting places that some people want to use in ways that would compromise their values (such as by removing fish).

The existence of the Great Barrier Reef Marine Park Authority as a single focus entity was a critical factor in integrating the roles of federal and state governments. (Great Barrier Reef Marine Park Authority led the process, but needed to work with a multitude of federal and State agencies). The Authority was also fit for purpose for a project of this size and complexity though, even though it was stretched by the size of the project.

3.3.5 Resources provided

- **The Great Barrier Reef Marine Park - the grandfather of modern Marine Protected Areas** Jon Day Chapter 5 in PhD thesis in prep
- **Biophysical Operational Principles as recommended by the Scientific Steering Committee for Representative Areas Program** (Technical Information Sheet #6, 2001)
- **Social, economic, cultural and management feasibility operational principles** (Technical Information Sheet #7, 2001)

The extent to which these principles were met is discussed in:

- **Establishing representative no-take areas in the Great Barrier Reef: large-scale implementation of theory on marine protected areas.** Fernandes et al. (2005) *Conservation Biology*, 19 (6). pp. 1733-1744.
- <http://www.gbrmpa.gov.au/our-partners/traditional-owners/traditional-use-of-marine-resources-agreements>
- http://www.gbrmpa.gov.au/_data/assets/pdf_file/0018/6183/reef-wide_framework_for_managing_tumra.pdf
- **Structural adjustment program (SAP) - Macintosh A, Bonyhady T, Wilkinson D (2010) Dealing with interests displaced by marine protected areas: a case study on the Great Barrier Reef Marine Park Structural Adjustment Package.** *Ocean and Coastal Management* 53, 581-588. [doi:10.1016/j.ocecoaman.2010.06.012](https://doi.org/10.1016/j.ocecoaman.2010.06.012)

3.3.6 Further contacts suggested

Robert Beaman Cairns deepreef.org.

3.4 BILLIE GORDON, JOHN PICKERING, JENNY HONG AND CAROLYN CARRUTHERS

3.4.1 Who are they?

Billie Gordon is the engagement and communications project leader for Reef Water Quality in the Department of Environment and Heritage Protection of the Queensland government. She was the principal informant in this interview. Carolyn Carruthers works in the Office of the Great Barrier Reef, a reef coordination office set up in May 2015. John Pickering and Jenny Hong have recently set up an independent consultancy firm that is going to support the programme. They come from an academic background in the positive parenting programmes and have a psychology background.

3.4.2 What did they say?

The Reef Water Quality Team has been going since 2009, and \$11M has been invested since, with additional \$12M to be invested over the next three years in the science program. They have worked to understand what they face, and now have a clear idea of the issues. These relate principally to how land-use affects water quality and thus the health of the Great Barrier Reef. This understanding has come from a structured science programme of looking at certain catchments in detail as well as the whole.

The State regulations on water quality put in place in 2010 were reinvigorated recently after a period of focusing on industry based solutions. The approach is influenced by the priorities of the government of the day.

There is a land-use bench marking programme (Smartcane BMP) where cane growers can self-assess, complete training modules and become accredited. The incentives for completing the programme have, however, not been strong.

After experience in working with the land managers on one of the projects in the Burdekin, the focus has shifted to encouraging good land use on the basis that it leads to increased profits, rather than talking about water quality and reef directly. The Reef Water Quality team, keeps close links with Agforce³ and the cane growers collective organisations.

Although some farmers are producing crops under accreditation and link to Bonsucro⁴, the product all gets mixed in the processing and the value of the accreditation is lost. This

³ <http://www.agforceqld.org.au/>

⁴ <http://www.bonsucro.com/>

works through the Smartcane BMP. *Smartcane BMP is about improving the bottom line of individual cane farms and is also a system we can use to market our sugar to the world.*⁵

While the idea was that a big proportion of the industry would get on board within a couple of years this has not happened. Now they are focusing on the Burdekin catchment^{6 7} and nitrogen inputs from farming. One of the trials, Burdekin nitrogen trials, has worked with 14 highly engaged farmers the finding has been that profitability can be increased by reducing N fertiliser input from 500kg/ha to 150kg/ha. An agronomist works with the farmers and aims to use the industry recognised *6 easy steps nutrient management rate*. The trial findings are now ready to be extended across the Burdekin to work with cane farmers in this region. This next project will utilise the *community based social marketing methodology*. The programme is now ready to embark on a *community based social marketing programme* sourced from Canada⁸. This involves a five-stage process leading to behaviour change. Having undertaken the research component of the project to identify specific practices, and define barriers and benefits to undertaking these practices, Billie is putting together a strategy paper and once approved two pilot groups will be set up where alternate strategies will be trialled. These strategies have been developed from interviewing groups of farmers to discover what they believe the barriers to adoption may be.

The discussion then turned to John Pickering's work. He and Jenny come from a background of parenting programmes based on evidence based interventions that work across the entire community at once (and they said this established a new normal). This is based on the work of Professor Matt Sanders⁹ and extension of that work to protecting coral reef areas in Indonesia. John and Jenny's work will be funded by the State but they will be located within the Smartcane BMP. It is early days and social mapping has begun but is not yet complete and this will be used to design interventions.

3.4.3 Key insights

Sophisticated social marketing may prove to be an effective tool for behaviour change in a dispersed and conservative stakeholder community. Creating a set of strategies based on stakeholder perceptions is a powerful approach, and the use of piloting allows things to be tested and refined before full scale implementation.

3.4.4 Analysis

It is notable that there are very different sorts of people to be engaged from ready adopters to highly resistant. Most do not believe the science if it conflicts with their strongly held mental models about the world.

Trust is a critical factor. Most people do not trust the Government or other parties with apparent agendas.

The framing of purpose of programmes needs to include the values of the stakeholders. Thus, framing in terms of feel-good results for the environment may not be effective for parties for whom that is not a factor. However, leaving out the wider social/environmental benefit from the purpose may deliver less results in the long run, as

⁵ <https://www.smartcane.com.au/aboutBMP.aspx>

⁶ <https://www.dnrm.qld.gov.au/water/catchments-planning/catchments/burdekin>

⁷ The **Burdekin River** is a river located in North and Far North Queensland, Australia. The river rises on the northern slopes of Boulder Mountain at Valley of Lagoons, part of the western slope of the Seaview Range, and flows into the Coral Sea at Upstart Bay over 200 kilometres (124 mi) to the southeast of the source, with a catchment area of approximately 130,000 square kilometres (50,000 sq mi). The Burdekin River is Australia's largest river by (peak) discharge volume. https://en.wikipedia.org/wiki/Burdekin_River

⁸ <http://www.cbsm.com/pages/guide/fostering-sustainable-behavior/>

⁹ <https://www.psy.uq.edu.au/directory/index.html?id=33>

other parties' values get left out. There is a risk of the programme having a felt lack of integrity if the "real" purpose is revealed. The opportunity to enrol people in a new paradigm may be lost.

The idea of mapping social forces as used by Phoenix Facilitation seemed unfamiliar to the researchers. Phoenix teaches people to concretise social forces and explore how to work with them through sociodramatic methods. With the Great Barrier Reef, participants tended to focus on structure and process, with social forces being largely unspoken and hence acting invisibly.

Characterisation of the system as *complex, complicated, or chaotic* as advanced by Snowden would help to understand whether the approach to intervention is a good one. In Snowden's terms the approach adopted depends on the system being no more than *complex* (it is clearly not simple). However, the approach being used for social marketing appears to be one applicable to *complex* systems where a mental model can be formulated (strategy) and then refined over time as feedback is received from the intervention. If, however, the system is *complicated* then a mental model based on part of the system, or on a period of time in interacting with the system, then the results are not likely to be sustained on scaling up or when discontinuities occur in the system. A more robust approach might be to put more resources into multiple pilots more widely spread through the system and then build on those that start producing results and dropping the others.

3.5 RICHARD LECK

3.5.1 Who is he?

Richard Leck joined WWF-Australia's Great Barrier Reef campaign team in 2003. The Great Barrier Reef campaign has successfully pushed for a substantial increase in protection for the Reef, including a dramatic increase in highly protected areas within the Marine Park. Richard has also worked for many years as part of WWF's international reef conservation programs. He is currently the Great Barrier Reef Campaign Director for WWF-Australia and coordinates the Fight for the Reef campaign.

3.5.2 What did he say?

WWF affirms the Great Barrier Reef zoning as world leading. They note however that it took 30 years from the Park boundary being set to having a reasonable network of no-take areas. The inshore areas ended up with a lower percentage in no-take areas as the resource usage is stronger. The issue of reviews is a serious one as protection can be diminished as easily as it can be enhanced. WWF have programmes with indigenous people but many of these groups currently lack capacity for effective engagement in Marine Protected Areas processes. His perception is that New Zealand is ahead in many respects in dealing with nutrient input and engaging communities. WWF bases its approach on polling to work out what will be effective. They think the social licence for coal mining is decreasing and the support for biodiversity protection is growing but at this stage few people make the connection between the two. Pollution is perceived as a much more live issue and a good starting point with the public.

3.5.3 Key insights

At present, the simplicity of the New Zealand approach in focusing just on no-take marine reserves may be more effective in getting such areas than large marine parks with cumbersome legal processes that lead to zoning.

3.5.4 Analysis

As an NGO with limited resources WWF has adopted a strategic approach that seeks to exert maximum influence for least expenditure. Polling is an important part of working out what that is and how to frame the messages. The national culture of collaboration in

New Zealand may be stronger than in Australia and this is possibly linked to the role of indigenous people and their processes of consensus.

3.6 KIRSTIN DOBBS

3.6.1 Who is she?

Kirstin Dobbs, PhD, Director, Environmental Assessment and Protection, Great Barrier Reef Marine Park Authority.



Figure 5 Great Barrier Reef Marine Park Authority Headquarters

3.6.2 What did she say?

She referred to an article by Garry Russ in *The Conversation* about the role of marine protected areas in conservation and resilience. This led to discussion about the controversy about the possible delisting of the Great Barrier Reef as a World Heritage Area and the role of social media in developing opposition to dredging and dumping. She concluded that the World Heritage listing does have force in helping to protect the Great Barrier Reef. The World Heritage listing was related to the scale and connectivity of the Great Barrier Reef that gave recognition to the whole even when the individual parts may not have received such recognition.

Its iconic status has helped social acceptance of its protection throughout. This was associated initially in the 1960s with a push from scientists to protect the Great Barrier Reef from petroleum prospecting. Now there is a broad united purpose where everyone wants the Reef to be cared for.

The dedicated focus of the Great Barrier Reef Marine Park Authority on the reef has been important in making progress. Its independence in reporting to its Board helps to give stability in the ups and downs associated with political election cycles. The regional location of the Great Barrier Reef Marine Park Authority is an important contributor to its success. The Future Eye review examined the quality of the consultation involved in the rezoning and recommended the agency continue its linkages with the local community. This resulted in enhanced connections through the establishment of 3 regional offices (Cairns, Mackay, Rockhampton) as well as the addition of a 12th local marine advisory committee (LMAC). LMACs have been valuable in developing connections with communities across such a large area.

The close working relationship with the Queensland Parks and Wildlife Service is important.

What is now emerging is the importance of people, particularly the people of local communities, in effectively managing the Reef.

There have been a series of reviews of management and these have led to significant organisational change while the core purpose of Great Barrier Reef Marine Park Authority

has remained constant. In the late 1990s four critical issues groups were established and this had success. Now there is another cycle of change and people are becoming more focused as it becomes more apparent that Great Barrier Reef Marine Park Authority cannot do the job alone.

As the importance of water quality became apparent in the early 2000s so did the need to become an influencer on land management and land managers. Forging partnerships and recognising stewardship actions for the Reef has become a stronger mode of activity, e.g. the Reef Guardians.

At the same time the foundational values of Great Barrier Reef Marine Park Authority grounding its work in the best science have not been lost. However, social science and economics have been added to the original focus on biological sciences.

In working with traditional owners, it became apparent early on that issuing permits for hunting was not the way to go. The Great Barrier Reef Marine Park Authority was not in a position to pronounce on who were the Traditional Owners for each area after many years of disruption and migration. There are 70 Traditional Owner groups each associated with “sea country”. The TUMRA approach has proven more fruitful and 20% of the Marine Park is now subject to TUMRAs. These empower the Traditional Owners to sort out what matters to them and write management prescriptions that can then be accredited by Great Barrier Reef Marine Park Authority. This recognition is very important to the Traditional Owners as part of restoring their authority over their sea lands. However, there can be values conflicts with the wider public for example when species that have been traditionally hunted like green turtles have gained iconic status with visitors and other parts of the community. Some of these species can be sustainably harvested.

Great Barrier Reef Marine Park Authority, and other parts of Government, are realising the importance of marketing and communication. In the rezoning exercise, it took a lot of work for people to accept there were real issues that need to be resolved. Strap lines like “Keep it great” were used with good results.

Some informants suggested that Australians tend to distrust scientists, and that this might even be part of the national psyche. This affects a wide range of issues from climate change to fishing. Scientists are having to get better at communicating and Great Barrier Reef Marine Park Authority fosters good practice in this respect. It highly values savvy scientists who will collaborate in framing results in ways that will achieve a positive impact. She cited Terry Hughes and Helene Marsh as good practice examples. Including scientists in advisory committees is also effective. It is important for Great Barrier Reef Marine Park Authority to have staff who are science capable to work with scientists.

Restructuring had led to a loss of corporate knowledge and this had highlighted the need to better capture management information in formal systems. Great Barrier Reef Marine Park Authority has been reviewed by the national audit office which noted people didn’t always write things down. At the same time, Government is becoming more transparent and the public is expecting agencies to be able to document and justify their decisions.

We discussed the Egg Model developed in Fiordland (as illustrated in the Figure below) and found Great Barrier Reef Marine Park Authority has used techniques of getting conflicted stakeholders into a room together to directly thrash out solutions they can live with.

Te Korowai o Te Tai ō Marokura - Kaikōura Coastal Marine Guardians

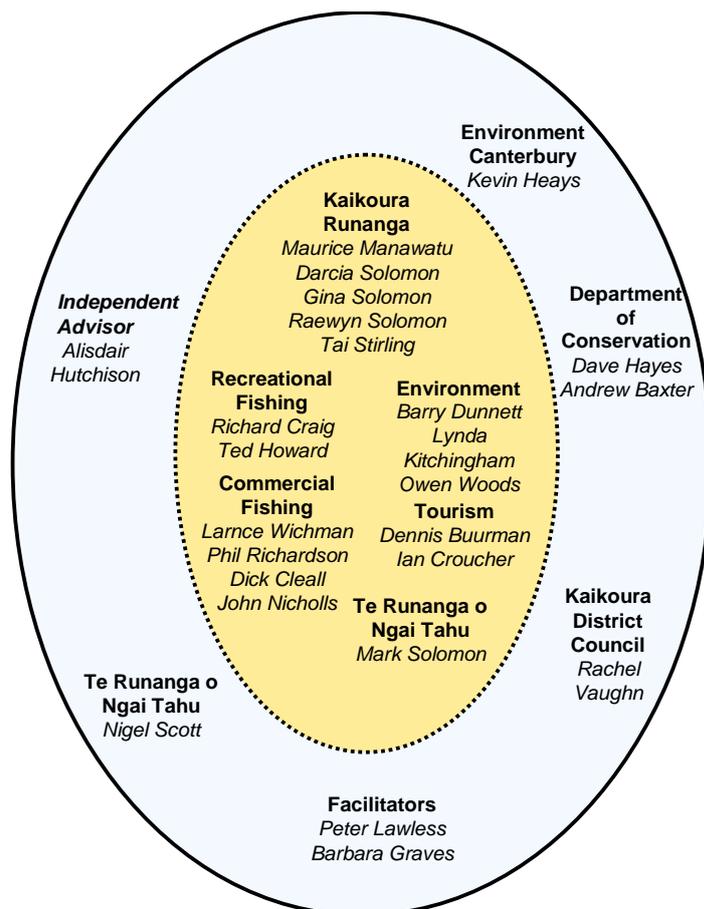


Figure 6 The egg model of Te Korowai (membership as at August 2011)

(Model developed by Laurel Tierney)

She highlighted the importance of the new Long Term Sustainability Plan 2050 for the Reef. This builds on 2009 and 2014 review reports (Great Barrier Reef Outlook Reports) that are tabled in Parliament.

She described the overall approach as not trying to be perfect at the outset. Once the boundary of the Park was initially defined in 1975 it took 30 years for the zoning to be refined through a process of adaptive management to be what it is today.

We looked at the Great Barrier Reef Marine Park Act. This has clear, strong objectives and these have been important in providing a sound base for management. It provides for the Board and gives a strong degree of independence. It enables the Great Barrier Reef Marine Park Authority as an advocate as well as a management agency and even gives the Authority power to make regulations controlling activities outside its formal management area where such activities may adversely impact the values of the Reef.

It can be hard for politicians and stakeholders to appreciate legacy issues and the time it takes natural systems to respond when management practices are changed. This can mean that outcomes can still be declining even when management objectives are being met.

Great Barrier Reef Marine Park Authority is in the process of reconsidering its core value proposition. While the outcome is not clear, its capacity to influence is clearly linked to the recognition of its integrity and that in turn rests on its commitment to good science established by Graham Kelleher the founding CEO, and being prepared to modify its views

in response to new evidence. The preparedness of the Great Barrier Reef Marine Park Authority to hold itself to account is also important.

3.6.3 Key insights

- Single focus entities have more chance of making a real difference.
- Good science, well presented is vital.
- Boundaries can be set and values recognised before issues identification and solutions generation commences.
- Recruiting allies bears fruit in the long run.
- Being rigorous with yourself building recognition of integrity.
- Regularly reviewing management actions and adapting to new information.

3.6.4 Analysis

A multiple use marine park can be a good approach for an iconic area that is large and complex. It does mean that much of the work takes place after boundaries are recognised. What is needed at the outset is a compelling story of values at risk, stimulating the need for an effective response.

3.7 NADINE MARSHALL

3.7.1 Who is she?

Nadine is a social researcher at CSIRO based at James Cook University. We ran out of time because CSIRO was that day announcing restructuring details that would see half the social science staff made redundant.

3.7.2 What did she say?

She said that what is critical is having a few key strong relationships and a wide network of weaker connections. The strong relationships allow influence to be exerted in the system while the weaker relationships keep it real. She works with social process mapping but was not familiar with Moreno or sociometry.

She emphasised trust as a key aspect and asked if we had measured trust as we proceeded through the Te Korowai project (which we did not).

3.7.3 Key insights

Taking readouts of the trust level in a long-term group could provide useful information on the efficacy of interventions.

3.7.4 Analysis

This conversation is incomplete and needs Skype follow up.

3.7.5 Resources provided

3.7.6 Further contacts suggested

She suggested connection with Vicky Martin at Canterbury University when I returned.

3.8 JESSICA HOEY

3.8.1 Who is she?

Jessica is Director of Indigenous Partnerships for the Great Barrier Reef Marine Park Authority.

3.8.2 What did she say?

Jessica has a team focused on relationships with 70 traditional owner groups. A key mechanism is the formation and implementation of Traditional Use of Marine Resources Agreements (TUMRAs). These allow traditional owners to define their own geographical range, aspirations, and governance requirements. They are then accredited by Great Barrier Reef Marine Park Authority and the state government and implementation plans are developed. Her team includes indigenous people. They also have outreach activities to help traditional owners sustain their links to their sea lands and to retain traditional knowledge and practices.

We had an extensive conversation comparing practice regarding relationships with indigenous people. This is expanded in the Analysis section below. The result was an invitation for Maori involved in marine management and protection in New Zealand to visit and exchange knowledge with traditional owners. I nominated Gina Solomon of Ngati Kuri and Raymond Smith of Ngati Kuia and offered to follow up with them.

3.8.3 Key insights

The societal gap between indigenous culture and settler culture in Australia is larger than in New Zealand. There is a lot of good will at an organisational level but little idea about what good practice would look like.

3.8.4 Analysis

The elements of practice used in New Zealand by the Department of Conservation (DOC) for relationships with iwi¹⁰ would form a good basis for developing better practice for the Great Barrier Reef Marine Park Authority. The social context is quite different, but some common things can be identified. In this it is important to relate to the formative stages of DOC as an entity rather than the current post-Treaty settlement situation that exist in many parts of the country. In terms of the wider society, two things stand out for me about Australia: the lack of a Treaty and the lack of a coherent process of reconciliation and redress.

When DOC was formed, the Treaty clause in S4 of the Conservation Act provided a firm legal base for the Department to operate from. The implications in 1987 of this were, however, far from clear. The following emerged as critical:

- Establishment of the position of Assistant Director General, and appointing Piri Sciacia into that role as an indigenous person reporting directly to the Chief Executive.
- The recruitment of 13 Kaupapa Atawhai Managers (later more and with new titles) to work regionally reporting to the Regional Conservators and working directly alongside the regional staff.
- The creation and delivery of Atawhai Ruamano training to 99% of all the staff in the organisation. This training mostly took place on marae¹¹ as cooperative exercise by the Kaupapa Atawhai managers and local Maori, and in most cases, was residential for 3 to 5 days.
- Meeting the requirements of each Treaty settlement as it occurred. The Ngai Tahu settlement, for example, involved all relevant staff in further residential training on the values of Ngai Tahu and the implications for their work of the Treaty settlement.

¹⁰ Iwi is a Maori tribe.

¹¹ Tribal meeting place and administrative centre.

The result is that Maori values are now deeply embedded in the organisation and working in a bicultural context has become business as usual.

Reviewing documents from Great Barrier Reef Marine Park Authority I found no ground level incorporation of indigenous values as a core part of the management paradigm. Rather, traditional owners were seen as a sector to be respected and their use and care for their environment to be facilitated. If we reviewed documents from the New Zealand Department of Conservation in 1987 we would find similar things. However, Great Barrier Reef Marine Park Authority has begun the journey and there is no turning back. I think that creating two connections at the same time, DOC to Great Barrier Reef Marine Park Authority and Maori to aboriginal and Torres Strait people, would be a powerful and timely action.

3.8.5 Resources provided

Traditional owners protecting the Great Barrier Reef Great Barrier Reef Marine Park Authority 4-page leaflet.

Posters (x4), one showing a sacred site but with no information that explained that was what it was, no voice of the traditional owners or them even being in the picture.

3.8.6 Further contacts

I emailed Raymond and Gina to see if they would be keen to come over for a visit.

3.9 BOB PRESSEY

3.9.1 Who is he?

Distinguished Professor Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University.

3.9.2 What did he say?

Bob has published extensively on the planning and management of protected areas and is the primary researcher of a group that has developed decision support software with a primary trial on multiple protected islands in Western Australia.

