

**BECOMING INDIGENOUS:
MEASUREABLE AND IMMEASURABLE VALUES IN ECOSYSTEM-BASED
MANAGEMENT**

by

Nigel Haggan

M.Sc. Trinity College Dublin, 1981

M.A Trinity College Dublin 1986

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES

(Interdisciplinary Studies)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

August 2012

© Nigel Haggan, 2012

Abstract

This dissertation follows the trajectory of fisheries management in British Columbia from a period prior to European contact when Aboriginal people encountered limits, learned to live within them and indeed enhance productivity of lands and waters. The diversity of ecological contexts and human experience created a rich diversity of *eco-social-spiritual communities*, sustained by the interweaving of scientific, economic, social, spiritual and aesthetic values. Since then, fisheries managed primarily for commodity value have depleted marine life, while the growth of other economic sectors has transformed ‘fisheries’ from a mainstay of culture and existence to a tiny fraction of BC’s economy as measured by GDP.

Globally, depletion and chronic undervaluing have prompted leading marine scientists, conservationists and others to call for a *sea* or *ocean ethic*. A literature review reveals a strong public demand for inclusion of immeasurable values between the lines of the ecological economics literature and in declarations from leading scientists and world religions, but there is no coherent way to implement it. A research project using Q methodology indicates that the public demand for inclusion of a spiritual dimension holds for a wide cross-section of people engaged in the governance, management and use of BC’s marine environment. The dissertation outlines a concept of the *secular sacred* based on a spirituality of dedicated attention to relationships. Dedicated attention confers the knowledge to enhance relationships that contribute to flourishing and unravel those that are destructive.

The secular sacred can draw on the moral authority of science to report objectively on large-scale relationships, the moral authority of Aboriginal and local people at local scale, the moral authority of ordinary people committed to flourishing of people, species and places, the moral authority of religion in terms of gratitude, generosity, compassion, love and justice and the moral authority of artists who can represent complexity and tension and point ways to sustainability which words cannot. Drawing on multiple sources of knowledge and authority without *belonging* to any of them, the secular sacred opens the door to transformative change in and beyond British Columbia.

Preface

Parts of Chapters 1 and 2, including an earlier version of Figure 1.1 and the present Figures 2.4, 2.5 and 2.6 were previously published in Haggan (2011) You don't know what you've got till it's gone: The case for spiritual values in marine ecosystem management. Pages 224-245 in: *World Fisheries: A Social-Ecological Analysis*. Ommer, R.E., Perry, I., Cury, P. and Cochrane, K. (eds). Wiley-Blackwell, Oxford. They are reproduced here with permission from Wiley-Blackwell.

The project described in Chapter 6 was approved by the UBC Behavioural Ethics Review Board; certificate H07-02131, expiry date January 12, 2013.

Table of contents

Abstract	ii
Preface	iii
Table of contents	iv
List of tables	vii
List of figures.....	viii
List of boxes.....	ix
Glossary	x
Acknowledgements.....	xvii
Chapter 1: Becoming indigenous: an eco-social-spiritual community	1
1.1 Introduction	1
1.2 Eco-social-spiritual community	2
1.3 Research issue and question.....	6
1.4 Organization of the thesis	6
Chapter 2: Current economics-based methods of valuing marine ecosystems	9
2.1 The natural resource paradigm.....	9
2.2 Global context	10
2.3 Fishing in BC: the golden rules of the Pacific Northwest	13
2.3.1 Golden Rule #1: Love your neighbour as yourself	13
2.3.2 Golden Rule #2: The one with the gold makes the rules.....	15
2.3.3 Golden Rule #3: The gold goes where the gold grows	16
2.4 Decline in value of fisheries	19
2.5 The value of salmon to BC	20
2.6 Whole ecosystem valuation	23
2.7 Total economic value.....	25
2.7.1 Ecosystem services.....	28
2.7.2 Ecosystem services and GDP.....	29
2.8 Extended valuation of marine ecosystems.....	32
2.9 Signs of values outside utilitarian frameworks	33
2.10 Conclusion.....	40
Chapter 3: Broadening the paradigm: towards a sea ethic	41
3.1 Marine ecosystem-based management	41
3.2 Social-ecological systems	43
3.3 Public demand for the sacred.....	44
3.4 Health or flourishing - broadening the natural resource paradigm	48
3.5 Towards a sea ethic	48
3.6 Conclusions	52
Chapter 4: An alternative valuation: incorporating spiritual values.....	53
4.1 Science and religion as separate realms.....	53
4.2 Informing principles of an alternative valuation	62
4.3 Tipping points and repentance	63
4.4 Vision, principles, outcomes and virtues.....	64
4.5 Core concepts.....	66

4.5.1	Faith as the driver of research and conservation	67
4.5.2	Spirit and spirituality	68
4.5.3	Epistemic injustice	70
4.5.4	Tradition and religion as remembering forward	72
4.6	The language of religion	73
4.6.1	Ecological and spiritual intelligence	74
4.6.2	Reticence and exclusion	77
4.7	Conclusion: towards the secular sacred	79
Chapter 5:	Ways of identifying immeasurable values: Q Methodology	84
5.1	Introduction	84
5.2	Value elicitation methods	86
5.3	Transformative (or visionary) methods	87
5.3.1	Penalty metrics	90
5.4	Eliciting place-based values	90
5.5	Values at coast-wide or national scale	94
5.6	Deliberative democracy	95
5.7	Q methodology	96
5.7.1	Pilot project	103
5.8	Conclusion	104
Chapter 6:	Research project, results and analysis	105
6.1	Introduction	105
6.2	Selection of statements	105
6.3	Ethical review and informed consent	107
6.4	Participant selection	108
6.5	Results	112
6.6	Interpreting the results	116
6.7	Factor A narrative	118
6.8	Factor B narrative	119
6.9	Factor C narrative	121
6.10	Factor D narrative	122
6.11	Discussion	124
6.12	Analysis	125
6.13	Conclusions	128
Chapter 7:	Becoming indigenous: Summary, policy implications and future work	129
7.1	Summary	129
7.2	Transformative impact and potential	133
7.3	Policy implications for governance and management	136
7.4	Future work	137
References	140
Appendix A	Marine ecosystem-based management principles	176
A.1	Scientific principles of marine ecosystem-based management principles	177
A.2	Flourishing as a vision for ecosystem-based management	186
Appendix B	Statement selection rationale	191
B.1	Number and length of statements	191
B.2	Principles of statement selection	193
B.3	Democracy and the public trust	193
B.4	Deconstruction and realignment	194

B.5	Adjacency and food security.....	196
B.6	Ecological literacy	197
B.7	Inclusivity of cultures and knowledge.....	200
B.8	Inclusivity of values	201
B.9	Principles of the gift paradigm.....	202
B.10	Statements on threat and the precautionary principle	203
Appendix C Informed consent process.....		205

List of tables

Table 2.1 Some examples of fisheries contribution to national GDP.	20
Table 2.2 Inconsistency of ‘use’ and ‘nonuse’ categories in ecosystem valuation. Legend: ✓ (included), x (excluded), □ (no mention), ≈ (overlapping).	35
Table 6.1 <i>Q sample</i> of statements.	106
Table 6.2 Demographic and occupational data.	110
Table 6.3 Percentage of variance explained by each factor before and after rotation	115
Table 6.4 Loadings on each factor. Asterisk indicates a defining sort, i.e., participant #1 contributes to Factor A, participants 2 and 3 to B and so on. Participant #8 loads almost equally on B and C, so is not a ‘defining’ sort.....	115
Table 6.5 Generalized Q sort for Factor A (bold), with scores from Factors 2, 3 and 4 for comparison.....	117
Table 6.6 Generalized Q sort for Factor B (bold), with scores from Factors A, C and D for comparison.....	119
Table 6.7 Generalized Q sort for Factor C (bold), with scores from Factors A, B and D for comparison.....	121
Table 6.8 Generalized Q sort for Factor D (bold), with scores from Factors A, B and C for comparison.....	122
Table 6.9 Ranking of statements indicative of spirituality.	126
Table 6.10 Response to inclusion of ‘spiritual and religious experts’ in coast and ocean management.	127
Table B.1 Number of concourse statements, Q statements, participants and statement length for 12 Q studies.....	191

List of figures

Figure 1.1 ‘Conversations’ between people, biota and environment give rise to ‘eco-social-spiritual’ diversity at individual, family, community and regional levels. The curved arrows represent the exchange of information. The double-ended arrow represents the flow of knowledge between neighbouring and distant places. (Adapted from Haggan 2011).....	2
Figure 2.1 Contribution of the BC "Fisheries and Aquaculture Sector" (commercial and recreational fisheries, aquaculture and processing) to GDP (\$1997 million), 1984-2005. Frame shows “recovery” from 1990s slump. Source data: BC (2007, Appendix 1).....	21
Figure 2.2 BC's "Fisheries and Aquaculture Sector" as percentage of GDP, 1984-2005. Source data: BC (2007, Appendix 1).....	22
Figure 2.3 Commercial fisheries contribution to British Columbia's GDP compared with farmed salmon, 1985-2005. Source data: BC (2007, Appendix 1). Reproduced from Haggan (2011). .	22
Figure 2.4 Farmed salmon vs commercial salmon fisheries (all species) as percentage of BC GDP. Source data: BC (2007 Appendix Table 1).....	23
Figure 2.5 Categories of total economic value with backdrop of BC central coast. Reproduced from Haggan (2100), courtesy of Wiley-Blackwell.....	26
Figure 2.6 A: Total sport and commercial catch of lingcod, <i>Ophiodon elongates</i> , from the Strait of Georgia, British Columbia, 1880-2000. Source, Department of Fisheries and Oceans, Canada. Reproduced from Haggan (2011) courtesy of Wiley-Blackwell. B: Total Canadian catch of Atlantic cod, <i>Gadus morhua</i> , 1950-2004. Data source: Sea Around Us Project, www.seaaroundus.org	27
Figure 4.1 Three ‘magisteria’ that contribute to coastal and ocean governance and management. Weight of arrows indicates current influence and need to rebalance to reflect the moral authority of all three.....	80
Figure 4.2 Elements of a more complete conversation on coastal and ocean values with potential to influence policy. <i>Pencil drawing courtesy of Emily Haggan-Köseoglu</i>	81
Figure 5.1 Scorecard for <i>Q</i> study with 40 statements.	98
Figure 6.1 Scree plot of eigenvalues for 8 factors generated by principal component analysis in PQmethod (Schmolck and Atkinson 2002).	113
Figure 6.2 Left panel shows unrotated matrix at top and 30° rotation at bottom to align participants 6 and 7 with factor C. Right panel shows that Factor C is well defined against Factors B and D.	114
Figure C.1 Introductory screens for <i>Q</i> survey. Top explains what is required. Bottom panel allows for personal user code	198
Figure C.1 Top: Informed consent information. Note option to withdraw at any time. Bottom: Instructions for rough sort	199
Figure C.2 Top: Rough sort screen. Note random numbering. Bottom, instructions for detailed sort	200
Figure C.4 Top: Partially completed scorecard showing statement ‘parked’ for consideration. Bottom request for comments on choice of “Most and “Least Appropriate” statement	201
Figure C.5 Top: Space for comments. Bottom: submission of data completes informed consent	202

List of boxes

Box I - Deep connections.....	75
--------------------------------------	----

Glossary

The glossary entries are for terms and concepts as used in the dissertation, i.e., definitions are not necessarily the first listing in the Oxford English Dictionary.

Aboriginal: From the Latin *ab origine*, those who were there from the beginning. Defined in the Canadian National Aboriginal Health Organization glossary¹ as a collective name for all the Aboriginal peoples of Canada, as recognized in the Constitution Act (Canada 1982, s. 35). Aboriginal therefore includes ‘Indians’, Inuit and Métis peoples. Aboriginal is therefore used throughout and capitalized as in ‘European’.

- *First Nation(s):* This term came into use in the 1980s to replace terms ‘Indian’ or ‘Indian band’ in Canada’s Indian Act², which some found offensive. The term is politically expedient as it adds the affirmation of nationhood to the sense of presence from the beginning contained in *Aboriginal*. On the downside, First Nation(s) remains connected to Canada’s definition of ‘Indian’ and so does not explicitly include Inuit and Métis people. First Nation is appropriate when a specific people change their Indian Act designation ‘ABC Indian Band’ to ‘XYZ First Nation’ where the new name reflects both their language, and their right to self-government;
- *Indigenous:* The UN Permanent Forum on Indigenous Issues estimates some 370 million indigenous people in 70 countries. Given the diversity, no UN body has adopted a formal definition, but the term can be understood to include, self identification and community acceptance; historical continuity with pre-colonial inhabitants; a strong link to territories and natural resources; distinct social, economic or political systems; distinct language, culture and beliefs; subjection to government systems; and resolve to maintain and reproduce ancestral environments and systems as distinct peoples and communities. Indigenous people are to be *recognized* rather than *defined* as self-identification is a fundamental criterion (UN 2006). Diversity and the principle of self-identification underlie the absence of a clear definition in the UN Declaration on the Rights of Indigenous Peoples (UN 2007).

¹ <http://www.naho.ca/publications/topics/terminology>. (Accessed August 6, 2012).

² <http://laws-lois.justice.gc.ca/PDF/I-5.pdf> (Accessed August 13, 2012).

Becoming indigenous: This concept bookends the dissertation:

- *As process,* throughout human history, people have entered new lands, encountered and learned to live within limits and often to increase the productivity of lands and waters. People, biota, lands and waters shape and reshape each other over long periods.
- *As present imperative:* The dissertation argues that encounter with planetary limits puts the present generation in the same position as every group that entered new lands since the dawn of time.

Epistemic injustice: a wrong done to a person or group “in their capacity as a knower” (Fricker 2007). Fricker attributes epistemic injustice to imbalances in how power is distributed in society and describes two forms: *Testimonial injustice* occurs when less credence is given to knowledge (testimony) based on social status, ethnicity, gender, sexual orientation, etc. *Hermeneutical injustice* is exemplified by a woman suffering from sexual harassment in a society where the concept does not exist. In both examples, the assumption that justice is the norm and injustice an aberration breaks down. This dissertation considers the ascription of ‘spirituality’ to Aboriginal people as an example of *testimonial injustice* that admits Aboriginal rhetoric of the sacred, but fails in application to the policy, science and management of natural resources. Exclusion of the language of gift, generosity, gratitude, love, relationship and ceremony from the business of ecosystem-based management is considered as an example of *hermeneutical injustice*. This admittedly extends Fricker’s definition, as the concepts do indeed exist, but are inadmissible.

Ecoliteracy: A condition of awareness of the web of relationships in which individuals and communities exist and an ethics of attention that contributes to flourishing.

Eco-social-spiritual community: A term used to extend the current ‘social-ecological systems’ approach to explicitly include the sacred or spiritual as an integrative dimension of human experience.

Ecosystem: “a biological community of interacting organisms and their physical environment³”. The term is used increasingly to include humans. Any present ecosystem must be understood as the intersection of numerous long-term environmental and increasingly of anthropogenic processes. The species, pathways and interstitial spaces of the present ‘system’ are themselves the intersection of trajectories of historic climate, natural variability and human actions.

Ecosystem-based management / marine ecosystem-based management: An approach which considers a wider range of ecological actions than classic single species management and is aimed at both human and ecosystem well-being (Garcia and Cochrane 2005). Marine ecosystem-based management is designed to tell us what we should do in view of the ‘nature’ of marine ecosystems as we learn about them from various sources. The approach should therefore speak to something of what the ecosystem *is* and how people *should* act in consequence.

Faith or belief: Faith is used here in the theological sense of belief seeking understanding (Migliore 2004:2), for example, in research based on scientific intuition. *Belief* is used in the sense of the original etymology of that which is beloved or as in the 2nd OED definition, “The mental action, condition, or habit of trusting to or having confidence in a person or thing...” For example, faith that through time and effort, one’s country might live up to the rhetoric in its constitution (Frost 1930). A research project is an act of faith in oneself, one’s colleagues—that given sufficient attention, dedication and stamina, the phenomenon studied will—or will not—reveal itself, either way, something new will be learned.

Immeasurable values: Used here to indicate values of love, commitment, cherishing and protecting as distinct from values measureable in money or other quantities which people are willing to buy, sell or trade. The language of management, measurement, monitoring, surveillance and control are particularly inappropriate for such relationships.

Lifeworld: What we collectively experience in living together (Husserl 1936:24). Used here to indicate the social consensus on what constitutes ‘normality’. The non-industrial lifeworld of the Pacific Northwest at the time of European contact considered the scientific, social, economic,

³ <http://oxforddictionaries.com> (Accessed August 14, 2012).

spiritual and artistic as part of everyday reality. The lifeworld as defined by Schutz and Luckman (1973) specifically excludes the artist scientist and mystic. The lifeworld of marine ecosystem-based management and social-ecological systems includes the scientific, social and economic, but not the spiritual or artistic.

Ontologies and epistemologies. This dissertation examines two views of the origin and nature of the world (ontologies) and the different ways of understanding the world (epistemologies) that result:

- *The gift paradigm:* the world's religious and spiritual traditions regard the world as sacred, whether as infused with a spirit or spirits of the land and other species, or as the gift of a benevolent Creator whose spirit enlivens the universe. Such gifts are useful, indeed essential for survival, but their spiritual dimension constrains how and how much they can be used. The world is understood in terms of unity, connection, relationship, reverence, respect and reciprocity to non-human entities that have personhood, sentience and agency. The appropriate response to a gift is gratitude, restraint in personal use, generosity with others and atonement and restoration when mistakes are made.
- *The natural resource paradigm:* in this view the world provides a number of 'stocks' of different resources, which can provide a 'flow' of benefits to people, most simply represented by a capital/interest model (Norse *et al.* 2012). Lack of connection between the 'stocks' is a substantive difference from the gift paradigm. In this utilitarian framework, resources exist for the benefit of people. In an extreme view, all forms of 'capital'—physical, monetary and natural—are interchangeable. The world has no numinous or spiritual dimension and is understood primarily through the subject-object lens of natural science.

Governance and management: Governance determines who has power, who makes decisions, how other players make their voice heard and how account is rendered⁴. Governance is carried

⁴ <http://iog.openconcept.ca/en/about-us/governance/governance-definition> (Accessed August 18, 2012).

out within an evolving framework of policy and legislation. *Management* denotes the systems whereby policy and legislation are brought into effect.

Love: the passionate connection between people, other species, lands and waters that evokes feelings of gratitude, encourages restraint in personal use, generosity with others, complicity in depletion and dedicated efforts to cherish, protect and restore that which has been lost or damaged.

Mystery vs problem: Mystery denotes a quality of immeasurable values, no matter how much can be learned, there is more—applicable to people and other objects of love, cherishing and protecting. Distinguished from a ‘problem’, as in math or quantitative science that has a solution, however difficult to obtain, but see *Wicked problems*.

Sacred: Used here to denote the *Secular* or *planetary* sacred that can draw on the spirituality and knowledge of science, indigenous communities, artists, ordinary people and world religious traditions, but does not *belong* to any of them.

Sea or ocean ethic: A sea ethic can be summarized as a desired consensus on a moral framework to promote the flourishing of the entire biotic community, people, plants, animals, air, lands, waters and the life-sustaining flows between them. Called for by increasing numbers of marine scientists and others, many of whom cite Aldo Leopold’s (1949) land ethic whereby actions that contribute to the flourishing of a living community are “right” and those that lead to depletion are “wrong”.

Social-ecological systems: An approach that recognises the interdependence between biophysical and social systems such that change in the one will bring about change in the other, and such change will proceed iteratively. Examining social-ecological systems engages natural and social scientists in research on the shaping and reshaping that occurs between human and ecological communities, both over time and as a result of either biophysical or socio-economic drivers, or both.

Spirit is the creative flow which religion understands as the creator, sustainer and transformer of life, and Indigenous spiritual traditions as the ancestral and ongoing transformative relationships between people, animals, plants and spirits of the lands and waters. *Spirit* can stand equally for the process by which species and environment reshape each other—what life scientists call *evolution* and theologians and Aboriginal people understand by the ongoing process of *creation*. It is the root of *inspiration*—where one idea flows into another, emerging in art, what science terms *discovery* and religion of theology understands as *revelation*. It is the belief that drives the artist, scientist and mystic in all of us to ask new questions or to face down the border police (Caputo 1997; Neis 2011) .

Spiritual literacy or intelligence: Identified along with *physical*, *emotional* and *intellectual* as one of four types of intelligence requiring at least equal attention, development, and education (Kellert 2003; Simpson 2011) .

Spirituality is in large part, the application of an ethics of attention—the loving eye of relationship that constrains exploitative use. This *spirituality of attention* is fundamental to identify relationships that contribute to flourishing and to understanding and unravel those that do not. In non-industrial societies, spirituality is developed through attention to myths and stories that recapitulate how people learned how to live in harmony with non-human attributes of their lands and waters.

- *Spirituality of belonging* Growing up in cycles of cultivation, harvest and ceremony and the practice of attention to connections between species, lands and waters can be described as a spirituality of belonging, where culture, identity and well-being are interwoven with lands, waters and other beings. This is often expressed in terms of ‘sacred land’ or ‘sacred ecology’. Human and ecological diversity create significant different expressions of the *spirituality of belonging* both within and between eco-social-spiritual communities, even those that are quite close to each other.
- *Spirituality of science* The *practice* of science is based on observation, hypothesis, theory, research and replicability. The *spirituality* of science stems, in many cases, from initial awe, fascination and mystery of an encounter. Many scientific careers are formed

in childhood. Childhood attachments are however inseparable from the totality of experience, sun, wind, water, plants, animals, the love of parents. Scientific education rips the object of initial fascination out of context and into a formal ecological or physical system. For example, the beautiful silver fish acquires a name—let's say a salmon, and a place in evolution. In fisheries and ecosystem science the salmon becomes a term in an equation, identical to all others of its kind and exchangeable through market price for other goods and services. Learning the language and method of science and proving the ability to contribute is a rite of passage from childhood attachment to membership. Science is no less a spiritual practice, but the scientific virtues of honesty and objectivity make it a *spirituality of detachment* rather than of *belonging*.

Wicked problems: Current management jargon that refers to the intransigence of some issues in (usually resource) governance that are caused by ecological and social complexities which may include conflicting worldviews and/or values. A wicked problem has no obvious 'right' solution, but has to be worked through in a democratic process involving all persons and values concerned.