We had a wide-ranging discussion in which I pressed Bob for insights into how to move to truly effective management of an entity as large as the Great Barrier Reef.

He referred to work on community based solutions in South Africa that I should follow up.

He felt science was generally well accepted by Australians but conservative politicians have whipped up opposition to action on climate change by trying to discredit the science. They seem intent on winding back environmental gains by relaxing regulation. Mining is promoted even though the employment gains are far less than those associated with alternative energy sources.

The 2004 rezoning of the Great Barrier Reef Marine Park could have recognised the importance of catchments and climate change but did not. As a piece of conservation planning it was for its day exemplary. However, now that we know more even the spatial decision making could be better. He said it's time for a reassessment of how the Reef should be managed spatially.

He has considered what an integrated solution for the Great Barrier Reef might look like and has presented this in a PowerPoint presentation in Canberra. He talked about the need for a social/ecological system solution, but could not describe it for the Great Barrier Reef, because it is yet to be conceptualised, let alone implemented. He explained the Pilbara work where decision support tools have been applied to the management required for a large suite of protected islands. The software has been used to inform the management of multiple threats affecting multiple species. After the data have been

loaded and the analysis run, fine tuning occurs through discussion of strategic priorities. This can identify where the data are wrong or where choices need to be made to undertake several smaller scale lower priority actions by sacrificing a more costly, larger action. However, even in these cases it is clear to decision makers what has been forgone. Fundamentally what he is trying to achieve is value for the scarce conservation dollar.

In biosecurity for islands he said they were choosing between quarantine, surveillance, and eradication. A Bayesian network analysis is used. This takes in sources of invasive species, a risk analysis to guide surveillance, and costs of control once invasives have arrived.

He cited the “Clean up Australia” campaign as an example of successful social marketing.

For a solution to nutrient inputs to work in the context of the Great Barrier Reef catchments it would involve buying out some landholders at fair market price or covering their costs to move to best-practice land management, where this affected their profitability. A grading of A, B, C and D is used for properties. The general goal is to move land management from C (below par) to B (best current practice). Category D (unacceptable practice) needs a regulatory enforceable solution. Category A (aspirational) involves land managers who would get there on their own without an intervention.

It is not justifiable to tell people with land-management enterprises (essentially private businesses) to protect things and to require them to accept meeting the cost of achieving the social good.

He has developed cumulative impact assessment for the Great Barrier Reef by analysing different, spatially explicit development scenarios, linked to models of cumulative impacts on selected species and ecosystems. This asks whether we can have more development of different sorts and have the values we care about persist.

3.9.3 Key insights

We tackle what we can tackle based on current knowledge and social conditions even when we know this to be insufficient in the long run.

3.9.4 Analysis

We should aim for a true social ecological system solution. Scenario modelling would be a useful step on this path. Data rich procedures and explicit decision frameworks need to be firmly linked to social processes.

3.9.5 Resources provided

Using social marketing concepts to promote the integration of systematic conservation plans in land-use planning in South Africa. ANGELIKA WILHELM-RECHMANN, RICHARD M. COWLING and MARK DIFFORD, 2013, Fauna & Flora International

Assessing interactions of multiple stressors when data are limited: A Bayesian belief network applied to coral reefs. Ban, Pressey and Graham, 2014, Global Environmental Change

Preparing for the next rezoning of the Great Barrier Reef Bob Pressey (drawing on work by Amélie Augé, Melissa Bos, Jon Brodie, Jana Brotánková, Ian Craigie, Mariana Fuentes, Alana Grech, Johnathan Kool, Amelia Wenger), PowerPoint presentation

Assessing the Effectiveness of Local Management of Coral Reefs Using Expert Opinion and Spatial Bayesian Modelling. Stephen S. Ban, Robert L. Pressey, Nicholas A. J. Graham (2015) PLoSONE10(8):e0135465. doi:10.1371/journal.pone.0135465

3.9.6 Other contacts suggested

Bill Sutherland - Horizon Scans Email: w.sutherland@zoo.cam.ac.uk

3.10 JON BRODIE

3.10.1 Who is he?

The leading scientist dealing with water quality management in the context of the Great Barrier Reef. He works both at James Cook University and as a consultant as part of the C₂O partnership. He has over 200 refereed papers and a very large number of technical reports and chapters in books (even he does not know quite how many). He was also my gracious host in Townsville and the account below is a synthesis of several conversations.

3.10.2 What did he say?

Protection of the Great Barrier Reef has failed. The coral cover is vanishing. The Park intervention gave good control of tourism and also of fishing for a few species but has failed to grapple effectively with the big issues of climate change and the input of nutrients and sediments from the land.

What is required is the exercise of Commonwealth powers over land use within the Great Barrier Reef catchments to control the land based inputs.

Stopping the dredge dumping proposed for coal port developments was significant but more symbolic than granting real relief for the reef.

The current bleaching event shows that climate change effects are occurring far sooner than anticipated (though see below about failed predictions).

Even if the nutrient issues are fully resolved, the Reef as we currently know it will be lost to warming and acidification. Something will remain, however. The reef structure will persist for some time, and coralline algae may thrive where once stony coral dominated. The question is whether controlling nutrient inputs will help to increase resilience and help the future ecology to sustain more biodiversity.

He spoke further about the positive interventions around fishing. This involved reducing prawn trawling effort and gear changes so they are no longer bulldozing the bottom and taking in by-catch at a volume of 5:1 to the target catch. Also, bycatch reductions including TEDs (Turtle Escape Devices) which do not work for sea snakes. There is also monitoring now on the trawlers.

Tourism turned out to be pretty low impact, and tourism operators have “skin in the game” when it comes to looking after the Reef.

Jon has extensively reviewed the climate change data including recent updates. He thinks the Paris agreement could limit warming to 3 degrees, but the 2-degree target is already lost. Even he cannot predict what the Great Barrier Reef will look like in this probable scenario.

Even though Ove Hoegh-Guldberg's 1999 models¹² predicted annual bleaching of the coral this did not eventuate due to increased cloud cover thanks to more cyclones. This shows the risk for scientists in predicting things in complex situations.

Jon started on water quality work for the Reef in 1991, and a real programme was finally funded in 2008. He asks what the resilience of the Reef would have been like if water quality improvement had started in 1991 when it was clear that action was needed? The

¹² Mar. Freshwater Res., 1999, 50, 83966
10.1071/MF99078 1323-1650/99/080839
Climate change, coral bleaching and the future of the world's coral reefs
Ove Hoegh-Guldberg

lag related to the time involved in assembling evidence and persuading decision makers to act. It took from 1990 - 2001 to get the evidence together. The decision to set targets came at a meeting with Minister Robert Hill just before Jon was made redundant from Great Barrier Reef Marine Park Authority. He had 6 weeks left and in that time, did the initial work to set those targets. The support of Virginia Chadwick CEO was critical. The result was the Reef Water Quality Plan 2003 with a funding of \$200M granted in 2007. Finally, action started in 2008. Now Jon has calculated that the necessary actions need \$10B over ten years. He has scaled up from the already costed Burdiken to the full Great Barrier Reef. He expects the Alluvium study to corroborate his costings. The full text of the abstract of his paper is reproduced below:¹³

The Great Barrier Reef (GBR) is a World Heritage site off the north-eastern coast of Australia. The GBR is worth A\$ 15-20 billion/year to the Australian economy and provides approximately 64,000 full time jobs. Many of the species and ecosystems of the GBR are in poor condition and continue to decline. The principal causes of the decline are catchment pollutant runoff associated with agricultural and urban land uses, climate change impacts and the effects of fishing. Many important ecosystems of the GBR region are not included inside the boundaries of the World Heritage Area. The current management regime for catchment pollutant runoff and climate change is clearly inadequate to prevent further decline. We propose a refocus of management on a "Greater GBR" (containing not only the major ecosystems and species of the GBR, but also its catchment) and on a set of management actions to halt the decline of the GBR. Proposed actions include: (1) Strengthen management in the areas of the Greater GBR where ecosystems are in good condition, with Torres Strait, northern Cape York and Hervey Bay being the systems with highest current integrity; (2) Investigate methods of cross-boundary management to achieve simultaneous cost-effective terrestrial, freshwater and marine ecosystem protection in the Greater GBR; (3) Develop a detailed, comprehensive, costed water quality management plan for the Greater GBR; (4) Use the Great Barrier Reef Marine Park Act and the Environment Protection and Biodiversity Conservation Act to regulate catchment activities that lead to damage to the Greater GBR, in conjunction with the relevant Queensland legislation; (5) Fund catchment and coastal management to the required level to solve pollution issues for the Greater GBR by 2025, before climate change impacts on Greater GBR ecosystems become overwhelming; (6) Continue enforcement of the zoning plan; (7) Australia to show commitment to protecting the Greater GBR through greenhouse gas emissions control, at a scale relevant to protecting the GBR, by 2025.

Climate change was known in 1974 (in fact Jon says Arrhenius predicted this a century before). It is just too big even for objective scientists to really believe in. However, with climate change rolling in faster than anyone predicted, Jon says he has lost hope for the Reef.

He referred to private/public benefit diagrams developed by David Panel in Western Australia. He explained that taking into account effects on the land managers per se was insufficient. A reduction in harvest also has downstream effects such as on the viability of sugar mills. Any large-scale regulation of land use therefore needs to consider disruption to economic systems.

¹³ Ecosystem health of the Great Barrier Reef: Time for effective management action based on evidence
Original Research Article, *In Press, Corrected Proof*, Estuarine and Coastal Shelf Science XXX 2016, pp1-14,
Available online 10 May 2016
Jon Brodie, Richard G. Pearson

He said marine pests were not a big issue for the Great Barrier Reef. It has such rich biodiversity that it is hard for any new species to get a foothold, let alone cause trouble.

Overall, in response to using the Great Barrier Reef Park as a model for other places, he said that no-one has done it better, but even then, they didn't do it very well. The issues of contaminants, such as metals and most pesticides, were resolved in the 80s. He did say however that assumptions that many pesticides had short half-lives proved not to be true, as the necessary bacteria do not live in the sea. Atrazine for example has a half-life of 500 days in the Great Barrier Reef marine environment. It and many other pesticides and herbicides have been found to be ubiquitous in the Reef environment albeit at very low levels.

3.10.3 Key insights

Only whole system solutions will be robust even when the whole system is the whole planet.

3.10.4 Analysis

We need to understand what leads to time delays between the issue being recognised and adequate action being taken. When the pace of environmental change accelerates new decision processes may be called for. Climate change is such a big elephant we have trouble looking at, even if we are the most objective of scientists like Jon. Only thinking and acting globally has any chance of success. Could Australia dramatically change direction and getting busy on emissions move the world community?

3.10.5 Resources provided

Management of ecosystem health of the Great Barrier Reef Australia: Time for reprioritisation on the basis of triage unpublished manuscript for Coastal and Shelf Science



Figure 7 Coral bleaching from 2016 high temperature event



Figure 8 Mangrove death after 2016 high temperature event

4 NOVA SCOTIA

4.1 PAUL MCNAB AND DEREK FENTON

4.1.1 Who are they?

Derek came into the Department of Fisheries and Oceans just after the passage of the Oceans Act in 1996 (but the Act only came into force in 1997). Paul joined him not long after this in early 1999.



Figure 9 Nova Scotia coast near Peggy's Cove

4.1.2 What did they say?

The Gully Marine Protected Area was formed under Oceans Act Marine Protected Areas regulations in 2004 (Department of Fisheries and Oceans 2004) rather than a special Act of Parliament as would be required for a National Park in Canada. Its formation set many precedents as it was the first of its type in the Atlantic Ocean. The Department had no prior experience with the establishment and regulation-making processes or their detailed step-by-step requirements.

The impetus to give extra protection to the Gully came largely from the World Wildlife Fund for Nature, Canada, which instituted a public campaign, initially mid-nineties and into the late nineties when a postcard campaign was directed at the Prime Minister and the Fisheries Minister. They were supported by elements of the science community.

The Department was at the point of considering the Gully as a prime candidate for Canada to test the Oceans Act as the first ever marine protected area on the east coast, what some thought of as a “national park in the sea”.

This led to requests for the Department to act to use the regulatory powers provided by the Oceans Act.

The Department responded with a full review of the science 1997 to 1999 (Harrison and Fenton). This lifted the focus from the whales to the broader Gully ecosystem. However, the presence of the iconic Sable Island and the iconic and endangered population of Northern bottlenose whales (Moors-Murphy) in The Gully, plus parallel and growing interest in deep sea corals (Breeze and Fenton), were important factors in enabling action to happen.

The science review was followed by The Gully Conservation Strategy. This identified the options for protection (and potential boundaries?) Paul and Derek said there were

advantages in having Marine Protected Areas formation in the same agency as fisheries management in sorting out the issues.

The science review was followed by The Gully Conservation Strategy (Department of Fisheries and Oceans 1998a). This identified the options for protection (and potential boundaries?) An “area of interest” announcement was made in 1999 triggering the formal part of the process.

Paul and Derek said there were advantages in having Marine Protected Areas formation in the same agency as fisheries management in sorting out the issues. For example, when the Gully was declared a formal Area of Interest (AOI) in the Marine Protected Areas Program, the senior invertebrate advisor with the Fisheries Management Branch imposed license conditions that closed the AOI to exploratory crab trapping. And when mammal bycatch in swordfish longline became a problem, the large pelagics advisor helped restrict that gear type from the Zone 1, the core protection zone that is heavily utilized by endangered whale populations.

At around the same time the WWF added to its focus the broader issue of a representative network of Marine Protected Areas (Day and Roff 2000). They convened a workshop of 60 scientists and proposed a solution for a representative network. The ground of the national debate was moving even as The Gully Marine Protected Area came into existence. Once the Marine Protected Areas was declared, WWF shifted attention away from the detailed decisions and post-designation requirements for The Gully; some of that was even beginning to happen as the boundaries were being finalised through the regulatory process.

The issues of timing and the institutional naivety of the parties about the process were important for both The Gully and the wider network process. Paul and Derek referenced Jon Day and the way he learned about forming a representative network (Day and Roff 2000) and went back to Australia and ran the process for the Great Barrier Reef successfully while Canada did not make substantive progress over the same period. Department of Fisheries and Oceans Maritimes did eventually undertake more systematic bioregional planning (e.g., see Horsman et al 2011) but without the rezoning mandate that Jon enjoyed as the end goal of his post-Canadian planning process in the Great Barrier Reef.

The Gully reserve boundary has 25 corners making up its core zone where no commercial extraction of any kind is permitted. The question of whether this leads to difficulty in enforcement was academic as there has never been a prosecution for a fisheries violation in the area. While ship tracking and GPS allow much finer levels of surveillance, enforcement action has not really kept up. For example, even though most fishing vessels can position themselves within a boat’s length or less, Department of Fisheries and Oceans would look for an incursion to be hundreds of metres inside a no-fishing zone before any evidence gathering would begin or prosecution would be seriously contemplated.

In setting boundaries the 600m contour was the limit of big “bubble gum” coral “trees” (*Paragorgia arborea*), but a contour limit was problematic for enforcement (i.e. chart inaccuracies mean that real-world depths showing on a sounder as shallower than 600m, and thus compliant for fishing according to the legal intent, might in fact be inside a closed area boundary according to the isobath) so straight line boundaries approximating this were chosen (see boundary case study presented at the Canadian Hydrographic Conference).

While the process of formation was going on, the Department of Fisheries and Oceans released a paper on how it wanted to work with communities (Department of Fisheries and Oceans 1998b). For the Gully, however, the process was clearly driven by Department of Fisheries and Oceans once it became a formal candidate of the Government’s (see case study presented at Science and Management of Protected Areas conference in 2000).

Derek and Paul referenced the St Anne's Bank process in terms of stakeholder involvement.



Figure 10 Research vessels of the Bedford Institute

4.1.3 Key insights

Doing something profoundly new in a country takes more time and energy and has more hurdles than any of the practitioners or the players realise when they set out. Every time you set a precedent it will impinge on someone's territory and they spring from the background when you might least expect it. The actual work of creating a marine protected area is thus far more complex than lobbyists realise. Paul gave the example of having to satisfy Canada's policy requirements related to the assessment of mineral, metal and energy resources occurring within the Gully study area prior to any regulations being approved (see case study presented at the Science and Management of Protected Areas Conference in 2003).

4.1.4 Analysis

Formation of the marine reserve over the Gully was much more like the Sub-Antarctic islands and Kermadec reserves than it was like Kaikoura or Fiordland. The core interaction was environmental lobbyists, scientists, public agencies, and politicians. The remote location (200km offshore) meant that the community involvement was very limited and the core stakeholders were industrial fishing and oil and gas interests. This simplified the number of interests to be resolved making success far more likely. The proactive environmental stakeholder was able to seize the initiative and mould perceived public opinion to create political leverage. This created sufficient momentum to ride over public agency protection of mineral and fishing interests (just as happened in Kaikoura).

Note that although large-vessel trawling interests were heavily involved in the fisheries discussions, most of their Gully activity was already foregone as a result of the Atlantic Groundfish Moratorium. This left a small but active group of smaller owner-operated vessels prosecuting: 1) a historically sustainable hook and line fishery for halibut on the seabed and 2) a highly mobile fleet pursuing swordfish, tuna and sharks using surface longlines. Neither fleet was allowed to continue fishing in the core deep-water Zone 1 area owing to surface entanglements of whales and benthic risks posed to ancient corals.

4.1.5 Resources provided

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- Westhead, Maxine C., Derek G. Fenton, Tanya A. Koropatnick, Paul A. Macnab, Hilary B. Moors. Filling the gaps one at a time: The Gully Marine Protected Area in Eastern Canada. A response to Agardy, Notarbartolo di Sciara and Christie. Marine Policy 2012 (36): 713-715

4.1.6 Other contacts suggested

Stefan Leslie, now Regional Director of Fisheries Management for Department of Fisheries and Oceans but previously held a senior position with the New Zealand fisheries agency during which time he negotiated several large offshore closures and became involved with Maori interests in new and developmental fisheries.

4.2 DR CLAUDIO DIBACCO

4.2.1 Who is he?

Claudio is a specialist in larval dispersal and applies his expertise to marine invasive organisms. He has experience in both the eastern and western North American continent over 25 years. *I am a larval ecologist studying biological and physical processes that regulate the abundance and distribution of marine invertebrate populations. Most of my research has concentrated on marine organisms that are sedentary or sessile as adults, but that have a free-swimming planktonic larval stage of development that remains in the water column until ready to settle as a juvenile or adult. My scientific approach has combined qualitative and quantitative studies of larval behaviour, physical oceanographic processes, and analytical chemistry techniques (stable isotope and elemental tagging) to address questions about larval transport and exchange between populations inhabiting estuarine and coastal habitats. This has implications for understanding basic ecological processes and population dynamics (i.e., sustainability, range expansion in the case of non-indigenous species), the management of ecologically and commercially important species, and marine conservation and habitat management issues.*

4.2.2 What did he say?

Ciona has been the biggest issue (AIS) for mussels and oyster growers, even bigger than *Styela*. These two species cause huge problems in harvesting (most growers must clean their lines at least twice maybe 3 times before harvesting, so it's not just an issue at harvesting) and operators have had to get larger boats and equipment just to haul the lines. These species also filter down to 1 micron while mussels only go to 5 micron meaning the pests can grow faster and longer than the valued species.

Claudio suggested that direct experience of the consequences for mussel and oyster farming at Prince Edward Island could help make the issues real for New Zealand decision makers.

They also have a recent introduction of *Didemnum vexillum* for which they are modelling spread. He thinks that this will not be such a big problem as *Styela* and *Ciona*, since it is not expected to spread into the southern Gulf of St. Lawrence where most shellfish aquaculture occurs in Atlantic Canada.

They are now modelling the tunicate complex using climate projections for seven nonindigenous species (submitted).

He said it was a mistake to look at temperature ranges or average annual temperatures as predictors of invasability or habitat suitability; as it was the extreme seasons that make the difference in understanding spread and habitat suitability; either eliminating species or causing them to multiply. As an example, large snow melt events can lower salinities to 20ppm (which are rarely captured in longer term averaging, including monthly) leading to large die off of a range of species. Now life history modelling to assess life history specific effects of environmental conditions on viability and, spread and relative competitive dominance of AIS. Salinity and temperature explained most of the environmental variability in our modelling work on suitable habitat mapping, but interestingly preliminary mesocosm experiments show early life stages of *Ciona* were more robust to salinity and temperature stressors effects are not as expected with larval stages proving more robust than expected in some cases.

4.2.3 Key insight

The gap between knowledge and active risk reduction is a critical factor in achieving effective action on marine invasives. Modelling the future spread under the probable range of environmental conditions is an effective technique.

4.2.4 Analysis

The range of species causing problems in Nova Scotia overlaps with those we are having trouble with in New Zealand. We have warmer waters so we also get species such as *Sabella* that are not a problem for them. We in the Top of the South appear to be ahead in regional cooperation, pathways management, incident management, and stakeholder networking. Claudio is ahead in terms of biophysical modelling and basic biology of invasives. Further sharing could advance the interests of both jurisdictions.

4.2.5 Resources provided

- **National risk assessment of recreational boating as a vector for marine nonindigenous species** (in prep) Simard, Pelletier-Rousseau, Murray, Therriault, Lacoursiere-Roussel, Bernier, Sephton, Locke, and McKenzie Research Document
- **Marine screening-level risk assessment tool for aquatic non-indigenous species** Canadian Science Advisory Secretariat National Capital Region Science Advisory Report 2015/044

4.3 JOSHUA MCNEELY AND ROGER HUNKA

4.3.1 Who are they?

Roger is Director of Intergovernmental Affairs for the Maritime Peoples Council and Joshua is Executive Director of Ikanawtiket which in New Zealand would translate as kaitiaki for marine resources. They are based in Truro, Nova Scotia and represent the maritime interests of the non-reserve indigenous people. Their tribe is the Mi'kmaq.

4.3.2 What did they say

Roger provided an extensive overview of the situation of the indigenous people of Canada and he and Joshua related this to the experiences of their people in Nova Scotia.

They said there are 73 nations of Aboriginal Peoples in Canada. Most of these have unsettled comprehensive land claims over land, water, and ice. Experiences of the different Aboriginal nations are quite different with some living more traditional lives in isolated areas and others with a longer contact period being much more sophisticated in dealing with the modern world and its challenges.

Roger made numerous references to legal cases and gave me copies of some legal judgements (see resources below). The first was the recent Daniels case which established that non-reserve and non-full blood indigenous people were to be recognised as Indian and fall under federal responsibility, Constitutional Head S91.24 and should be treated as such.

He described a divide between those that had stayed on reserves and identified with those areas and those that viewed the whole area or territory as their traditional ancestral homelands. The judgement related to federal jurisdiction under S91.24 “Indians, and Lands Reserved for Indians” rather than provincial jurisdictions of S92, where most of the social services provisions lay outside federal jurisdiction and decisions over natural resources management generally fall within the provincial ambit.

He described four types of treaty:

- Pre-confederation treaties
- Numbered treaties
- Modern day land-claims
- Northern comprehensive land-claims agreements.

He said that some of the more recent northern land-claims agreements (treaties) have been driven by politics and the international perception of title to the vast resources of the North, including territorial competition with claims by the Russians and Americans to the North. He said the North is contentious territory and the federal Government is prepared to spend billions to sustain services to the Indigenous peoples of the North to first ameliorate their very difficult conditions and from a political perspective to demonstrate that the Aboriginal Peoples of Canada continue to occupy the North. Even so he said that Canada was half a century behind the Russians in the practical management of recognizing and supporting people in the North. There are currently 4 comprehensive land-claim treaty settlement areas in the great Canadian North.

The introduction of new technologies in communication was driving social change amongst the younger generation. This has positive effects in linking with a wider world but leads to loss of language and traditional practices.

There are 45 reserves in Nova Scotia inhabited by less than 10,000 Indigenous Peoples and about 24,000 Indigenous Peoples living off-reserve throughout their traditional ancestral homelands. Interestingly Europeans here had generated the same stories about the indigenous people conquering earlier groups as happened with the Moriori myth making in the NZ.

We discussed the fundamentally different worldview of the Mi'kmaq to the settler culture. We found that there was great similarity in the idea of *Netukulimk* and *kaitiakitanga*. Both untranslatable into English or French but stemming from a common base of the connectivity with all things inherent in the worldviews of these indigenous people on opposite sides of the world.

The driving force for the formation of the pre-Confederation Treaties in Nova Scotia and the Waitangi Treaty in NZ was English competition with the French for territorial dominance. These Nova Scotian treaties were however very different to the Treaty of Waitangi. In 1763 the Royal Proclamation changed the basis of treaty making. Roger said that the Royal Proclamation of 1763 is included in the Constitution Act of Canada, 1982 under Part II, Section 35.

The Royal Proclamation is a document that set out guidelines for European settlement on Aboriginal territories in what is now North America. The Royal Proclamation was issued by King George III in 1763 to officially claim much of the French territory in North America after Britain defeated France in the Seven Years War or War of the Conquest. In the Royal Proclamation, King George asserted

sovereignty while also recognizing that Aboriginal title has existed and continues to exist. The Royal Proclamation explicitly states that all land not bought by the Crown from Aboriginal title holders would be considered Aboriginal land “reserved to the Indians”. The Royal Proclamation forbade settlers from claiming land from the Aboriginal occupants and also ordered settlers off Aboriginal lands not purchased by the Crown. Furthermore, the Royal Proclamation set out instructions for the purchase of Aboriginal lands: that they can only be purchased by the Crown, from Aboriginal occupants inclined to dispose of said lands, at a public meeting of the Aboriginal occupants, and only for an explicitly stated use of the land.

In contrast to the “peace, friendship and trade” pre-Confederation treaties of the East, he referred to the Douglas Treaties of the West to highlight the shift in political power from Indigenous Peoples to colonial governments as British settlement expanded westward:

Beginning in 1850, the Hudson’s Bay Company was appointed authority by the colonial office in London to establish a colony on Vancouver Island. The significance of indigenous peoples relationship to their lands and resources was completely disregarded, and all the newcomers could see was an empty land that harboured boundless wealth for the taking. In the four years following, Douglas completed fourteen purchase agreements with Vancouver Island indigenous nations.

These documents are often referred to as the “Fort Victoria Treaties” or the “Douglas Treaties”. James Douglas did not explicitly use the word treaty in these agreements, but a Supreme Court of Canada decision ruled that these agreements were and remain valid treaties since Douglas, who was acting as an agent of the Crown at the time, arranged them with the indigenous peoples (Regina V. White and Bob 1965). Aboriginal Peoples argue that their ancestors understood this as a peace treaty and not a purchase agreement. These treaties effectively abolished aboriginal title to those nations that signed them, but promised to allow those indigenous peoples to carry on their fisheries as they formerly had, for millennia. Arguably, for the Saanich peoples and for all indigenous peoples on the Pacific slope, their fisheries were, and still are necessary for their existence as independent nations. The Saanich people have never surrendered title to the Gulf Islands and feel that their territory expands across the U.S.A. border.

Roger referred to the Supreme Court of Canada decision obtained by Bill Calder in 1974 which was the first time the Canadian legal system recognized that Aboriginal title existed at the time of the Royal Proclamation and that the Aboriginal title existed on its own, not derived from colonial law:

The Nisga’a sued for a declaration that their Aboriginal or “Indian” title “has never been lawfully extinguished.” In the judgment, this question broke down into three issues:

- (1) whether Aboriginal title existed in the first place;*
- (2) whether, in the case of the Nisga’a, this title had been lawfully extinguished; and*
- (3) a procedural issue as to whether the Court had jurisdiction to grant such a declaration despite the fact that the Nisga’a had not secured permission to sue the Crown, which at that time was still required in British Columbia.*

The major victory of Calder lies in the fact that of the seven judges, six responded to the first issue by affirming the existence of Aboriginal title at common law. However, they split three to three on the legal foundations of this title and on the question of extinguishment, and the case was ultimately decided on the procedural question.

The first group of three judges, whose reasons were delivered by Justice Wilfred Judson, affirmed the Nisga'a's Aboriginal title based on the simple fact of prior occupation. Although they held that the Nisga'a could not rely on the Royal Proclamation of 1763 to ground their claim (because, in their view, the proclamation did not extend to British Columbia), this decision in no way affected the fact that "when the settlers came, the Indians were there, organized in societies and occupying the land as their forefathers had done for centuries." They concluded that "this is what Indian title means."

The second group of three judges, in reasons drafted by Justice Emmett Hall, undertook a thorough review of legal precedent and the relationship of anthropological and historical evidence to common-law concepts such as possession. The review led this group to base Aboriginal title on two foundations that we now see as mutually inconsistent: on the one hand, the common law of possession and, on the other, a recognition that the title held by Aboriginal people prior to British sovereignty continues to persist in contemporary common law.

Roger said that Prime Minister Pierre Trudeau recognised the essential injustice of the continued occupation and moved to engage with Canada's indigenous peoples to resolve the question of Aboriginal Rights and Treaty Rights in the Constitution Act, 1982 and subsequent First Ministers Conferences.

He talked about Billy Diamond's march to New York in 1973 and his interview with Governor Rockefeller that led to a settlement in 1975 with HydroQuebec for payment for use of waters in the traditional ancestral homelands of the James Bay Cree to generate hydropower destined for New York. This one catchment produced quarterly payments of \$800K for the tribe. This is very important as it is business money not welfare money, where the James Bay Cree received royalty payments to several wholly Cree owned businesses as well as themselves administering to community needs.

Roger saw the period of French occupation of 175 years in Nova Scotia (c.1604-1764) before the English arrived as being very important in defining the future for the indigenous people in the Maritimes. The French had a fundamentally different approach, settling for trade and commerce rather than colonisation and assimilation. They also introduced the Roman Catholic religion, confirmed by the Holy See Concordant of 1610 which slowed assimilation by the English with their Protestant commitment.

He described the complex indigenous jurisdictions over the Gulf of St Lawrence with 5 different Indigenous nations. He described with pride the technology of the sea going Mi'kmaw "humped gunnel" birch bark canoe made with springy ash ribs and one whole ply of birch bark for the skin. He talked of the history of tribal trade all up and down the east coast and the importance of the river routes as Indigenous Peoples' highways.

There was a history of trade, prior to the English and French, with the Basques and Portuguese and to this day the Portuguese national dish is salted cod from the Grand Banks of Canada. The Portuguese learned from the Mi'kmaq how to salt and dry cod on racks along the shore, instead of the costly Portuguese method of packing fish in barrels of brine. These early trades meant that the indigenous people were well familiar with European technologies and ways before the French arrived at St Croix in 1604, Port Royal in 1605, and Quebec City in 1608. Both he and other informants pointed out that these

settlements precede the permanent English settlement of James Town established in 1610.

By 1610 the Catholic Church had adapted its rituals to requests by the Mi'kmaq to use sage in the place of incense, to use spring water in place of holy water, to use oil from beasts in place of sacrament oil, and most importantly to conduct services in the Mi'kmaq language rather than Latin. This significance of the last allowance was that all other Peoples on Earth proclaiming the Catholic faith had no other option than to hear services and repeat catechism in Latin only until Catholic reforms introduced by the Second Vatican Council in 1965.

The English expelled the French Acadians (1755-1764) but left the Mi'kmaq in place.

Other places had other experiences such as the 6 Iroquois nations (Mohawk, Oneida, Cayuga, Seneca, Onondaga, and Tuscarora) who were expelled from the USA following the American Revolution and re-settled along the Grand River in southern Ontario, thus carving out from other Aboriginal Peoples' territories the largest reserve in Canada, from which parcels were sold or rented by the Six Nations to white settlers while the sale of other lands remain highly contested, such as those on which the present day community of Caledonia is located.

He described the effect of the Marshall decision:

Unlike a number of other well-known fishing rights cases, the Marshall case addresses the right of an aboriginal people to a commercial fishery, and not just to a food fishery. The Sparrow decision of 1990, by contrast, dealt only with the question of whether or not Fisheries Act regulations applied to Ronald Sparrow of the Musqueam Band BC, when he was fishing salmon for personal use. On page 25 of that decision the Supreme Court re-affirmed the principle that, after conservation, "Indian food fishing is to be given priority over the interests of other user groups". In the Marshall decision, the Supreme Court ruled that the Mi'kmaq do have a treaty right to fish commercially, but it did not rule on the issue of how that right might be affected by the rights of non-aboriginal commercial fishers. When considering the application by the West Nova Fishermen's Coalition for a rehearing of the Marshall case (R. v. Marshall, November 17, 1999), the Supreme Court simply stated on page 16 that:

"In the case of any treaty right which may be exercised on a commercial scale, the natives constitute only one group of participants, and regard for the interest of the non-natives, as stated in Gladstone, supra, may be shown in the right circumstances to be entirely legitimate."

Roger described how further legal developments further disadvantaged the Mi'kmaq people. For example, they could not borrow money to equip larger vessels necessary to ply deeper waters when Canada extended its jurisdiction in 1974 from 11 miles to 200 miles over the continental shelf.

The Parliamentary Standing Committee ruled that the Minister of Fisheries can and should exercise the powers in his tool chest to ensure that the aboriginal people be allowed to participate in both the commercial fisheries and to sustain their way of life.

In the East, this led to a \$500M buy back of fishing licenses from non-Aboriginal Atlantic fishermen to allow the Minister to accommodate Aboriginal Peoples' Aboriginal Rights and Treaty Rights to the commercial fisheries.

He said the eastern situation was far more complex than the western. In the West, fisheries are dominated by large industrial fishing enterprises of a few hundred vessels, while in the East, the fisheries remained dominated by artisanal fisheries of several thousand vessels.

4.3.3 Key insight

The indigenous people's world view needs to be understood as a gift needed by the world to live in harmony with its environment. This should cause decision makers to go beyond seeking buy in, beyond consultation, beyond engagement to true collaboration to reconcile the assertion of Crown sovereignty with the pre-existence of Aboriginal Nations of Aboriginal Peoples.

4.3.4 Analysis

The Mi'kmaq experience is very familiar in outline with the Ngati Kuri history of occupation. Their current situation, however, reflects the complexity of the Canadian relationship with their indigenous citizens and a relative failure to fully grasp the nettle of reconciliation and recompense. It is notable that all parties operate in a far more legally focused frame than NZers would be accustomed to. In the absence of an equivalent of the Waitangi Tribunal, the parties fall back on the courts which are not really well constituted to research and resolve historical grievances.

4.3.5 Resources provided

- **Mawqatmuti,kw (We all live together) Summer Fall 2103/3 journal**
- **Tsilhqot, in Nation vs British Columbia, 2014 SSC 44 Supreme Court of Canada**
- **MAARS resource kit**
- **Implementation of the Nagoya Protocol with Canada Hunka and McNeely March 14, 2011**
- **2020 Biodiversity Goals and Targets are Deficient Aboriginal Peoples Perspectives on Canada's national 2020 Biodiversity Goals and Targets Hunka and McNeely September 7, 2012**
- **Our Land: The Maritimes Gould and Semple 1980 St Anne's Point Press New Brunswick**
- **The Mi'kmaq Treaty Handbook Clarke and Patterson 1987, Native Communication Society of Nova Scotia**
- **Mi'kmaq Fisheries Netukulimk Towards a Better Understanding Sylliboy et al November 2013**
- **Daniels v. Canada (Indian Affairs and Northern Development) Supreme Court of Canada**
- **Annual 2014/2015 Report of the NCNS Netukulimkewe'l Commission**
- **Going Forward to a Better Future Native Council of Nova Scotia 14 April 2016**
- **Eastern Scotian Shelf Integrated Ocean Management Plan - Summary Fisheries and Oceans Canada 2007**

4.4 PROFESSOR HAL WHITEHEAD

4.4.1 Who is he?

Principal researcher on behaviour, ecology and conservation of whales in the Gully over 25 years. He mainly works on the behaviour, ecology, population biology and conservation of two species of deep-diving whale: the sperm and northern bottlenose. Hal is cited by other informants as the father of The Gully Marine Reserve.

4.4.2 What did he say?

In 1998 the science was in place to say the Gully was an area worthy of protection. WWF pushed formal protection at a lot of levels. The oil industry had an interest in area and there is still an extant permit to drill in the Gully but it will never be exercised in the face of the Marine Protected Areas. At the outset, it was not clear which agency was in charge between Park, Environment and Department of Fisheries and Oceans but eventually the Department of Fisheries and Oceans took the lead. Key people were David Anderson Minister of Fisheries 1998 to 2000, Bob Rutherford, Paul and Derek Fenton in Department of Fisheries and Oceans. It was the national Department of Fisheries and Oceans that was resistant while the Minister and local staff were pushing things forward. A critical point was when Rutherford took the initiative and drafted the first version of the regulations. This met with approval from science and environmental interests.

Now the reserve is in place Hal thinks the Department of Fisheries and Oceans has done well in assigning resources for management and research.

The reserve involved resolving real issues and ending significant fishing. Long lining for swordfish was the main problem with entanglement of the Bottle nosed whales.

The real fuss occurred as the reserve formed and now support is general and the committee meetings peaceful and constructive.

Hal felt the Department of Fisheries and Oceans was very consultative in the formation of the reserve. They were very patient when the criticism became forceful and persisted with the decision to act.

The Gully does not experience the tourism pressures of the Kaikoura Canyon. There is one tourist trip a year and it has a science presence on board.



Figure 11 Inshore Nova Scotian fishing vessel

4.4.3 Key insight

An engaging academic can be a major force in driving protection if allies are available in the administrative and political spheres.

4.4.4 Analysis

The discussion with Hal emphasised the differences between The Gully and the Kaikoura situation. The distance offshore diluted all interests and made the role of science more

important. This meant the real opposition resolved to a small number of fishing companies and petroleum interests.

4.5 MAUNCIO CANTOR, ANA EGUIGUREU, ELIZABETH ZWAMBORN

4.5.1 Who are they?

Mauncio is a doctoral student from Brazil, Ana a Master's student from Ecuador and Elizabeth a Canadian Master's student all studying marine mammals under Hal Whitehead

4.5.2 What did they say?

They each felt that marine management and marine protected areas in their country were far from perfect. In Brazil and Ecuador, the marine protected areas were there on paper but not enforced. Ana was concerned about the undue influence of industrial fishing and all agreed that artisanal fisheries were easier to engage people and create good management with community support.

4.5.3 Key insights

Marine Protected Areas are only as good as their implementation. Even though conflict peaks in the formation process, so does engagement. Sustained management solutions are needed.

4.5.4 Analysis

Graduate students are an important component in sharing knowledge internationally. Their experiences in South America are significant, but were absent in the international conferences I have attended.

4.6 HILARY MOORS-MURPHY

4.6.1 Who is she

Hilary is the principal marine mammal Research Scientist with the Department of Fisheries and Oceans in Nova Scotia. Hilary could meet me after I delivered the invited BIO seminar on Kaikoura ("What the whales knew") presented in the Needler Boardroom and attended by an audience of approximately 65 staff members.

4.6.2 What did she say?

Hilary described her acoustic monitoring work in The Gully and at other sites. Acoustic recording devices are dropped to the seabed and record for a period before being recovered and the data analysed. The devices can function down to a depth of 2000m (built by JASCO in Nova Scotia). An acoustic signal is sent from a vessel when the time for recovery has been reached and the release mechanism lets the device ascend to the surface.

Data analysis can distinguish the presence of different genera to the species level. Although the result is simply presence/absence data for each species, the number of data points are two orders of magnitude higher than that captured with surface observation techniques. The approach can also work at periods when surface observations are not practical, such as mid-winter. This has led to discovery of over-wintering populations of baleen whales that were previously unknown (presumed to be migrating to other places at this time). It has also revealed the presence of species that had not been previously found in the area. In addition to the iconic beaked cetaceans, the endangered population of Northern bottlenose whales this has included 4 different species of beaked whales (which are very difficult to distinguish in surface observations).

Hilary's work has been important in interactions with the petroleum exploration sector (see Resources provided) and in identifying species at risk. The Gully has been a focal point for Hilary over ten years now (Moors-Murphy 2014).

Some of the most important data are gathered when recording acoustic data from cetaceans and anthropogenic sources at the same time, particularly acoustic survey periods for petroleum as this can allow the real risks to be better assessed. For example, change in cetacean vocalisations can identify responses to disturbance. Assessing the significance of such changes is however something that is subject to debate. Hilary undertook such work in 2014 and the resulting reports are in preparation.

There are opportunities for the petroleum industry to fund this sort of work, which is expensive (\$25K capital cost for each device from JASCO Applied Sciences, <http://www.jasco.com/amar/>). There has been a lot of interest from the BP international head of the Sound and Marine Life Program in the acoustic investigations underway in the Gully and nearby.

The real questions are what are the cumulative impacts on the whales and the overall ecosystem impacts of a range of disturbances from human activities.

Hilary suggested the Dublin Underwater Noise conference in July was a good opportunity to learn more. She is also the principal organiser for the Marine Mammal Science Conference in Halifax in October 2017. There will be sessions on marine mammal tourism and indigenous people's issues as well as the core science.

4.6.3 Key insight

Automated acoustic data collection vastly increases information available on marine mammal presence and behaviour.

Both Hilary and Paul McNab were very interested in the Atlantis model as an aid to dealing with whole of ecosystem level understanding. I promised to put them in contact with the relevant people in NIWA.

4.6.4 Analysis

Using acoustic techniques in the Greater Cook Strait area and Kaikoura could provide robust and important data on marine mammals. Given the focus of the Sustainable Seas Science Challenge on the prospective areas around the Taranaki Basin, and that this extends to the Marlborough marine area, a conversation with the Marlborough District Council, NIWA and the petroleum industry could prove productive. Some of this work may already have been commissioned, but, if not, then including Hilary in the conversation could be very helpful in enabling people to see the possibilities. Such work could also be included in the Te Korowai Research and Monitoring Strategy and the Kaikoura Guardians could provide advice on priorities directly to the Ministers of Conservation and Fisheries.

4.6.5 Resources provided

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- Moors-Murphy, H. Submarine canyons as important habitat for cetaceans, with special reference to the Gully: A review. Sea Research Part II Topical Studies in Oceanography. 2014: 104:6-19

5 BOSTON

5.1 BRAD BARR

5.1.1 Who is he?

Bradley W. Barr, PhD, Affiliate Professor, School of Marine Sciences and Ocean Engineering, University of New Hampshire. Brad has 40 years of experience in Marine Protected Areas establishment and management and works for NOAA as well as having a teaching role. Brad is:

- Senior Policy Advisor, NOAA/Office of National Marine Sanctuaries, Woods Hole and Scituate, Massachusetts. *Current work focused on interagency coordination, maritime heritage in Alaska, ocean wilderness, enhancing university partnerships, international collaboration.*
- Visiting Professor, University Centre of the Westfjords, Isafjordur, Iceland. *Marine and Coastal Management Masters' Program, Courses: Marine and Coastal Conservation, Coastal Heritage Conservation and Management.*
- Affiliate Professor, Centre for Ocean and Coastal Mapping/Joint Hydrography Centre, School of Marine Science and Ocean Engineering, University of New Hampshire, Durham, New Hampshire.
- Visiting Professor, World Maritime University, Malmö, Sweden

He was referenced by Department of Fisheries and Oceans staff in Nova Scotia as a world leading big picture thinker.

5.1.2 What did he say?

Brad said that experience of Kaikoura would be more similar to the inshore whale watching areas on the Stellwagen Bank National Marine Sanctuary off Boston, which has the sort of intensity of human use I described for Kaikoura near Boston, rather than The Gully in Nova Scotia. For these offshore areas such as The Gully the number of competing interests is small and the real issue is the difficulty of ongoing compliance and enforcement once the area is established.

In relation to no-take marine reserves, he said that there is a serious lack of consistency in terminology. Globally he estimates that 42 different things are called “marine protected areas”. In Chile, for example, an “Marine Protected Areas” may be no more than an aquaculture area. He advocates simply using the IUCN terminology¹⁴ as a consistent base (see text box below).

¹⁴ <http://www.iucn.org/content/guidelines-applying-iucn-protected-area-management-categories-marine-protected-areas-0>

IUCN defines a protected area as:

A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. The definition is expanded by six management categories (one with a sub-division), summarized below:

Ia Strict nature reserve:

Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values

Ib Wilderness area:

Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition

II National park:

Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities

III Natural monument or feature:

Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove

IV Habitat/species management area:

Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category

V Protected landscape or seascape:

Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values

VI Protected areas with sustainable use of natural resources:

Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims

The category should be based around the primary management objective(s), which should apply to at least three-quarters of the protected area – the 75 per cent rule.