Acknowledgements

I acknowledge my wife Pam for cherishing and protecting the author. My primary academic debts are to my co-supervisors Rashid Sumaila and Ron Trosper, and then to my committee members Conrad Brunk, with special thanks to Rosemary Ommer for critical editorial assistance. I also thank the external and university examiners for their appreciation of the work and for their urging to explore policy implications beyond the coast and ocean of British Columbia. I am grateful to my sister Pauline Nashashibi for critical comments and theological insights, not all of which could be included. I acknowledge many mentors and friends: The late Percy Walkus of Wuikinuxv Nation, Ron MacLeod and others who taught me to look to the wider benefit of people, places, marine life, waters and lands. Tony Pitcher for opening the world of fisheries science to me and many other colleagues and friends at the UBC Fisheries Centre and further afield. I am grateful to Tim Michel for discussion of ideas and for challenging all assumptions and generalities about Aboriginal people. I owe a huge debt of gratitude to participants in the Q project for taking the time to respond and provide insightful comments, and also to Dave Barrett for assistance in recruiting commercial fisheries and aquaculture participants. I acknowledge Bessie Brown for permission to use the backdrop photo in Figure 2.5, and my daughter Emily for the pencil drawing *Starfish opening a clam* in Figure 4.2. The content of this thesis owes much to my experience growing up with a foot on both sides of the sectarian divide in Northern Ireland and later work with Aboriginal people and collaborative projects with coastal communities and government. My love of the people and creatures of the sea began in childhood days in my Grandparent's holiday house in Whitehead on the shores of Belfast Lough.

Chapter 1: Becoming indigenous: an eco-social-spiritual community

1.1 Introduction

Becoming indigenous indicates how people arriving in a new territory move from initial encounters with unfamiliar attributes to stable relationships. The process of establishing such a relationship is fraught with peril, which begets what has been described as an “ethics of attention” or “ecological literacy”, a process of socialization and attunement to the movement and growth of plants and animals through territory, seasons and weather. This attention includes the individual beings or things, the connections between them and the spaces between where unknown and unseen faunas and floras flourish. Learning to live within limits forges relationship and a sense of “belonging” to a “place” in the deepest sense of relating to other beings and forces that “co-construct” our world (Latour 1993:6, 106). Over time, the dance of matter in space and time, the return of the eulachon and salmon, the ripening of camas are encoded in the mix of dance, art, myth, stories, teachings and celebration and mourning which we term ceremony. The dedicated attention, practice, stories and ceremonies through which young people become socialized and attuned to the web of relationships which constitute ‘place’ or ‘territory’ and which continues throughout their lives, is here termed ‘spirituality’. Tim Michel of the Secwepemc people in the interior of BC describes the spiritual practice of *šetsxe*, a regime of fasting, meditation and prayer that attunes you to your own guiding spirit *šne7e* and the spirits of the land, or equally of the city⁵ (*pers. comm.* November 2011). The diversity of ecological contexts and human experience gives rise to an enormous number of ‘eco-social-spiritual communities’.

⁵ This practice, loosely termed a ‘vision quest’ is analogous to retreats of fasting, meditation and prayer in other spiritual and religious traditions.

1.2 Eco-social-spiritual community

The term community acknowledges relationship. It is not created by measurement or from some outside or objective stance. The term eco-social-spiritual community explicitly includes the sacred or spiritual as an integrative dimension of human experience as worthy of articulation as the measurements of science and economics. Figure 1.1 presents a conceptual view of how communities are formed at timescales from 100s to 1000s of years.

The extent to which people, species and landscape have shaped and reshaped each other is only beginning to be understood (Turner 2004; Anderson 2005; Mann 2005). After hundreds to thousands of years, none of these are what they were at the beginning and marine species are no exception (Harper *et al.* 1995; Haggan *et al.* 2006; Williams 2006; Rick and Erlandson 2008). Lands, waters, their creatures and humans have nurtured and

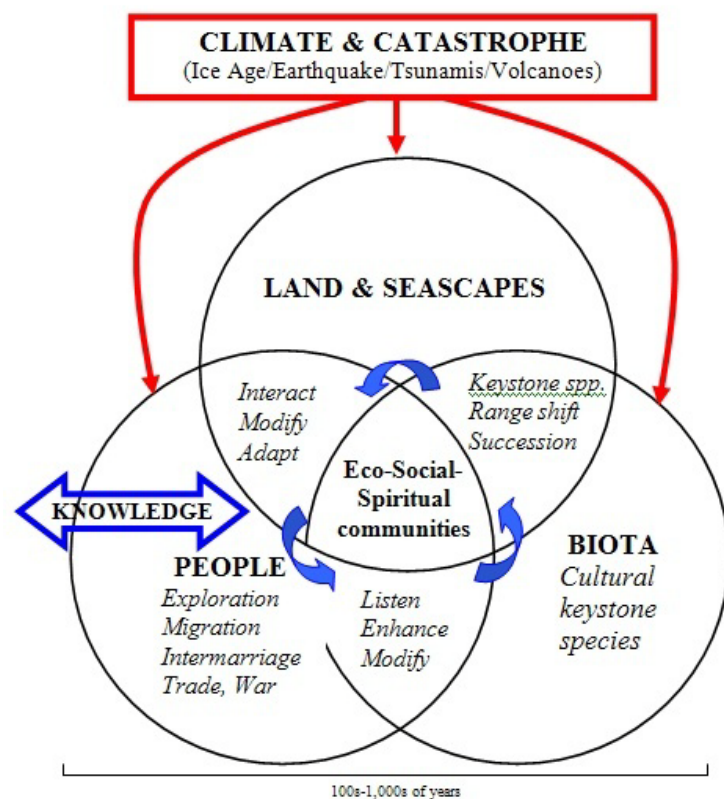


Figure 1.1 ‘Conversations’ between people, biota and environment give rise to ‘eco-social-spiritual’ diversity at individual, family, community and regional levels. The curved arrows represent the exchange of information. The double-ended arrow represents the flow of knowledge between neighbouring and distant places. (Adapted from Haggan 2011).

sustained each other since the dawn of time. Archaeological records of human dependence on Pacific Northwest marine ecosystems go back almost 13,000 years to the end of the last Ice Age

(Fedje *et al.* 2004). Some Pacific Westcoast societies have an 8-10 thousand year record of sustainability (Erlandson *et al.* 2008; Campbell and Butler 2010). Principles and practices that ensure sustainability are at least 3,000 years old (Trosper 2009). This is by no means to suggest that all previous societies were sustainable, just that it is well worth paying attention to those that were and are.

Understanding relationships leads to the cultivation of those that contribute to individual and community well-being. This is practical, in that it contributes to understanding and conserving our world. It is also a source of intellectual satisfaction and of joy in the flourishing of the people, lands, waters and creatures. Understanding relationships contributes to a feeling of harmony and belonging and alerts and energizes us when they are eroded or threatened, as with climate change today. Figure 1.1 can also be read as a metaphor for the totality of a formative or career-shaping experience, or the flow between human and non-human beings and events represented in the graphic, plastic and performative art and literature (stories) of traditional societies. The names, spirits and crests of ancestors are entangled with lands and waters in a “recursive epistemology” (Bateson 2000; Rose 2007), or person to person relationship (Buber 1937). The notion that learning is reciprocal “...seems at hopeless odds with the distinction of subject and object considered essential to science.” (Le Guin 1985:275). This concept of becoming indigenous through encounters with limits sets the stage for a journey from the rich human societies of the Pacific Northwest prior to European contact through an increasingly crowded and contentious coast and ocean to a conclusion that adding the immeasurable values of cherishing and protecting the sea are as necessary to marine ecosystem-based management as the measurements of science and economics.

This thesis combines concepts and insights from science, religion and spirituality to develop and test a set of principles with which to address the marine ecological crisis as it affects the seacoast of British Columbia (BC). It thus bridges Einstein's separate realms of "*is*" (science) and "*should*" (religion) (Einstein 1954:42) and Stephen J. Gould's "non-overlapping magisteria" (Gould 1997), both of which leave moralizing to the moralists (Latour 2004:98; Mackey 2007:19). Mainstream religion and theology are increasingly vocal on the spiritual and moral questions raised by global ecological and human poverty, but the same cannot be said for the voice of mainstream religion in the Pacific Northwest⁶. This silence leaves the emerging field of marine ecosystem-based management dominated by the voices of natural and social science (mostly economics) with concessions to Aboriginal people as the major holders and spokespersons for spiritual values.

That racial stereotyping puts Aboriginal people in the invidious position of speaking for spiritual values while also having to negotiate for material needs. Religious leaders in BC need to connect global declarations on the ecological crisis as "crimes against creation" (Sagan 1990) or a "moral crisis" (John Paul II 1990) with growing human and ecological poverty in the Pacific Northwest. Declarations from all the faith traditions demand attention to environmental, ecological and human injustice. For far too long, BC Aboriginal people have been the sole voice for the spiritual dimension of our relationship to this beautiful and fragile place. It is time for mainstream religious leaders to work with scholars and communities seeking not only ecosystem-based management but also a more harmonious, happy and just relationship with the people, places and creatures they love. This is vital since the depletion and extinction of fish

⁶ Exceptions include a statement on the Columbia River by Roman Catholic bishops (WSCC 2001) and a 2012 letter from the Anglican bishops of BC and the Yukon calling for fair and inclusive process in hearings on the Enbridge pipeline (Hager 2012).

populations compromises marine ecosystem structure and impoverishes human communities. It means, in effect, that *everyone should become indigenous*.

Scientific literature and media articles agree that that the ocean is depleted of fish, threatened by climate change and sadly undervalued (please see section 2.4). In short, “...our entire mode of interaction with the sea is wrong...” (Pauly 2009). Industrial fisheries move from coastal waters to the continental shelf and seamounts (Longhurst 2006; Pitcher *et al.* 2007) and as sequential depletion drives us to eat ‘new’ species. Efforts to revalue nature by attaching monetary equivalents to the ‘ecosystem goods and services’ that underpin human life and economy are vital to a sustainable economy. To many people, their emotional and spiritual connection, their moral beliefs and ethics, respect and community standing are equally if not more important. There is evidence that these ‘intangible’, ‘unquantifiable’, or ‘incommensurable’ values matter to a surprising cross-section of people, including those who live and work in the BC coastal and ocean environment.

This dissertation argues that scientists and others need to take spirituality seriously. This can be done *first*, by thinking of the wonder that fuels their fascination as a spiritual gift; *second* by recognizing that their dedication to understanding the world is a spiritual practice inspired by love for people, places, plants, animals and phenomena; and *third*, by inviting those knowledgeable in the religious and spiritual traditions along with artists to collaborate in ‘ecological’ and ‘social-ecological’ research. Love in this context means cherishing and protecting that about which we care. As radical as this may sound today, it is I suggest no more so than the first suggestion that social science had a role to play in fisheries management.

1.3 Research issue and question

The issue is that current regulatory frameworks were not designed for a coast and ocean as crowded and contentious as they now are. Attempts to expand the framework, such as marine ecosystem-based management and social-ecological systems, are underway but none of these move beyond measureable to non-measurable spiritual values (see Chapter 2). The research question, therefore is: *How do we include non-measurable spiritual values in marine ecosystem based management?*

1.4 Organization of the thesis

The first step is to consider the evolution of management systems into those that currently exist on the BC coast. The next is to consider the extent to which these systems include the spiritual and indeed if there is a public ‘demand’ for immeasurable values as well as those quantifiable in the metrics of science and economics. The final step is to test whether a cross-section of people who live and work in the BC coast and ocean see a need to incorporate immeasurable values of love and cherishing in the policy framework and practical implementation of marine ecosystem-based management.

Chapter 2 traces the decline in the value of BC fisheries from a primary source of wealth, culture and identity prior to European contact to a tiny fraction of current wealth as measured by gross domestic product (GDP). Major approaches to address undervaluing include total economic value, which identifies categories of value which humans attach to the world, and ecosystem services, which explores the way in which ecological structure and function underpin social, cultural, economic and spiritual existence. Total economic value is solidly rooted in the utilitarian paradigm, but hints of broader values are found in ‘incoherence’ in how values are

assigned to categories and in conflicting definitions of ‘intrinsic’ and ‘instrumental value’. Spiritual values are included in ecosystem services, but as an item on a list as opposed to a pervasive aspect of everyday reality.

Chapter three therefore explores how the entanglement of human and ecological elements is addressed in marine ecosystem-based management and leads into a discussion of social-ecological systems that examine interactions and interdependencies. Growing demand for a sea ethic prompts an examination of the evidence that non-tangible values matter as much to the general public as they do to Aboriginal people.

Chapter four presents the argument for incorporating spiritual values. The problem to be overcome is the treatment of science and religion as separate ‘realms’ or ‘magisteria’. Informing principles of an alternate vision include correspondences between faith as believing something into being and faith as essential to research. Spirituality understood as an ‘ethics of attention’ to species, the connections between them and the spaces between is argued to be as integral to science as it is to traditional societies. The desired outcome is the combination of ecological and spiritual literacy. The dominance of the language of scientific and economic measurement contributes to exclusion of the ‘language of religion’, i.e., of love in the sense of cherishing and protecting people, plants, animals lands and waters.

Chapter five discusses ways to elicit values which are deeply personal, or which respondents may be unwilling to articulate in contexts dominated by scientific and economic rhetoric. Some methods are applicable to particular places, i.e., given an appropriate interview or survey format, people will discuss personal, cultural and spiritual values. These methods are valuable in

determining what is in play in a particular place, but may be discounted or dismissed as inapplicable to the entire coast or irrelevant to the wider public. *Q methodology* allows participants from different backgrounds, affiliations and loyalties to review and rank a set of ‘statements’ drawn from all the discourses that can be identified. The technique allows for individual ranking and reflection, i.e., participants can reflect on the statements as they relate to them rather than having to take a position for or against any or all. The discourses applicable to the BC coast include the voice of science in the literature and practice of marine ecosystem-based valuation and management, ecosystem services and social-ecological systems. A second strand is the growing call from scientists, policy makers and conservationists for a sea or ocean ethic that represents a step between ‘hard’ science and spirituality. The discourse of spirituality includes the words of Aboriginal people, coastal communities and those who claim a spiritual connection with nature, but have no formal religious affiliation. Major world religions are more eloquent on planetary issues than on impoverishment of ecosystems and people in BC, so these ‘top down’ declarations have to be translated into local relevance.

Chapter Six describes a research study in which 61 participants (living and /or actively engaged in the coast and ocean) rank 21 statements in terms of their appropriateness for coast and ocean management. Analysis identifies four rather different perspectives on what should and should not be integral to coast and ocean management.

Chapter Seven concludes the dissertation with a discussion of the creation of a sea ethic, including a new definition of the sacred based on the ethic of “preserving and cherishing the sea”.

Chapter 2: Current economics-based methods of valuing marine ecosystems

“...traditional dwellers and those of more recent arrival love this place. But unfortunately, the things that make it so special are disappearing and we want to do something about that.” (Elliot Norse, cited in Gardner 2006).

2.1 The natural resource paradigm

Originally ‘resource’ meant to rise again as in the ‘resurgence’ of an underground river in limestone country or next year’s crop⁷, but its meaning has narrowed and hardened. Some of the original sense survives in the term ‘renewable resource’, but with less or no sense of a duty of reciprocity. The resource is thought of as renewing itself, but the resurgence of an underground stream or the return of a species in accordance with its lifecycle depends on multiple interactions including the behavior of those who use it. As currently used, the concept of natural resource creates a subject-object relationship, i.e., between a *person* and a *thing*. In the modern sense, a resource is something we use. The achievements of modern technology lend credibility to a mindset in which a universe of beings becomes an undifferentiated “standing reserve” (*Bestand*) of energy (Heidegger 1949) available for any use to which humans choose to put it⁸. In natural resource thinking, this translates into ‘stocks’ and ‘flows’. In the current usage, “resource” means raw material or potential energy. Jay (1992) comments, “We have resource planning, resource development and resource allocation. In our day “resource” denotes an energized plastic something we practice our clumsy cleverness on.” The only difference between non-renewable and renewable resources is that an ore body or oil deposit has a finite life. A fish stock, consisting in its simplest form of identical units, can generate a flow in perpetuity. This

⁷ The online etymology dictionary (n.d.) traces the roots of “resource” from the Latin *resurgere* (rise again) by way of the Old French *resourdre*, (to rally, raise again).

⁸ A concept reminiscent of McFague’s “hegemonic human being entitled to all he can afford McFague (2001:48).

breaks down when over-fishing results from commodification and the existence of other investment opportunities with a higher rate of monetary return (Clark 1973).

2.2 Global context

The first record of concern about the impact of fisheries dates to an 11th Century complaint recorded in the UK Rolls of Parliament by coastal fishers that the invention of the bottom trawl net was destroying baby fish and the ‘flowers of the sea’, and that the residue was used to feed pigs (Given-Wilson *et al.* 2005). This is prophetic considering what we now know about the impacts of bottom trawling on fish habitats on the continental shelf (Watling and Norse 1998) and the extremely long-lived deepwater corals and sponges on seamounts (Clark and Koslow 2007; Rogers *et al.* 2007; Norse *et al.* 2012). Fish have been ground up and fed to pigs and chickens at least since the 1950s. Farmed salmon (*Salmo salar* and *Onchorynchus* spp.) and crustaceans, notably Asian tiger prawns (*Penaeus* spp.), now account for almost 70% of total fishmeal consumption (Tacon and Metian 2008). We are emptying the ocean to feed farmed salmon, prawns, pigs, chickens and domestic pets.

Fish populations long thought to be “inexhaustible” (Huxley 1883)⁹ have been depleted and on occasion even rendered commercially extinct, Atlantic cod (*Gadus morhua*) being the textbook example (Ommer 2002; Walters and Martell 2004). The extent of depletion is best understood by comparing past with present abundance, e.g., in global research programs such as the Sea Around us Project (Pauly 2007) and the Census of Marine Life (Yarincik and O’Dor 2005), metadata assessments (Myers and Worm 2003) or regional studies (Pitcher *et al.* 2005;

⁹ Huxley’s view itself derives from the notion of the sea a limitless commons, not subject to ownership as was the land (Grotius 1633; Locke 1690; Macinko and Bromley 2003).

McClenachan *et al.* 2006; Saenz-Arroyo *et al.* 2006; Worm *et al.* 2006; Roberts 2007). As prime species become scarce, fishers target species further “down the foodweb” globally (Pauly *et al.* 1998) and in Canada and BC (Pauly *et al.* 2001). Overfishing has also led to extinctions, (Carlton *et al.* 1999; Musick *et al.* 2000; Punt 2000; Ommer 2002; Dulvy *et al.* 2003; Sadovy and Cheung 2003; Hutchings and Reynolds 2004).

In a 1968 speech in Port Hardy, a copper mining, logging and fishing town at the north end of Vancouver Island, Canada’s Minister of Fisheries Jack Davis compared the fishery to a mine, where the best ore is taken first and so on until the mine is exhausted. According to the North Island Gazette:

“Mr. Davis then turned to the sea and explained that life there is built on the same type of pyramid, at the top is the whale and below it such species as the salmon and the tuna. As the base broadens out it contains fish successively smaller but in greater number until, at the bottom, is the limitless mass of plankton which supports the whole pyramid.”

The whale, the Minister said, has been virtually wiped out and the tuna and the salmon will be the next to go as man [sic] works his way down the pyramid to the plankton (cited in Meggs 1991). The mining metaphor recurs in Norse *et al.* (2012). We are now in the late stages of this experiment. Pacific salmon, vital to the culture and existence of many Aboriginal people have decreased from supporting major commercial fisheries to multiple listings as threatened or endangered (Limburg *et al.* 2011). The UN predicts that by 2042, *all* fisheries will shift into the “fully exploited/depleted/recovering” category (Limburg *et al.* 2011). The large predatory or ‘table fish’, which are the first target of commercial fisheries, have been reduced to less than 10% of their former abundance (Myers and Worm 2003), while a heavily-subsidized global fleet retains the two and a half times the capacity necessary for catching the rest (Sumaila *et al.* 2012).

Consequently, while a few commercial fisheries are deemed ‘sustainable’ (Hilborn 2007), many more, particularly in the developing world, are not.

Predictions that fisheries as we know them will be over in 50 years must be taken seriously, if this is not to be the “last century of wild seafood” (Worm *et al.* 2006). Intensive fishing pressure is known to reduce fish size (Law 2000; Conover 2007), but other, more insidious forces are at work. Ocean acidification from increased CO₂ absorption makes it harder for all marine organisms from bacteria to tuna to breathe (Cheung *et al.* 2009). This too leads to a reduction in fish size that could reduce global catch by a further 20% (Cheung *et al.* 2010). Nonetheless, fish still provide 1.5 billion people with 20% of their animal protein and 3.0 billion with 15% (FAO 2010). There is no evidence that aquaculture can fill this gap¹⁰, but the belief that it can persists among decision-makers, letting governments turn away from protecting the fish and seafood that have shaped and sustained human society from its African origins. Our distant ancestors consumed fish and shellfish between 2.5 and 1.7 million years ago (Erlandson 2001; Broadhurst *et al.* 2007), and it has been argued that this early seafood diet may have enabled a quantum jump in human brain size (Eaton and Eaton Iii 2000), setting *homo sapiens* on the road to what we currently understand as humanity in all its eco-cultural-spiritual diversity. Any further loss will have serious repercussions for humanity.