In the US, Congress has limited the establishment of new sites under the National Marine Sanctuaries Act. While this does not apply to other authorities, this approach has effectively limited the designation of all new marine protected areas simply because Congress is so polarized and can't agree on much of anything. Instead all initiation must come from the community, meaning there is no opportunity for a strategic programme. It also means that these "quirky" little areas are only protected in ways that are nominated by the initiating community. While the National Marine Sanctuary Programme is meant to focus the law on areas of special national significance, most qualifying areas in the inshore

are not considered at all and offshore areas are driven by the scientists and NGOs. New sites being currently considered for inclusion in the National Marine Sanctuary (NMS) System might not necessarily be the most worthy as “areas of special national significance”, but could be interpreted as meeting this “special national significance” standard because the criteria are so broad and the bar is set low in the statute. However, they are not being identified through some strategic planning process independently identifying sites in the waters of the US that clearly meet the standard. The current site establishment process only acts on what sites are provided through the community-based nominations.

The Canadian process is disabled by the approach of firstly designating areas and then having the actual effects being determined by the subsequent management plan. So as resource constraints delay the management plan, the marine protected area has no effect for some years. US NMSs have a fully developed management plan adopted at the time of designation. The issue with the Canadian approach is that the public engagement process that is required to achieve “establishment” is still one that demands much of participants in that process, and raises expectations of how the site will ultimately managed. The iterative process involving the subsequent development of the full management plan for that site is constrained, sometimes significantly, by that establishment process. Experience suggests that you need to work out the details before the site is formally gazetted while explaining to the participants at every opportunity in this process that the ocean is highly dynamic and changes over time. This may require new and different management strategies will be implemented in the future. The concept of “adaptive management” is very difficult for some to accept after many years of sometimes combative debate over the details of how the site is to be managed). Brad said *“I believe, again based on my experience, that the idea that “let’s get something in place, and work on improving it in the future” is deeply flawed thinking...once any institution adopts an approach, it is the proverbial “super tanker”, which can be steered in another direction but it takes considerably more time and distance than you might anticipate.”*

Communities tend to value Marine Protected Areas more because they attract a federal facility that adds resources and recognition for things like tourism than because they value the protection *per se*.

The words “biodiversity” and “ecosystem integrity” are not favoured by the current administration, and other terms are used in preference for political reasons.

The National Parks Service only goes to 3 nautical miles and the split jurisdictions of the various agencies and levels of government make essential collaboration more challenging.

Brad has thought a lot about “wilderness”. He sees the USA as being the foundational nation in the concepts of leaving large areas unmanaged. He said that we have a considerable way to go before the idea of ocean wilderness can achieve its potential value as part of the Marine Protected Areas “toolbox”. Progress can be made, at the right place and time, toward this potential, but not without some coordinated action. He sees the Arctic (our iconic wilderness) as a place where we can move this idea forward. He says *“but we’ll see...may not be the political will to pursue it”*.

He said that areas that are currently biodiverse will remain biodiverse even if the species composition changes in the face of biological invasions or climate change. He does not agree with those that advocate for trying to keep everything as it once was. He has more faith in the inherent resilience of ecosystems to deal with what we throw at them, and believes we need to be less impatient.

A big failing in the US is the lack of resources for monitoring marine protected areas. Much more attention is focused on formation than on management and ongoing learning and adaptation. This is in part the result of directions from Congress on the political

priorities. For instance, the fate of radioactive waste from the Manhattan Project in Massachusetts Bay keeps getting attention and resources even though no significant contamination has ever been found.

At the same time the funding for the Inventory Monitoring programme of the National Parks Service has been reduced more and more. The money has largely gone to maintaining the visitor related infrastructure. The US National Park Service still has an Inventory and Monitoring (I&M) Program, but it is considerably smaller with fewer resources than it once had. More generally, he thinks the point is that finding resources to do even some monitoring is difficult, and requires that Marine Protected Areas stewardship agencies have a "culture of evaluation" ...which many do not. *Scientific uncertainty is not a concept that we are very good at explaining to the public, and uncertainty is usually interpreted as "junk science" by those who disagree with what that science is leading us toward in terms of how conservation should proceed (climate change is an excellent example of this). Monitoring is necessary, but opens the agency to criticism when it suggests that some existing management approach (again, that was developed in a public engagement process that was hard fought and no one was particularly happy with the outcome...one measure of "consensus") is not working..." failure" is the only thing we learn from, but is least likely to be something that is discussed in public.*

Brad sees The Gully Marine Reserve as an example of an agency taking the path of least resistance in the face of Government requirements to do something following the passage of the Oceans Act. This offshore area had little resource exploitation potential and high natural values. Establishing the Gully Marine Reserve Department of Fisheries and Oceans has really done little further in Marine Protected Areas formation. He referenced Paul's paper on EASOM as describing something that never came to fruition. The idea of integrated ecosystem management led to lots of meetings but not much outcome. A few small National Marine Conservation Areas have been designated but Environment Canada has not designated any marine conservation areas for wildlife.

Unlike New Zealand, the US has saltwater recreational fishing licences but they are ineffective even for information collection as there is no enforcement of requirements to record catch.

Brad talked about the "chaos box" model and how that can be applied to Marine Protected Areas formation. You throw a lot of balls (strategic initiatives) into the box, and something may pop out of the aperture of opportunity at the other end. The "box" does not have fixed dimensions, and the critical intervention is to change its orientation. This is done by manipulating the environment around the box.

Brad cautioned that ideas cannot be successfully picked up in one place and transferred to another. First, they will be rejected as being a foreign idea and second, they will not fit. It is far better to sense into each situation with a broad toolkit of possible interventions and produce what is needed directly.

He referenced "ESSIM" (Eastern Scotian Shelf Integrated Management) ...*If you read any of the papers on ESSIM, it will appear to be a very successful process, but whether it actually achieved anything on the ground commensurate with the investment, the jury is still out. Still, we are fond of talking about our "successes" well before they actually are proven, largely as a way of creating the perception of success (making the actual outcome more difficult to challenge, perception being far more important than reality).*

In relation to the Pacific North Coast Integrated Management and Assessment process in British Columbia Brad described an event at a First Nations' workshop that was *illustrative of how an agency can "shoot itself in the foot" by not being genuinely committed to collaboration, and fail to make the necessary investment to build the required "social capital" needed to forge effective partnerships. People know when you are doing*

something because it is the adopted process, as opposed to when you are deeply committed to the outcome, and willing to do whatever is necessary to build and foster true partnerships. In this process, Department of Fisheries and Oceans were hosted by the First Nations but completely miscued and the first nations people all left.

He also referenced a paper in the Marine Policy journal by Langholz and Abeles that listed the social skills needed to work successfully in natural resource conservation (see resources provided).

He said that success comes from building human relationships.

5.1.3 Key insight

Working with the emergent is the only way to go.

5.1.4 Analysis

Brad's comments about the US situation emphasised for me the issues of the democratic system disabling effective and timely responses in marine protection in an era of accelerating environmental change and degradation. His clear-eyed appreciation of the way the world is changing made me want to go back to considering the long-term consequences of the recombinant ecology we have created by moving species around the world and modifying environments. He affirmed for me the value of settling on the IUCN classification of Marine Protected Areas types and reinforcing that in national contexts. He reminded me that everyone believes their own story and that critical listening and evaluation is vital. His experiences affirm the value of the facilitation of the emergent rather than trying to peddle a fixed approach or falling into goal-traps. He also reminded me of the importance of dealing with the underdeveloped portion of the system - effectively training change agents in how to generate alignment and relational capacity to enable creative problem solving.

5.1.5 Resources provided

- **Rethinking Postgraduate Education for Marine Conservation** Langholz and Abeles, Marine Policy 43 (2014) 372 to 375

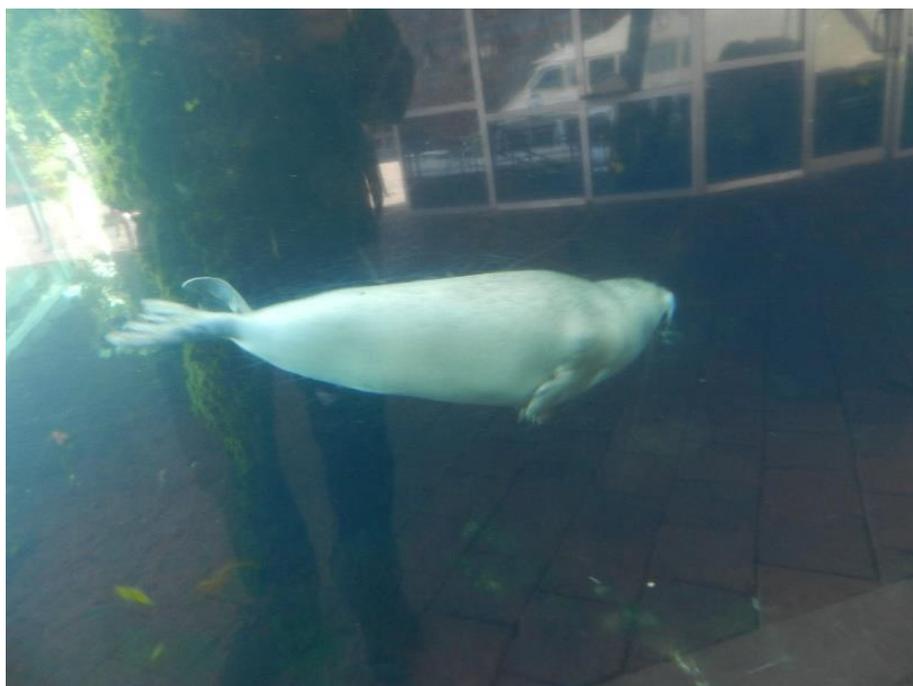


Figure 12 New England Aquarium

5.2 BILL CLARKE

5.2.1 Who is he?

William Clark is the Harvey Brooks Professor of International Science, Public Policy, and Human Development at Harvard University's John F. Kennedy School of Government. Trained as an ecologist, his research focuses on sustainability science: understanding the interactions of human and environmental systems with a view toward advancing the goals of sustainable development. He is particularly interested in how institutional arrangements affect the linkage between knowledge and action in the sustainability arena.

5.2.2 What did he say?

We can successfully connect science and action when time and space scales are small. When the time and space scales are small, the feedback loop between action and result is reasonably clear.

However, when we scale up to longer time scales and more diffuse issues, the record is dismal.

He commented on my Kaikoura example and its relation to the Marlborough work. If, hypothetically, we had started seven Kaikoura scale exercises in the Marlborough Sounds seven years ago, we would find certain characteristics consistent and other characteristics that were unique and non-reproducible.

We discussed the way that the catalyst person (facilitator) can need to manifest leadership for a period before it becomes an emergent property of the process.

The scale issues and unique components means that the idea of doing pilots to scale up, or having a formulaic approach will not work.

The core work is to build social capacity to define and deal with the issues.

The dynamic is that the building is the thing, not that the thing is the product of the building.

Ideally, seed as many processes in as many places as possible. When the time is ripe, two or three years into the process, assist the participants to come together. While it's fine to have the catalyst, people come together early to share experiences and lessons, the participants of the different processes shouldn't bump into each other too early.

It's important to remember that you won't be doing the same things in year 6 as you were in year 2 (and implicitly these are decadal processes).

Bill described a project in Cameroon which was encouraging agroforestry. In year two or three the whole annual budget (very small) of the project was spent on gathering participants from around the region. Transport was difficult and communications limited. This involved a two-ton truck and the meeting point was a community fair. There were no speeches or formal processes. Rather the participants embraced the opportunity to talk with their peers about the practical issues and solutions they had uncovered, catalysing horizontal learning.

Once again, he emphasised that there was no magic rabbit that could be pulled from a hat, or a manual for these approaches. The process of constructing the thing is the thing.

In dealing with large dispersed issues the productive approach is to deconstruct them into short term not-dispersed things. This way we can turn messes into something we can do something about.

It's important to find ways to bring big dispersed things into examples that relate to people where they can comprehend how elements fit together. He gave the example of telling his students that in the Boston environment they will have a significant mercury loading that will affect the IQ of their kids adversely. This connects the wider dispersed issue to something personal.

5.2.3 Key insights

The process of constructing the thing is the thing. In dealing with large dispersed issues the productive approach is to deconstruct them into short term not-dispersed things.

5.2.4 Analysis

Bill's ideas about reducing things to a manageable scale link with Brad's views that we must work in the context of place with the emergent field.

Bill gives us real clues about how to relate the Kaikoura and Marlborough experiences. He confirms it is not possible to scale up from Kaikoura to Marlborough. However, the diversity and scale of Marlborough offers the opportunity to start several small things and learn from each rather than going straight to the whole. I would characterise it thus:

- Sense into the field
- Draw on the whole wisdom available
- Create social capacity to engage at multiple locations
- Act
- Reflect
- Act
- Reflect
- Join up the catalyst people
- When the time is right join up the diverse participants
- Work with the emergent.

For Marlborough, taking a place based approach we might consider:

- Queen Charlotte Sound - tourism and transport, Te Atiawa (Ngati Apa, Rangitane, Ngati Kuia, Ngati Toa)
- Pelorus Sound - marine farming and life style, Ngati Apa, Rangitane, Ngati Kuia, Ngati Toa
- Durville Island - remote Ngati Koata, (Ngati Kuia)
- Tasman Bay - benthic ecological restoration shared with Tasman and Nelson, Ngati Tama, Ngati Rarua, Ngati Koata, Ngati Apa, Ngati Kuia, Ngati Toa
- Cloudy Bay - open coast strongly influenced by large catchments, Ngati Apa, Rangitane, Ngati Kuia, Ngati Toa, Ngati Kuri
- Cook Strait - dynamic narrows shared with Wellington, Ngati Toa (Te Atiawa, Ngati Apa, Rangitane, Ngati Kuia, Ngati Toa).

6 CHESAPEAKE

6.1 JANA DAVIS

6.1.1 Who is she?

Jana Davis is the Executive Officer of the Chesapeake Bay Trust. She trained as a marine biologist before moving to the not-for-profit sector. The Trust provides grants of \$10M a year. It is a quasi-governmental organisation but reports to an appointed Board.



Figure 13 Traditional Chesapeake recreational sail boat

6.1.2 What did she say?

Jana said that the Federal level sets the overall strategy and all the parties align with it. The Trust as an NGO is not a signatory to the agreement. However, the process of forming the Strategy was open and consultative.

The overall Bay programme involves six states and Washington DC. At the operational level the administration teams involve not-for-profits in setting their own work programmes and coming up with the numbers. These numbers focus around allowable input of N, P and sediment, with N for example being calculated as lbs of N per acre of wetland. While there might be complaints about the programme details, there are none about the degree of engagement.



Figure 14 Chesapeake tributary urban catchment Hyattsville

The Environmental Protection Agency has become more active in enforcing the requirements of the Clean Water Act. This involves compliance with the Total Maximum Daily Load (TMDL) for a range of contaminants. Each State is required to have an implementation plan and these engage the County level.

The level of resources being applied has been rising with new funding sources such as a storm water utility fee. This has raised \$10 to \$30M per county.

Those involved knew long ago what needed to be done. These have been codified into 28 best management practices.

Waste water comprises 20% of N load and this has been vastly improved.

While there is a lot of data, many parameters are modelled, rather than calibrated to data. This reduces credibility.

Over time the water quality has been dropping; however, it could have been much worse without the actions that have been taken.

Jana sees sea level rise as a human rather than a biological problem in the context of Chesapeake Bay. In contrast to the Great Barrier Reef where climate change will lead to the loss of the reef system, the waterways of Chesapeake will migrate inland and the wetland ecology will re-establish at new contours.

The Trust has supported initiatives in social marketing and these have become far more sophisticated. Rather than a wide dissemination of broad pamphlets and videos, the questions behind the social marketing are “who are the audience and what do you want them to do differently?”.

The investment in social marketing is seen to be very effective, particularly programmes that use information gathering like pre and post surveys to target and measure success.

For example, in trying to get farmers to plant cover crops it's essential to consider that the farmers do not care about the Bay at all. It is necessary to use incentives and to communicate with them through trusted sources such as agro-technical staff and the use of farmer breakfasts.

She described a campaign to reduce the incidence of cigarette butts in the Anacosta River. This involved discovering who littered butts, why and the perceived barriers to not disposing of them properly. Then they developed the logistical and behavioural model. It is just like marketing a product to a price point.

She cited a study in Oregon targeted at reducing litter. There just the perception of a threat was enough to change behaviour (the threat was an app that encouraged people to dob their friends in for prosecution for littering).

She cited the work of McKinsey Moore (the Canadian advising the Queensland government on social marketing).

Achieving culture change involves focusing on “co-benefit”. Farming has been there so long; the culture is deeply embedded and the costs taken for granted.

She said that McKinsey Moore said that, in response to information, 20% of people will change behaviour, 20% will be oppositional and 60% will be neutral.

Many people who live inland have never been to the Bay. They do want things like trees and parks and no litter that deliver co-benefit.

Initially the Trust gave funds to help form watershed implementation plans. Now that they are accepted practice, the Trust funds projects that align with the plans.

Funds come from a range of sources, with a key one being the sale of Chesapeake car licence plates (\$3M annually).

The Trust sets strategic direction and uses an RFP process to solicit proposals that align with it. These can engage with widespread issues, as well as the restoration of places. An example was the funding of a study to enable consents for stream restoration works after gaining licences was proving problematic due to a lack of real information on best practice.

A good example of the place-focused projects is the Living Shorelines programme. This removes coastal armouring in favour of natural biotic communities.

The Trust also funds capacity building for community organisation engaged in related projects.

6.1.3 Key insight

Creating funding streams enables a strategic approach without building a large administrative superstructure.

6.1.4 Analysis

This conversation revealed a mental model where incentives were favoured over regulatory approaches, carrots rather than sticks. This seemed to stem from the quasi-governmental status of the Trust that precluded overt political activity. It also showed a much greater role for not-for-profit philanthropy than occurs in New Zealand. It also demonstrated the importance of “putting yourself in the other person’s shoes” e.g. the farmers, thinking about how “the world works best” for them, and incorporating that analysis when planning incentives.

6.1.5 Further contacts suggested

Blue Water Trust

South River Federation

6.2 DAVE SLATER

6.2.1 Who is he?

Communications officer for the Chesapeake Bay foundation.



Figure 15 Chesapeake Foundation Headquarters

6.2.2 What did he say?

The Foundation has just had its 50th anniversary. It is the biggest regional NGO with a budget of \$20M.

It has state offices in Maryland, Virginia and Pennsylvania, a federal office in Washington DC, and several regional offices.

The Foundation is engaged in advocacy for the Bay and large scale education programmes that include putting every kid in the States that adjoin the Bay on the water at least once in their time at school. It has also recently moved into litigation.

The results have been successful in Virginia and Maryland, but not so in Pennsylvania.

The Foundation sued the EPA under the Clean Water Act and this contributed to an Executive Order from President Obama and a settlement with the EPA.

Despite taking this more litigious approach, the relationship with the EPA remains friendly.

The Foundation is careful to position itself in the middle of the political spectrum, and avoids getting into party politics.

The Bay-wide clean-up plan, which runs through to 2025, is progressing well except for Pennsylvania, especially regarding reducing the input of N. Roughly 85% of the shortfall comes from farming practices in Pennsylvania. This state also faces a budget shortfall just when it needs to be subsidising retirement of riparian margins and the planting of winter cover crops. 50% of the inflow to the Bay comes down the Susquehanna.

The Foundation is now going for “micro-targeting”. Their political campaign handbook now involves a lot of polling of stakeholder groups with potential political influence. These include sportsmen, educators, and environmental justice activists. To connect target audiences to local stream pollution, the Foundation produces resources that are relevant to particular areas, such as GIS maps that show the state of local waterways.

In the pilot project in York County, Pennsylvania, they went door to door and 14,000 conversations through this and other means such as phone calls. They did this with a small staff of organizers but leveraged volunteers aggressively. These had three levels of goals in interacting with people. The first level was to get them to sign a petition to the Governor seeking action on water quality and 86% of the people at the door signed the petition (a total of 2,000 York County residents).

A second level involved people taking direct action. For example, when using phone calls, people could be linked directly with the Governor’s office through an automated database and 48% of calls resulted in a patch through. Action takers were split equally between Republicans and Democrats.

The third level involved people becoming longer term activists. In one programme they are targeting veterans as people that spend a lot of time outdoors and have credibility with politicians. Sportsmen (hunters and anglers) and educators are also on their priority target list.

The Foundation will not take positions that harm relationships with Republicans and this is a point of difference from other large environmental NGOs that are perceived to be left leaning.

Both sides of the political spectrum want to clean up the Bay but differ in their preferred methods. The Farm Bureau is very powerful and opposes regulatory solutions supported by the Republicans who favour voluntary methods. The Bureau has sued against regulations up as far as the Supreme Court.

The Foundation has turned to economic analysis and commissioned a study to set a value on ecosystem services. Although this was a low budget study (<\$70K vs \$1M for Tasman

Bay) the figures have been widely accepted and shifted the ground of debate. The study suggested a 5-to-1 return on investment in improving the quality of the Bay, even though all assumptions were very conservative.

The Foundation also funds the operation of grassroots networks and active restoration of oyster and sea grass beds. The oysters reached 1% of their historic biomass, but are beginning to recover.

Dave spoke highly of the effects of their “State of the Bay” report that reduces complex data to simply understood metrics and scores. It combines the art and the science.

Another successful initiative is the training of “Bay Captains”. These volunteers are given a rigorous programme of training that enables them to become well informed advocates for the Bay.

Dave also spoke highly of the social marketing initiatives of the Chesapeake Bay Trust focused on reducing fertilizer usage in the watershed.

He said that both the current political polarisation, and the imminence of the election, were creating a difficult climate for their work. For example, with Pennsylvania as a swing state, no one associated with the Democratic administration in Washington DC wants to be seen to be putting pressure on the Democratic Governor about poor performance on water quality if alienation of the farming community could affect the presidential election results.

6.2.3 Key insight

Micro-segmentation and careful selection and targeting of opinion leaders can be a highly effective avenue for influencing bipartisan political outcomes.

6.2.4 Analysis

The Foundation has quite a different model from the Trust, in part because it can be politically active, even though for strategic reasons it works hard to be unaligned vis a vis the major parties. It has demonstrated the value of linking a rich vein of local action with well selected litigation. In this respect its New Zealand parallel is the Royal Forest and Bird Protection Society but it has escaped the left/right labelling. The Bay Captains programme has potential for places like the Marlborough Sounds.

6.2.5 Resources

- **The Economic Benefits of Cleaning Up Chesapeake Bay.** Chesapeake Bay Foundation October 2014
- **2014 State of the Bay.** Chesapeake Bay Foundation

6.3 IAN DAVIDSON AND WHITMAN MILLER

6.3.1 Who are they?

Ian is a marine invasive species and vector ecologist and Whitman is a research scientist working on marine invasives and ocean acidification. They are located at the SERC laboratory of the Smithsonian Institute near Annapolis.



Figure 16 Smithsonian Laboratory

6.3.2 What did they say?

They described the work of SERC which is very broad and includes both new research and integrated programmes that link around the world. I was shown:

- Large natural area surrounding SERC with its terrestrial and shoreline restoration projects, as well as conservation and interpretation of the historic resources associated with the tobacco plantation that once occupied the area;
- The model sustainability programme for the lab and its operation;
- The CO₂ measurement operation that is part of a large network coordinated by Whitman that is working in the estuarine environments largely ignored by such studies to date;
- Marine vector modelling that subjects invasive organisms to the environmental conditions pertaining during a typical ocean voyage (at the moment I visited they were transiting the Panama Canal which with its low salinity acts as a natural barrier for hull fouling organisms).



Figure 17 Smithsonian scientists modelling a ship voyage

Ian's vector work is highly relevant to pathways management in New Zealand. They see the New Zealand biosecurity system as the gold standard for other nations. There were strong links with NIWA and Cawthron and it was clear that the New Zealand marine biosecurity community is well connected worldwide.

I gave a talk on both the TOS and Kaikoura programmes to the staff. These were well received and led to requests for further correspondence.

6.3.3 Key insight

Global warming is opening new vector routes through the Arctic in a complex international political environment that will make management difficult. This phenomenon may have parallels in other parts of the world.

6.3.4 Analysis

Discussion suggested that New Zealand practice in marine biosecurity is at the leading edge worldwide. This means that the lessons from other jurisdictions will be limited and that it will be very important to support our people to tell the New Zealand story.

6.4 BILL DENNISON, HEATH KELSEY, JANE THOMAS, DYLAN TAILLIE AND BEN WAHLE

6.4.1 Who are they?

Dr Bill Dennison is a Professor of Marine Science and Vice President for Science Applications at the University of Maryland Centre for Environmental Science (UMCES). Dr Dennison's primary mission within UMCES is to coordinate the Integration and Application Network. The University of Maryland Centre for Environmental Science is one of two research and service institutions in the 13-institution University System of Maryland. UMCES is comprised of three laboratories distributed across the watershed of Chesapeake Bay within Maryland: Appalachian Laboratory in Frostburg, Chesapeake Biological Laboratory on the western shore of Chesapeake Bay in Solomons and Horn Point Laboratory on the eastern shore of Chesapeake Bay near Cambridge as well as Maryland Sea Grant College in College Park, Maryland. UMCES also operates an Annapolis Liaison Office. Dr Heath Kelsey is the programme director, Jane Thomas is a senior science communicator and Dylan Taillie and Ben Wahle are science communication interns.

6.4.2 What did they say?

They said that science communication is critical to creating effective ecological restoration. A simply presented but deeply respected score card can be a key part of this. They have completed hundreds of these report cards with two seminal areas in Chesapeake Bay and the Great Barrier Reef, and across a diverse range of other environments around the world. The process engages stakeholders in workshops to define meaningful indicators and then the assembly of data to index the current state and trends of the environment in terms of these indicators, goals, and targets. Their Chesapeake and Moreton Bay reports were cited.

They describe themselves thus:

The Integration and Application Network (IAN) is a dedicated group of scientists intent on solving, not just studying environmental problems. IAN is an initiative of the University of Maryland Center for Environmental Science. IAN's mission is to inspire, manage and produce timely syntheses and assessments on key environmental issues, with a special emphasis on Chesapeake Bay and its watershed. IAN is a network which includes different agencies and institutions in different locations. IAN staff are physically located at the following sites:

The IAN building is on the campus of Horn Point Laboratory, University of Maryland Center for Environmental Science on the eastern shore of Chesapeake Bay overlooking the Choptank River, near Cambridge, Maryland.

The Chesapeake Bay Program, a partnership run by the Environmental Protection Agency, which includes federal agencies and academic partners is located at the mouth of the Severn River in the Eastport section of Annapolis on the western shore of Chesapeake Bay.

MD Department of Natural Resources, a partnership between UMCES and DNR on climate change projects.

UMCES Annapolis Office with staff and conference facilities located in downtown historic Annapolis on the western shore of Chesapeake Bay.

They use two half day workshops with an overnight stay as standard modus operandi. They have a range of tools and techniques for the process of the workshops and these have been refined over time. These include the use of map outlines as a focus, use of criteria (SNAP process¹⁵), community mapping, and use of narrative index.

They referred to the World Harbours project as a useful initiative.

The University has a large programme for restoration of oyster beds in partnership with industry and government. This annually seeds 1.2 billion oysters attached to recycled shell into the Bay.

The University of Maryland also has the National Socio-Environmental Synthesis Center (SESYNC) *which brings together diverse groups in new, interdisciplinary collaborations to identify solutions to society's most challenging and complex environmental problems. SESYNC focuses on a research approach called "synthesis" to produce fundamental knowledge about co-dependent human and natural systems. Synthesis brings together existing but disparate data, methods, theories, and tools in new and perhaps unexpected ways to reveal relationships or to generate novel insights. Synthesis is a highly varied effort, and its definition will change depending upon the lens of those who undertake it. However, in all cases, synthesis is a means for accelerating scientific understanding that is applicable across multiple places and scales.*¹⁶

6.4.3 Key insight

State of the Environment reporting in the form of simply presented report cards and indices can unlock action by agencies and communities.

6.4.4 Analysis

The IAN group is filling an important niche in connecting science to people and information to action. This role is present in New Zealand as seen with the initiation of the Hauraki Gulf Sea Change project and the recent report card for the Waikato River. There is potential to involve this group with a range of projects including Kaikoura, Marlborough, Tasman Bay, and TOS Marine Biosecurity Partnership. The cost of developing a report card for say the Marlborough Sounds would be \$100K to \$150K. The next step will be to have conversations with a range of parties to see what appetite there is for a collaboration in this area.

¹⁵ To address this question, [Sarah Freeman](#) from WWF drew a human outline and placed it on the wall, and asked us to note down qualities that came to mind on post-it notes. In this exercise, called "SNAP", someone is chosen to call out what they wrote on one of their post-its. The person then selected where on the diagram to place the note (head for intellectual features; heart for motivational features; hands and feet for practical features). If someone else had a similar post-it, they called out "Snap" and added to the original post-it. <http://ian.umces.edu/blog/2016/03/03/determining-what-makes-a-good-environmental-champion/>

¹⁶ <https://www.sesync.org/about>

In addition, Phoenix Facilitation training could benefit the science communicators of IAN. They have facilitators who are already skilled and our programmes are ideal in increasing the range and effectiveness of people operating in this area.

6.4.5 Resources

- **Chesapeake Bay Report Card 2014**, University of Maryland Centre for Environmental Science
- **State of the South Atlantic 2015**, South Atlantic LCC 2015
- **Total Maximum Daily Loads. A citizen's guide to the Chesapeake Bay TMDL**, Chesapeake Bay Program 2011
- **New Insights: science based evidence of water quality improvements, challenges, and opportunities in the Chesapeake.** Executive summary. IAN, Chesapeake Bay Programme



Figure 18 School party visiting Smithsonian laboratory

7 VANCOUVER

7.1 DOUG BIFFARD

7.1.1 Who is he?

Doug works for the Ministry of Aboriginal Relations and Reconciliation as a Lands Specialist. He was involved in Marine Protected Areas issues for 18 years with British Columbia Parks and had recently moved to work on land admin related to Aboriginal relations.



Figure 19 Vancouver Island

7.1.2 What did he say?

Doug began by outlining the 1850's Douglas Treaties which were of the same type and template as the Treaty of Waitangi. He referenced the 1996 coastal strategy and the Race Rocks ecological area as a case example. When the Oceans Act came into force, six areas were selected for pilot designations. The Province has particular powers east of the "surf line" which equates to the definition of the internal waters and to 3 nautical miles from the baseline it defines.

Many indigenous people value and refer to their relationship as being with the Queen rather than the current state entities. However, Gordon Campbell, the Provincial Premiere 2000 to 2010, took a bold step in recognising the sovereignty of the aboriginal of British Columbia. This changed the whole basis of the relationship. The aboriginal governing entities effectively became legitimate governments with which treaties and like instruments could be formed.

The Race Rocks Ecological Reserve was selected as one of the pilot areas for the Oceans Act designation process. Federal government has control of navigation and fisheries. A paper was prepared setting out what was to be done in classifying areas, including a no-take fishing area at Race Rocks. Everyone including the Federal officials agreed. Part of this agreement was that the new regulation would exclude all fishing except indigenous fishing. The indigenous people however would exercise their sovereignty by an ancestor-honouring ceremony that would mean that their people would not exercise their right to take fish from the area. When the regulation was drafted in Ottawa, however, the terms were changed to ban fishing by the indigenous people. They then wrote saying that under the Douglas Treaties they would not accept this and would keep fishing. The designation

then fell apart and bands in other parts of the country lost trust in the Department of Fisheries and Oceans.

This event was part of a family of things happening as the conservative government sought to pass a series of laws that were struck down by the Supreme Court as unconstitutional.

Doug talked about the residential schools and the way the aboriginal people had been kicked out of their fisheries in the 1970s. These people were considered “wards of the state” rather than citizens. Thus, when fishing licences for salmon were issued, the European fishers got class A licences and the aboriginal fishers class B licences. When stocks came under pressure, the class B licences were cancelled.

Doug believes that the indigenous people of British Columbia do not want marine protected areas - at this time, there is a continuing concern that it's just one more way to separate aboriginal peoples from their natural resources.

He spoke of a Truth and Reconciliation Commission, but the general feeling was of things being stuck at the Federal Level.

Doug was involved in a comprehensive strategic process for biodiversity in British Columbia in the 1990s. This included land, freshwaters and the sea and went beyond the publicly managed lands. The Department of Fisheries and Oceans led the marine component in this process. Their initial report listed threats to marine biodiversity. Number one was habitat loss, and number two was aboriginal fishing, ahead of marine pollution, even though aboriginal fishing had not been quantified. After a protest from Doug that this was racist the “threat” was downgraded, but not removed.

He sees the solution is in Coastal Zone Planning where the whole story is/can be brought to the table.

The Marine Protected Areas strategic process of the 1990s to 2000s failed because the government did not go the aboriginal governments first before consulting anyone else. This led to the Marine Area Planning Partnership(s) led from the provincial level. However, the aboriginal governments have much bigger issues to grapple with on land and social fronts, and have little appetite for such processes at present. The behaviour of the new Trudeau government could be a game changer, however.

Doug related the story of the rockfish conservation areas. This began when Doug started working on Marine Protected Areas in 1997. Rockfish and ling cod fisheries were collapsing and there was a possibility they would come under the Endangered Species Act. This stimulated Department of Fisheries and Oceans to create a rockfish conservation strategy to address the decline. In fact, there were about 40 species caught up in the overfishing but only a couple had reached critical levels. In the process, the Department of Fisheries and Oceans found that it couldn't only engage with recreational fishers who collectively resisted any limits and proposed areas of sand for reservation. Commercial fishers were more realistic. Department of Fisheries and Oceans' idea was to close areas with regulations that still allowed the aboriginal people to fish. This was seen as window dressing by the bands (tribes) who said that social forces would mean that they could not exercise such rights without alienating large sectors of the community.

With inshore marine protected areas processes falling apart, the Federal officials turned their attention offshore. This involved protecting seamounts so far offshore no coastguard vessel can operate there to police them. Doug described one situation where oral traditions dating back 10,000 years identified a hitherto unknown seamount as having been an island, and the geological evidence supported this. He said that the indigenous knowledge is generally under-rated and discounted.

Doug described how the understanding of concepts like representivity and ecosystem scale management had pushed forward for terrestrial protected areas while it languished for

marine systems. Of note was an infusion of knowledge and perspectives from Eastern Europe (former Czechoslovakia mostly - especially forest and wetland ecologists). A needed change is accepting that planning for representative areas needs to stem from a geophysical base, with biological data coming in as a secondary layer. This approach is particularly important in grappling with the data-poor Arctic areas.

Now one of the risks is that traditional knowledge of such areas will be lost before it can be applied to the risks facing these areas.



Figure 20 Vancouver Island barge Nanaimo

7.1.3 Key insights

Beginning with the Treaty relationship or recognition of sovereignty in relation to indigenous people is fundamental to enduring solutions for marine management and protection.

7.1.4 Analysis

In most respects, British Columbia seems behind New Zealand in the way it connects with its indigenous people in the management of natural resources. However, the recognition of sovereignty is in some ways beyond what is happening in New Zealand. This has come about due to the lack of treaties and has an advantage in that the relationship terms can be negotiated at a point when the aboriginal people have a much more sophisticated understanding of international relationships. This situation is complicated by the relationship between the province, which seems quite progressive, with the federal government which is just coming out of a long period of *neo-colonial style conservatism*. The joint planning between the province and aboriginal bands is worthy of further investigation. This would entail interaction with the major players - federal, provincial and the bands (tribes) themselves. As with Australia and Nova Scotia, an effective interaction between New Zealand and this work would be enhanced by the inclusion of Maori to allow peer to peer learning.

7.1.5 Resources provided

- *Fed/Prov blueprint for the Marine Protected Areas network*https://www.for.gov.bc.ca/tasb/slrp/pdf/ENG_British_Columbia_Marine_Protected_Areas_LOWRES.pdf

- *The doorway to marine planning that is the result of a provincial/first nations partnership (first nations = aboriginal nations = FN). <http://mappocean.org/>*
- *Marine ecosystem information <http://www.mccpacific.org/>*
- *A Federal planning effort that sort of lost FN support <http://pncima.org/>*
- *Federal Dept. of Fisheries and Oceans (Department of Fisheries and Oceans) website Marine Protected Areas national website so this is mostly national in nature. <http://www.dfo-mpo.gc.ca/oceans/oceans-eng.htm>*
- *Federal Marine Protected Area Strategy and the National Framework for Establishing MPAs*
- *<http://www.dfo-mpo.gc.ca/oceans/publications/index-eng.htm>*
- **British Columbia's Marine Protected Areas: Protected Areas or 'Paper Parks': A Legislative Perspective** Student ID: V00739872 Student Name: Samantha Andrews
- **Shifting Currents: Seeking Convergence in the Pursuit of Conservation Arrangements that Respect First Nations' Rights on Canada's Pacific Coast**, Julie Gardner and Robert Morales, Policy Matters 17, 2010

7.2 TOM THERRIAULT

7.2.1 Who is he?

Dr Thomas Therriault (Thomas.Therriault@dfo-mpo.gc.ca) is a Research Scientist with Fisheries and Oceans Canada (Department of Fisheries and Oceans) at the Pacific Biological Station in Nanaimo, British Columbia. Tom is working on several aquatic invasive species research questions both within Department of Fisheries and Oceans and through the second Canadian Aquatic Invasive Species Network (CAISN II). Within PICES, Tom serves as Chairman of Science Board.



Figure 21 Pacific Biological Station Nanaimo

7.2.2 What did he say?

British Columbia faces a similar suite of pests to New Zealand. These include *Styela*, *Ciona intestinalis*, and *Didemnum vexillum*. They are just completing their national assessment of the risks associated with recreational vessels. The two primary coasts, Atlantic and Pacific, are very different and there was not sufficient data to assess the Arctic. As the process unfolded, there was some internal pressure to adjust some scores in the risk assessments for regions, risking skewing the objective assessment, as some felt additional resources would follow the priorities. In the end, the assessment was relative and west coast ecoregions were at greater risk from recreational boats. The Canadian

Shipping Act is being used to enforce ballast water standards. In terms of hull fouling they are finding significant risk associated with some fishing vessels but additional research is required to understand how pervasive this is.

There seems to be no real management of marine biosecurity risks anywhere in Canada. From an invasive species perspective, there are no named marine pests with legal prohibitions (Chinese mitten crab is prohibited due to health reasons -- a lung fluke), and only some marine pests have been identified for control (but not with specific funding); there is no incident management of vectors or new incursions and no long-term control efforts on invasive organisms.

7.2.3 Key insight

New Zealand is way ahead of Canada in taking practical steps to reduce marine biosecurity risks.

7.2.4 Analysis

This interview confirmed that marine biosecurity scientists have a very healthy international network and New Zealand is well connected and respected. The surprise is to find that New Zealand has a decade of policy formation, law reform, and practical risk reduction that is absent in Canada. A government-to-government relationship for knowledge transfer would have big benefits for the Canadian administration.



Figure 22 Recreational break Vancouver

8 MONTEREY

8.1 MIMI D'IORIO AND CHARLES WAHLE

8.1.1 Who are they?

Charles and Mimi are members of the National Marine Protected Areas Centre. Their role is to look at Marine Protected Areas at a national scale and create a framework for understanding what is protected.

Dr Mimi D'Iorio is the GIS Database Manager for NOAA's Marine Protected Areas Centre in Monterey. Mimi specializes in GIS and remote sensing applications for the mapping, monitoring and management of coastal and marine processes. At the Marine Protected Areas Centre, Mimi is responsible for a variety of geospatial efforts; maintaining, updating and distributing the Marine Protected Areas Inventory; designing, planning and implementing participatory ocean use mapping projects; managing the design and development of online mapping tools for visualizing Marine Protected Areas and ocean uses data; and collaborating with NOAA partners on the development of GIS applications for assessing spatial resources inside and outside Marine Protected Areas.

Dr Charlie Wahle is a marine ecologist with extensive experience working at the interface between science and policy of marine conservation and protected areas. Prior to joining the Marine Protected Areas Centre, he served as NOAA's liaison to three key interagency marine conservation initiatives: the U.S. Coral Reef Task Force, the Invasive Species Council, and the national Marine Protected Areas initiative. From 1993 to 1999, he led the national programs for science, education, and conservation policy for the National Marine Sanctuaries Program and the National Estuarine Research Reserves Systems at NOAA headquarters in Silver Spring, Maryland. Prior to joining NOAA, Dr Wahle developed and managed a marine research and teaching laboratory on the New Jersey coast for Lehigh University. He has conducted extensive field research on Caribbean coral reefs and mid-Atlantic coastal ecosystems. Dr Wahle is an elected Fellow of the American Association for the Advancement of Science.

8.1.2 What did they say?

After an exchange of draft text, Charles provided what is written below to accurately reflect what they had to say.

MPA Inventory

The MPA Center manages information about U.S. marine protected areas to help understand status and trends of marine conservation in U.S. waters. The Center maintains the MPA Inventory, a comprehensive spatial database for MPA boundary and classification information. A classification system was developed by the Center to provide agencies and stakeholders with a consistent approach to describe MPAs in functional terms. The Inventory can be used to sort MPAs by functional attributes to analyse local to national scale coverage and patterns, and can provide insight to the various ways MPAs are used as a tool for resource protection. It also provides an intuitive, common language with which to describe, understand, and evaluate proposed and existing MPA sites, networks and systems.

The Inventory is used to respond to a wide range of spatial data calls, but MPA coverage and MPA no-take area are the most common statistics requested from the Center. No-take MPAs are areas where commercial and recreational extraction are prohibited. These sites range from small, state managed marine reserves focusing on species and habitats to large zones within federal monuments and sanctuaries that protect large marine ecosystems. In recent years, the Center has been working to apply IUCN categories to U.S. MPAs to complement the

existing US classification approach and to better align the U.S MPA data with global MPA information. These efforts work towards more consistency in terminology about MPAs, an ongoing challenge for the global MPA community.

MPA Designation and Governance

Federally managed MPAs in the US are established through a variety of legal statutes and public policy mechanisms, ranging from top-down Executive action by the President using the Antiquities Act (e.g. recent Marine National Monuments) to more locally-driven and bottom-up nominations of sites identified through stakeholder engagement processes (e.g. newer National Marine Sanctuaries). A similar range of designation processes exists at the State levels. Additionally, Federally recognized tribes (e.g. in the Pacific Northwest) often have independent authorities and means to manage marine resources, including the creation of MPAs. This diversity of Federal, State and Tribal legal mandates and goals can pose significant challenges to efforts to take a more collective, science-based and stakeholder-informed approach to identifying and ultimately managing important ocean areas for conservation in any given region. While the MPA Executive Order of 2000 (EO #13158) envisions such a national-scale process, time has shown that achieving this goal would benefit from comprehensive legislation and dedicated funding designed to support comprehensive planning and coordination of US MPAs across jurisdictions and purposes.

MPA Monitoring

The US lacks a single, coordinated system for monitoring ecosystem trends or management effectiveness in MPAs. While some individual MPA programs (e.g. NOAA's National Estuarine Research Reserves System) have system-wide monitoring programs, the US' system of federal, state and tribal MPAs does not, as an integrated whole, employ a consistent set of methods, indicators or thresholds for adaptive management of these diverse sites. Doing that would likely require national legislation, explicit expectations and benchmarks, continued engagement and guidance, and adequate appropriations for long-term coordination and operational support. MPA monitoring programs are often chronically difficult to maintain and justify over the long-term, especially during periods of tight budgets. When setting priorities for what must be monitored to evaluate MPA effectiveness, ocean agencies should consider focusing on understanding the sites' success in changing patterns and intensities of human uses that impact their protected resources, which is often the primary way MPAs achieve their conservation goals.

Tourism and Recreation in MPAs

Many MPAs in US waters, both Federally- and State-managed, have a statutory mandates to support compatible human uses, often including ocean recreation (e.g. national parks and marine sanctuaries). Recent studies illustrate that trends in ocean recreation in MPAs are increasing in both the intensity and types of ocean recreation. US MPAs, like others throughout the world, are increasingly facing a rising tide of ocean recreation and are often ill-equipped to fully understand the origins, drivers, intensity, impacts and benefits of expanding recreational uses, or to sustainably manage them and the healthy ecosystems they require.

National Marine Sanctuaries

NOAA's National Marine Sanctuary Program is arguably the US' primary system of exclusively marine (including Great Lakes) protected areas, established to conserve their ecosystems and cultural resources for this and future generations. Now spanning 14 sites, including two Marine National Monuments, the sanctuary

system protects some of the nation's most treasured ocean areas. A new public nomination process holds the potential for the designation of new sites based on input and support from local communities and user groups. Fundamental to the sanctuary system's goals and management approach, and the source of its greatest strengths and challenges, is the fundamental statutory mandate to facilitate multiple human uses that are compatible with the primary mission of resource protection. Consequently, many sanctuary sites have relatively few restrictions on ocean uses and rely instead on educating and engaging local communities and users as effective stewards of these areas to ensure their long-term conservation and sustainable use. Clearly, this more community-based approach places a premium on understanding and addressing the risks posed by ocean uses, especially as the human footprint on the ocean expands and the affected ecosystems respond to a changing climate.

8.1.3 Key insight

Federal processes for creating marine protected areas in the USA are ineffective while state processes can yield useful results, but only California has delivered to date.