Threats to ecosystem integrity are increasing. Warning signals include the replacement of finfish by jellyfish (Boero *et al.* 2008; Acuña *et al.* 2011; Brotz *et al.* 2012), trophic cascades caused by removal of large sharks (Myers *et al.* 2007) and by cod and other bottom fish (Frank *et al.* 2005),

¹⁰ Indeed certain forms of aquaculture, notable salmon and prawn ‘farming’ represent a net loss of protein and compromise marine foodwebs by removing vast tonnages of ‘forage’ fish (Naylor *et al.* 2000; Pauly *et al.* 2005).

the combination of invasive species and climate change (Carlton 2000) and the impact of toxic algal blooms on fish (Burkholder *et al.* 1992) and humans (Morris 1999). Climate change is certain to profoundly change the distribution of marine species, possibly with negative impacts on food security (Cheung *et al.* 2010). Significant marine impacts on human consumptive use of fish coming from other sectors of the economy include growing ‘dead zones’ in the ocean (Pew Oceans Commission 2003:62; Diaz and Rosenberg 2008) and the threat posed by ocean acidification to tropical coral reefs (Hoegh-Guldberg *et al.* 2007), deepwater coral and sponge reefs (Roberts *et al.* 2006; Rogers *et al.* 2007) and creatures that depend on calcium for all or part of their life history—almost all animal life in the sea (Orr *et al.* 2005; Kleypas *et al.* 2006; Stokstad 2008; Barange and Perry 2009). Attempts to bring this home to BC decision-makers include analysis by marine scientists and others in a 2011 piece in the Georgia Strait (Wood 2011) and a significant report by conservation organizations (Okey *et al.* 2012), but necessary public awareness that ocean fisheries are under severe threat has been slow in coming.

2.3 Fishing in BC: the golden rules of the Pacific Northwest

2.3.1 Golden Rule #1: Love your neighbour as yourself

The Pacific Northwest coast has had three periods of ‘transformation’, which we may characterize as having been guided by different ‘Golden Rules’. In the first, a close relationship is manifested in Aboriginal themes of transformation between humans, environment and other species as spiritual beings (Jones and Williams-Davidson 2000; Trosper 2003), respect for the personhood of non-human lifeforms (Moss 2011) and in sentient landscapes (Povinelli 1995; Basso 1996; Cruikshank 2005; Rose 2007; Ehrlich 2010) and the flow of knowledge between human and non-human entities in the concept of eco-social-spiritual community.

In this vision, Pacific Northwest land and seascapes are inhabited by powerful spiritual beings (Jones and Williams-Davidson 2000; Lutz 2007; Brown and Brown 2009). Encounters with these beings can lead to alliances and intermarriage, conferring names and crests (Beynon 1915) and rights to territory (Marsden 2002). Salmon and other species are also spiritual beings, which enter into covenantal relationships where they will be generous with their gifts, but swift to punish greed, waste or disrespect (Jones and Williams-Davidson 2000; Trosper 2003). Appropriate expressions of respect and thanks accompanied all uses of the natural world (Boas 1921; HETF 1992), while the principle of frugality ensured against over-exploitation¹¹ (Brown and Brown 2009:31, 45). Salmon are also a major contributor to food and social security, wealth and status (Trosper 2003; Haggan *et al.* 2006; Trosper 2009).

This reciprocal relationship corresponds to the first Golden Rule: “Love your neighbour as yourself” common to all major religions (Beverluis 2000; Swidler 2006), often with the direction that neighbour is to extend beyond family and friends to encompass even enemies and particularly the poor. The first articulation of the Golden Rule is attributed to Confucius (551-479 BCE) (Wattles 1996:15), but its universality suggests that the Golden Rule is rooted in the web of relationships that characterizes egalitarian non-industrial societies, e.g., The *Lakota* affirmation, “we are all related” (Cajete 2000), the Great Thanksgiving of the *Haudenosaunee* people (HETF 1992), the Nuuchah-nulth principle of unity (Atleo 2004; Lucas 2008) and a sense of ‘right relationships’ which underlay English “bread riots” (Thompson 1991).

¹¹ The need for the earth and for all life to rest and recuperate is also present in world religious traditions (Dunham and Coward 2000; Limburg *et al.* 2011).

Major differences between pre- and post European contact societies reside in the locus, use and flow of wealth and the options available. Traditional coastal societies were organized along the lines of house territories (Marsden and Galois 1995; Sterritt *et al.* 1998; McMillan 1999). While leadership was hereditary, any leader who failed to maintain or increase and distribute wealth could be replaced. Herein lies a critical distinction between tribal and western feudal and subsequent concepts of ownership (Trosper 2009).

Extended kinship and intermarriage contributed to food and territorial security (Trosper 2003; Lucas 2004; Trosper 2009). This system of distribution is characteristic of many tribal societies (Ommer and Turner 2004). Tsimshian Nation elder Violet Skog (cited in Menzies and Butler 2007) says, “People were *syt güülm goot* [of one heart]. They helped each other, they shared everything.” Menzies and Butler describe this ethic as a “community-wide system of distribution [that] ensured both household survival and nutritional balance and also encouraged the sustainable harvest of resources. The geographical scope of the Gitxaala territories, and the varying abundances and different species within those territories, were maximized through this ethic of *syt güülm goot*.” The Sekani people of northern BC think of sharing food as water finding its own level (Lanoue 2007).

2.3.2 Golden Rule #2: The one with the gold makes the rules

The near annihilation of Pacific Northwest Aboriginal peoples by old world diseases (Boyd 1999) and European settlement ushered in a ‘biotic-commodification’ period based on high rates of exploitation of seals, sea otters, whales, fish and forests. The commercial fishery transformed salmon and other species from spiritual beings to commodities. Wealth flowed off tribal lands into a global economy. Golden rule #2: “The one with the gold makes the rules” drove the

politics that alienated Aboriginal people from the wealth of their lands and waters. By 1992, Aboriginal people had been reduced to a 5% share of the salmon fishery (Pearse and Larkin 1992). Loss of management control to settler government and inability to distribute wealth were profoundly destructive of traditional management and government systems (Harris 2001). Aboriginal people have been marginalized in most fisheries by limited entry licensing schemes and being bought out by corporations in hard times (Scow 1987; Gislason *et al.* 1996). They are effectively excluded from quota fisheries by high prices (Haggan and Neis 2007).

2.3.3 Golden Rule #3: The gold goes where the gold grows

The growth of other economic sectors presented investment options that did not exist prior to European contact. Clark (1973) describes the economics of overexploitation and extinction that drive industrial fishing, "...the principal shortcoming of the existing theories is their disregard of the time variable, both biologically and economically... ..It denies the fundamental principles of economics itself to overlook the latter effect, and that is just what the rule of maximizing rent does." (Clark 1973). Clark's theorem states that extinction is possible whenever people are only prepared to wait half as long for their money as it takes the whales or fish to grow. Almost 20 years later, Gordon Munro (1992) remarked with asperity that although Clark's work was widely cited: "The static economic model of the fishery appeared to go on seemingly unscathed." 34 years later Grafton *et al.* (2007) claimed that Clark's theorem was of only academic interest, and that property rights would protect even slow-growing species from extinction. In response, Clark and colleagues (2010) modelled the growth rate of over 1,000 species. They concluded that private ownership might be justified for just one extremely rapidly growing species, but would be "supreme folly" for slow-growing fish such as orange roughy (*Hoplostethus atlanticus*) and sablefish (*Anopoploma fimbria*).

Aesthetic or moral questions aside, the decision to exterminate a species is an irreversible decision that can only be justified in economic terms if we are certain that present conditions will persist into the distant future. (Clark 1990:41).

Clark's theorem is a modification of the "golden rule equation" which tells an investor when it's time to liquidate one asset and diversify into others (Munro 1992; Clark *et al.* 2010). Clark's equation also describes a relationship, but one that consumes all others—what Gudeman (2008) describes as converting multiple relationships into one 'ratio', i.e., market price. It erodes the broad subsistence base of "incommensurable" units of goods and labour that confers resilience and is largely the province of women, whose control and thrift protect against thin and hungry times. Freedom to trade leads often to specialization, which can result in loss of self-sufficiency and freedom to refuse to trade (Daly and Cobb 1994:159; Brunk 2004; Hawken 2007).

The modified golden rule can be restated as: "The gold goes where the gold grows". Maintaining fish populations into the far future makes sense for indigenous people who depend on fish for their "cultural and physical survival" (Canada 1990) and for maritime communities whose identity was shaped by fishing and whose people would have liked to see their children have the same opportunity (Gislason *et al.* 1996; Newell and Ommer 1999). Small-scale fisheries, moreover, use less fuel; generate more employment and more protein (Pauly and Maclean 2003, Figure 25). Reconstruction of past catches has shown that many small-scale fisheries are underreported, and that contributions to GDP¹² may be underestimated by a factor of 3 to 7 (Zeller *et al.* 2006; 2007), indicating that the estimates of Pauly and McLean (2003) are low. With less or no fish protein, people turn to other sources, putting additional pressure on terrestrial animals or "bushmeat" (Robinson and Bennett 2000; Brashares *et al.* 2004). Most fish

¹² GDP is a measure of the value that an industry or activity adds to the economy and is calculated by subtracting the material and service cost of production from total sales (BC 2007).

caught in West African and other foreign waters are processed in Europe to comply with restrictive EU health and safety regulations that protect almost 40,000 jobs for EU fishers and processors with a severe loss of economic revenue to West Africa. Guinea-Bissau received only 7.5% of the landed value of catch (Kaczynski and Fluharty 2002), which does not take into account the impact of the loss of a way of life caused by the destruction of eco-social-spiritual relationships.

Local extinctions of fish populations may well be economically rational for marine corporate or “footloose” capital (Ommer 2000). These “roving bandits” (Berkes *et al.* 2006) are able to deplete fish populations before regulations can be in place, indeed sometimes before local people are even aware of their presence. Small-scale fishers who participated in the film *Weather the Storm* were stunned that one vessel could take the entire season’s mackerel (*Scomber scombrus*) quota in one day (Menzies 2008). Almost 40% of fish and seafood is traded annually, making it one of the most traded commodities in the world (FAO 2008). Most of the movement of fish and seafood is from developing to developed nations (ICTSD 2006), and it is traded by large international companies. Not all depletion is caused by such corporate fleets, but one consequence of the depletion of fish populations by large vessels (Kaczynski and Fluharty 2002; Alder and Sumaila 2004) is the resultant poverty that drives indigenous, artisanal and subsistence fishers to overexploit populations that they had used sustainably over long periods of time.

Fisheries that are operated on a purely economic basis, i.e., taken out of the web of eco-social-spiritual relationships, become subject to three drivers of depletion. Pitcher (2001) identified ecological, economic, and cognitive ratchets, i.e., processes that move easily in one direction, but are hard to reverse. These ratchets are subtly interrelated. On the ecological side, as large fish

are depleted, fishers buy bigger, more powerful vessels, fishing gear, and high-tech electronics, paid for in part by taxpayers in the form of fisheries subsidies (Sumaila *et al.* 2007). Licensing costs escalate as fish become scarcer and regimes more complex (Haggan and Baird 2007). Brown (2005:88) contrasts the \$500 his father paid in 1950 for a boat that allowed him to fish the entire BC coast for *all species* with the \$100,000 value of a 2004 license to fish *one area* of the coast for *one species* of fish—sockeye salmon. The capital tied up in Pacific vessels, licenses, and quota is around US\$2 billion (Nelson 2004). The third, cognitive ratchet, operates because fishers and scientists alike tend to see what was there at the start of their careers as what there ‘ought to be’. The perception of productive potential thus ratchets down with succeeding generations (Pauly 1995). ‘Hindcasting’ projects that reconstruct abundance prior to modern industrial fishing (e.g., Jackson *et al.* 2001; Yarincik and O’Dor 2005; Pauly 2007; Pitcher and Ainsworth 2008) can help set restoration targets that relate to past abundance rather than present scarcity, but these projects do not recreate the values that contributed to long periods of sustainability in the distant past.

2.4 Decline in value of fisheries

The decline in fisheries abundance that followed the onset of modern industrial fishing, (Roberts 2007; Grescoe 2008; Mitchell 2009), has been accompanied by a decline in the value of fisheries relative to other marine and terrestrial resource sectors. This is due in part to a decline in catch caused by overfishing, in part to the growth of other economic sectors, and in part to a narrow view of fisheries and their value (Auster *et al.* 2009).

The low contribution of fisheries to BC GDP is part of a global pattern. Table 2.1, expanded from Haggan (2011), shows fisheries as percentage of GDP for several countries, varying from a

high of 12% for Iceland in 2002, to 0.21% for the UK in 2006, or approximately the same value as the mushroom industry¹³. Japan, accounted for 15% of world fish catch and 30% of imports in the late 1990s (Anon), but the contribution of fisheries to Japan's GDP is comparable to Canada and the US.

Table 2.1 Some examples of fisheries contribution to national GDP.

Country / Region	Year	% of GDP	Source (and remarks)
Iceland	2002	12.00	(FAO n.d.a)
Indonesia	2004	2.40	(FAO n.d.a)
Norway	2002	0.70	(FAO n.d.a)
USA	2005	0.30	(Fishing, sealing, whaling and aquaculture)
Canada	2006	0.26	(FAO n.d.a) (Incl. forestry and hunting)
Japan	2006	0.29	(Gardner Pinfold 2009 Table 5.3) (Excluding recreational fisheries)
UK	2006	0.21	(FAO n.d.a; Japan n.d.)
			(FAO n.d.a)

2.5 The value of salmon to BC

The traditional eco-social-spiritual world of the Pacific Northwest was extremely rich at the time of European contact. Fisheries drove the coastwide expansion of European settlers and the early BC economy. Present-day public perception that fisheries matter to BC has been heightened by media coverage of salmon wars with the US, the wild and farmed salmon wars and general rejoicing in 2010 at the return of 34 million sockeye salmon to the Fraser river—by far the largest run in 30 years. Salmon are still an iconic species that in many ways represent the ‘spirit’ of BC, but how important are these “generous fish” and other species to the overall BC economy? Figure 2.1 indicates that BC's “Fisheries and Aquaculture sector”, i.e., commercial and recreational fisheries, aquaculture and processing, is showing a good recovery from a sharp decline in the 1990s (BC 2007).

¹³ Dr John Reynolds, Adapting To Climate Change in the Coastal Pacific Northwest, Victoria, BC 2003.

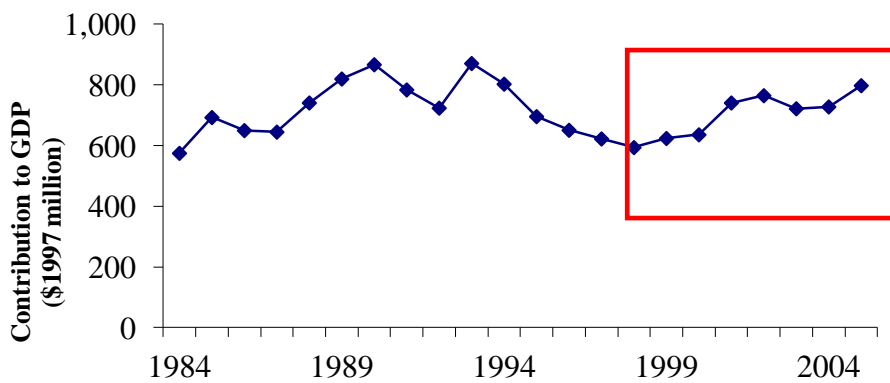


Figure 2.1 Contribution of the BC "Fisheries and Aquaculture Sector" (commercial and recreational fisheries, aquaculture and processing) to GDP (\$1997 million), 1984-2005. Frame shows "recovery" from 1990s slump. Source data: BC (2007, Appendix 1).

The red box exemplifies the framing problem, where a short-term trend is taken out as a permanent upturn, as happened with the remnant North Sea cod population, when a recent minor upturn was used as an argument to keep fisheries open. This is in spite of the fact that UK trawl fishers have to fish 17 times harder than their Victorian counterparts for the same catch (Thurstan *et al.* 2010), and are now forced to discard almost 50% of their catch (Fearnley-Whittingstall 2010). Rebuilding, not "sustaining the present misery" (Pitcher and Pauly 1998) is the proper goal for depleted systems. Figure 2.2 shows BC's fisheries and aquaculture sector as a percentage of gross domestic product (GDP), a measure of total economic activity in the province. Despite the perception of fisheries as important to the BC economy, current contribution is substantially less than 1% of GDP.

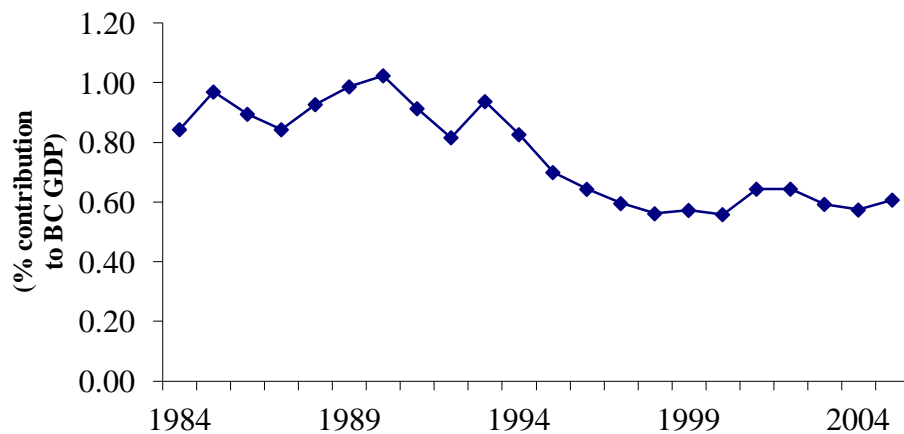


Figure 2.2 BC's "Fisheries and Aquaculture Sector" as percentage of GDP, 1984-2005.
Source data: BC (2007, Appendix 1).

Figures 2.1 and 2.2 are examples of the type of aggregated data used by politicians when they weigh the economic return from one economic sector against another. Figure 2.3 disaggregates the commercial fisheries and salmon farming components of the “Fisheries and aquaculture sector”. By 2001, farmed salmon had overtaken commercial fisheries for *all* species of salmon, other finfish, shellfish, invertebrates and marine plants in BC. By 2007, farmed salmon contributed almost twice as much to GDP. Commercial fisheries for all species now constitute ~0.1% of GDP.

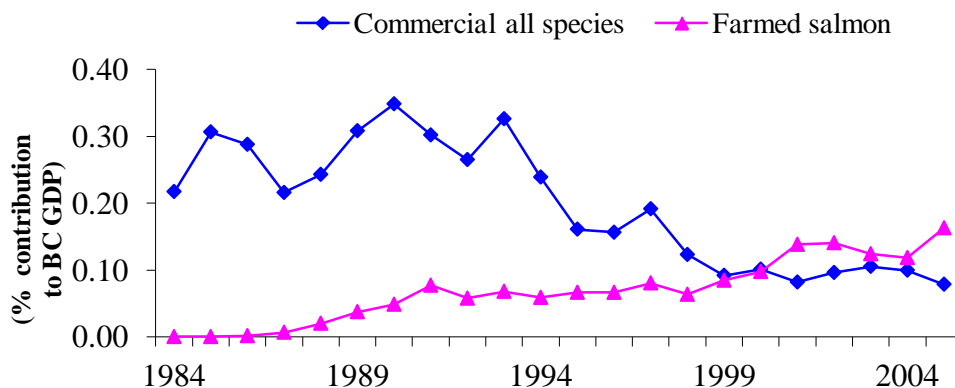


Figure 2.3 Commercial fisheries contribution to British Columbia's GDP compared with farmed salmon, 1985-2005. Source data: BC (2007, Appendix 1). Reproduced from Haggan (2011).

Figure 2.4 presents farmed salmon vs commercial fisheries for all species of wild Pacific salmon.

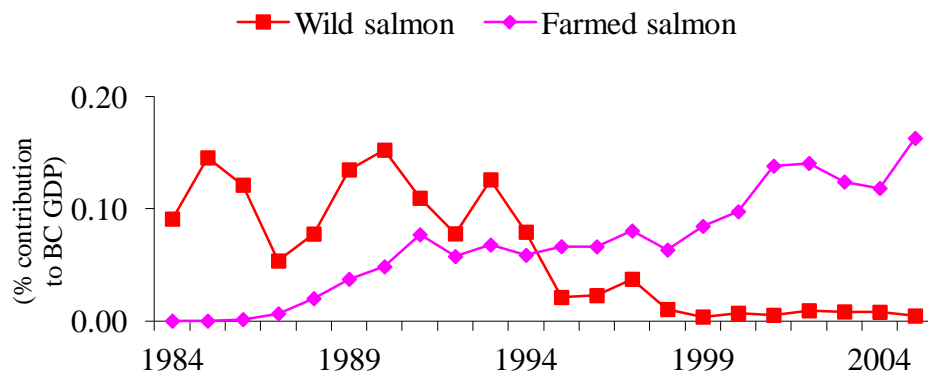


Figure 2.4 Farmed salmon vs commercial salmon fisheries (all species) as percentage of BC GDP. Source data: BC (2007 Appendix Table 1).

The commodity value of wild salmon as shown in Figure 2.4 does not represent what salmon mean to Aboriginal people and other British Columbians. It does, however, go a long way to explain the difficulty of communication between people for whom salmon is vital to culture and identity and politicians preoccupied with overall economic performance. Those close to wild salmon can't understand why their concerns aren't heard, while politicians don't understand what all the fuss is about.

2.6 Whole ecosystem valuation

What the above discussion makes clear is that we have been failing to evaluate and manage our marine ecosystems successfully. The development of ecosystem evaluation is rooted in the 1950s debate about how best to use and protect the natural environment. By the 1960s and early 1970s, attention focussed on the impact of population growth on the coastal zone as being the main problem (Spinner 1969; Sweet 1971; Gosselink *et al.* 1974). This was driven by the general unawareness of politicians and developers of environmental impacts and the need to identify

sensitive habitat as part of an integral planning process (Spinner 1969). Debate focused on the wisdom or desirability of converting ‘unproductive’ lands to agricultural, urban or industrial use. A 1960s committee charged with developing “A Plan for the Marine Resources of the Atlantic Coastal Zone” saw a need for:

“...a method that accounts for all habitats and all uses, present and proposed and which evaluates a proposal for change by its effect on the entire [US Atlantic] coastal system as well as on the state or local situation ...” (Spinner 1969).

The spatial, temporal and human scope is significant. It recognizes that ecosystem effects transcend the immediate interest of coastal state governments and particular development projects. The Committee’s work extended beyond the general prescriptions so easy for a government panel to make and so hard to implement. Collecting “...*biological and sociological information as well as economic data...*” is a huge task, but a good start can be made using existing “*studies on the salt marshes, estuarine zones and shoal waters*” (Spinner 1969). Salt marshes, generally regarded as unproductive habitats suitable to conversion to harbours or farmland, figure largely in early calculations of total economic value. Gosselink *et al.* (1974) calculate net present salt marsh values ranging from \$US 550-880,000 / hectare in 2008 dollars for contributions to commercial and recreational fisheries and tertiary waste treatment. The concept of ecosystem services is anticipated in the term “free work of nature that is grossly undervalued. Simply because it has always been taken for granted, or assumed to be unlimited in capacity.” (Gosselink *et al.* 1974).