8.1.4 Analysis

The National Marine Sanctuary system is not producing any useful marine protected areas. The Congressional halt on further National Sanctuary formation means little as the Sanctuaries do little apart from stopping some development activities such as petroleum exploration. The business of trying to classify these ineffective marine protected areas seems pointless. They simply help prevent the real work being done.

8.1.5 Resources provided

Framework for the national system of marine protected areas of the USA National Marine Protected Areas Centre November 2008

8.1.6 Contacts suggested

Joe Schumacher

8.2 ANDREW DE VOGELAERE

8.2.1 Who is he?

Andrew is the Research Director for the Monterey Bay Marine Sanctuary. He runs SIMoN, the national Sanctuary Integrated Monitoring Network and is the research representative for the whole West Coast of the U.S. as well as the Central and Northern Californian Ocean Observing System. Dr DeVogelaere oversees the Sanctuary's Research Program. This includes facilitating collaboration among over 20 research institutions in the region, providing technical information to decision makers and the Sanctuary staff, and initiating research on resource management issues. Dr DeVogelaere is also leading the effort to develop the Sanctuary Integrated Monitoring Network (SIMoN), a critical program that assesses how populations of marine organisms and habitats are changing through time.

8.2.2 What did he say?

The Marine Sanctuary condition reports are essentially Pressure State Response assessments. They are done across all 13 National Marine Sanctuaries and answer 17 standard questions. The Monterey reporting breaks the Sanctuary into estuary, nearshore, offshore and seamount environments. The Sanctuary programme itself does not receive any federal funding to study the conditions of the Sanctuary. Rather they compile metadata from over 100 monitoring efforts undertaken by other bodies. This method for compiling monitoring information in SIMoN (<http://sanctuarymonitoring.org>) has been expanded to the Sanctuaries to the north and south. There is a very active research community with multiple institutions around Monterey Bay. The Sanctuary monitors their

outputs and maintains a list of research needs and encourages working these areas by assisting with grant applications, staff, SCUBA dive operations, and minimal boat time. This has resulted in \$1M of grants per year.

Some academic programs and many federal grant programs are now required to demonstrate the societal benefit of funded research.

The Sanctuary Condition report has highlighted issues such as proposals for desalination plants, side casting of material from road maintenance and the effects of trawlers on benthic habitats.

The Sanctuary programmes bring issues to the fore to be resolved by federal fisheries management and he gave the example of concerns over krill harvesting.

The citizen science beach cast organism monitoring programme picked up the otherwise unknown mortality of birds being caught in large numbers in gill nets. The National Fisheries Service then then resolved this, illustrating the form of the relationship of the Sanctuary with fisheries management.

However, when the Sanctuary was formed and regulations developed, existing fishing and fishing methods were grandfathered in.

The Californian state government has intervened to control the types of trawling within its jurisdiction and this has reduced impacts.

The National Fisheries Service is now endeavouring to take an ecosystems based approach to fisheries management, but the change is very slow.

The Californian Sea Grant programme has historically focused more on making fishermen more effective at catching fish rather than managing impacts, but this has now changed.

In the deeper areas of the Sanctuary, the work is more in the nature of characterizing rather than monitoring in most cases, but more monitoring is needed.

Citizen science is making a significant contribution.

Andrew was interested in work on valuing ecosystems services and I offered to provide information on the Massey/Cawthron work on Tasman Bay. The website for this work is <http://www.mesv.co.nz/>.

Andrew has an Integrated Ecosystem Assessment Model that has developed key indicators for each habitat in the Sanctuary. There is also the Integrated Ocean Observing System (<https://ioos.noaa.gov/>) that deals well with the physical parameters but the biological has proven much harder. The system includes the Marine Biodiversity Observation Network (MBON), a new project to bolster regular biological observations (<http://www.marinebon.org/about-mbon.html>).

New environmental DNA techniques are picking up organisms missed by traditional SCUBA fish counts and surveys. Hydrophones and autonomous vehicle sampling and seafloor mapping are extending the reach of researchers.

Pollutants are an ongoing issue, with aerosols from the industrialisation of China and historic pollution from DDT and DDE still showing up in sampling.

8.2.3 Key insight

Lack of science is not the problem. Monitoring is key to assessing the effectiveness of management. Developing systems of sharing observatory/monitoring information that resource managers will use is a complex task.

8.2.4 Analysis

The Sanctuary management system has negligible budget for research and monitoring. However, in California it exists in an environment remarkably rich in research institutions

with their own funding streams. The approach is therefore to act in way that compiles and collates rather than doing the work itself. The Sanctuary administration punches well above its weight using its statutory status and visibility and respected staff, but remains a bit player starved of real resources. One of the main benefits of a Sanctuary Research Program is that it can explain applied science needs to scientists and research organizations, while explaining complex science in a way that educators and managers can understand.

8.2.5 Resources provided

- **Monterey Bay National Marine Sanctuary Condition report 2009**
- **Monterey Bay National Marine Sanctuary Condition report partial update - A new assessment of the state of Sanctuary resources 2015**
- **Sanctuary Research Web Page**
(<http://montereybay.noaa.gov/research/welcome.html>)**Monterey Bay National Marine**

8.3 PAUL MICHEL

8.3.1 Who is he?

Paul Michel is the Monterey Bay Sanctuary Superintendent. Paul has over 20 years' experience in environmental protection at the local, state, federal, and international levels. He is a nationally-recognized leader in wetlands, coast, and ocean management and protection. He has extensive experience in developing comprehensive natural resource and protection plans and coordinating collaborative projects and studies.

8.3.2 What did he say?

Paul started by talking about the Monterey Bay National Marine Sanctuary Advisory Council. This was established by Federal law to assure continued public participation in the management of the Sanctuary.

The Advisory Council's twenty voting members represent the following user groups: Agriculture, At-Large, Business/Industry, Commercial Fishing, Conservation, Diving, Education, Recreation, Recreational Fishing, Research and Tourism, plus seven local and state governmental jurisdictions. In addition, the respective managers for the four California National Marine Sanctuaries (Channel Islands, Cordell Bank, Gulf of the Farallones, and Monterey Bay), the Elkhorn Slough National Estuarine Research Reserve and the U.S. Coast Guard sit as non-voting members. Members are appointed competitively by the National Oceanic and Atmospheric Administration and serve three-year terms. The Advisory Council meets bi-monthly in open sessions located throughout the almost 300-mile boundary of the Sanctuary.¹⁷

The Sanctuary has a staff of 13, plus 8 contractors with a federal budget of around \$3M per annum. It works by influence rather than regulation.

He referred to the importance of the Big Blue Live BBC series.¹⁸

The Sanctuary had one enforcement officer but he left and has not been replaced. There are ongoing issues with jet skis and their effects on wildlife. Seasonal closures are not being enforced.¹⁹

The Sanctuary administration does have the capacity to get on the water with a 67-foot vessel and a smaller boat.

¹⁷ <http://montereybay.noaa.gov/sac/advisory.html>

¹⁸ <http://www.bbc.co.uk/programmes/p02v036z>

¹⁹ <http://www.outsideonline.com/1790016/noaa-cracks-down-mavericks-jet-skis>

They are not yet regulating marine mammal tourism.²⁰

The Sanctuary visitor centre at Santa Cruz is a centre piece for engaging the public. This was a joint venture with the city providing the land (\$2M), the federal administration the construction costs (\$17M), and charitable sources the costs of displays (\$3M).

An arm's length foundation was established to handle the funding contributions.

The Sanctuary has an association with American Samoa with Bruckner Chase reconnecting the people with the sea.

The Sanctuaries Act has not been reauthorized in 15 years. The programme has created a nominations process for new sanctuaries. There have recently been 2 new designations by the Agency:

- A small pristine embayment in Chesapeake Bay and
- Thunder Bay, a historic site, in Lake Michigan.

The latter has brought economic and social benefits to the community.

The programme has a role in promoting recreation and tourism. These can be a precursor in starting a new nomination process in demonstrating relevance and value.

Some special places get nominated, others are just for economic reasons.



Figure 23 NOAA Monterey Bay Marine Sanctuary Headquarters

8.3.3 Key insight

The overall Sanctuary programme is underfunded, has too little power and is more for promotion of recreation and tourism than for conservation.

8.3.4 Analysis

I found the whole Sanctuary programme far smaller and less effective than I had expected. It seems the federal government does not give this high priority either in funding or in the standards it sets for protection. The emphasis thus goes into education and advocacy for action by those parties that do have real power. However, the staff are highly committed and skilled, and their work has great value within the resource and political constraints under which they operate.

8.3.5 Resources provided

Explore the West Coast National Marine Sanctuaries with Jean-Michel Cousteau Ocean Futures Society 2012

²⁰ http://oceanservice.noaa.gov/outreach/pdfs/wildlife_watching_handbook.pdf

8.4 LISA WOONINCK

8.4 LISA WOONINCK

8.4.1 Who is she?

Lisa is policy coordinator for five national marine sanctuaries on the West Coast of the United States (four in California and one in Washington state). She focuses particularly on issues that span more than one sanctuary or on issues that arise from activities outside the existing national marine sanctuaries.

8.4.2 What did she say?

Many issues or threats to sanctuary resources are addressed by coordinating or collaborating with partners and other agency bodies. One issue occurring in the California national marine sanctuaries for example, was the need to reduce ship strikes to large whales, such as blue whales in the Santa Barbara Channel, adjacent to the Channel Islands National Marine Sanctuary, and at the approach to the San Francisco Bay in Greater Farallones and Cordell Bank national marine sanctuaries. These national marine sanctuaries coordinated with the US Coast Guard, the National Marine Fisheries Service (NMFS), the shipping industry and fishermen to adjust vessel traffic lanes away from known whale aggregation sites, thereby reducing the risk of whale ship strikes. All national marine sanctuaries have sanctuary advisory councils that allow for a dialogue between communities adjacent to sanctuaries and sanctuary management. The sanctuary advisory councils provided community input on how best to address the threat of whale ship strikes and were integral to the process of adjusting the vessel traffic lanes. Sanctuaries frequently provide a public interface of the ocean to communities.

The sanctuaries on the west coast prohibit oil and gas mining, wildlife disturbances, discharges, and disturbance of the sea floor, with exemptions for lawful fishing practices (which are managed by NMFS and state fishery agencies). NMFS with the Pacific Fishery Management Council (PFMC) implemented bottom trawl closures to protect essential fish habitat, primarily over hard bottom habitat with some sandy habitats also protected. These bottom trawl closures also protect fragile corals, which are susceptible to harm by bottom trawl gear and have slow recovery rates because of their life history. Currently, NMFS and PFMC are reviewing and adjusting the boundaries for the bottom trawl closures. The west coast national marine sanctuaries, interested in protecting fragile deep sea corals because of the role they play as biogenic habitat for deep sea communities, have coordinated a collaborative effort with fishermen and environmental non-governmental organizations (NGOs) to adjust the boundaries of the existing bottom closures. By playing a facilitative and science advisory role the national marine sanctuaries have been able to craft a collaborative proposal that secures more protections of deep sea corals, while simultaneously opening up fishing effort at historically productive fishing grounds.

In terms of discharges the sanctuaries have had success in prohibiting the discharge of untreated sewage; all vessels must have holding tanks or marine sanitation devices and discharges entering from outside the sanctuary (e.g. from pipes or outfalls) must not produce an adverse effect to resources inside the sanctuary. There are legal controls on wildlife disturbance including the use of jet skis and aircraft over breeding or nesting animals. A new issue in need of enhanced understanding and mitigation is the use of drones (unmanned aerial vehicles).

National marine sanctuaries have a close working relationship with the California Coastal Commission, because of the similarities in mission and conservation goals, and in many cases both agencies will coordinate environmental review for coastal and ocean issues, in terms of permitting otherwise prohibited activities.

National marine sanctuaries frequently play a coordinating and facilitative role to address impacts that originate inside or outside of their boundaries.

Sanctuary staff are very creative and efficient in securing conservation goals in the face of development/human use pressures. Using marine spatial planning techniques, facilitation, and the best available science, staff have been able to address complex use and conservation ideals that appear to be incompatible and produce sustainable, conservation solutions.

8.4.2 Key insight

A statutory advocacy role is a key activity for a marine protected area, to be able to deal with impacts that relate to offsite activities.

8.4.3 Analysis

The policy role comes into prominence because of the limited powers and resourcing of the Sanctuary administration. However, these same limits mean that the staff must be very creative and efficient in securing results and development pressures are immense.

8.4.4 Resources provided

- **Guide to the central Californian marine protected areas - Pigeon Point to Point Conception California** Fish and Wildlife February 2013
- **California marine protected areas past and present** Deborah A McArdle 2002 California College Sea Grant Programme

8.5 KAREN GRIMMER

8.5.1 Who is she?

Karen has been with MBNMS since 1999, and is responsible for the Resource Protection activities within the agency through leading a small team of six. Most recently, Karen led a team to establish Sanctuary Ecologically Significant Areas within the Sanctuary, and worked with fishermen and conservation groups to collaboratively propose boundary modifications for the trawl fishery.

8.5.2 What did she say?

Karen described the regulatory regime for the Sanctuary. This involves the programme both directly permitting and authorising other agency's permits. Aspects such as essential fisheries habitat are dealt with the fisheries arm of NOAA. This includes no-trawl areas as agreed by the 5 trawl operators in the area. There is ongoing work the fishermen to protect new areas. More information can be found at:
http://montereybay.noaa.gov/resourcepro/ebmi/130731efh_proposal.pdf.

She talked about the role of OCEANA²¹ and other conservation NGOs in GIS mapping of habitat including biogenic structures. Initially there was a 6-month process with the fishermen and then the environmental NGOs were added to the process. The resulting collaborative package for Monterey was such a success it is now being applied to the whole West Coast. In addition, the group identified voluntary management areas, which are non-regulatory and will be a pilot program to see if fishermen can voluntarily avoid small areas with biogenic habitat.

The State led Marine Protected Areas programme was highly collaborative and resulted in 142 new marine protected areas (29 in the central California region). For more information, visit <https://www.wildlife.ca.gov/Conservation/Marine/MPAS>. Karen serves

²¹ <http://oceana.org/about-oceana/about-us>

on the State Marine Protected Areas Leadership Team as a regional representative to help integrate efforts between state and federal marine protected areas.

8.5.3 Key insight

Effective regulation and enforcement are key parts of the success of any marine protected area.

8.5.4 Analysis

Within the limited role, the Sanctuary administration is given, its staff are working to leverage as much influence as possible to enhance the overall well-being of the area. They are proportionately more effective in areas such as major developments where they have a strong statutory role than in fisheries management where the roles are fragmented within NOAA and grandfathering in fishing practices has compromised the Sanctuary as a marine protected area from the outset.

8.6 BRIDGET HOOVER, LISA EMANUELSON AND PAM KRONE-DAVIS

8.6.1 Who are they?

Bridget Hoover is Director of the Water Quality Protection Program in Karen's Resource Protection Team. In this capacity, she is responsible for implementation of the six WQPP Action Plans related to monitoring, urban runoff, agriculture, beach closures, marinas, and wetlands. Prior to this position, Bridget was employed by the Monterey Bay Sanctuary Foundation from January 1999 through March 2007 as Coordinator of the Monterey Bay Sanctuary Citizen Watershed Monitoring Network where she provided water quality expertise to a wide range of school programs, watershed groups and government agencies.

Pam Krone-Davis coordinates research, education and implementation efforts between the Sanctuary and partner organizations toward the goal of reducing pollution entering the Monterey Bay from agricultural runoff. Her efforts are directed toward helping growers conserve irrigation water used on crops and reduce the amount of agricultural pollutants (e.g. nutrients, pesticides, and pathogens) that enter local streams and rivers that eventually empty into the ocean. She coordinates the Agricultural Water Quality Alliance (AWQA), a partnership effort between industry groups, resource conservation agencies, researchers and environmental organizations, with the aim of sustaining the beauty, viability, and productivity of our local farmlands while improving the water quality needed to restore and preserve the integrity of marine and stream ecosystems.

As the Volunteer Monitoring Coordinator, Lisa Emanuelson tackles such wide-ranging topics as: water quality monitoring and reporting, watershed education, and wildlife disturbance. Lisa trains and coordinates the Team OCEAN Kayaker Naturalist program, and Bay Net Shoreline Naturalist Program. Lisa also provides direction and coordination to the Sanctuary Citizen Watershed Monitoring Network through training, data management, and data quality control assistance, and several Sanctuary-wide monitoring programs each year, including Snapshot Day, Urban Watch, and First Flush.

8.6.2 What did they say?

The water quality programme was developed with input from the Sanctuary staff. There are 10 major watersheds with a mix of urban and agricultural uses. The Salinas River is the largest with a length of 170 miles and a watershed area of 4,160 square miles. The city of Salinas is the largest urban area with more the 150,000 people.

The Agricultural Water Quality Alliance was begun in the late 1990s. NOAA, the Natural Resource Conservation Service and grants support this effort www.awqa.org.

Participation is voluntary. In 2012, the Central Coast Regional Water Quality Control Board (CCRWQCB) adopted a Conditional Waiver of Waste Discharge Requirements (Agricultural Order No. R3-2012-0011) that applies to owners and operators of irrigated land used for commercial crop production.

The CCRWQCB regulates discharges from irrigated agricultural lands to protect surface water and groundwater. Initially, those growers in AWQA's voluntary program received credit in the regulatory framework, but the latest Order imposed additional regulatory burden on them. The agricultural community then became less willing to work with AWQA participants and try new practices to improve water quality. Now food safety requirements are cutting off more natural treatments. However, there is now more positive progress taking a watershed based approach regulating groups of farmers and providing for nutrient trading.

Due to the four-year drought, water is in very short supply and storm water is being redirected to the sewerage system for treatment and re-use through infiltration and agriculture irrigation.

Bridget described the volunteer programmes. Urban watch involves field tests of water quality parameters by citizens at storm drain outfalls in local cities. Volunteers are given rigorous training.

Grants are provided for stream improvement programmes.

8.6.3 Key insight

Citizen science can be effective with adequate systems, oversight, and training.

8.6.4 Analysis

The Californian administration appears to lack the integrated regulatory role that regional councils have in New Zealand. The result is a complex administration in which all parties are endeavouring to use best efforts to improve water quality. These efforts are hampered by the importance of horticulture producing food crops for the large urbanised population. The result is that non-point source run-off remains a major problem even while urban sewerage issues are largely resolved.

8.7 TOM DEMPSEY

8.7.1 Who is he?

Tom is the Senior Fisheries Project Director for The Nature Conservancy²², the largest land protection NGO in the USA. After a long terrestrial focus, it has turned its attention to the marine environment.

8.7.2 What did he say?

Tom said that most national marine sanctuaries in the USA are ineffective. Collaborative processes have led to 3.8M acres of trawl closures around the nation. Although the Marine Protected Areas process in California was the best in the USA clear objectives such as a target percentage for no-take areas were not identified. He talked of the need for big wilderness (50% for other than human use). He commented on the importance of Foundation funding for the Sanctuary programme and the shortage of federal funds.

8.7.3 Key insight

Direct engagement with fishers by individuals with a deep understand of their realities is a key part of creating effective collaboration in marine protection.

²² <http://www.nature.org/>

8.7.4 Analysis

The Nature Conservancy is prepared to raise money to buy out fishers to allow marine protection to proceed. This is a key factor missing in the New Zealand situation and compromised the boundaries of the Hikurangi Marine Reserve at Kaikoura. We need to explore ways of creating and equivalent capacity in New Zealand, noting that the Awaroa beach purchase case demonstrates the existence of a constituency willing to pay for protection in coastal environments.

8.8 RIKKI DUNSMORE

8.8.1 Who is she?

As Director of the California Marine Protected Areas Program for the California Marine Sanctuary Foundation, Dr Rikki Grober-Dunsmore works with communities, businesses, non-governmental organizations, foundations, academic institutions, and government agencies to help implement the state's Marine Life Protection Act.

The California Marine Sanctuary Foundation serves an important niche in the California non-profit community. By partnering with the National Marine Sanctuary Program, the state of California's Ocean Protection Council, and other ocean and coastal management agencies, helps facilitate their work. As a fiscal sponsor, the Sanctuary Foundation is able to solicit funds from many sources and implement projects to aid in the understanding and protection of California's coastal and ocean resources.

The California Marine Sanctuary Foundation (CMSF) was established in 1995 focused on the Monterey Bay National Marine Sanctuary. Recently the organization has expanded to support the Channel Islands National Marine Sanctuary and California's state-wide network of marine protected areas. The Sanctuary Foundation focuses its efforts on community outreach, education, research, and resource protection for conserving and protecting the extraordinary environment and resources of the marine sanctuaries, reserves and other marine protected areas in California, coastal and undersea equivalents to our nation's parks, forests, and wilderness areas.

8.8.2 What did she say?

The Foundation has supported the work of the Monterey National Marine Sanctuary and this has included serving as the administrative support for staff and resources. They are now focusing on more-nimble and long term things. They support all four sanctuaries across California. The water quality programme is supported by the Foundation. There has been a steady decline in in federal funding.

The formation of the State marine protected areas has been highly collaborative and effective. In terms of management, however, enforcement has been challenging given the fiscal climate of the state. The formation process, was elaborate and lengthy with multiple attempts before success. first commencing in 1999 and completing in 2012. In a participatory community based process, the Fish and Game Commission produced 4 packages with the North Coast being the last in 2010. The north coast tribes in coordination with other stakeholders in the North Coast developed their own collaborative proposal package. The programme tried to balance competing demands, and efforts to place marine protected areas in locations which would not disrupt existing activities (including fishing) were attempted. The scientific advisory team were outstanding and many gave years of their careers to the process. The replication was duplicated by region. The result was 16 % protected within the 3-nautical mile limit and half of this was no-take. However, most Californians are not aware of the network of marine protected areas.

She showed me very impressive interactive maps that had been created with Tour Builder to reach a wider audience. This had been done in the Beta testing stage with Google support.²³

There has been a lot of work on education resources and the results can be found at <http://www.californiampas.org/>.

When creating signage, the greatest uptake has been with cheap laminated copies.

She talked about the success of the Marine Protected Areas Underwater Parks Ambassadors Program. The California Marine Sanctuary Foundation, in collaboration with Ocean Conservancy and Resource Media launched a specialized training and outreach program, designed for docents and interpretive personnel, to promote greater understanding, appreciation, and enjoyment of our local marine protected areas.

8.8.3 Key insight

The Californian State marine protected areas programme is the key process to understanding what has been effective in collaboration for marine protection in California.