There are two major approaches to extend ecosystem valuation. ‘Total economic value’ identifies broad categories of ‘use’ and ‘non use’ (market and non-market) value. ‘Ecosystem services’ identifies a growing number of ways whereby the human economy is a “wholly owned subsidiary of the environment” (Nelson *et al.* 2002).

2.7 Total economic value

Total economic value breaks ecosystem value into major categories and subcategories of “use” and “non use” values (MEA 2003; NRC 2005). ‘*Consumptive*’ and ‘*non-consumptive*’ use refers to extractive and non-extractive uses such as recreational industries and activities. *Indirect use* refers to the ecosystem structure and functions that contribute to direct and indirect use, but are not part of standard cost benefit analysis or may rely on linkages and / or organisms that are unknown to science. *Option value* is defined as maintaining the opportunity to use something in the future that we don’t use now, or of which we may not be aware. *Quasi-option value* is the value of information gained by deferring developments that risk irreversible harm. *Bequest value* is the amount we would like future generations to be able to enjoy. Definitions of *existence value* have varied considerably between the 1960s and the present, but the current total economic value notion of existence value is based on the amount people are willing to pay to preserve species or landscapes from extinction or degradation (NRC 2005:33).

Figure 2.5 overlays total economic value categories as described by the Millennium Ecosystem Assessment (2003) on a Pacific Northwest seascape. The area is contested in several ways. It is the subject of protracted treaty negotiations between Aboriginal people and the governments of Canada and BC (BC Claims Task Force 1991). It is a site of ongoing tension between the exercise of Aboriginal fishing rights, allocation of commercial fishing licenses and quota, the sport fishing industry, conservation organizations and numerous academic research projects. It is a prime location for both industrial sport fishing and industrial salmon feedlots. It lies within the Pacific North Coast Integrated Management Area designated as a pilot ecosystem-based management project. It is one of the areas that would be directly impacted by an oil spill if the proposed Enbridge pipeline and tanker route go ahead.

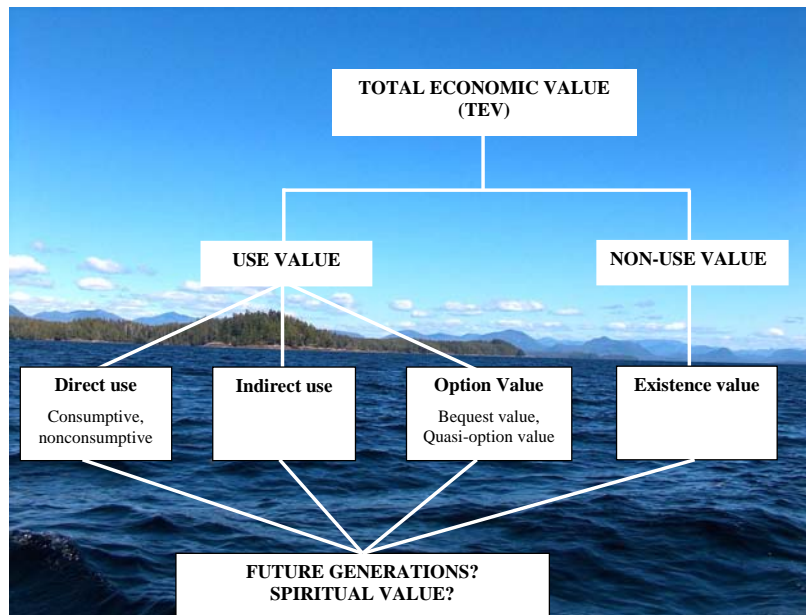


Figure 2.5 Categories of total economic value with backdrop of BC central coast. Reproduced from Haggan (2100), courtesy of Wiley-Blackwell.

Key questions are whether these categories represent the spiritual value of individual species and the whole system and whether bequest value protects the interest of future generations. The complex relationship between the categories has led to a great deal of work on how to compute total value (e.g.,

Smith 1987; Randall 1991) and a great deal of controversy as indicated by the special edition of *Ecological Economics* (Vol 25:1) in response to Costanza and colleagues (1997) estimate that the earth's "ecosystem services and natural capital", were worth more than twice the then world GNP of \$US 18 trillion (Costanza *et al.* 1997).

It is important to distinguish the interest of future generations from bequest value. The "bequest motive" (Krutilla 1967) assumes that most people would like future generations to enjoy at least the same level of material and environmental goods as ourselves. Sumaila *et al.* (2008) describe bequest value as a very special category comprising the flow of all benefits to future generations, as distinct to those to the current". Despite this good intent, fish populations continue to decline (Pitcher *et al.* 2005; McClenachan *et al.* 2006; Saenz-Arroyo *et al.* 2006; Worm *et al.* 2006). Figure 2.6 shows the depletion of two prime species of table fish, the lingcod *Ophiodon elongates* in BC and cod *Gadus morhua* in Atlantic coastal waters. It would be desirable to have

more of these fish, but the population levels that past generations of fishers were willing or able to bequeath to us preclude that option.

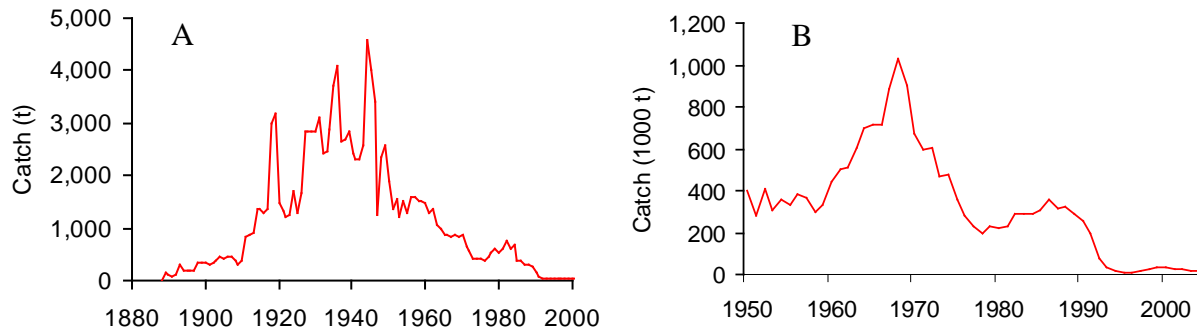


Figure 2.6 A: Total sport and commercial catch of lingcod, *Ophiodon elongates*, from the Strait of Georgia, British Columbia, 1880-2000. Source, Department of Fisheries and Oceans, Canada. Reproduced from Haggan (2011) courtesy of Wiley-Blackwell. **B:** Total Canadian catch of Atlantic cod, *Gadus morhua*, 1950-2004. Data source: Sea Around Us Project, www.seaaroundus.org.

The major contribution of total economic value is that it identifies particular ways in which people care about the environment, not to foreclose options for themselves or others; that where there is possibility of severe or irreversible impact, there is merit in postponing until more is known; that people want to leave both ecological and environmental wealth to future generations, and that many people recognize a value if not a right in the continued existence of biota and landscape apart from any present or future human use.

Total economic value framework diagrams such as Figure 2.5, give the impression that the ‘boxes’ of value are separate. In fact, they become increasingly fuzzy or porous, they bleed into each other and become harder to define and quantify from left to right (Laplante 2005; Turpie *et al.* 2010:36, Table 6.1). Conflicting and overlapping definitions of ‘intrinsic’ and ‘existence’ value during framework development indicate the complexity of the borderland between use values and the spiritual and cultural values that give life meaning. Levels of consumptive use

which lead to extinction and compromising of ecosystem structure bear on the option of future use, the bequest value or ability of future generations to enjoy what we had, threaten the very existence of species and may compromise the flourishing of the entire system.

2.7.1 Ecosystem services

Ecosystem services can be broadly defined as the nested local, regional and global planetary ecosystem structure and function that make human life and economy possible (e.g., Costanza *et al.* 1997; Daily 1997; Heal 2000a). The ecosystem services approach has grown from the indirect use component of total economic value to a framework that now includes all categories of use and non-use value. This is likely due to a combination of factors, starting from Costanza and colleagues' (1997) \$US 33 trillion estimate for global ecosystem services and natural capital, increasing engagement of ecologists in identification of service categories, growing business community interest in the contribution of nature to the economy (Heal 2000a; Daily and Ellison 2002; MEA 2005) and a sharp rise in awareness of the impact of climate change on ecosystem services. The popularity and attention is attested by the TV series *Nature Inc.* (BBC World Service 2008). De Groot *et al.* (2002) divide ecosystem services into four major categories or functions:

1. *Regulation Functions*: Maintenance of essential ecological processes and life support systems;
2. *Habitat Functions*: Providing habitat (suitable living space) for wild plant and animal species;
3. *Production Functions*: Provision of natural resources;
4. *Information Functions*: Providing opportunities for cognitive development.

Typologies of ecosystem services include spiritual values, but only under category 4 above. Costanza *et al.* (2010) identify 'Cultural' services including "Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems" as the last of 17 categories. Farber *et al.* (2006)

identify “Spiritual and historic” as the last of 23 services, while de Groot *et al.* (2006) identify “Spiritual and historic information” as the 22nd of 30¹⁴. Ecosystem services includes spiritual value while total economic value does not, but the lumping of spiritual values with, for example, “Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems”, is qualitatively different from the sacred as “an integrative dimension of experience” (Bateson and Bateson 1987) and a long way from consideration of the sacred or spiritual as a major source of ecosystem value, or a critical way to think of “our planetary home” (Sagan 1990).

The approaches are complementary in that ecosystem services flesh out the categories of total economic value, while total economic value adds. Both approaches represent a significant step to recognizing the interdependence of ecology and society. Both approaches assume a human centrality and rely extensively on monetary equivalents to represent value. They are therefore ‘necessary, but not sufficient’ to represent complex relationships of love, compassion, loyalty, gratitude, complicity and atonement with the other people, animals, plants, lands, waters and weather that co-construct our world.

2.7.2 Ecosystem services and GDP

Ecosystem services estimates are often expressed in terms of monetary contributions to GDP. For example, forests contribute only 7.1% to India’s GDP, but are 57% of the livelihood of the rural poor (Warren 1996; Sukhdev 2009). Addition of forest ecosystem services raised Brazil’s GDP from 6% to 17% (Torras 2000), while Turner *et al.* (2012) estimate that payments for biodiversity conservation could contribute \$500 billion to the alleviation of poverty. Terrestrial

¹⁴ The additional seven categories belong to a fifth category of “Carrier functions”...“Providing a suitable substrate or medium for human activities and infrastructure...”

ecosystems in the BC Lower Mainland are estimated to provide \$Canadian 5.4 billion per annum, an amount which is deemed to be conservative due to incomplete understanding of all the benefits and “the intrinsic value of nature itself” (Wilson 2010). No estimate is provided for aquatic ecosystem services from the Fraser River, its estuary and the Strait of Georgia, although this work is in hand (Wilson 2010). Costanza *et al.* (2010) estimated that the Gulf of Mexico oilspill would result in a 10-50% loss of ecosystem services from the Mississippi Delta or “\$34 – \$670 billion in present value (at a 3.5 percent discount rate)”¹⁵. Given the risk and range, a court might set a performance bond at \$US50 billion, which would “mightily encourage investment in environmental and human safety measures” (Costanza *et al.* 2010).

These, and figures such as spending \$14 billion to restore Louisiana wetlands set against potential \$100 billion “cost of doing nothing” in damage from a repeat of Hurricane Katrina (Pew Oceans Commission 2003:54) don’t seem to have much traction. This may be because the cost of doing nothing is spread over multiple levels and departments of government and the general public, while the cost of doing something, whether flood protection in New Orleans or marine ecosystem-based management in BC falls on one or possibly two government departments. The relevant minister(s) have then to balance the cost of a long-term investment in environmental protection against the immediate demand of voters for jobs and national revenue priorities. Failure to take very large figures seriously may also be because those who deal in ‘real’ markets find such calculations meaningless or mystical.

¹⁵ Compare the 7-10% discount rates for business and the 1% recommended by Stern (2007) and the 2.5% derived by Weitzman for (2001) “deep future” projects.

There is also a risk that ascribing high dollar values to ecosystem services will provoke efforts to bring even more elements of the informal economy into the market, further eroding the subsistence base (Gudeman 2008). Colonial powers and their latter-day equivalents the transnational corporations have proved mercilessly efficient in wringing the absolute maximum out of indigenous and local people (Scott 1976). The Supreme Court of Canada noted in a landmark case on Aboriginal fishing rights that Aboriginal people did well to beware of initiatives put forward with the apparent best of intentions (Canada 1990).

The convenience of GDP in enabling rapid comparisons at international, national, regional and provincial levels does not make up for some fundamental defects. GDP does not include the unpaid work of women and volunteers (e.g., Waring 1988; Daly and Cobb 1994; Waring 2003). GDP fails to include most of the contributions of nature, in fact, the US government cost of the 2010 Gulf of Mexico oil spill cleanup *contributed to* GDP¹⁶. It is therefore a poor measure of place-based wealth (Waring 1988; Daly and Cobb 1994) represented in the complex web of eco-social-spiritual relationships in fishing communities (e.g., Gunn 1941; Anderson 1994; Newell and Ommer 1999; Coward *et al.* 2000; Ommer and Team 2007). GDP can equally well be seen as reflecting the amount of natural capital diverted to the human economy and that economic welfare, and ecological and economic sustainability have declined as GDP has continued to grow over the past few decades (Limburg *et al.* 2011 and references therein). Stiglitz *et al.* (2010, xvii) conclude that, “In the quest to increase GDP, we may end up with a society where the citizens are worse off.”

¹⁶ As do such “goods” as nuclear weapons, landmines and farmed salmon and “services” such as the armed forces and prisons.

2.8 Extended valuation of marine ecosystems

Extended valuation in the marine sector relies heavily on ascribing monetary value to non-market values, an exercise that seems a marked departure from the economic article of faith in markets to set a price. That said, it is not totally irrational to infer that the cost of a journey to a place one loves is some kind of proxy for the extent one cares about it. On the other hand, those who can't afford the journey, or don't have cars may care as much about their backyards, a degraded urban creek or the fight to create 'guerilla gardens' in vacant lots or fight to protect a tiny park in the Port of Vancouver from industrial development. Ascription of value through 'willingness to pay' or 'willingness to accept' surveys provide similar indications and, of course, irrational anomalies where respondents ascribe infinite value, or the same value to saving one lake as to saving six. Willingness to sacrifice material goods for what is perceived as a greater good demonstrates care—indeed love.

Monbiot (2011) states forcefully, "The well-intentioned dolts putting a price on nature are delivering it into the hands of business." McCauley (2006) and Anderson (1996) concur. The ecosystem services literature contains cautionary tales as well as striking examples where valuing nature has contributed to conservation. Protecting habitat for natural pollinators saved coffee growers significant costs in renting domestic bees, but when production shifted to pineapples, the pollinators were no longer required (Chan *et al.* 2007). The much-cited example of New York saving billions in water treatment cost by protecting the natural filtering services of farm and wetland is not supported by evidence (Sagoff 2002). Markets are notoriously fickle; today's valuable ecosystem services may be worthless tomorrow. The economic dogma of substitutability makes it unwise to rely on the ephemera of prices to protect something we need

in perpetuity, i.e., that any estimate of ecosystem services is “a serious underestimate of infinity” (Toman 1998).

2.9 Signs of values outside utilitarian frameworks

Other measures have been developed. Bhutan, number 132 of 177 countries in the UN Human Development Report (UNDP n.d.), is very well off by their own “Gross National Happiness” index (Priesner 1999). Aboriginal people in the Pacific Northwest often describe themselves as rich in food (e.g., Helen Clifton, an Elder of the Gitga'at Nation in BC, cited in Tirone *et al.* 2007), but while some communities still have access to traditional foods, others do not. Canada ranks in the top five of the UN index, Canada’s Aboriginal people “fell into the midrange with countries such as Albania, Cuba, Paraguay and Iraq” (Barsh 1994). Some progress has been made on indices (Waring 2003), but GDP weighs heavily with senior political decision-makers preoccupied with considerations of health (50% of BC government expenditures), security, the economy, crime, climate change and other domestic and geopolitical considerations.

Signs of non-utilitarian values within the utilitarian paradigm appear in what is said, what is not said and what is acknowledged, but deemed to belong to a different realm (Einstein 1954:42; Gould 1997) or relegated to the “Parliament or legislature” (MEA 2003:143). The problem is that when these values are spiritual or religious in nature, they may be deemed inappropriate in a pluralistic society (Brunk 2004), i.e., be inadmissible in the political process.

The focus on ecosystem valuation and the proliferation of categories from total economic value to ecosystem services indicates that the future of the environment and of species matters — if only in terms of options for ourselves and other human beings, present and future. This is

evident in pervasive concerns about ‘irreversibility’ (e.g., Weisbrod 1964; Krutilla 1967; Arrow and Fisher 1974) and passionate debates about the appropriate discount rates for ‘deep future’ projects (Portney and Weyant 1999). Low future discounting rates in the Stern Review on climate change (Stern 2007) generated significant discussion (e.g., Dasgupta 2006; Nordhaus 2007; Weitzman 2007). The principle of inter-generational equity as flourishing into the deep future is recognized in the total economic value categories of bequest value, existence value and to a lesser extent in option value and quasi-option value. Inter-generational equity is also recognized in environmental legislation which seeks to balance the needs of present and future generations and in creative responses to the problem of discounting the future in general (Chichilnisky 1996; Weitzman 2001) and in the fisheries sector (Ainsworth and Sumaila 2005; Sumaila and Walters 2005). The motives for future survival are often linked to altruism or to a feeling of happiness or satisfaction that something exists for the benefit of others or for its own sake (Table 2.3). The notion of intrinsic value, that something has value apart from any present or future, real or apparent use to humanity underlies differences of opinion in how categories are assigned to the basic use and non use divisions.

Definition of non use benefits is problematic “because the conceptual frameworks...are not mutually consistent.” (Smith 1993; 2005). Smith also noted that the “...definition of existence value as distinct from *in situ* consumption [(Krutilla 1967)] requires a redefinition of consumption to include...important unobservable (or indirect) uses of certain types of resources, and by both generalized and specific (i.e., bequest) altruistic motives. The use/nonuse distinction is also problematic because the same individual can hold both use and nonuse values for the same thing (Freeman 2003). This is not controversial when it comes to Aboriginal people whose knowledge and spiritual values derive from making a living on the land, but the same applies to

those who work in the natural resource sector today (White 1996). Aboriginal people and others who work in industrial salmon feedlots are deeply conflicted. The overworked Fox minding the henhouse analogy is however deeply entrenched in tragedy of the commons thinking. All of the foregoing deny the possibility that individual use is mitigated by multiple motives and the ability of ancient and modern societies to self-regulate based on traditions of love, justice and the need to constrain raw power to protect the poor, oppressed and helpless. Aldred (1994) suggested that the “incoherence” in a definition of existence value which extends to extinct species points to a wider conflict and overlap in concepts of intrinsic and existence value. Table 2.2 illustrates how different authors vary in the categories that they include and how value categories are assigned to the major use and nonuse divisions.

Table 2.2 Inconsistency of ‘use’ and ‘nonuse’ categories in ecosystem valuation. Legend: ✓ (included), x (excluded), □ (no mention), ≈ (overlapping).

Value category	Option		Quasi-option		Bequest		Existence		Intrinsic	
	Use	Non use	Use	Non use	Use	Non use	Use	Non use	Use	Non use
Weisbrod (1964)		✓								
Krutilla (1967)						✓		✓		
Randall and Stoll (1983)		✓		✓		✓		✓		✓
Bishop <i>et al.</i> (1987)		✓	x	x			✓			
Randall (1991)	x	x	x	x				✓		
Freeman (1993; 2003)										
Barbier (1994)	✓		✓		✓			✓	✓	
Goulder & Kennedy (1997)		✓						✓		
Dixon & Pagiola (1998)	✓					✓		✓		
MEA (2003 Fig. 6.1)	✓		✓		≈	≈		✓	≈	≈
NRC (2005 Fig 7-1)	x	x	x	x				✓		
(Sharp and Kerr 2005)										
Plottu & Plottu (2007)			x	x				✓		
de Young <i>et al.</i> (2008)	≈	≈	≈	≈		✓		✓		✓
(Sukhdev <i>et al.</i> 2010)		✓		✓	✓	✓		✓	x	x

Table 2.3 presents divergent concepts of intrinsic and existence value.

Table 2.3 Divergent concepts of intrinsic and existence value in ecosystem valuation studies.