8.8.4 Analysis

The Foundation role was critical to creating the opportunity for the effective collaboration that created California's network of marine protected areas. This clearly involved a broad suite of activities involving political and social influence as well as funding key activities. The Foundation staff are key knowledge holders both for processes of formation and management.

8.9 LIZ WHITEMAN

8.9.1 Who is she?

Liz Whiteman is a Senior Advisor at the Ocean Science Trust. Liz currently holds a research appointment at the Institute of Marine Sciences at the University of California in Santa Cruz, and was appointed to the West Coast Ocean Acidification and Hypoxia Science Panel in 2013. The Trust is an independent non-profit created by a California statute that recognized the value of independent science to support decisions.

8.9.2 What did she say?

The California Ocean Science Trust was set up to provide independent science advice on the marine environment. The Resources Secretary appoints its Board. It's a public/private partnership with an annual budget of \$20M. It has changed public expectations of the policy process. While it is stakeholder driven, the broad goals are ecosystem protection and the commitment to good science for decision making processes. The Trust has adopted a broad focus on ocean health and understanding what this really means. It strives for durability and sustaining its independence. It uses its limited resources as seeding money to leverage useful products.

Liz said that the Ocean Protection Council was a response to political complexity, providing an over-arching unifying policy element across all relevant bodies. The Trust gets political influence as the Deputy Secretary of Natural Resources, Oceans, is its Executive Director and is the main science advisor on the Ocean Protection Council²⁴. *The Council was created pursuant to the California Ocean Protection Act (COPA), which was signed into law in 2004 by Governor Arnold Schwarzenegger. The OPC is guided by principles included in COPA:*

²³ <https://tourbuilder.withgoogle.com/>

²⁴ <http://www.opc.ca.gov/>

- *Recognizing the interconnectedness of the land and the sea, supporting sustainable uses of the coast, and ensuring the health of ecosystems*
- *Improving the protection, conservation, restoration, and management of coastal and ocean ecosystems through enhanced scientific understanding, including monitoring and data gathering*
- *Recognizing the “precautionary principle”: where the possibility of serious harm exists, lack of scientific certainty should not preclude action to prevent the harm*
- *Identifying the most effective and efficient use of public funds by identifying funding gaps and creating new and innovative processes for achieving success*
- *Making aesthetic, educational, and recreational uses of the coast and ocean a priority*
- *Involving the public in all aspects of OPC process through public meetings, workshops, public conferences, and other symposia*

The council is tasked with the following responsibilities:

- *Coordinate activities of ocean-related state agencies to improve the effectiveness of state efforts to protect ocean resources within existing fiscal limitations*
- *Establish policies to coordinate the collection and sharing of scientific data related to coast and ocean resources between agencies*
- *Identify and recommend to the Legislature changes in law*
- *Identify and recommend changes in federal law and policy to the Governor and Legislature*

8.9.3 Key insight

Independence in science advice can counter embedded vested-interest game playing.

8.9.4 Analysis

The role of the Trust has similarities to the roles of the New Zealand Parliamentary Commissioner for the Environment and Prime Minister’s Science Advisor. That is, there is an avenue directly into the political superstructure for good science-based advice. This bypasses the filtering that normally occurs through administrative channels. This appears to play a very important role in enabling information to be the “great un-locker” in collaborative processes, as Alistair Bisely calls it.

8.10 CHELSEA PRINDLE

8.10.1 Who is she?

As Sanctuary Exploration Centre Manager, Chelsea is responsible for overseeing the education programs and overall operation of the Sanctuary Exploration Centre. She sets program goals, trains appropriate staff and volunteers and oversees program implementation.

8.10.2 What did she say?

Chelsea and her staff showed me the displays in the Exploration Centre and described the education programmes. They have 60,000 visitors per year despite having no dedicated car park. They are located next to a very busy visitor area.

The Exploration Centre only has funding to operate 5 days a week and is closed Monday and Tuesday. She did not know of any depreciation process to provide funds to replace the displays when they wear out. The building is federally owned, so presumably its depreciation and maintenance are provided for somewhere.

The facility is well used by educational groups. The nature of the displays means that having docents²⁵ on site is essential to people getting value from their visit. This dictates the use of volunteers and staff at all times.



Figure 24 Monterey Sanctuary Discovery Center

8.10.3 Key insight

Visitor services are best embedded in a system for which the role is core business, but excellent staff will create excellence regardless.

8.10.4 Analysis

The quality of the static displays is high but the interactive displays, while innovative, have glitches.

The information is excellent and the staff very well informed.

The retail is of a good standard and appropriate to the core mission, though as the only such Sanctuary Exploration Centre in the USA, it operates without national policy and standards or the sort that would be seen in the Parks Service for whom it is standard business.

8.10.5 Resources provided

One Breath - A Monterey Bay Experience - 18-minute video.

8.11 MIKE DAVIS

8.11.1 Who is he?

Mike is a volunteer naturalist with the James V. Fitzgerald Marine Reserve. Mike is retired and uses his passion for the natural world to inform visitors about the tide pools in the reserve.

8.11.2 What did he say?

There are about 140 volunteer naturalists associated with the Reserve. Many live closer to the coast than he does and may be on the shore several days a week. Each volunteer has more than a week of training for their role and is issued with a uniform cap and jacket. We met several other naturalists during our visit, each guiding groups of visitors, mostly school children. The naturalists have a good understanding of the area, but not a scientific

²⁵ a person who acts as a guide, typically on a voluntary basis, in a museum, art gallery, or zoo.

knowledge of species and processes. The Reserve is administered and enforced by the county Sheriff's staff.

The shore itself had abundant life on rock platforms and in tide pools. This included very diverse seaweeds and invertebrates. The foot traffic was intense but there were few areas that showed obvious damage. The naturalist docents enforce strict rules about looking but not disturbing. An area of Harbour Seals was coned off and the public was respecting the no access signs.



Figure 25 James V. Fitzgerald Marine Reserve

8.11.3 Key insight

Trained volunteers can vastly increase the outreach of administrative agencies.

8.11.4 Analysis

The level of professionalism by the volunteers was truly impressive. The commitment to training and supporting their activities was clearly a priority for the administrative body. This role had been delegated down to the County level.

8.12 PHIL SAMMET

8.12.1 Who is he?

Phil is a professional diver, vessel skipper and tourism operator. He is the dive representative on the Monterey Marine Sanctuary Board. He works with researchers at the Monterey Bay Aquarium Research Institute²⁶.

8.12.2 What did he say?

Phil kindly took me diving in the Marine Sanctuary off Cannery Row in the *Macrocystis* kelp forest.



Figure 26 *Macrocystis* kelp Monterey Bay

²⁶ <http://www.mbari.org/>

The water was cold and unusually clear (20m visibility). The kelp forest abounded with sea otters and harbour seals. The benthic environment was rich with huge anemones, squid eggs, and large sea hares sucking the insides out of equally large tubeworms. The kelp was, perhaps, 30m long and from the bottom of the sea the view was reminiscent of being in a great cathedral with stained glass windows or a tall forest that created deep shade.

There were many small vessels including guided kayak tours and recreational fishers. Each part of the shore along from Cannery Row was committed to a different activity: line fishing, no-take, recreation and so on.

Phil was very passionate and knowledgeable about his marine environment. It is his life. He exemplifies the connection with the sea that comes from intensively getting out there and getting into the water. This deep knowledge leads Phil to be frustrated with the scientists and their narrow understanding, and very frustrated with administrators and their lack of insights and inability to resolve the hard issues.

He related many stories about the inter-connectivity of the marine environment and the land with the sea. His key exemplar was the interaction of sea otters, urchins and *Macrocystis*.



Figure 27 Cannery Row and Phil Sammet at the kelp forest

8.12.3 Key insight

The people who live and work in the marine environment are the ones who truly know it.

8.12.4 Analysis

Phil's frustration shows the gap between what is needed and what is delivered in marine protection as a consequence of the social forces operating on the situation. He has multiple roles in the system: as a commercial diver, a recreational diver, an environmental champion, vessel skipper, working with the scientists and advising the administrators. He can see the system and its limitations, but has no positional power and little moral authority to improve things. The system in which he exists masks an underlying power structure of vested interested behind a formal superstructure of law, administration, and research. However, in California there are also powerful allies in the not-for-profit sector and parts of the political process. In this State, the cultural conserves are much more strongly liberal than the more conservative culture of Chesapeake Bay. There is a history of citizen action resulting in effective action for the environment. He would like to see the Sanctuary administration become more effective and honestly share power with its supportive stakeholders. At the same time, those administrators feel the forces of tension between what they are formally charged with doing and what is felt to be politically achievable. They are so embedded in the system that it would be hard for them to see it as Phil does from his multiple perspectives.

However, the binding force is the shared values of loving the sea and caring about its health. There is a clear opportunity to build on the momentum of the state marine protected area's successes and build a collaborative process that engages problem solving at the level of the whole marine environment of the State. What is required is the right mix of commitment, resources, and skilled means.



Figure 28 Last day of travel at Tassajara retreat centre

9 ANALYSIS

The key insight from this study is the implication of the systemic linkages between the science, stakeholder, and political/administrative processes in determining whether marine areas will become protected or timely action taken to restore them. Understanding these systemic dynamics and identifying effective ways of reducing the time and increasing the effectiveness of interventions and actions is the critical work to emerge from this study. The application of three analytical frameworks is proposed - realist evaluation, sociometric analysis of social forces and systemic analysis as proposed by Senge using archetypes. It is suggested that, using insights from these analyses, skilled interventions can be proposed to enable windows of opportunity to be identified, created if necessary, and exploited.

9.1 GREAT BARRIER REEF

The Great Barrier Reef experience shows that even world best practice in marine protected area formation and management is not on its own sufficient to ensure that the values of outstanding areas will be sustained. Based on the Great Barrier Reef, the necessary elements would appear to be:

- Identify the values
- Understand the conditions necessary for their continued existence
- Assess the contribution of each of the suite of anthropogenic stressors now and in the future
- Set limits for each stressor in the context of the whole including synergistic effects
- Explore options for containing each stressor
- Select policy mix for stressor limitation
- Implement
- Monitor
- Adapt management based on observations.

Because marine protected areas are social rather than biophysical phenomena, the keys to their success lie in the elements of the social realm. In New Zealand, we label these predominantly as political, economic, social, and cultural processes, however these are linked within a full social fabric. Australian marine protected areas are predominantly legally defined, and thus are a product of formal political processes. It was evident that there was a time delay of one or more decades from recognition that something should be done to protect the Reef from particular threats and the emergence of effective action.

Political decisions create legal instruments and allocate public resources. In the context of politics, the health of the marine environment, even an icon like the Great Barrier Reef, is a small feature in the political landscape. In politics, natural environments do not matter for their own sake, but only because some influential group with political influence cares about them.

Within social processes, people's actions are mediated by their belief systems, their knowledge and what they experience. This is as true of those with political power as anyone else. It is the belief system that is the central driver. When new data arrives, it is processed in the light of the prevailing mental model. This means that most of the incoming information is rejected if it conflicts with the belief system of the recipient. This is why the environmental administration in Queensland has turned to social marketing as its mode of activity to effect social change for the good of the Reef. Experience has shown that adding more information changes the behaviour of few people.

Taken together with the huge raft of competing political priorities, it is thus not surprising that political action on dealing with environmental stressors facing the Reef has lagged far behind the realisation by knowledgeable stakeholders that action is needed.

In Australia, the dominant political groups over recent years have held a mental model that gave primacy to economic development. This mental model led decision makers to reject a huge amount of credible science advice on matters like climate change. In such a context, science advice itself generally takes on a more limited role in all political decision making. Stakeholders that value political action on environmental issues turned to social marketing of their own, but turned it onto the political process. This successfully moved the political process against the dumping of port capital dredging inside the Reef.

Uncertainty plays an important role in these processes. When the incoming information conflict with the prevailing mental models there is a call for greater certainty. Science itself is comfortable with uncertainty even as it works to reduce it. Scientists are trained to be rigorous in identifying uncertainty and seeking data that would disprove their current hypotheses as they seek for more general explanatory power. In the political process, however, this works against action being taken and resources being allocated. Uncertainty is a reason not to act on this issue or at this time, freeing resources and favours for other competing interests.

This leads in turn to changes in the behaviour of the science community. There was noticeable tension between battle-hardened older scientists who had modified the way they expressed things to speak with more certainty to influence decision making and younger scientists who held more strongly to science conventions as they sought to build their credibility with their peers.

The biophysical world is also full of surprises and apparent discontinuities. These include the outbreaks of Crown of Thorns Starfish, bleaching events, and cyclones. Where prevailing wisdom has been built on linear models, these events can lead to insights that management actions have been grappling with wrong or insufficient things. This has been seen in a sequence for the Great Barrier Reef - oil and gas, tourism, fishing, sediment and nutrient and most recently global warming and sea acidification. These events can also be dramatic opening windows of opportunity in the social/political process. Such openings are called Overton windows²⁷.

Imagine, if you will, a yardstick standing on end. On either end are the extreme policy actions for any political issue. Between the ends lie all gradations of policy from one extreme to the other. The yardstick represents the full political spectrum for a particular issue. The essence of the Overton window is that only a portion of this policy spectrum is within the realm of the politically possible at any time. Regardless of how vigorously a think tank or other group may campaign, only policy initiatives within this window of the politically possible will meet with success. Why is this?

²⁷ <https://www.mackinac.org/7504>

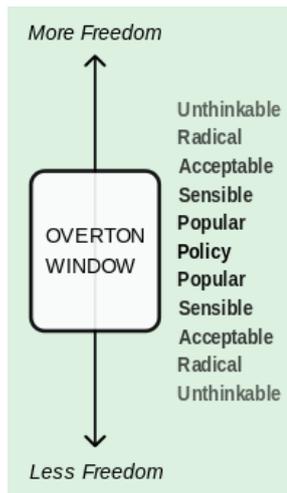


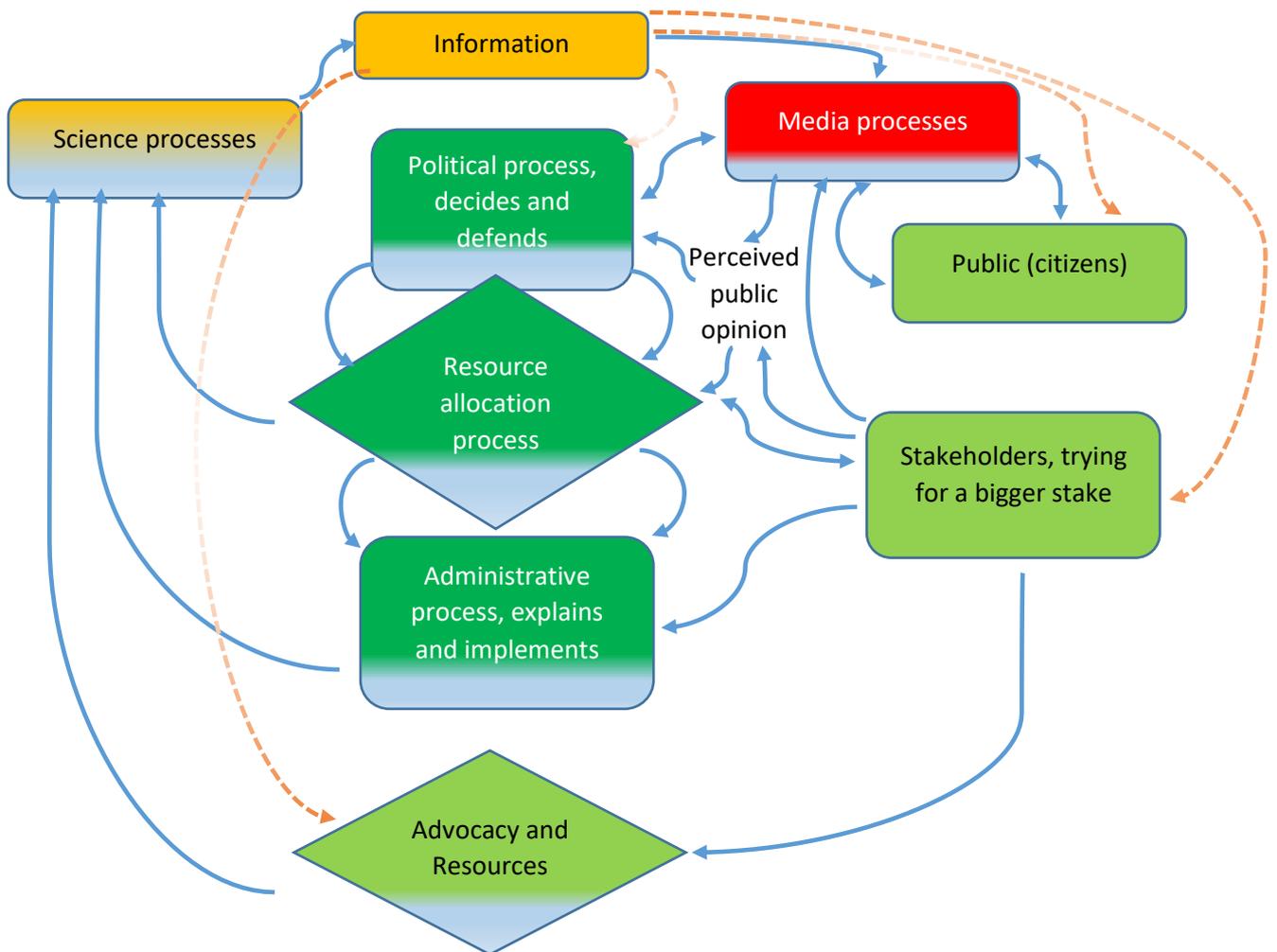
Figure 29 Overton windows

Politicians are constrained by ideas, even if they have no interest in them personally. What they can accomplish, the legislation they can sponsor and support while still achieving political success (i.e. winning re-election or leaving the party strong for their successor), is framed by the set of ideas held by their constituents – the way people think. Politicians have the flexibility to make up their own minds, but negative consequences await the elected officeholder who strays too far. A politician’s success or failure stems from how well they understand and amplify the ideas and ideals held by those who elected them.

In addition to being dependent on the ideas that form the boundaries of the political climate, politicians are also known to be self-interested and desirous of obtaining the best political result for themselves. Therefore, they will almost always constrain themselves to taking actions within the "window" of ideas approved of by the electorate. Actions outside of this window, while theoretically possible, and maybe more optimal in terms of sound policy, are politically unsuccessful. Even if a few legislators were willing to stick out their necks for an action outside the window, most would not risk the disfavour of their constituents. They may seek the good of those who elected them, and even the good of the state or nation as a whole, but in pursuing the course they think is best, most will certainly take into account their political future. This is the heart of the Overton window theory.

Applying this to the Great Barrier Reef experience we get the system below:

Figure 30 Great Barrier Reef political and information processes



Note that the weak (red dashed) flows are the results of the science process, while the strong flows (blue solid) are strongly influenced by stakeholders who are trying to grow their valued stake in the system. The media mediates the interaction with the wider public, but the stakeholders endeavour to directly insert themselves to change perceived public opinion and influence the political process. In the case of the Great Barrier Reef the Worldwide Fund for Nature with its letter writing campaign was particularly effective.

In speaking of “stakeholders”, I am distinguishing sectors with interests greater than the public generally. These include both the organized, such as WWF and the farmer lobbies, and the unorganized such as recreational fishers. High levels of organization and/or sophistication cause some stakeholder groups to exercise high levels of influence on the political process, while others exercise far less influence than objective measures of effect would militate. The indigenous people of the Great Barrier Reef exemplify the latter category.

9.2 THE GULLY AND BRITISH COLUMBIA

The Gully Marine Reserve is another good example of the interaction of a sophisticated stakeholder, again the WWF, with a political administrative process at a point ripe for demonstration of the effectiveness of new policy. In this case, however, the stakeholder became distracted and the administrative machinery encountered a political move to the right that disabled further progress.

This shows the importance of:

- Sustaining processes of influence to capitalise on initial success;
- The change in mode required when the general political environment changes.

In this case the WWF moved its attention to a representative Marine Protected Areas system just at the time the political process became unreceptive to initiatives that might adversely affect the interests of the productive industry stakeholder sector. How then can the administrative part of the system respond?

Given the role of Overton windows the best response is two-fold:

First, limit the damage of the adverse political process on valued outcomes by slowing policy processes and arguing for better policy.

Second, prepare for the opening of the next window.

The less the public service is politicised the more possible are these approaches. Canada has been experiencing strong political pressure on the public administration and is looking to the New Zealand model for a remedy²⁸.

Now with a change in Government a window has opened:

A Liberal government will:

- *Meet Canada's international commitments by increasing the amount of our protected marine and coastal areas from 1.3 percent to 5 percent by 2017, and 10 percent by 2020;*
- *Reinstate the \$40 million cut from the federal government's ocean science and monitoring programs, and restore scientific capabilities at the Department of Fisheries and Oceans;*
- *Re-establish thorough environmental assessments, review all amendments made by the Harper Conservatives to the Fisheries Act and other legislative changes, and incorporate modern safeguards to protect our ocean and freshwater fish habitats;*
- *Work with provinces, Indigenous Peoples, and other stakeholders, to effectively co-manage our oceans; and*
- *Formalize the moratorium on crude oil tanker traffic on British Columbia's North Coast - including the Dixon Entrance, Hecate Strait, and Queen Charlotte Sound - and ensure that ecologically sensitive areas and local economies are protected from the devastating impacts of a spill.*²⁹

However, the Department of Fisheries and Oceans in Nova Scotia does not appear well placed to implement these policies. It has spent so long resisting, or responding to, environmentally adverse policies it is not well positioned to respond to the opportunities being offered. Policy, networking, methodology for Marine Protected Areas formation are all weak and the targets set by the Liberal Government are, in any case, impractical without a brutal top down approach that would offend against its other principles of collaboration.

Conversely, the British Columbia experience is quite different. Here a Provincial leadership cut across the Federal *neo-colonial style conservatism* to make what progress it could in integrated marine management under its own authority. This now leaves British Columbia in a much better position to respond to the window that has opened. The issue will be the capacity of the federal administration to be responsive to the policy shift and change its own culture quickly enough to capitalize on the opportunity.