Source	Concept	Definition/Motivation
Weisbrod (1964)	Intrinsic	Not addressed.
	Existence	Defined in terms of willingness to pay for the continued existence of a park they might never visit or hospital they hoped never to have to visit.
Krutilla (1967)	Intrinsic	Not addressed
	Existence	The value which people place on the “mere existence of biological and / or geomorphological diversity and its widespread distribution.”
Randall and Stoll (1983)	Intrinsic	Defined as personal satisfaction in knowing the resource exists. This is conceived as a “third form of altruism”, see below:
	Existence	“Pure existence value” excludes any values arising from current or future use. “Demand” of 3 types of altruism: 1) knowing the resource is there for others, 2) is available for future generations, leading to bequest value. Bequest and intrinsic value are thus categories of existence value.
Bishop <i>et al.</i> (1987)	Intrinsic	A “catch-all category for all nonuse values”, e.g., the option of future use or simply the continued existence. Motivated by altruism towards present and future generations, sympathy for "nature itself" and / or responsibility for damage to species and environment.'
	Existence	Aspect of intrinsic, see above.
	Intrinsic	Not mentioned.
Randall (1991)	Existence	Follows Krutilla's (1967) example of those who value wilderness but “would be appalled by the prospect of exposure to it.” Existence value over and above <i>in situ</i> use. “...burden of proof should always lie upon the analyst who claims existence value does not matter... important local and regional existence values may be at stake, even if existence at the global level is not threatened.
	Intrinsic	See below
Freeman (1993; 2003)	Existence	Existence = intrinsic = “conservation” value quantified as difference between use value and “total value” determined by “willingness to pay”. Existence value related to someone's use, independent of any use by the person holding the existence value (2003 p.140).
	Intrinsic	Intrinsic value = existence value. Defined in terms of individuals who don't use tropical wetlands, but want to see preserved “in their own right”. Extremely difficult to measure as it involves subjective valuation by individuals unrelated to either their or other's use, present or future
Barbier (1994)	Existence	See above
	Intrinsic	The intrinsic rights approach puts other living things on the same moral plane as humans, with the same right to exist
(Goulder and Kennedy 1997)	Exist	Defined as “passive use”—the satisfaction one enjoys from the mere contemplation of the existence of some entity, e.g., knowing the Grand Canyon exists without having to visit it.
	Intrinsic	Not mentioned.
Dixon and Pagiola (1998)	Existence	The value people derive from knowing that something, e.g., blue whales or the panda; exists even if they will probably never see one. If blue whales became extinct, many people would feel a definite sense of loss.
	Intrinsic	...animals, plants and even landscapes may have an intrinsic value, a value independent of their anthropocentric value... <i>see below</i>
(Heal 2000b p.17)	Existence	...[animals, plants, landscapes] may have a right to exist independent of their value to humanity. It is hard, if not impossible as a matter of principle, to

Source	Concept	Definition/Motivation
Berman & Sumaila (2006)	Intrinsic	place an economic value on such values and rights. Perhaps respecting them has to be seen as a constraint on society's economic activities, and we should not seek to trade them off against other goals. ...education by ecologists about the intrinsic value of healthy ecosystems might improve the economic justification for ecosystem restoration—by increasing the degree to which people value the amenities that restored ecosystems could provide.
	Existence	Not mentioned.
de Young <i>et al.</i> (2008)	Intrinsic	Not defined, cited among ecosystem services not traded in market which, “include the cultural identity of coastal communities, the preservation of ecosystems for their intrinsic value, or changes in water quality...” Value of what ecosystems represent for the future...Independent of anyone’s present or future use...a philosophical value of the inherent right of ecosystems and communities to exist now and in the future
(Philcox 2007)	Existence	Intrinsic value and existence value used interchangeably
(FAO n.d.b)		Intrinsic value = existence value: “...there are individuals who do not currently make use of the goods and services of an ecosystem but wish to see them preserved ‘in their own right’. Such an ‘intrinsic’ value is often referred to as existence value.

There is considerable confusion or ‘entanglement’ between intrinsic and existence value (e.g., Bishop *et al.* 1987). Definitions of existence value based on altruism (Randall 1991) or “happiness that the ecosystem exists quite apart from any future option to consume it, visit it or otherwise use it ... [which] may arise from aesthetic, ethical, moral or religious considerations...” (Sumaila *et al.* 2011), indicate the presence of values beyond existence value in the strict utilitarian sense. In his review of non-market valuation methods for BC, Philcox (2007) observes that the terms “intrinsic value” and “existence value” are used interchangeably.

Tables 2.2 and 2.3 illustrate the inconsistency noted by Kerry Smith (1993; 2005) in how value subcategories are assigned to use and non-use divisions and question the validity of the use and non-use division which is held to be “fundamental” (Randall 1991; MEA 2003; NRC 2005). The entanglement between definitions and use of intrinsic and existence value and referral of moral, aesthetic, and spiritual values to the political domain indicates the need for a consistent way to include such values to balance the attention given to quantification and its influence in policy

and decision-making. Gudeman's (2008) issue with cash economies converting 'relationships' grounded in webs of 'incommensurable' units, familial and community reciprocity to 'ratios'—price as ultimate determinant of value—illustrates two very different metrics, one of which binds community over long time periods. Fishbane (2008:9) comments:

Without a standard of judgment, we cannot evaluate our actions in terms of what would constitute a just or humane way of existing on earth; and in the process, measurement serves the most narrow or self-serving ends.

Major studies identify intrinsic, moral and spiritual values as 'inputs to decision-making'. The US National Research Council (2005: 39) suggests that conservation decisions could be based on "a political consensus about what is morally right or wrong". The Millennium Ecosystem Assessment authors (2003:143) agree with Sagoff (1998) that "Parallel to using the market or its surrogates to measure economic value, in democratic societies the modern social domain for the ascription of intrinsic value is the parliament or legislature." The UK National Environmental Assessment continues in the tradition of the Millennium Ecosystem Assessment, but does include a more integrated valuation framework where the overall contribution of ecosystem services is comprised of "economic valuation of use and non-use values" and a separate "non-monetary assessment (e.g., spiritual value of environment)" (Bateman *et al.* 2010, Figure 1). This balancing is however qualified by stating that the "drive of the UK NEA and the focus of this paper is to apply economic assessment as widely as possible". Other methods are to be used "only as necessary" and would feed into the "final assessment of well-being as a constraint on development."

Economic considerations, or rather "the economic way of thinking" (Nelson 2010), do however carry disproportionate weight in the political arena. The US Supreme Court discerned that the

clear intent of Congress in the Endangered Species Act was to assert “the primacy of an ethical imperative to prevent extinction over any cost-benefit calculations”, but the case of the snail darter (*Perca tanasi*) a small fish of no commercial value that halted a huge hydroelectric project; prompted a rapid amendment to “include a provision for balancing extinction against the economic costs of its prevention.” (NRC 2005:226). The same logic moved Canada’s Environment Minister to deny listing of the Cultus and Sakinaw Lake sockeye salmon (*Onchorhynchus nerka*) under the Species at Risk Act (Canada 2004). Relegation to the political arena seems to be a rather convenient way to replace passions deemed as “dangerous and uncontrollable” with “interests-pictured as reasoned calculation” (Gudeman 2008:10). Relegation also avoids the need to engage the “open debate in ecological economics” on whether “non-human entities have value beyond reduction to individual human preferences, expressed either in the market place or political arena...” (Spash 1999):

Any debate which does ensue will undoubtedly reflect different cultural values which themselves require greater acceptance within economics.

In his review of contingent valuation of wetlands, Spash (2000) criticizes authors (e.g., Costanza *et al.* 1997) for neglecting, “wider concepts of value which fall outside of the (neoclassical) economic approach.” Bruno Latour (2004) deplores the sleight of hand by which prices, which are reflective of human values and preferences, are treated as objective data. The curious mixture of data and value (represented, for example by the price of a barrel of oil) which constitutes the “modern fact” (Poovey 1998) drives parliamentary and legislative processes which exclude the sacred as non-objective.

2.10 Conclusion

This Chapter clarifies that simply leaving non-economic values to the political policy-making process has not worked. To do this, it has surveyed the evolution of management on the BC coast from the initial worldview of non-industrial societies through increasingly utilitarian and measurement dominated systems of natural resource management, underpinned by a natural resource paradigm that values commercial exploitation of the ocean over other non-tangible values. It has then shown that the restrictive utilitarian paradigm has led to increasing depletion of the ocean. More recent approaches have broadened the purely utilitarian perspective, but the utilitarian paradigm remains, for the most part, dominant in practice. Finally, it has suggested that other methods of valuation exist, and are discussed in the next two chapters.

Chapter 3: Broadening the paradigm: towards a sea ethic

The complexity of human-ecological interactions forces natural and social scientists to take greater cognizance of each other and of the communities they study. The primary response to depletion of fish populations and undervaluing of marine ecosystems is referred to as the “ecosystem approach to fisheries” (Garcia and Cochrane 2005), or more generally as marine ecosystem-based management.

3.1 Marine ecosystem-based management

Garcia and Cochrane (2005) ground the “ecosystem approach to fisheries” in the, “founding principles and conceptual goals emerging from the decades-long process of elaboration of the foundations for sustainable development, aiming at both human and ecosystem well-being”. Notions of ‘right’ and ‘wrong’, ‘good’ and ‘bad’ are beginning to crop up in evaluating performance in meeting international standards for responsible fishing and analysis of the role of subsidies in overfishing.

Marine ecosystem-based management is designed to tell us what we should do in view of the nature of marine ecosystems as we learn about them from various sources. Marine ecosystem-based management is re-emerging as a necessity from the findings of science and the experience of fishers, the maritime community and the broader public. The approach should therefore speak to something of what the ecosystem *is* and how people *should* act in consequence. In other words, a set of ‘principles’: in scientific terms, the ecosystem is complex and unpredictable and people should therefore act with precaution. In spiritual or religious terms, the ocean is a gift; people should approach it with reverence, respect, gratitude and generosity. Where actions lead to loss and damage, there should be acknowledgement of complicity, atonement and restitution.

(Please see extended literature review in Appendix A). Humans are seen as part of the ecosystem, but such identification tends to be simplistic, i.e., as ‘intruders’ or ‘predators’. While this is true in the case of industrial fleets, it ignores the waters and land/sea interface as social or “peopled spaces” (Shackeroff *et al.* 2009), the existence of peoples who live entirely or mostly at sea (Anderson 1972; Hope 2001) and the conversations whereby people, and the biota of the land-sea interface have shaped and reshaped each other since the dawn of time (Erlandson *et al.* 2008) and Figure 1.1. Labelling humans as intruders and predators does not give sufficient credit to the sustainable relationships that have been formed. It is likely also an unfair characterization of the people driven to overfishing by inherited institutional, capital and social structures and skill sets (Kennelly and Broadhurst 2002; Haggan *et al.* 2007; 141-6 Clover 2008; Anon n.d.). Further, if management objectives are a matter of “societal choice” (FAO n.d.b), society should not be restricted to the language of commerce and the marketplace (Somerville 2006:74-6).

The core concepts of ecosystem-based management are complexity, connections and interdependencies, ‘ecological space-time’, cumulative impacts and precaution necessitated by growing demand for fish and the excess of fishing capacity over reproductive potential. Humans are generally recognized as part of the ecosystem, but fisheries scientists and managers tend to see themselves outside the system, i.e., aware but outside of cultural ties and imperatives and uncorrupted by the economic necessity that drives overfishing. The fishers see the managers as lacking in experiential knowledge and with nothing to lose (van Zyl 2009). Auster *et al.* (2009) comment that “many conservation scientists may feel uncomfortable with unfamiliar venues in which conservation strategies and successes stem explicitly from human values”, but the “current conservation crisis demands that they move outside their comfort zone to reach a larger

community”. The need to broaden the scientific paradigm to include communities and stakeholders underlies the emerging field of social-ecological systems.

3.2 Social-ecological systems

The human dimension of marine ecosystem-based management informs a growing field of ‘social-ecological systems’ that relates the biophysical and the human in an iterative, interactive and interdependent way. This relatively new field explores interactions, interdependencies and the wide range of ways in which people, plants, animals, land and seascapes shape each other (e.g., Folke and Berkes 1995; Berkes and Turner 2006; Ommer *et al.* 2011). The field draws heavily on the approach to nature of Aboriginal people and other longstanding communities of place (Berkes *et al.* 2000; Levin and Lubchenco 2008; Parrish *et al.* 2008; Trosper 2009). A core concept of ‘resilience’ speaks to the ability of social-ecological systems to adapt to significant environmental change (e.g., Berkes *et al.* 2000; Chapin *et al.* 2009). Social-ecological systems thinking also includes the spiritual subsumed under the general rubric of ‘cultural’ understood as odd or outside the mainstream¹⁷. This is clearly seen in the ubiquitous term ‘cultural and spiritual values’. The strength of the social-ecological system concept is to put the social and ecological on an equal footing. Social-ecological systems include the spiritual by extension, but a coherent approach to include a spiritual or religious dimension in the work of ecosystem-based management or social-ecological systems has yet to emerge.

¹⁷ This point must be underscored. There is one ‘civilization’, one ‘free world’, one ‘free market’. As James Baldwin (1953) notes, all previous civilizations are merely tributary to this one. “We are therefore civilizations guardians and defenders.” The image conjured up by ‘cultural and spiritual values’ is of ‘other’ cultures that exist outside of twenty-first century civilization.

3.3 Public demand for the sacred

The conundrum for the ocean conservation community is how to explain to the broader public, which often lacks such a strong attachment to the sea, why they should also care about the state of the oceans. (Auster et al. 2009).

The terms “many people”, “others” and “one” in scientific and economic studies can denote constituencies which are acknowledged to exist, but whose values are deemed to belong to some realm outside the author’s ability to investigate. Examples from the ecosystem valuation literature include:

- “...**many persons**...value wilderness...[**others**]...place a value on the mere existence of biological and/or geomorphological variety and its widespread distribution (Krutilla 1967);
- “**Many people** believe that ecosystems have value quite apart from any human interest in explicit goods or services...comprehending this intrinsic value does not trouble most individuals, assessing it is problematic.” This is linked to incomplete knowledge (NRC 2005:87);
- “An environmental good may be valuable merely because **one is happy that it exists**, quite apart from any future option to consume it, visit it or otherwise use it. This value may arise from aesthetic, ethical, moral or religious considerations.” (Sumaila et al. 2011);
- “**for many** the oceans have spiritual and cultural values that are incommensurable with neoclassical economics concepts of value. This presents a stern challenge to ecological economists” (Šunde 2008);
- **Many cultures** have an intimate spiritual connection with the sea and all it embraces. Beliefs, spirituality, ethics and a ‘way of life’ are inextricably intertwined with the ‘web of life’ of the sea and its environs. The natural world and the integrity of natural ecosystems also form an explicit or implicit part of the religious beliefs and cultural heritage of essentially all human religions and cultures. Such values need recognition. (Peterson and Lubchenco 1997);
- Spiritual values are not restricted to indigenous people [they are] evident in maritime communities on east coast of Canada, or fishing villages in the Mediterranean (Patterson et al. 2008);
- **For many people**, ecosystems are closely associated with deeply held historical, national, ethical, religious, and spiritual values. (MEA 2003 140);

- “...**many people** ascribe ecological, sociocultural, or intrinsic values to the existence of ecosystems and species and, sometimes, to inanimate objects such as “sacred” mountains.” (DeFries *et al.* 2005).

The final quote is taken from the Millennium Ecosystem Assessment chapter on assessing ecosystem condition and human well-being. The authors note that where the “very identity of a community” depends on the ecosystems “socio-cultural value...transcends utilitarian preference satisfaction.” (DeFries *et al.* 2005).

These “many” can be divided into approximately three groups with a considerable degree of overlap. First are those who have the resources and leisure to avail of parks and various eco-tourism experiences. Ecotourism is the “world’s largest business”, much of which depends on the “amenities and values” of the coast and ocean (Peterson and Lubchenco 1997). More North Americans visit zoos and aquariums than attend all athletic events combined (Wilson 1992). Eco-tourism is predicted to reach 25% of the global travel market by 2010 for an annual value of approximately \$473 billion (CREST n.d.). Marine eco-tourism alone is valued at \$US 46 billion (Cisneros-Montemayor *et al.* 2010). More than half of the US population live in coastal counties comprising only 17% of total land area, with a 20% increase anticipated by 2015 (Pew Oceans Commission 2003:49). “Tourism is the second largest contributor to the U.S. gross domestic product and coastal tourism and recreation account for 85 percent of all tourism revenue (Pew Oceans Commission 2003:49). In California alone, coastal tourism is valued at nearly 10 billion dollars annually, far exceeding the 6 billion dollars generated by port traffic and dwarfing the 550 million dollars generated by the state’s fisheries and saltwater aquaculture” (Wilson and Wheeler 1997). Eco-tourism is of course an option for the reasonably well-to-do, i.e., those able to pay. But there is evidence that up to 30% of less well-off individuals were willing to sacrifice

considerable personal well-being to ensure the survival of endangered species and preservation of landscapes (Spash 2000).

World religions have become increasingly concerned with the link between ecological devastation, climate change and poverty. Leaders have acknowledged complicity in promulgating a “false anthropology” of human individualism (McFague 2008:37) or false gospel of human centrality in violation of central teachings of stewardship and care of the earth (Hessel and Ruether 2000; WSCC 2001; Astudillo *et al.* 2005; WCC 2009). This refocusing from otherworldly or afterlife concerns to the ‘integrity of creation’ has enormous potential to energize adherents and bring their resources to bear on ecological issues. The World Council of Churches, representing 560 million Christians, acknowledges culpability in the “ecological debt” owed by the north for depletion and climate change (WCC 2009). They also called for forgiveness of “illegitimate” developing world debt. The eleven faiths that contribute to the Alliance of Religions and Conservation “represent two-thirds of the world’s population. They own about 7% of the habitable surface of the planet, they have a role in 54% of all schools, and their institutional share of the investment market is in the range of 6-8%” (Wolfensen 2003). Apart from the institutional share, individual adherents of these faiths control a significant portion of total planetary wealth. Globally, some two billion Christians (Sluka *et al.* 2011) hold a disproportionate share of the world’s pecuniary wealth. In the US alone, investment portfolios under professional management in 2007 exceeded \$24 trillion, with only 11% in socially responsible investment (Gardner 2010). Leaving aside a significant percentage who locate the sacred outside the environment, or those representatives of the “one percent” who do not yet link their spiritual beliefs to environmental issues, these “many people”, these “others”, hold the key

to a level of investment in social and ecological justice that could match if not dwarf the trillions found to bail out financial institutions since 2008.

The ability of religious leaders to raise awareness of human impact on the integrity of creation has fired the attention of scientists for some time. A “Warning to Humanity” from the Union of Concerned Scientists (1992) called on all scientists, business, industrial and religious leaders for concerted response including diversion of some of the \$US 1 trillion military expenditure to conservation of planetary atmospheric, terrestrial and coastal ocean systems. E.O. Wilson’s puzzlement that religious leaders who represented so many people around the world have failed to make care for creation a “part of their magisterium” (Wilson 2006:5) was answered by the 2008 Southern Baptist Declaration on the Environment and Climate change, calling on leaders to inform and energize their congregations (SBECI n.d.). Several authors have picked up on the potential of religious leaders to energize support of this constituency for, “a new era of ocean literacy” (Pew Oceans Commission 2003) and the ability of religious leaders to mobilize millions in support of a sea ethic (Auster *et al.* 2009). Pacific North America also has the highest percentage of people who deny any religious affiliation, but claim a spiritual connection to nature (Shibley 2004). Literature on parks, wilderness and ‘sacred natural sites’ identifies a very large constituency who look to the outdoors for ‘psycho-spiritual’ renewal, but this constituency is less amenable to persuasion by religious leaders. The same can be said for scientists who subscribe to something like Einstein’s “cosmic religious consciousness”, but may tend to associate religious leaders if not with persecution and fundamentalism, at least with untenable views on science.

3.4 Health or flourishing - broadening the natural resource paradigm

The ubiquity of the term ‘health’ in ecosystem-based management and social-ecological systems indicates a broader vision of what natural resources really are. Health is readily understood on a personal, family or even community level. Humans measure their own health against a baseline or benchmark when they felt well, energetic, motivated, up for whatever comes next. Changes in the health of friends, family and colleagues, or favourite places, are quickly noted. Social-ecological health might be thought of as the abundance and diversity of individual living entities, the number and strength of the connections/energy flows between them and the complexity of the matrix where the connections cross and ramify. Even the most complex model shows only a fraction of the nodes and connections. The species, pathways and interstitial spaces of the present system are themselves the intersection of trajectories of historic climate, natural variability and human actions. The vision is inherently spiritual, being one of flourishing where there is attention paid to the surrounding world that leads to understanding and promoting relationships that contribute to flourishing and identifying and unraveling those that do not.

3.5 Towards a sea ethic

Have ecologists nothing to say about ethics? (Kinne 1997).

An emerging literature on a “sea ethic”, “ocean ethic” or “new myth for the ocean” exists: examples include the Pew Oceans Commission, the Scientific Consensus Statement on marine ecosystem-based management, the work of Berkes (n.b. Sacred Ecology 2008) and books by environmental science writers. Almost all such calls refer to Aldo Leopold’s (1949) “land ethic” and / or the work of Rachel Carson (1951). These are the prophets of ecology, who dared to prescribe a right and wrong way to deal with the natural world. This appeal to the prophetic

tradition attests to the discomfort of scientists who have left the safe shores of ‘is’ and ventured into the deep water of what ‘should’ be.

The notion of an ocean ethic also occurs throughout the ecosystem-based management literature whether as an explicit “ethical field” in evaluation of specific fisheries (Pitcher and Preikshot 2001), overall illegal fisheries assessment (Pitcher *et al.* 2009), or in reports, declarations and statements by scientists reflecting on the state of the ocean or their life’s work (e.g., McLeod *et al.* 2005; Auster *et al.* 2009; Centre for Ocean Solutions 2009; Pauly 2009). A related literature seeks to root a sea ethic in the work of prophets such as Aldo Leopold, Rachel Carson and Henry Beston (e.g., Bratton 2004; Dallmeyer 2005; Callicott and Back 2008; Kroll 2008; Sideris and Moore 2008).

The Pew Oceans Commission (2003) calls for an ethic of stewardship and responsibility towards the ocean and its inhabitants. This requires nothing less than a “change in values, a moral framework to guide conduct of individuals and society, like the land ethic that has emerged...”. Again, references to Aldo Leopold’s Land Ethic are ubiquitous (e.g., Lubchenco *et al.* 2002; Safina 2003; Bratton 2004; Dallmeyer 2005; Arkema *et al.* 2006; Callicott and Back 2008; Gaydos *et al.* 2008). Like Pitcher *et al.* (2000; 2009; 2009) who frankly distinguish “good” and “bad” ecosystem-based management performance, Leopold’s (1949) ethic marks actions that contribute to the “integrity, stability, and beauty [flourishing] of a living community” as “right” and those that lead to depletion as “wrong”.

Leopold’s criteria of “right” and “wrong” action and his acceptance that humans can be part of the flourishing or “harmony” of the biotic community (Leopold 1940) give scientists access to a

moral position inaccessible in their research tradition. This taboo is relaxed when it comes to discussing an ocean ethic, and rather surprisingly, in economics where work on subsidies has moved from identification of “perverse incentives” (Myers 1998; Munro and Sumaila 2002) to outright condemnation as in “bad subsidies” (Milazzo 1998; Sumaila *et al.* 2007), whereby nations are paying billions to the fishing industry each year, “effectively funding the over-exploitation of marine resources” (Sumaila *et al.* 2010). Safina (2003) defines a sea ethic as active implementation of the Golden Rule as a relationship of present and inter-generational social-ecological flourishing that people “acknowledge or seek to forge”. Conservation is the “effort toward what is right” (Auster *et al.* 2009).

Pauly (2009) sees a “new myth for the ocean” as the only way out of the “biodiversity crisis” caused by human demand for seafood. A new myth shared by all people on earth is the only thing that can mobilize political action on the scale necessary. This sets the stage for an exploration of “old” myths that contributed to flourishing over long time periods and what those who deal in myth or religion are currently saying. “We are”, Pauly says in a nod to the “many” left out by the scientific-economic paradigm, “a species that believes in and acts on myths (as evidenced by those that define our tribal, 'racial' or religious identity)”.

A sea ethic can be summarized as working towards the flourishing of the entire biotic community, people, plants, animals, air, lands, waters and the life-sustaining flows between them. Berkes (2010) cites Habermas’ model¹⁸ with approval, but does not seem alert to the issue of problematizing’ whereby experts and fishers identify what turns out to be the wrong issue or question (Callon 1986), or to the issue of the ‘discrepant’ (van Zyl 2009) or incommensurable.

¹⁸ 1981 in German vs 1985 translation.

Neis (2011) notes that local concepts of fish as agents and fishers as stewards are incommensurable with the stock assessment paradigm of fish as biomass and fishers as greedy, shortsighted predators. Neis cites Berkes (2008), “Going even further, for some Aboriginal fishers, behavior in natural world, including the world of fish, is perceived to be governed by a spiritual dimension that permits communication between humans and animals and mediates the behaviour of both groups.” Neis concludes that incommensurability has more to do with the starting point than knowledge itself, i.e., the policy response will be the same whether one believes collapse is due to offending the fish spirit through greed, waste, disrespect, or to removing too much biomass—see also van Zyl (2009).

The intersection of science and the maritime community in both marine ecosystem-based management and social-ecological systems requires that scientists and fisheries managers have sufficient respect to listen to a view radically different from their own. There is no substitute for respectful dialogue. A sea ethic of flourishing as ‘right’ clears the way to address both Gould’s doctrine of “non-overlapping magisteria” as a major node of discrepancy and the epistemic injustice of marginalizing Aboriginal spirituality and denying the language of relationship, compassion and atonement to science. Once the ideas of right and wrong are admitted, the safe haven of ‘is’ has been left for the shores of ‘should’ (Einstein 1954). It is unreasonable to expect scientists to adopt the language of religion (Haggan 2011). It is equally unreasonable for scientists to follow the example of Dawkins (2006) and Hitchens (2007) and treat the insights of religion, ancient cultures and Aboriginal scholars with condescension or contempt (Caputo 2008; Haig-Brown 2008; Eagleton 2009).

3.6 Conclusions

This chapter has surveyed the wider view of fisheries management inherent in marine ecosystem-based management and social-ecological systems analysis, but recognizes that it is still anthropocentric for the most part. It reviews the growing number of ordinary voices calling for a better way to think about the sea, to enhance its health and to cherish and protect it. It then turns to the discussion of a sea ethic along the lines that are sought by ordinary people, religious leaders and scientists alike.

The Pew Oceans Commission (2003) has identified a sea ethic as essential to reframe and coordinate policy, education, public awareness, action and funding towards social-ecological spatial and temporal scales. Such an ethic is endorsed by those well-informed of the peril posed by overfishing, competing and more lucrative uses of ocean space and climate change, but this is a small minority. The legal, political and institutional changes implicit in the UN Code and explicit in Pew and other EBM frameworks will require an unprecedented level of public awareness and support to overcome inertia and opposition from powerful, vested interests. Public education and awareness is critical, but it will take inspired leadership to awaken the “many” to the peril that faces not only places and things they love, but the vital role of the sea, its people and living creatures in planetary health and survival.

Chapter 4: An alternative valuation: incorporating spiritual values

4.1 Science and religion as separate realms

A 1990 declaration “Preserving and Cherishing the Earth”—drafted by leading scientists including Stephen J. Gould and Carl Sagan and endorsed by 270 religious leaders (Sagan 1990)—suggests that the ecological crisis amounts to “crimes against creation”, which can most properly be addressed in the “language of religion” grounded in a concept of the earth as “sacred”. This “Declaration on preserving and cherishing the earth” calls on religious leaders to speak out, as does a similar “Warning to Humanity” issued by the Union of Concerned Scientists (1992). Explicit calls on religious leaders to speak out on marine issues include the Pew Oceans Commission (2003) and Auster *et al.* (2009). spiritual values have also entered the scientific and resource valuation literature through the Millennium Ecosystem Assessment (2003) and the growing field of ecosystem services (Costanza *et al.* 1997; Farber *et al.* 2002; de Groot and Hein 2007), which explore how local, regional and planetary processes make human life and economy possible. Indeed, a growing number of scholars and leaders in conservation believe that the primary motive for conservation is *love*, in the sense of dedicated attention, cherishing and protecting (e.g., Sagoff 1991; Anderson 1996; Rosenblatt 1998; McCauley 2006; Maathai 2010). Where *love is not explicit*, the more neutral language of “ethical or moral considerations” (Peterson and Lubchenco 1997), “justice” (Coward *et al.* 2000) or a sea ethic introduces clear distinctions between right and wrong action. The desire—indeed the perception—that future generations have a right to inherit a vibrant and healthy planet is a basic human motivation (Krutilla 1967; Berman and Sumaila 2006), even if human love for nature has been “thinned and demeaned as the land was commodified” (Daly and Cobb 1994).

An increasing number in the marine science and conservation community are now calling for a sea or ocean ethic (e.g., Safina 2003; Dallmeyer 2005; Auster *et al.* 2009). The FAO Code of Conduct for Responsible Fishing (1995) is used today to characterize fisheries that meet or fail standards of sustainability as “good” and “bad” (Pitcher *et al.* 2009). Economists categorize subsidies that contribute to overfishing as “perverse” (e.g., Milazzo 1998; Myers 1998; Munro and Sumaila 2002) or just plain “bad” (Arnason 1999; Sumaila *et al.* 2010). The term “wicked problem” (Ludwig 2001; Jentoft and Chuenpagdee 2009) is also used to characterize the difficulties inherent in the management of coastal and marine ecosystems. Wicked problems are complex at all levels, so that a right or wrong solution cannot be determined by science alone, but only through an inclusive, deliberative process.

This growing chorus speaks to a need, not just to get people of faith to mobilize politicians for conservation, but to expand the policy framework of marine ecosystem-based management to explicitly include spiritual, religious and moral dimensions. Such a broadening of the management mandate would promote the kind of open discussion of spiritual considerations that would no longer be confined to Aboriginal people. It would involve local implementation of ecosystem-based management and the involvement of a much wider range of expertise in environmental assessment, commissions of inquiry into missing sockeye salmon such as the Cohen Commission in BC¹⁹ and major project review such as the Enbridge Panel²⁰ evaluation of the pros and cons of oil transport to and through the BC coast.

¹⁹ <http://www.cohencommission.ca> (Accessed May 25, 2012).

²⁰ <http://gatewaypanel.review-examen.gc.ca/clf-nsi/bts/jntrvwprcss-eng.html> (Accessed May 25, 2012).

While scientists are increasingly open to considering spiritual, moral and ethical dimensions, values or aspects, their training and vocabulary does not encourage use of these terms. The love (the immeasurable values of protecting and cherishing) that clearly inspires their work, the emotions of grief, anger and despair that may be a response to the graphs and tables that document ‘depletion’, has no way of being expressed. This is yet one more expression of the long and troubled relationship between religion and science, recently exacerbated by caricatures of science as unifying and enlightened *vs* religion as divisive and backward (e.g., Dawkins 2006; Hitchens 2007). However, our ability to cherish and protect the sea requires a robust concept of the sacred; the spiritual values that flow from it and a language of religion that resonates with maritime communities and those who work with them. The desired outcome—a love relationship with the coast and ocean – will then broaden and inform the quantitative values of monitoring, management and control. We need the goods and services of the coast and ocean, but we also love them, which is to say we cherish and protect them. They are vital to the identity, culture and existence of many British Columbians, and citizens of the globe.

If the oceans’ management focus is solely on scientific quantification and economic valuation, it should be no great surprise that the immeasurable values of love, compassion, gratitude and generosity then become part of the counter-narrative of protest. Religion is rich in concerns about right relationships and distributive justice, but also relies on a prophetic vision of the world as it should be and understands immeasurables as motivation and active principles to bring these about. Such immeasurables include the Buddhist quatrain of love, compassion²¹, equanimity and equal treatment (Fossey *et al.* 2003; Armstrong 2011), the Christian triad of faith, hope and love,

²¹ The whole idea of compassion is based on a keen awareness of the interdependence of all these living beings, which are all part of one another, and all involved in one another.” Thomas Merton in his last days (cited in Padovano 1984).

the mercy and compassion of Allah and the Aboriginal quatrain of reverence, respect, reciprocity and relationship (Archibald 2008; Trosper 2009). All of these in their own way, extend the Golden Rule—familial relationships and duties of love, power and justice—to all of the living and non-living elements of creation.

While we are comfortable measuring quantities and outcomes, we think poorly of measuring or managing love (Monbiot 2011). Early connections to people, places, plants and animals are physical, emotional and spiritual, bound up in a total experience of our surroundings and the feelings we hold for the people looking after us. Later in life, however, the interest of many people in these parts of nature becomes scientific or economic, and emotional and spiritual connections come to be associated with childhood. Moreover, values variously characterized as intrinsic, spiritual, intangible and moral elude incorporation in cost-benefit analysis and are not found in such extended ecosystem valuation approaches as total economic value and ecosystem services. This is partly because dollars or their equivalent, are universally understood, while the articulation of intrinsic and spiritual values varies dramatically with cultural and ecological context. It is also partly because the people who hold such values are unwilling to express them in dollar equivalents, or perhaps even to discuss them at all. Hence the inadmissibility of sacred or spiritual language and concepts in resource policy, science and management, with the result that fish populations are subjected to the jeopardy of valuation in the metric of the very market economy that holds a significant part of the responsibility for their depletion and extinction.

While the interactions between natural variability, overfishing, climate change and food security are scientifically recognized as complex (e.g., Brander 2007; Allison *et al.* 2009; Cheung *et al.* 2010), our failure to rein in the more obvious human impacts has much to do with the values

which we include and exclude from the coastal and marine policy framework and from processes such as fisheries allocation, review of the sustainability of industrial salmon feedlots and most recently, of the pros and cons of large-scale oil transport on the BC coast.

The scientific and economic vision of the world as comprised of physical or ecological ‘systems’ that generate flows of benefits to people, however, contrasts with pre-industrial and many surviving traditional (non-industrial) cultures and world religions which still regard the world as sacred or inspired, and whose eco-social-spiritual world is characterized by fluidity and permeability (McNiven 2010). There are also a growing number of people who, while disavowing any religious affiliation, nonetheless claim a spiritual connection to nature, particularly in the Pacific Northwest (Shibley 2004). For all of these, the intrinsic value, personhood, sentience or agency of non-human entities is seen as requiring at least equal consideration to their use value. In the words of John Winter of the B.C. Chamber of Commerce testifying before the Special Commission on Sustainable Aquaculture (2007), “In many ways the history of salmon is the history of British Columbia. Salmon is part of our culture and is viewed by many as a symbol for the environment and the natural beauty of the province (BC 2006).

The 2009 conference *Swimming with the Salmon* included an iconography of Pacific salmon which goes some way towards indicating how deeply these fish are interwoven with the identity of the Pacific Northwest and its people (Hart 2009). Salmon, as an *iconic species*, is both real and symbolic of ecological health; it is both idealized and representative. As a *spiritual icon*, it represents the relationship between creation and creator. As an *ethical icon*, it stands for just and interdependent relationships between species and cultures. As a *regional icon*, it symbolizes the uniqueness of the Pacific Northwest. Salmon is an icon for nature, social, commercial and

spiritual life in the Pacific Northwest, a cross-ethnic social and commercial symbol; functioning as both species and icon it commands respect.

The depletion and extinction of salmon populations, then, destroys both the corporeal reality and the ecological and social relationships that are inherent in them. Their extinction parallels in impact and sense of loss the extirpation of the buffalo which removed another natural icon that was also the primary source of food, clothing and shelter of the Plains Indians. Destruction of that symbol of indigenous culture was seen to be sacrilegious waste: white hunters took only the tongues of the buffalo, leaving thousands of carcasses to rot in plain view, thereby mocking and destroying iconic corporeal, symbolic, spiritual and social realities. As the buffalo to the Plains Indian, so the salmon is an ecological and cultural keystone species in the Pacific Northwest: ecological in it's in fertilizing waters and lands with marine nutrients, and cultural in its vital contribution to the identity of Aboriginal people and to the inter-generational transfer of their knowledge (Garibaldi and Turner 2004).

Thus, it can be seen that understanding the communication barrier between science and religion requires an investigation of different views of the origin and nature of the world (ontologies) and the very different ways of understanding the world (epistemologies) that result. In the 'natural resource management' paradigm, the world provides a number of 'stocks' of different 'resources' (Heidegger 1949; Borgmann 1987). These stocks can provide a 'flow' of benefits to people, most simply represented by a capital/interest model (Norse *et al.* 2012). These flows are theoretically infinite in the case of 'renewable' resources such as fish, forests and wildlife and finite for resources such as oil, iron and coltan. In this utilitarian framework, resources exist for the benefit of people. Their ready availability cloaks the web of costs and connections. The

capital/interest model encompasses a view of resources as tradable commodities valued in monetary terms and subject to human needs and desires for money, “stock is itself an accountancy term, biomass being the biological construct” (Ommer 2000). In an extreme view, all forms of ‘capital’—physical, monetary and natural—are interchangeable. The growing influence of “the economic way of thinking” (Nelson 2010) is seen in terms such as social and even spiritual ‘capital’.

In contrast, the world’s religious and spiritual traditions regard the world as sacred, whether as infused with a spirit or spirits of the land and other species, or as the *gift* of a benevolent Creator whose spirit enlivens the universe. Such gifts are useful, indeed essential for cultural and spiritual survival, but their spiritual dimension constrains how and how much they can be used. This is a ‘sacramental’ view, in which everything (lands, waters, animals, plants and of course people) has intrinsic value, i.e., their good has to be considered along with the good of the interdependent humans (Hart 2006). This good can be conceived in terms of the personhood of other species and a sentient landscape, religious norms of justice for the poor, oppressed, sick or helpless, or less coherently, but with no less power, as a spiritual connection to nature by many with no formal religious affiliation. Such a view extends Kant’s (1785) requirement to consider people as “ends” as well as “means” to other species (Wood and O’Neill 1998).

Peoples who succeeded in becoming Indigenous by forming sustainable relationships with other species, lands and waters had the advantage of a common language or metaphor. Spiritual values are actually finding increasing acceptance in resource management and valuation literature (Costanza *et al.* 1997; Farber *et al.* 2002; MEA 2003), and so we may be on the way to developing a similar metaphorical relationship with the natural world. At present, however, we

still have the competing metanarratives of science and religion. According to Einstein (1954:41), “Knowledge of what *is* does not open the way to what *should* be the goal of our human aspirations. Stephen Hawking (1993) is of like mind, “Love, faith and morality belong in a different category to physics.” For Stephen J. Gould (1997), “The net of science covers the empirical universe: what is it made of (fact) and why does it work this way (theory). The net of religion extends over questions of moral meaning and value.” Gould’s doctrine of “non-overlapping magisteria” nonetheless recognizes the contributions of religion, even permits friendly conversations provided neither side tries to annex the other’s questions or answers (Mackey 2007:16), i.e., maintains Einstein’s separation. This is the root of E.O. Wilson’s appeal to world religious leaders to include love and care for the planet in their “magisterium” (Wilson 2006:5).

Gould’s nets of science and religion invoke but defy the unifying Hindu metaphor of Indra’s net of jewels that pervades and unites the cosmos -- each jewel is unique, but the facets reflect each other. Hawaiian scholar and surfer Manulani Meyer sees Indra’s net in the play of sunlight over rippled shallows as a sign of interconnection (*Pers comm.* May 2012). This insight enriches rather than contradicts the scientific explanation of complex diffraction patterns, as does the *Haudenosaunee* view of the sun as spiritual being *and* nuclear furnace whose energy makes the grass grow and evolution proceed (Thompson and Lickers 1992). Gould’s intent was not to divide, but to show that there is no need for conflict. Gould is one of 32 leading scientists who signed on to Carl Sagan’s (1990) Declaration on “Preserving and Cherishing the Earth”, endorsed by 270 religious leaders from 83 countries. The Declaration speaks of ‘crimes against creation’ and concludes, “Efforts to safeguard and cherish the environment need to be infused

with a vision of the sacred.” This is a plea by scientists for help from those for whom the language of the sacred is permissible.

The difficulty becomes obvious when Gould welcomes formal Vatican acceptance of evolution. He has no problem with the Pope’s stipulation that humanity was, at one point infused with a soul, as, “the concept of souls cannot threaten or impact my domain...” (Gould 1997). While the existence of soul cannot be disproved by science, the belief that only humans possess a soul, i.e., merit moral consideration, precludes relationships of “respect, responsibility, reciprocity and reverence” with non-humans, which are perfectly acceptable in Indigenous cultures (Anderson 1994; LaDuke 2005; Archibald 2008; Trospen 2009; Pierotti 2010). If social activities are, after all, a distinguishing mark of civilization, then, “only humans can engage in ‘social’ activities such as reciprocity” (Nadasdy 2007). Familial relationships with other species as signified on Pacific Northwest tribal crests can even be perceived as ‘idolatrous’ (Turner 2004:233). Indeed the very terms resource and management are inconsistent with the relationship sought in “cherish” and “vision of the sacred”. “Cherish” is not strongly associated with consumer goods, nor do we think highly of ‘managing’ the people we love. Gould’s error if such it be, is to ignore the power shift whereby science and economics-as-science (Nelson 2010) have become the dominant political rhetoric.

There is as yet, then, no coherent “vision of the sacred” to which to appeal. Lacking a concept of the ‘secular sacred’ that spans different forms of religion and spirituality without violence to their specificity, the language of commerce has been allowed to extend far beyond its proper sphere (Somerville 2006:74-6; Sandel 2012:7).

4.2 Informing principles of an alternative valuation

Accurate interpretations of historical circumstances require a full examination of the context to understand why people believed and acted as they did. Applied to the fishery, this principle requires understanding why Aboriginal people knowingly participated in fisheries which violated their culture and traditions (Jones 2000; Pitcher and Power 2000; Lucas 2007) and the revulsion felt by North Sea fishers forced by EU regulations to discard almost half of their catch (Fearnley-Whittingstall 2010). This principle requires, that is, that we move from facile judgments of greed and stupidity to recognition that both BC Aboriginal and North Sea fishers are actors in a long drawn out tragedy. The trope of tragedy is enhanced by the Greek chorus of scientists and economists prophesying ecological and economic doom. Even the ‘faceless bureaucrats’ who administer these systems are caught in the *realpolitik* of an economy where the economic value of fisheries is negligible (Table 2.1) and so subject to tradeoff against other economic sectors.

In general, any analysis of a situation must look for explanatory context, before pouring scorn on others’ behaviours that strike us as absurd or just plain wrong. For this reason, it is incorrect to dismiss efforts to value nature in monetary terms as the equivalent of mediaeval discussion of the number of angels that could stand on a pinhead. Both are attempts to represent where the physical and spiritual worlds meet. The angels and pin exercise fails because in the sacramental view, things are not material or spiritual, but both. The economic valuation fails because, as the song goes, “money can’t buy me love”. In like manner, the consideration of economic valuation needs to be understood as an exploration of humans’ relationship with the planet (an honest, but inescapably incomplete way to cherish the earth) rather than a doomed effort to quantify the unquantifiable (Haggan 2011). As Daly and Farley (2011) remark, “...ecological economics

adopts a kind of ‘practical dualism’, which they define as entailing: ‘...the mysterious problem of how the material and the spiritual interact.’”

“Creative Justice” (Tillich 1960) seeks to reunite the separated, such as the separate realms of science and religion, or fishery sectors set at odds through the politics of scarcity (Haggan 2000). The motivation for both is love—a passionate desire for the flourishing of the world, its people and creatures and commitment to conserve and protect them against depletion and extinction. Love has entered the scientific literature through Leopold’s land ethic, the concept of *biophilia* (Wilson 1984; Kellert 1999) and as the primary motivation for conservation. Love likely underlies the dedication, passion and stamina that keep scholars working through setbacks (Einstein 1954) and in spite of the scorn of their peers²². Love underlies the passion and dedication of resource managers in their quest to ensure the flourishing of both fish and fishers. Love as compassion and desire for flourishing is central to the language of religion, but is not part of the resource management or ecosystem-based management lexicon, although some have suggested it should become so (Millar and Yoon 2000). Religious and spiritual leaders and artists have yet to be accredited as having expertise pertinent to marine ecosystem-based management or social-ecological systems.

4.3 Tipping points and repentance

Generally speaking, people don’t understand the web of marine social-ecological relationships well enough to understand what has gone wrong, or how to fix them. Climate and ocean

²² Dan Shechtman was hounded out of his lab for the research on quasicrystals which 30 years later earned him the 2011 Nobel Prize for chemistry (The Royal Swedish Academy of Sciences 2011). Peter Higgs whose work informs the Large Hadron Collider had to fight through the scorn of colleagues (Quoted in *Nova*, “The fabric of the Cosmos”-- <http://www.pbs.org/wgbh/nova/physics/fabric-of-cosmos.html> Accessed 28/5/2012).

scientists talk of tipping points where rising temperature and ocean acidity will threaten life as we know it. Humanity can't do much long-term harm to a planet that is 4.7 billion years old, but we can make it "hideous for our children" (Margulis 1986). Avoidance of an ecological tipping point, then, requires nothing less than a redefinition of the quality of life. In religious terms our 'repentance' would involve not only turning away from destructive action, but returning in gratitude to the planetary systems which cradle and sustain us—"... a change of consciousness that includes rediscovering that love of nature that animated the minds and souls of our ancestors" (Maathai 2010: 103). This requires a change of heart and the vigorous promulgation of a message that the quality of life, what we can term belonging, happiness, harmony or peace, cannot be equated to income (Sachs 2011) or measured in any currency other than what ecologists, economists, philosophers and theologians understand as flourishing of the biotic community (Leopold 1949; McFague 2001). This can also be appreciated in the negative—a visceral hatred of waste (Fearnley-Whittingstall 2010) and rejection of "conspicuous consumption" (Veblen 1927) designed to show status, or "invidious consumption" (Lapham 2003) designed to provoke envy. The call for a change of heart, repentance, 'returning in gratitude' requires that the spiritual leaders of today add their voices to the dialogue, along with the scientists whose skills it is to tease out the web of sick and healthy relationships, and the economists' ability to suggest the most efficient means to enhance those that are life affirming and life giving (Arrow *et al.* 1996; Ludwig 2000).