²⁸ <http://www.cbc.ca/news/politics/top-bureaucrats-met-to-resist-partisanship-imposed-on-public-service-1.3294972>

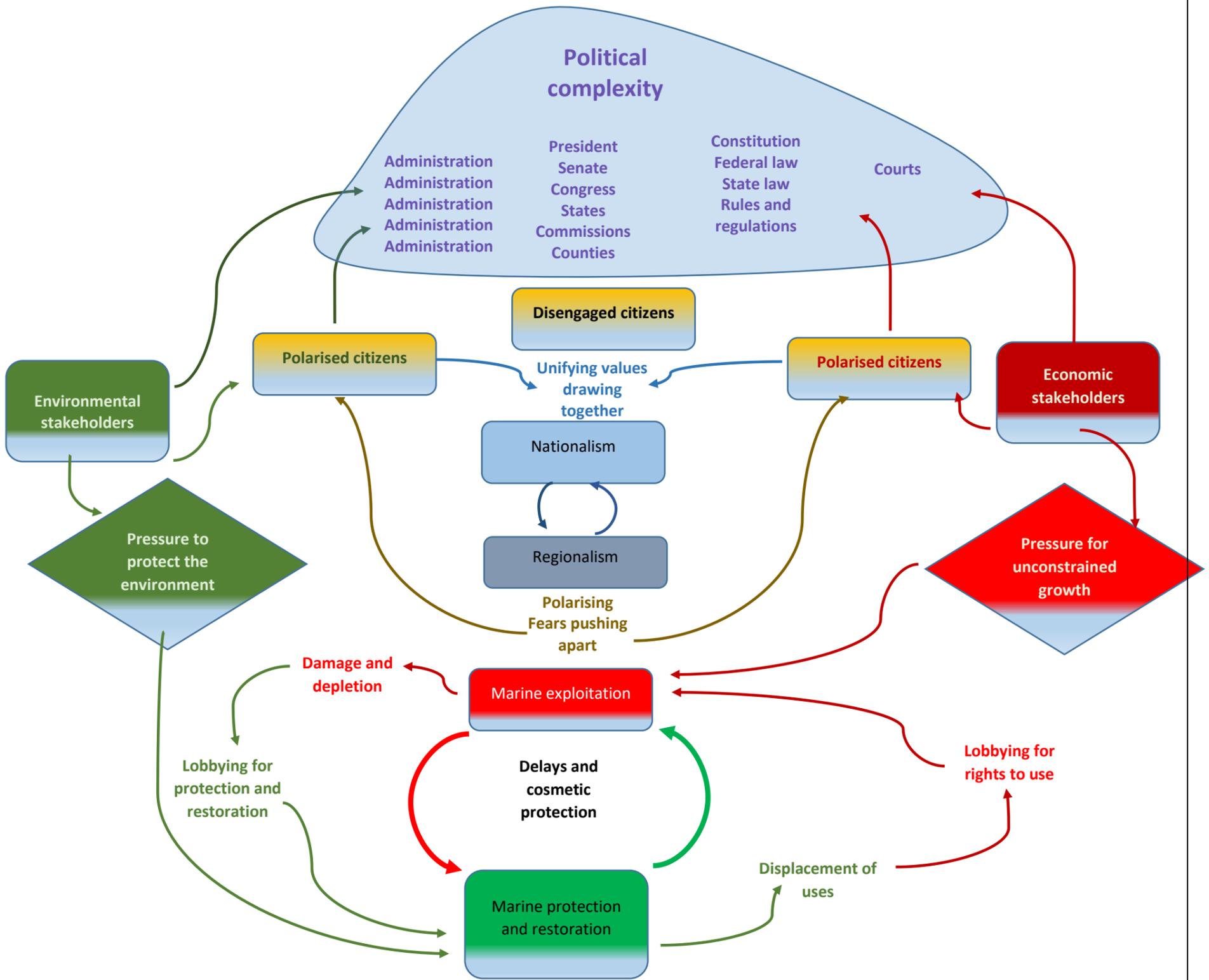
²⁹ <https://www.liberal.ca/trudeau-announces-plan-to-protect-canadas-oceans/>

9.3 CHESAPEAKE BAY AND MONTEREY

Everyone interviewed in the USA, on both seaboard, was talking about political polarisation and the effect on their work and what could be achieved. The sheer scale of the human impacts on the sea, both positive and negative, and political complexity were defining aspects of marine protection on both coasts.

Figure 32 attempts to capture the system of political complexity and reduce its role in marine protection to something understandable. It is very hard for any participant to comprehend the whole and there are strong homeostatic forces at play, meaning that any action draws compensating responses that tend to lead to outcomes of delay or cosmetic protection that appears to satisfy the wishes of environmental stakeholders while achieving little in practice.

Figure 31 USA political complexity



10 CONCLUSIONS

10.1 KEY INSIGHTS

10.1.1 Indigenous people

The societal gap between indigenous culture and settler culture in Australia and Canada is larger than in New Zealand. There is a lot of good will at an organisational level, but little idea about what really good practice would look like.

Beginning with the Treaty relationship (if it exists), or recognition of sovereignty, is fundamental to enduring solutions for marine management and protection.

The indigenous people's world view needs to be understood as a gift needed by the world to live in harmony with its environment. This should cause decision makers to go beyond seeking buy-in, beyond consultation, beyond engagement to true collaboration.

10.1.2 Catalysing marine protection

The process of constructing the thing is the thing. There is no magical end point to be reached. Strategies, plans and lines on maps are just artefacts marking phases in a community coming to care for its place.

Working with the emergent is the only way to go. Processes developed in one place and time cannot be blindly applied to another with any strong likelihood of success. Only by sensing into the field can a practitioner realise the catalyst actions that will move whole communities to a new level.

In dealing with large dispersed issues, a productive approach is to deconstruct them into short term not-dispersed things. At the same time, only whole system solutions will be robust, even when the whole system is the whole planet.

We tackle what we can tackle based on current knowledge and social conditions, even when we know this to be insufficient in the long run. This yields short term gains, but, as seen with the Great Barrier Reef, even something as big as fixing the land run-off may be overwhelmed by climate change.

Taking readouts of the trust level in a long-term group could provide useful information on the efficacy of interventions.

Recruiting allies bears fruit in the long run. These large complex problems have long times frames and working to increase the net friendliness in the system makes collaboration possible.

Being rigorous with yourself builds recognition of integrity. People are used to being disappointed and crave trust. Taking responsibility earns authority.

The realist analysis process asks the question *what works for whom and how*, rather than proceeding from a pre-set idea of what "works" looks like. This frees the analysis to encompass the full range of perspectives.

It takes time to refine objectives, build trust, develop governance mechanisms and secure commitment and resourcing. Good facilitation, creating relational capacity and commitment to a common direction is critical. This means that it is vital to be realistic with people at the outset that this is a marathon, not a sprint.

Leadership is an emergent property of the collaboration rather than a role attaching to a person. Consequently, requisite leadership is built rather than discovered, and may emerge at a range of places and times as the process unfolds.

Collaboration requires the parties to be prepared to modify their goals to achieve a shared purpose. Cooperation merely requires them to find common ground for agreement. Some parties may become full collaborators in the core process while others may just need to cooperate sufficiently for an enduring solution to be found.

Direct engagement with stakeholders by individuals with a deep understanding of their realities is a key part of creating effective collaboration in marine protection. This means involving individuals with a wide range of experience, expertise and perspectives.

Even though conflict peaks in the formation process, so does engagement. When undertaking a process, you should be prepared for the way that apparent conflict increases as the enduring solution is approached. This is because parties are trying to secure maximum gains before the system moves from a labile to a meta-stable condition.

Boundaries can be set for marine protected areas and values recognised before issues identification and solutions generation commences. The Great Barrier Reef model, for example, succeeded. However, it is important that the founding legislation and administration contains the seeds and powers necessary for an adequate solution to emerge.

10.1.3 Socio-political processes

More locally based initiatives have a higher rate of success than federal processes in federated polities. This is seen in all three countries in the study tour. A rich appreciation of the local system of relationships, perspectives and natural and social systems are required to construct a sufficiently nuanced solution to gain acceptance by all critical stakeholders and to endure over time.

Creating funding streams enables a strategic approach without building a large administrative superstructure. The Foundations for Chesapeake Bay leverage influence through strategic analysis and investment. This leverages at multiple points: with the donor, the recipients and those involved in the projects.

At present, the simplicity of the New Zealand approach in focusing just on no-take marine reserves may be more effective in getting such areas than large marine parks with cumbersome legal processes that lead to zoning. Focus really matters. This is pertinent to the current discussion about new legislation for marine protected areas.

Sophisticated social marketing may prove to be an effective tool for behaviour change in a dispersed and conservative stakeholder community. Creating a set of strategies based on stakeholder perceptions is a powerful approach, and the use of piloting allows things to be tested and refined before full scale implementation. Conversely, the emergent properties of systems at different levels of scale may render piloting approaches ineffective in some systems.

Micro-segmentation and careful selection and targeting of opinion leaders can be highly effective avenue for influencing bipartisan political outcomes. This can be particularly important in foundation stages when wide support needs to be garnered or in implementation stages when behaviour change is needed from many stakeholders.

The people who get out in the marine environment are the ones who truly know it. It is easy to be seduced by sophisticated stakeholders skilled in dealing with political or administrative “realities”. The people who get out into the environment are the ones

with a felt sense of the place and its dynamics. They are also likely to have generational commitment to the place. Getting their voices heard is a critical task for catalyst practitioners.

10.1.4 The role of science

Lack of science is not the problem in developed societies. Calls for more science are usually driven by stakeholders who want to slow processes down, or by scientists touting for business. The “problem” is closing the gap between what is known and doing something about it. That said, well presented good science is vital. Evidence-based, soundly analysed information allows an agreed and robust set of facts to emerge on which action can be based with some probability that the results of the action might have something to do with the aligned goals of the participants.

Independence in science advice can counter embedded vested-interest game playing. People, rightly, have come to distrust science sourced from vested interests. The lack of ability of scientists to create a firm ethical base for their advice means that new structures and processes are needed for science to play its most useful roles.

An engaging academic can be a major force in driving protection if allies are available in the administrative and political spheres. Academics have more independence than other “experts” and through their work have to develop skills in communication. This gives them a place to stand, resources, and capability to move hearts and minds. Bill Ballantine is the exemplar of this in New Zealand marine protected areas.

Monitoring is key to assessing the effectiveness of management. Marine protected areas seldom do what their founders thought they would do. Temptation to set outcome targets should be resisted, as the results can bring marine protected areas into disrepute when they fail to “deliver”. However, because of this difficulty in prediction, it is normal that management needs to be adapted over time to achieve foundational and emergent goals. Adaptive management works best when based on data. Monitoring is one way, but not the only way, of getting such data. Monitoring works better when harnessed to research, survey, and integrative processes. It should be noted that developing systems of sharing observatory/monitoring information that resource managers will use is a complex task. New technologies mean that automated data collection vastly increases information available on systems. Citizen science can be effective with adequate systems and training. This increases the pool of information and the people who will appreciate the meaning of the data at the same time.

Information on its own does nothing. “State of the Environment” reporting in the form of simply presented report cards and indices can unlock action by agencies and communities.

10.1.5 Administering marine protected areas

Marine protected Areas are only as good as their implementation. The more people using the marine protected areas, the more implementation that is required to be effective. Many marine protected areas investigated in the study tour were so poorly managed they risked putting the whole concept into disrepute.

Sustained management solutions are needed. Often more effort is put into establishment than into implementation.

Doing something profoundly new in a country takes more time and energy and has more hurdles than any of the practitioners or the players realise when they set out. Every time you set a precedent it will impinge on someone’s territory and they spring from the background when you might least expect it. The actual work of creating a marine protected area is thus far more complex than lobbyists realise. Conversely, in

a place with experience of establishing marine protected areas in a particular form, the learning permeates the system and can make subsequent efforts go more easily. Models of success matter.

Single focus entities have more chance of making a real difference. Regularly reviewing management actions and adapting to new information is essential. Critical success factors are the skills and commitment of the agency leaders in leadership, political processes, and committing resources. The Great Barrier Reef provides a model of all the necessary elements.

A statutory advocacy role is a key activity for a marine protected area to be able to deal with impacts that relate to offsite activities. Every marine protected area has boundaries, and the flows from land to sea and within marine environments means that capacity to influence activity beyond the borders is essential to maintain the health of any marine protected area. Equally within the marine protected area, boundary effective regulation and enforcement are key parts of the success of any marine protected area. The need to legal enforceability comes because in many cases effective action can have a material and adverse effect on the interests of a set of stakeholders.

Visitor services are best embedded in a system for which the role is core business, but excellent staff will create excellence regardless. Providing infrastructure and interpretation have become highly skilled and professionalised areas of activity. Agencies and organisations that do a lot of this work will do it better than those for whom it is a one-off project.

Trained volunteers can vastly increase the outreach of administrative agencies. This was a major feature in the USA and is much less evident in New Zealand.

10.1.6 Biosecurity

New Zealand is way ahead of other jurisdictions in taking practical steps to reduce marine biosecurity risks. Most jurisdictions are either unconscious of the need for action, or are contemplating it rather than doing it. At the same time the scientists are on the ball and well networked. The gap between knowledge and active risk reduction is a critical factor in achieving effective action on marine invasives around the world.

Global warming is opening new vector routes through the Arctic in a complex international political environment that will make management difficult. This phenomenon may have parallels in other parts of the world.

10.2 GENERAL CONCLUSIONS

Processes of collaboration can only be successful when the unifying forces exceed the divisive forces. Therefore, we see small gains, like those described by Paul Michel for the Sanctuary programme, where division is avoided by leaving out the key area of conflict, in this case, fishing. Equally, in enormous programmes like the Chesapeake Bay restoration, there is slow headway despite the resources and skills applied.

Large, diffuse highly conflicted systems with long time delays require great unifying forces and highly effective catalyst processes that reduce transactional costs to the parties. These catalyst processes are the technologies of dialogue, synthesis, and collaboration. Chesapeake at \$5B a year is at the top end of subnational processes of this type.

Smaller, localised, less conflicted systems with shorter feedback loops can produce enduring solutions with modest efforts, BUT the solutions are vulnerable to being overwhelmed by signals from larger systems. The Californian marine reserves at a state level is at the top end of such approaches with a cost of \$14M.

11 APPLICATION OF LEARNING

11.1 CONTRIBUTION TO FACILITATION IN NEW ZEALAND

The learning from this Fellowship advances the practice of facilitation of community leadership in caring for the marine environment. It has enabled the development of insights and tools that can be applied to large scale collaborations currently being applied to environments such as the Hauraki Gulf, Waikato River, Marlborough Sounds, and the south-eastern coastline of the South Island. These tools can also form the basis of training facilitators active in these fields.

11.2 CONTRIBUTION TO MAINTENANCE OF THE COMMONWEALTH AS A BENEFICIAL INFLUENCE IN WORLD AFFAIRS

In the course of this Fellowship travel, well attended presentations were given at the Bedford Institute in Nova Scotia, the Smithsonian Institute in Annapolis, and the Monterey Sanctuary in California. These allowed case studies and learning from New Zealand to be shared with leading researchers and interest groups in these locations. The New Zealand approach to working with indigenous people was of interest and has led to requests for further contributions, including from aboriginal people.

11.3 APPLICATION OF LEARNINGS

Learning from the Fellowship has already been applied to integrated management in the Marlborough Sounds, resolving coastal access issues around Nelson, advising on priorities for the Kaikoura Coastal Guardians and developing links between indigenous groups in different countries. The outline of a book has been developed and key insights have been shared with policy makers in central and local Government. Further steps will involve publication and integration of learning into training facilitators.

11.4 WHERE HAVE I SHARED MY LEARNINGS?

- All 50 contributors to this study were provided with the full report in draft and many contributed responses to the insights provided.
- A half day workshop on collaboration was run at the Environmental Defence Society conference on wild places and one of the contributors came from Australia as the key note speaker.
- Presentations have been made to: the Nelson Biodiversity Forum, Forest and Bird, Kaikoura Guardians, Marlborough Sounds Integrated Management Trust, and TOS Marine Biosecurity Partnership.

11.5 WHO ELSE MIGHT BE INTERESTED IN YOUR LEARNINGS?

The learnings from this Fellowship are directly applicable to:

- Biosecurity Direction Statement currently in preparation.
- The marine protected areas legislation review.
- The work of a wide range of organisations engaged in marine protection.
- Facilitation professionals.

Steps are underway to contribute to all of these.

12 RECOMMENDATIONS

The key recommendations from this study are addressed to the Ministers of Conservation, Environment, Fisheries, and Biosecurity. They are that:

1. Collaborative processes being embedded in policy and legislative instruments need to be more carefully set out to enable the full value to be realised by communities and by the country as a whole;
2. Large scale, multiple-use, zoned marine parks of the form adopted for the Great Barrier Reef should be provided for in any new marine protected areas legislation;
3. The historic underinvestment in marine biosecurity needs to be corrected as a matter of urgency, and the new provisions for pathways management implemented nationally as soon as possible.

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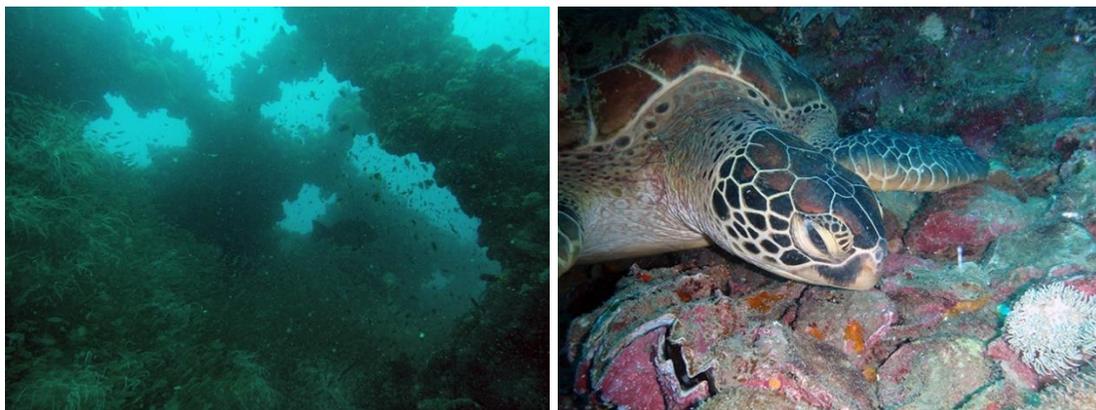


Figure 32 Yongalla wreck Great Barrier Reef

APPENDIX 1 - REFLECTIONS ON LEADERSHIP IN COLLABORATION

The question is what is the requisite leadership at each stage of a collaborative process. Eberhard says that leadership is an emergent property of the collaboration rather than a person or position. In our work, we often speak of positional leaders, network leaders and facilitative leaders. This implies that there are both common properties that distinguish leadership per se, and elements that define particular forms of leadership. In relating the idea of leadership as an emergent property to the stages of collaboration, the following forms were posited:

Stage	Requisite leadership
1. Idea	Thought leader
2. Inception	Initiating leader
3. Formation	Design leader
4. Establishing the ground of collaboration	Broker
5. Issue identification and problem solving	
6. Creating a nuanced solution	Synthesising mediator
7. Testing the solution	Engagement leader
8. Refining the solution	Synthesising mediator
9. Mandating the solution	Political leader
10. Transition to implementation	Administrator

1. The thought leader

A thought leader has an idea with the infective properties of a meme. They see a possibility and can communicate it to others in a way that activates them. The idea awakens the potential for action. While every idea must begin with one person, in the early stages a thought leadership team may emerge or there may be a conversation such that later many people might claim the role of thought leadership. In relation to the Great Barrier Reef this was formalised into a Royal Commission of Enquiry. The core thought was that the Great Barrier Reef needed protecting and that a legal and administrative basis was required for this to succeed.

2. The initiating leader

The initiating leader takes the thought and creates a powerful call to action. This may be a new thought that has emerged from the conditions pertaining in a place or they may suggest that thinking that has been developed in one place can be applied in another. This was the case in Kaikoura where Ta Mark Solomon proposed uplifting the Fiordland Guardians model and applying it in Kaikoura. The initiating leader must be highly chosen by those who command the resources and authority required for the collaboration to

succeed. In the case of Kaikoura Ta Mark Solomon enrolled the support of the Minister of Conservation who was in a position to direct his department to apply the resources required and gave the process mandate.

3. The design leader

The design leader develops the thought into an idea about how the collaboration could proceed. They can distinguish the roles of governance, problem solving, engagement, facilitation, project management etc. and assemble them into a coherent plan of action. This role requires the capacity to relate the unique circumstances involved in the proposed collaboration to models of action that would allow the collaboration to succeed. The result will usually be a project plan or proposal that matches the necessary actions with the resources required.

4. The broker

Brokerage involves persuading the parties required for the collaboration that engaging in work together is worthwhile. This goes to the root of the word collaboration the Latin *collaboratus* which means to labour together. The parties must come to think that committing their time and energy to the collaboration is worthwhile. Brokerage is more than selling the idea. As the parties become engaged in the idea of the collaboration, the design may have to be refined or modified for them to want to participate. These requirements may affect the resources required, the outcomes that can be achieved and the time required for the collaboration. The product of the brokering is an agreement of parties to proceed with the collaboration and often this is formalised into one or more foundational documents, such as terms of reference.

5. The group facilitator

As the collaboration gets underway some sort of working group forms. The process of working group formation and operation requires skilled facilitation. Facilitation means to make easier, or to make possible. The group facilitator enables the working group, and in some cases other entities created for the collaboration to develop the culture and working processes that enable them to align around the purpose of the collaboration, tease out the issues and develop solutions that could be widely supported.

6. The synthesising mediator

All issues and solutions that are the subject of the collaboration need to be knitted into an integrated proposal. This may take many forms: a strategy, plan, contract, memorandum of understanding, an accord, a treaty or even a piece of law. The work of the synthesising mediator is to take the parts and create from them a whole that takes into account the way different parts of the solution impact on each other and on the interests of the parties. For example, in Kaikoura the decisions on Maori fishing reserves, no-take areas, recreational fishing limits and rules on commercial fishers are all inter-related, and changes to each affects the whole.

7. The engagement leader

Once a comprehensive solution has been generated by the collaboration it needs to be tested and/or socialised with those it may affect. For the Great Barrier Reef, rezoning this involved processes that resulted in over 30,000 submissions. The engagement leader creates the process for this wider engagement, managing the dissemination of information, fostering understanding of the solution and channelling comments into a robust process of recording and analysis.

8. The synthesising mediator II

Once the comments have been received, decisions need to be made and a new holistic solution melded from the original and the new information. The changes desired by different parties will require further mediation and socialisation of synthesised solutions.

9. The political leader

Within the social fabric any solution needs to be formally mandated by those with positional authority. This might be at any level, from a local community to a national legislature, or even involve a number of states. Gaining this mandate is part of the role of a persuasive political leader(s).

10. The administrative leader

Once a solution is mandated and resources allocated, someone has to lead implementation. This may involve a simple or complex project or leading new institutional entities as happened with the formation of the Great Barrier Reef Marine Park Authority.