4.4 Vision, principles, outcomes and virtues

The relationship between 'vision', 'principles', 'outcomes' and 'virtues' is used throughout this dissertation as follows. 'High level' principles advanced to guide our spiritual and moral relationship are distinguished from 'operational' principles which are linked to a specific

measurable objective such as maintaining a fish stock at a particular level or the number of salmon that must be allowed to escape the fishery to maintain the population (Jamieson *et al.* 2010). Both are ‘should’ statements, both seek justice or fairness as outcomes, but there is a profound difference in our ability to measure the result. Principles demand a response. For example, a view of salmon as a gift engenders responses of gratitude, personal restraint and sharing with others; a view of salmon as a species or commodity requires maintenance of some measurable level of abundance and related economic return. Principles can thus be articulated in the active voice, as opposed to the ‘characteristics’, such as complexity and connection, sometimes advanced as principles in the ecosystem-based management literature (e.g., Arkema *et al.* 2006).

A vision describes an ideal state of the world, an aspiration that relates to our traditional norms and evolving concepts of justice, rightness, who we truly are and what we would like our children’s children to inherit. The following two vision statements present these goals in rather different ways. The first comes from the scientific ecosystem-based management literature, the second from a Pacific Northwest Aboriginal source:

“a healthy economy and thriving natural ecosystem... that is resilient to changes, has built-in redundancy in its components, and has a representative sample of the diversity of species and habitats that characterized the historical state. (Levin et al. 2009).

The abundance that nature presents is available to us, to provide us with the energy we need, with food, materials, medicines, and all the richness, beauty, joy and wonder that fills our days. In turn, all the other lifeforms who share their existence with us – and all those to come – depend upon us not to squander them or use them carelessly, to be mindful of their fragility and to assist them, in every way we can, to live and thrive as vibrant populations along with ourselves. (Brown and Brown 2009).

Principles stem from a concept of what or how the world is, a state or characteristic. Principles thus link an ‘*is*’ to a ‘*should*’ statement. The ‘*is*’ statement derives from a particular understanding of what the world is and how it came to be (ontogeny). The ‘*should*’ statement relates to an ideal version or vision of the world. In either case, principles are linked to outcomes. In general, science is more comfortable with measurable outcomes such as the number of salmon that should be allowed to escape the fishery to spawn than with high level principles or “conceptual objectives” such as ecosystem health (Jamieson *et al.* 2010). Principles such as gratitude, humility, repentance, atonement, compassion and the Golden Rule are generally taken to be the province of religion. In each case, the work of implementing a principle can be understood as a virtue, for example, the “epistemic virtue” (Carlson 2007; Fricker 2007) of attention to perspectives currently deemed inadmissible, “incommensurable” (Povinelli 2001), “discrepant” (van Zyl 2009), or immiscible (Gould 1997). Virtue derives from *virtus*, “strength”. Plato (ca 375 BC) identified four cardinal virtues—Prudence (or wisdom), temperance, courage and justice, of the classical world as principles to live by. Christian tradition identifies three theological virtues, faith, love and hope as principles that make life worth living. Courage enables us to face up to challenge and danger, temperance equates to restraint in what we take out of the sea and what we put in, prudence = precaution, and justice relates to both spatial and temporal distribution of costs and benefits, deconstruction of subsidies, licensing systems, scientific, management and capital structures that perpetuate depletion and the creative work of bringing discrepant knowledge traditions together.

4.5 Core concepts

Core principles, concepts and terms throughout are, where possible, described in both the language of religion and the language of science. The degree of consonance or extent to which

these complement each other sets the stage for exploring a more complete set of principles for the flourishing of the coasts and oceans and all who look to them for their cultural and physical survival.

4.5.1 Faith as the driver of research and conservation

...the moral response...is to reimagine conservation as the expression and defense of all things worth loving in this world...(Forbes 2001; cited in Nabhan 2004).

Faith is believing something into flourishing – it is an act of love. Love for the people, places, plants and animals of our special places, formative experiences and scientific investigations means believing them into flourishing as opposed to ‘mere existence’ (Krutilla 1967; Attfield 1998). This is the opposite of the kind of fundamentalist thinking excoriated by Richard Dawkins (2006) and Christopher Hitchens (2007). The denial of the language of love and relationship in science is an epistemic injustice that keeps scholars apart when numerous collaborative projects show there is no need (Daly 1995; Hobson and Lubchenco 1997; Coward *et al.* 2000; Ommer and Team 2007). Scientists’ belief (faith) in science is well grounded for matters such as understanding the origins of the universe, ecological or economic relationships or the solving of ‘problems’. But their belief in the ability of science to deal with wicked problems without cooperation from other kinds of knowledge is misplaced. Science can tell us a great deal about ecosystems and social-ecological relationships, but faith in science runs into a wall when concepts of fish stocks and ecosystems encounter spiritual and religious beliefs in the goodness, providence and holiness of what science can only speak of as a species or a system (Šunde 2008; Brown and Brown 2009; van Zyl 2009).

4.5.2 Spirit and spirituality

Spirit is the creative flow which religion understands as the Spirit of Creation and Indigenous spiritual traditions as the ancestral and transformative relationships between people, animals, plants and spirits of the lands and waters. It is what life scientists call evolution and theologians and Aboriginal people understand by the ongoing process of creation. This creative flow can also be conceived as the process of forming, deforming and reforming whereby the elemental particles of the universe develop into ever more complex forms (Mackey 2007). Spirit is the recombinant power of a universe that tends towards flourishing. It is why a bird is not a fact, but a step between a dinosaur and something yet to be *and* a joy in itself. It is the untold thousands of populations of Pacific salmon that ebbed and flowed through the Pacific Northwest since the last Ice Age, shaping and being reshaped by people who ‘became indigenous’ (see Chapter 1) as the ice receded and forests grew. It is the root of ‘inspiration’—where one idea flows into another, emerging in art, scientific theory and what theology understands as “revelation”. It is the belief that drives the artist, scientist and mystic in all of us to ask new questions or to face down the border police (Caputo 1997; Neis 2011). It is recognition of the difference between ‘you’ and ‘me’ and the spark that jumps between: I: Thou rather than I: it (Buber 1937). Wood (2000:81) articulates what might be a spiritual definition of biodiversity as an “emergent property of collections of entities, the benefits of which are more than the sum of its manifested parts and are essential for the well-being of humans.”

Spirituality is the circle of attention-learning-knowledge-practice-attention or ‘mindfulness’ that attunes and socializes us to the other entities that co-create our world. The education of young people in traditional fishing and agrarian societies steeps children in the world from their earliest age. Children were taught to attend: to understand and to respect animals, plants, seasons and

weather through watching, participating and listening to the stories and teachings of family members (Turner 2004; Narcisse 2007; Green 2008). Traditional education looks at the web of relationships and the beings or things that exist at the intersections and inhabit the interstices. It understands species, but is acutely aware of the ‘unevenness’ within species. Some animals are ‘leaders’ or ‘keepers’, not only especially fecund, but with the knowledge to steer herds away from traps and abilities to pass on to others (Pierotti 2010).

Traditional education and knowledge is deeply attentive to roles and relationships such as the cooperative hunting that occurs within and between species (Pierotti 2010). This has also been observed in reef fish (Bshary *et al.* 2006). This lumpiness within species creates dramatic differences of fecundity in fish (Hauser *et al.* 2002) and seagulls and enables extraordinary rapidity in adapting to changing habitats and conditions (Pierotti 2010). Science is as much a spiritual activity today as it was to the ancient Greeks who saw natural science, philosophy and theology as a coherent search for the “ultimate creative agency” in the universe (Mackey 2007). Scientists who seek to understand the origins of life and tease out the relationships whether in climate or ecological models; are theologians. Lest this seem far-fetched, it was the Southern Baptists, of E.O. Wilson’s famous appeal to attend to creation (Wilson 2006), who now accept the findings of science, uncertain as they are, as ongoing revelation to which they must respond by educating their followers on climate change (SBECI n.d.).

Spirituality seeks an emergent order in the world (Dillard 1974; Urion 1991), which can then be enhanced by human activity to enrich human life in turn (Kellert 2003). Walters and Kitchell (2001) describe how large predatory fish ‘cultivate’ their range by consuming smaller fish which would otherwise prey on their eggs and young. There is no sense of intentionality, but the

‘cultivated’ systems remain stable and, in the case of Atlantic cod, sustained annual catches of 200 tonnes until fishing power exceeded productive capacity. This emergent order has a kind of perfection. Annie Dillard’s pond of water lilies is beautiful, but each individual flower has some flaw (Dillard 1974). This ‘perfection of the imperfect’ is contrasted with the vicarious experience of nature provided by aquaria displaying perfect specimens in gin-clear water provided courtesy of corporate sponsors, whether in the US (Davis 2005), or by a recent donation of \$12.5 million from the mining giant Teck Resources to the Vancouver Public Aquarium (Fumano 2012). The emergent order is achieved at tremendous cost of those lives that went to feed others (Beston 1928; Dillard 1974) and visible in the scarred but beautiful bodies of survivors.

4.5.3 Epistemic injustice

The core assumption that justice is the norm and injustice an aberration breaks down in the case of “epistemic injustice” defined as a wrong done to a person or group “in their capacity as a knower” (Fricker 2007). Epistemic injustice comes in two forms:

- *Testimonial injustice* occurs when someone is disbelieved or given less credence because of ethnicity, gender, status, sexual orientation, etc.;
- *Hermeneutical injustice* occurs when a society lacks the concepts needed to express the injustice, as in the case of a woman experiencing sexual harassment in a society where the concept does not exist.

The first group of students to complete a new Aboriginal PhD program at Trent University gave a seminar with a general invitation to faculty members from all departments. Overall response was cool, but reaction to matters relating to spirituality was particularly negative (Haig-Brown 2008). Besides being unjust to indigenous knowledge holders, this “Epistemic racism” denies the academy, “opportunities to see the limitations of specific ways of knowing...” and impoverishes us all (Haig-Brown 2008).

If genius has any common denominator, I would propose breadth of interest and the ability to construct fruitful analogies between fields. (Gould 1980).

Miller (2007) tells how elders of the Coast Salish people of BC taught him, “You’ve got to be of good mind and have a good heart”. Newhouse (2008) asks how the “good mind” enters the academy. Non-Aboriginal members of the University of Trent review process for tenure and promotion of Aboriginal scholars don’t know how to deal with a summative comment that “X is a good person.” What possible relevance does a person’s “goodness” have to academic output? The question is answered by Haig-Brown (2008), “Knowledge is sacred...it always already acknowledges four dimensions—the physical, mental, emotional, and spiritual.” Kellert (2003) links human “physical, emotional, intellectual and spiritual well-being to the health and diversity of the marine environment. These four dimensions of knowledge are necessary for “a fully embodied way of being in the world” (Simpson 2011:94), and integral to the training for participation in whale hunting (Gardner 2006). The comment “X is a good person”, means that X has intellectual *and* heart knowledge, which is relevant and put to use in their community. Selection criteria for teachers and nurses—the caring professions—also include “demonstrating a virtuous character” (Clark 2006). The Pew Oceans Commission (2003:89) calls for “knowledge that can help to sustain the health, biodiversity, productivity, and resilience of marine ecosystems for future generations.”

Testimonial injustice acknowledges the validity of the knowledge of Aboriginal people, e.g., in all Canada’s environmental legislation, but fails to take this knowledge into science or day-to-day management. *Hermeneutical injustice* is exemplified by the exclusion of the concepts and practice of religion and spirituality from the world of policy, science and management.

Gould's doctrine of non-overlapping magisteria is creative in that it admits the language of religion to the dialogue, but insufficient in that it fails to recognize science as a spiritual practice inspired by awe and wonder, motivated by love and passion. It constrains economists to the language of costs and benefits. It denies the language of gratitude, repentance and restoration to resource scientists and managers. This meets the criteria for epistemic injustice or wrong done to persons in their capacity as knowers (Fricker 2007).

4.5.4 Tradition and religion as remembering forward

Tradition is what we take from the past to confirm our sense of who we are. The tradition of societies close to the subsistence base is informed by what they have learned about how to survive and live well with the other entities that co-create their world. These lessons are encoded in dance, sculpture, painting, myths and stories. Dances invoke the movement of salmon and caribou, the seasons of planting and harvest. The encoded knowledge necessary not just to survive but to flourish is constantly updated by an 'ethics of attention' (Rose 2007). 'Religion', literally translated as linking back, connects us to our vision of a just society as taught by the founders and prophets and interpreted in the light of current knowledge. Past norms of love and justice serve to critique the present and renew a vision of future justice that has to be believed and loved into existence. This is the 'prophetic imagination' as articulated by Brueggemann (2001).

Marine scientists calling for a sea ethic hark back to Aldo Leopold and Rachel Carson, the prophets of ecology. Religion as analysis of our heritage identifies what is life-giving, what destructive. Studies and projects which hark back to past ecosystem states, whether to promote awareness and love of the ocean—as with the Census of Marine Life (Yarincik and O'Dor

2005)—to ‘analyze the impact of fishing at ocean basin and global level’—as in the Sea Around Us Project (Pauly 2007) – or to deliberately to set a vision of the future (Haggan 2000) are prophetic insofar as they measure present poverty against past abundance to create a vision of future flourishing.

4.6 The language of religion

I love the trees and their colors...Once you plant them they grow taller than you. They speak to you, they provide shade to you. They protect the land from erosion. They give you fruits...They give you that sense of beauty and security. (Wangari Maathai, cited in Santana n.d.).

To love and feel compassion is to share the joy and grief of others. The notion of the ‘love of God’ is abstract and easy to dismiss by invoking the horrors perpetrated in “His” name. The love of the universe for itself, the love of (whatever you may name, or however you understand) the ‘ultimate creative agency’ is easier to believe in by thinking of someone who dedicated their life to understanding, protecting and cherishing some part of it. Consider Nobel Laureate Wangari Maathai and trees (Maathai 2003; 2010), fisheries scientists and fish, a teacher whose love of their subject fired you with a lifetime passion. Why do we care? Why do we fight for the animals, plants, lands and waters to flourish? We do it because we love them and would miss them desperately if they were no more. We believe extinction, depletion and impoverishment are ‘wrong’. We believe flourishing is ‘right’, but as scholars, we are denied the language of love, compassion, gratitude and contrition. We feel these things, they overflow in the ‘dedications’, ‘acknowledgements’ and the occasional ‘personal statement’, but they may not appear in our scientific and economic analysis.

This is the basis for appeals from the scientific declaration entitled “Preserving and Cherishing the Earth” to marine scientists calling on religious leaders to promote awareness of the need to preserve the oceans. If the sacred is an integral dimension of experience (Bateson 2008), if we share in the awe and wonder expressed by scientists from Einstein to Dawkins, if we see in others and ourselves elements of the immeasurable love that exists in all things—the desire for all beings to flourish, commitment to liberate all creatures from pain and delight in the happiness of others, if in short, we seek to live by the Golden Rule, (Armstrong 2011), then surely our governance and management frameworks should include these values and the religious or spiritual people who can speak for them. Fricker (2007) describes “epistemic injustice” as a wrong done to someone in that person’s capacity as a knower. I suggest that the denial of the language of love, joy, harmony, contrition and renewal goes beyond epistemic injustice; it is a sin against love. It leaves us with no way to represent the immeasurable while a ‘fact’ such as the price of a barrel of oil which hides our addiction to speed, comfort and power, dominates decision-making.

4.6.1 Ecological and spiritual intelligence

People fortunate enough to grow up in a culture where contact with other species is part of their upbringing are acutely aware of connections (Box I). This has been referred to as ecological literacy (Orr 1992; Capra 1996), “Ecoliteracy” (Armstrong 2000), “ecological awareness” (John Paul II 1990), a “dwelling perspective” (Ingold 2000) “cultures of habitat” (Nabhan 1997) or the “focal things and practices” that give meaning and joy to our lives (Borgmann 2000). Chief Simon Lucas (2008) of the Nuuchah-nulth nation refers simply to the “intelligence” which European explorers, dazzled by exploitable wealth, failed to see in his ancestors. Nabhan (1997:164) laments a new era when, “ecological illiteracy has become the norm. The Pew

Oceans Commission (2003, 91), calls for a “new era of ocean literacy”. Nellie MacLoughlin (2004) beautifully describes fish as “the literature of the sea”—what the interplay of sunlight, lands and waters has written into existence and which we can learn to read from earliest infancy. The Pew Oceans Commission is silent on emotional attachment, but the juxtaposition of a picture of a mother and child with their plea for ocean literacy (2003:91) speaks to a pre-scientific, pre-economic attachment.

Box I - Deep connections

Traditional fishing for Pacific halibut *Hippoglossus stenolepis* requires knowledge of multiple land-sea connections (Turner 2004:185). Lines are braided from the stalks of bull kelp *Nereocystis lutkeana*, that can grow to 60m in ocean waters. Young divers, who cut the stalks from their holdfasts on the seabed, practice holding their breath by pulling frondlets off the western sword fern *pila pila*. “Pila” means ‘one’ in the Salish language of Turner’s informant. The game is to take a deep breath, say ‘one’, pull one frondlet. The one who can strip the most stalk wins. The main fishing line of braided bull kelp stalks is tied to a crosspiece with two ‘U’ shaped hooks carved from knots of hemlock *Tsuga heterophylla*. Each hook has to be steamed using the bulbous float and hollow top end of a bull kelp stalk, then bent into shape. Barbs are fastened with yarn from the stinging nettle *Urtica dioica*, which is also used for the leaders, which fasten the hooks to the crosspiece. The piece of child’s play that cuts the kelp from the deep is inseparable from the act of lowering the line back to the deep. Halibut hooks were often decorated with carved human or animal figures (Stewart 1977). The art, the line that connects fingers to fish mouth, the prayer spoken by the halibut fisher (Boas 1921) and the value of the fish itself, are inseparable.

There are some 7,000 Indigenous languages (Davis 2009). Multiplying these by the very different local climates, landscape and species would yield a staggering number of different eco-

social-spiritual contexts, “cultures of habitat” (Nabhan 1997), “dwelling perspectives” (Ingold 2000), “natures-cultures” (Latour 1993:104ff) or “intelligence” conceived as the knowledge and wisdom of Indigenous people not perceived by explorers (Lucas 2008). BC has 26 language groups with 197 ‘Indian Bands’ recognized by Canada’s Indian Act, (Lucas 2007), each with numerous variants and dialects, and almost 10,000 populations of salmon in 3,600 rivers and streams (Slaney *et al.* 1996), although the number could have been as high as 14,000 before biodiversity loss caused by commercial salmon fisheries (Haggan *et al.* 2006). In each salmon run, some fish arrive early, most at a peak, while some trickle in late. These components were anticipated, celebrated and used in different ways. Each family has its own preferred way of harvesting, processing, sharing, preparing, trading, enhancing and celebrating. The collective knowledge and adaptive wisdom represented by these locally adapted cultures is what Davis (2004) refers to as the “Ethnosphere”, a term encompassing an incredibly diverse number of different ways of understanding and being in the world.

The spiritual dimension of nature might be described as a relationship between other living creatures, the physical environment and ourselves. Nature as a realm that is governed by immutable laws and understood only by natural scientists—whose business is to discover facts, which they believe must forever change the way politics and business is done—is a dysfunctional modern concept. This is attested to by the equal frustration of scientists, politicians and business (Latour 2004). In contrast, the pre-modern world was made up of different relationships between people, environment and biota. Humans like to see themselves as in charge but, as Pollan (2001) mischievously suggests, corn and wheat have hoodwinked us into transforming much of a planet for their benefit. It might amuse the Aztec corn god that North Americans eat more corn than his ancient adherents (Pollan 2006); he would be less amused that

transforming corn into biofuel was raising the price of tacos for their descendants²³. Corn or potatoes in Latin America, yams for the people of the S. Pacific, salmon in the Pacific Northwest, are not facts reducible to genus and species. They were and are spiritual beings who could be persuaded to cooperate, and which change in abundance, form, time of appearance, taste and texture from year to year. This understanding contrasts with a view of non-human species and attributes as resources.

4.6.2 Reticence and exclusion

Spirituality is still part of the everyday lifeworld of many traditional societies and fishing communities. When things go wrong, the deep thinkers and most acute observers—the holy people or ‘shamans’—are consulted for their deeper knowledge of connections. Such people are ecologically and spiritually literate. Many have been trained as traditional speakers and orators. The epistemic injustice that relegates religious and spiritual feeling and expression to private life limits the scope of what professionals in the field of ecology and environment feel free to report on. Exclusion of spiritual values from the discourse of science and economics and the practice of resource management has led to the privileging of quantitative information (e.g., Waring 1988; Daly and Cobb 1994; Poovey 1998; Gudeman 2008).

Scientists who venture into the territory of religion risk being written off as losing their grip or being of unsound mind (Jastrow 2000; Spash 2000). Reduction to a “single numeraire” is a prime concern of Daly and Cobb (1994) and the root of the problem of ‘misplaced concreteness’ (Whitehead 1925) where the power and balance of mathematical equations is taken as reality.

²³ Fidel Castro (2007) described conversion of corn to biofuel as “genocide”. The World Bank has also called for reconsideration of US and EU policies “which subsidize production...in light of their impact on food prices.” (Mitchell 2008).

The same applies to taking a model or metaphor as a literal description of reality rather than a useful way to gain insight into complex questions, whether it be as a way to express God or an ecosystem (McFague 1997). Epistemic injustice is a truly democratic concept. It extends far beyond Aboriginal people and scientists. Satterfield (2001) suggests that valuation survey respondents tend to “avoid expressions of value that come across as, to put it bluntly, flakey...”.

Relegating religious and spiritual feeling and expression to private life limits the scope of what professionals in the field of ecology and environment feel free to report on. Senior advisors to EU governments on climate change report that undue focus on the scientific and economic excludes the spiritual which they find personally important (Craig *et al.* 1994). In their exploration of the intangible value of parks, Harmon and Putney (2003) observe that, “the perceived invincibility of scientific and economic argument” renders people silent and unable to explain why they care. Aboriginal participants at a 2006 conference on BC marine and coastal ecosystems were concerned that, “spiritual aspects tend to be neglected, in part because they cannot be quantified” (Gardner 2006). A discussion panel at the 2012 American Association for the Advancement of Science meeting concluded that, “the path to a truly sustainable future is through the muddy waters of emotions, values, ethics, and most importantly, imagination...If we can't imagine a better world we won't get it.” (John Robinson, UBC, cited in Leahy 2012). Information alone is insufficient, “art can help us examine our values and have a discussion that's broader than just scientific facts...” “Art can provoke thinking and actually change people's perceptions of the complex issues associated with sustainability science,” (Thomas Dietz, cited in Leahy 2012). Dietz continues, “...we don't like to talk about our values or feelings, because it threatens our personal identity.”

4.7 Conclusion: towards the secular sacred

This chapter discusses the processes involved in becoming indigenous and illustrates how an eco-social-spiritual community speaks to the multiple ways in which human and non-human entities adjust to each other. The process of adjustment is, as we have seen, conceived as a conversation taking place over thousands of years (Figure 1.1) at the end of which time, all of the participants, people, biota and environment are profoundly changed. The extreme variability of local ecology and human response, leads to enormous eco-social-spiritual diversity, even within relatively short distances.

This conversation changed profoundly with the coming of European settlers to the Pacific Northwest. For the newcomers, non-humans were not ‘persons’, but ‘resources’. The realm of natural science applied to this latter ‘material’ world, which had no spiritual dimension for them although it continued in the minds of the indigenous peoples. The split between science and religion contributes to epistemic injustice, which discounts the spiritual perceptions of Aboriginal people and marginalizes or excludes the language of love and relationship from resource management. This split is formalized by Einstein’s realms of ‘*is*’, (i.e., that which is open to scientific investigation), ‘*should*’ (which belongs to religion) and the doctrine of non-overlapping magisteria (Gould 1997).

While the state of the oceans is cause for concern, there is also good reason to hope that the language of love and relationship can again inform resource management as it did throughout most of human history. One step is to hold a conversation between the practice of resource management scholarship and the core messages of compassion and extension of the Golden Rule, in order to care for depleted fish populations and damaged ecosystems.

Nothing less than a ‘meeting of the magisteria’ can bring the knowledge and moral authority of science, spirituality, art, religion and ordinary people to bear on policy and implementation. This leads inescapably to the conclusion that the magisteria—the realms of *is* and *should*—are already bridged by coastal communities for whom resilience and long-term survival is not an option, but an imperative. What is needed, then, is an affirmation, formalization and rebalancing of elements that are already contained in traditional and local knowledge, ecosystem-based management and social-ecological systems, as sketched in Figure 4.1.

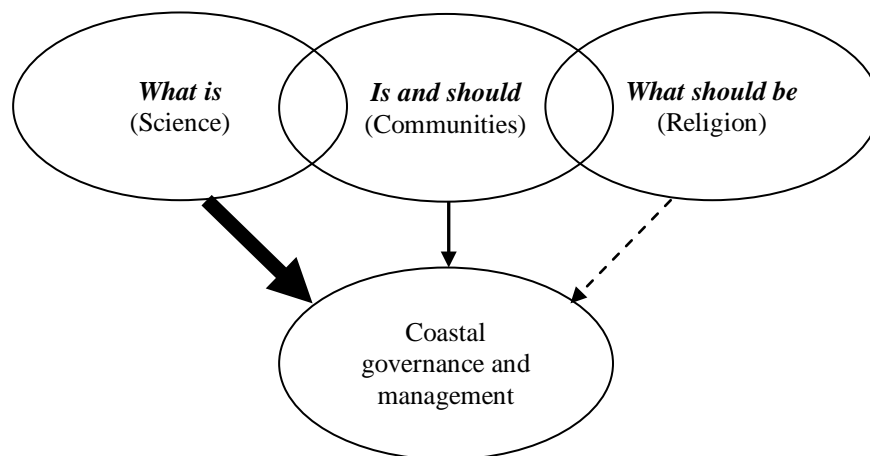


Figure 4.1 Three ‘magisteria’ that contribute to coastal and ocean governance and management. Weight of arrows indicates current influence and need to rebalance to reflect the moral authority of all three.

The relative weight of the arrows in Figure 4.1 signifies the uneasy relationship between science and local knowledge, and reservations about religion, attributable to emphasis on fundamentalism, intolerance and creationism *vs* faith, hope, love, compassion and justice. Evidence that the intangible, sacred or spiritual is important to many people prompts an examination of the concept of a ‘secular sacred’, which might rebalance what many feel to be undue emphasis on the scientific and economic. The secular sacred would then welcome the insights of spiritual and religious traditions without *belonging* to any of them. It would also welcome the perspectives of scientists, economists, artists and ordinary people. The metaphor of

a starfish opening a clam suggests how policy change might then become possible. The muscles that hold the clam shut are immensely powerful, but the starfish can exert a gentle but sustained pull for a very, very long time (Figure 4.2).

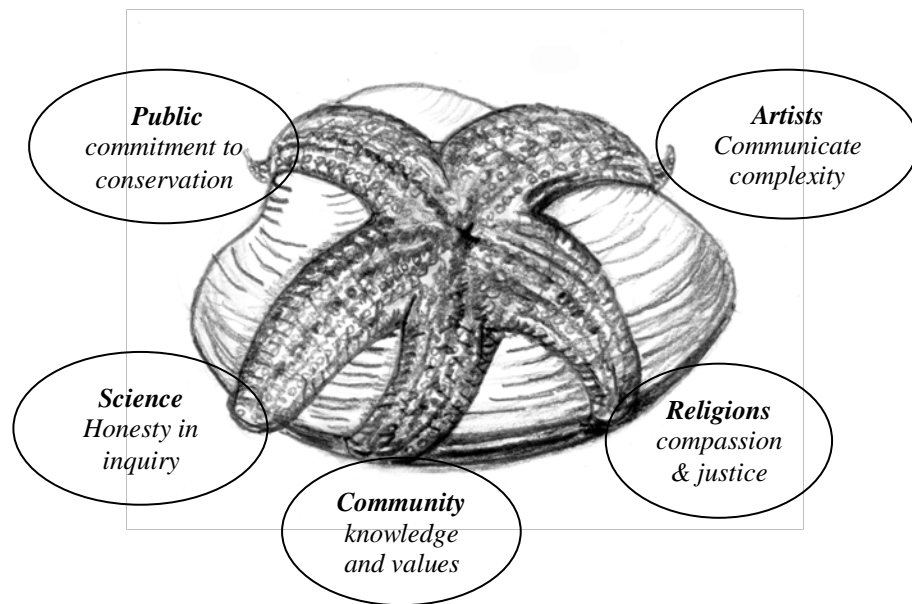


Figure 4.2 Elements of a more complete conversation on coastal and ocean values with potential to influence policy. *Pencil drawing courtesy of Emily Haggan-Köseoğlu.*

Three arguments have been advanced for the sacred as necessary, first, to confine the language of commerce and the marketplace to its proper sphere (Somerville 2006:74-6; Sandel 2012:7). Second, because ecology is so complex that you alter it at your peril, regardless of your intentions (Bateson and Bateson 1987; Peterson 2010)—as evidenced by the effects of pesticides on wildlife, acid rain on lakes and forests, and most recently climate change and ocean acidification. Third, to paraphrase Carl Sagan (1990), the planetary sacred is essential for preserving and cherishing the Sea, a logical extinction of Aldo Leopold’s (1949) land ethic of flourishing of the interdependent human and biotic communities.

There has been lots of discussion about why the sacred is necessary, and there are many examples of how the spiritual or sacred contributes to local management and sustainability, but

little about what the sacred *is*. This is dangerous ground—where angels fear to tread (Bateson and Bateson 1987). Nonetheless, we can say with some confidence that the sacred is recognizable by awe, wonder, mystery and fascination. That it seeks flourishing of the eco-social-spiritual community and is *recognized* rather than *assigned* by an external authority. At a local level, the sacred can be described as:

- *Emergent* from relationships built over the lifetime of peoples, communities, families and individuals;
- *Experienced and expressed* as relationship, identity and belonging;
- *Productive* of bio-cultural diversity as different ways of being in the world;
- *Implemented* by application of the Golden Rule to humans and non-humans;
- *Consistent* with grateful, respectful and generous use;
- *Resistant* to depletion, extinction and damage;
- *Resistant* to monetary equivalents;
- *Evident* in attention and dedication to the flourishing of relationships; and
- *Essential* to conservation, restoration and flourishing.

The power of the secular sacred to include the language of love, gratitude, generosity, cherishing and protecting at local scale is key to becoming indigenous to the planet. Drawing on all of these sources may well be what is needed to cherish and protect “our planetary home” as sacred (Sagan 1990), i.e., the secular sacred is relevant at local and planetary levels.

Modern humans are in the same position as every group of people who came up against limits since the dawn of time, except that we have encountered planetary limits. We have to become indigenous because there is no ‘next valley’ to expand into, no neighbouring tribe to conquer, no ‘New World’ to ‘discover’ and exploit. Unlike our forebears, we lack a common language in which to address the limits we have encountered. Instead, we have discourses including high level declarations from religions, science and international organizations, the spiritual traditions and practices of Aboriginal people and the predominantly scientific and economic discourse of

ecosystem-based management. Unlike our distant ancestors, or those few of us who still maintain a subsistence or small scale farming economy, we lack the opportunity to become socialized and attuned to the web of relationships. We are also torn between the scientists who tell us life has to change abruptly and the economists who tell us we can't afford it. How we may bridge these divides is the subject of the next chapter.

Chapter 5: Ways of identifying immeasurable values: Q Methodology

5.1 Introduction

Chapters 3 and 4 discussed present day approaches to marine management, the gap between science and religion, and the possibility that a conversation between the two could help marine management. This chapter now looks at various methods by which this could begin to happen. It examines ways in which immeasurable values could be elicited from people who would not normally be willing to speak of them, and then explains the reasons for the selection of Q methodology as the most appropriate for this study. The way in which we speak about metrics is incomplete for, while the inclusion of love and relationship does not change the fact of (or need for) measurement, it does challenge the manner by which quantities are measured, considered first in themselves, and second in their distribution. In this study, we ask now: do people who live and work on the BC coast think that spiritual, religious or immeasurable values belong in coast and ocean management?

Such values are often itemized in a list that includes: aesthetic, natural beauty, spiritual, moral, or religious (please see section 3.3). While inconsistencies and ‘irrational’ figures in monetary valuation can indicate that other values are in play, the challenge remains of how to represent those or to handle the belief that the world and its attributes are sacred: they are entangled with the eco-social-spiritual community (Chapter 1) to which individuals belong, or have come to know and love. Usually this is readily understood in terms of a place or places important to individuals, but it can also apply to a scientist working to protect fish populations, locally, regionally or globally. This interpenetration of values accounts for the increasing difficulty of a linear measurement of values, and for the fact that concepts, images and memories of experience

in nature have value that cannot be related to any standard market ‘good’ or any usual measure such as travel cost (Freeman 2003:142). Thus the view that, “difficulty of quantification aside, total economic value is the sum of *all* these components” (Dixon and Pagiola 1998) is difficult to sustain.

Freeman (1993; 2003) notes, however, that the same individual is capable of holding more than one value for the same thing²⁴. The question then becomes: how are these multiple values to be represented in both the policy framework for coast and ocean management and in local implementation? A cursory inspection of the Preamble to the Species at Risk Act suggests that one way to approach this would be to expand the list of experts for such valuations to include artists, spiritual and religious people, philosophers and ethicists as well as scientists, managers, resource users, coastal communities, etc. That is, there is a *prima facie* case that past and present inquiry processes on the BC coast (whether into missing sockeye salmon, sustainability of industrial salmon feedlots or the transport of tar sands oil) are simply not capable, as currently constituted, of addressing the moral, ethical and spiritual questions that major changes to the coast and ocean environment may entail.

The challenge of representing immeasurable values takes over where total economic value and ecosystem services leave off, since there are dimensions of human and non-human existence where the sacred (spiritual) values of cherishing and protecting are most appropriate, invoking (as they will) powerful feelings of love, commitment and passion for justice. Since, outside of Aboriginal and religious cultural traditions, there is a reluctance to introduce spiritual or religious beliefs in the context of resource management discussions, methods must be found that can elicit

²⁴ For example, loggers who love the woods, but make their money clearcutting (White 1996; Swedeen 2006).

such values and overcome the reticence noted in section 4.6.2. They also have to address the ‘duality’ issue of species, places and environmental attributes having *both* use *and* spiritual value. It must also be recognized that methods that succeed in demonstrating that spiritual values are critically important in one place may not be felt to be appropriate on a coast-wide basis, or to speak to the wider public on whose support a radical change in valuation ultimately depends.

5.2 Value elicitation methods

Value elicitation methods fall into two major categories: ‘palliative’ or ‘transformative’ approaches. The first seeks to compensate for a loss; the second seeks a more just and happy future situation. Palliative approaches are problematic: ‘substitutes’ may not work. Salmon farming jobs might possibly pay as much as commercial fishing, but they involve a profound change: from the independent fishing life-world with its demands of attention and attunement to the ocean, weather and other life-forms to what is essentially agricultural wage labour in a monoculture situation. Palliative methods tend to manifest themselves in the form of questionnaires or experts.

Fortunately, some palliative methods have the virtue of engaging a community and different agencies in a collaborative exploration of values and tradeoffs. “Value-Focused Thinking” (Keeney 1996) is an approach that identifies and clarifies the values in play in a particular situation: it has been applied to the BC salmon farming industry (Gerwing and McDaniels 2006). The “Damage Schedules” approach applied to fisheries by Chuenpagdee *et al.* (2001) bases management decisions on “predetermined fixed schedules of sanctions, restrictions, damage awards... based on community judgments of the relative importance of different environmental resources and particular changes in their availability and quality.” This approach provides

similar assessments across a surprising range of groups (Chuenpagdee 1998), suggesting that common values may be in play.

Value elicitation methods include one-on-one interviews where the researcher is front and centre, as well as deliberative methods that encourage group discussion and methods where participants reflect on the study materials with minimal input from the researcher. Face-to-face interviews have the advantage of direct contact and may allow researchers to relive the experience during transcription. Disadvantages include the potential effects of gender, age, ethnicity, appearance and personality of the interviewer, all or any of which may encourage or constrain responses, but can be mitigated if the interviewer spends sufficient time in the community or with the respondent that he or she become an interlocutor rather than an outsider. The combination of *rapport* generated, and the provision of some level of assurance by the customary ethical review process, can help to overcome any reticence that may exist about discussing deeply personal values. Interviews start with seeking to elicit the sacred at local level. This is important: it engages communities, researchers and other partners in an articulation of the values in question. By the end of the research process, the community has a report and/or a journal article or book that can help make the case against a development that would impact or destroy values that are important to them. Sadly, however, such values may be lost in the later translation to academic language (Lassiter 2001), or may even simply not be included in ‘environmental planning documents’ (Craig *et al.* 1994).

5.3 Transformative (or visionary) methods

Visionary or transformative approaches seek solutions outside the accepted framework. Advances in collaborative research have already proved transformative, for example

collaboration between archaeologists and marine ecologists has provided new insights into the interdependence of historic use and ecological communities (Rick and Erlandson 2008); collaboration between natural and social scientists, Aboriginal people, archaeologists, historians and others were crucial to computer simulation of past ecosystems in Northern British Columbia and elsewhere (Haggan 2000). The Just Fish project (Coward *et al.* 2000) widened research horizons by including theologians and ethicists. The later and more comprehensive Coasts Under Stress Project was transformative for both researchers and graduate students (Ommer and Team 2007:459-464). Collaboration between ecologists, economists, communities and others in developing ecosystem services approaches has been transformative for all concerned (Daily 1997). Indeed, the work of ecosystem services can be seen as a return to a fuller relationship with the planet, while, despite real concerns about the emphasis on monetary value and GDP, the term itself can be seen as a returning to the gift paradigm, i.e., what the planet provides without charge, however inappropriate the metric.

Transformative value elicitation methods engage the perspectives of all participants in developing a vision of the future they would be proud and happy to live in. This seeks to get past the stale metaphors of what is on or off the ‘table’, in or outside the ‘box’. The starting point may well be deconstruction. Donald Woods (1987:60) quotes Nigerian activist Steve Biko as saying: “We are aware that the white man is sitting at our table. We know that he has no right to be there; we want to remove him from our table, strip the table of all the trappings put on it by him, decorate it in true African terms, settle down and then ask him to join us on our terms if he wishes.” Chief Simon Lucas of the Nuuchahnulth nation in BC articulates a vision of renewal for the fisheries of his traditional territory:

And in my vision, hundreds of thousands of sockeye swarm again in Tofino River and the Kennedy River. They spawn in Kennedy Lake and its tributaries. And in my vision, seiners and gill-netters, spaced out along Browning Passage and Tofino Inlet, respectfully sharing in the bounty of the sockeye returning to Kennedy Lake as they once did. Native and non-native fishermen sharing this abundance as freely as they once did. (Chief Simon Lucas 1988).

Chief Simon's vision is one of gift and generosity. The principle of reciprocity or cherishing rejoices in salmon 'swarming' to spawn, recognition of the generosity of the gift in the fish encourages generosity in sharing between traditional and more recent users.

Visionary methods seek to rebuild individual, family, community and ecological health. Restorative methods engage whole communities in processes designed to envision what Brueggemann (1997) describes as the "proposed" world, as in Steve Biko's "African table" and Chief Simon Lucas' vision of thriving of a community that embraces lands, waters, people and salmon. It is in marked contrast to rhetoric that simply chastises consumptive behaviour and equates necessary cutbacks with a reduced standard of living measured by material goods rather than transformative change to a better quality of life.

Visionary approaches are those that assist participants in conceptualizing, designing and achieving their proposed or ideal world as opposed to accepting compensation or settling for someone else's idea of what is appropriate. Appreciative Inquiry (Cooperrider and Srivastva 1987; Seel 2008) is designed to promote transformational change, generate new knowledge and new processes and generative metaphors. The method is claimed to be *appreciative* because it deliberately identifies individual and organizational strengths and best performances rather than focusing on trying to fix failures. Appreciative Inquiry has been used by a range of religious, educational, scientific, business and other organizations (Bushe and Kassam 2005).

5.3.1 Penalty metrics

Another way of judging the seriousness with which society takes a resource is to measure the severity of the penalties that are handed down for infraction of the rules governing management of the resource. For example, in Western society, the highest penalty attaches to murder (MEA 2003: 144). In some aboriginal societies the death penalty was applied to those who violated their rules for fishing (McIlwraith 1948). Today, penalties for overfishing, damage to and loss of fish habitat are often deemed inadequate by those communities directly affected by such behaviour, but they are ‘in scale’ with a GDP-based perception of fisheries value (Table 2.1).

Penalty metrics provide an ordinal ranking for intrinsic value (Callicott 1994), since “legal and social consequences” provide some measure of the degree of value ascribed (MEA 2003). Satria (2007) describes how social sanctions or ‘shaming’ ensure compliance with traditional management in Indonesia. Benefit-cost analysis of environmental policy choices may incorporate a constraint to ensure that certain conditions reflecting intrinsic value are not violated (NRC 2005). The problem with the practical application of this metric is, however, the absence of an agreed-upon intrinsic value for non-economic factors such as in the case of the possible extinction of the Cultus Lake sockeye salmon versus calculable economic loss (Canada 2004) or the implementation of hydroelectric power versus a small fish of no commercial (but possible ecological) value (Spiller and Tiller 1996).

5.4 Eliciting place-based values

Several recent studies have addressed the problem of the reluctance of some persons and communities to express or discuss place-based spiritual values. Klain (2010) has sought to determine if a survey weighted equally between monetary and non-monetary values could

overcome the emphasis on “biophysical considerations” that can result in “intangible cultural and social values” being ignored or unevenly represented (Klain and Chan In press). Map-based interviews were used to elicit the monetary and non-monetary values held by 30 people who were actively engaged in marine ecosystem-based management or making a living from the ocean on the north end of Vancouver Island. Interviews started with open-ended questions on how they came to be associated with the ocean and the links they perceived between ocean health, personal and community well-being.

In step 2, participants were asked to outline areas important for livelihood in green on a marine chart. Interviewees were then asked why these areas mattered to them, and to indicate relative value by assigning 100 counters between the areas. In step 3, participants were asked open-ended questions about cultural ecosystem services in order to encourage participants to reflect on connections between place and non-monetary values such as, “heritage, identity, activities including subsistence food collection, spirituality, art, education and intergenerational value.” In step 4, participants were asked to outline areas with high non-monetary values in blue, and indicate their relative importance by distributing 100 “tokens” representing non-monetary value. The interview concluded with questions about those ecosystem service values that participants felt were under threat. Threatened areas and sources of threat were outlined in red, and the intensity of the threat was captured by 100 ‘threat’ counters. Generalized threats such as climate change, pollution, acidification and debris were noted but not mapped.

This methodology was quite effective in eliciting and mapping monetary and threat value, but was unable to overcome the refusal by “a sizable minority” to answer spatial questions on non-monetary value. Significant overlap showed that the categories are not discrete, one respondent

going so far as to suggest that to delineate one space as ‘special’ was to open others up to wholesale exploitation. That said, significant value was attached to non-monetary categories, with “spiritual value” rated highest of all intangible or non-market values, although still an order of magnitude lower than the market value of eco-tourism and almost seven times lower than the non-market value of biodiversity. This may arise out of the ecosystem services approach, which considers spiritual value as one of a list of ‘services’, not as an integrative dimension of experience (Bateson and Bateson 1987:2), or the prime human motive of cherishing and protecting the environment.

The study found, however, that participants were willing, indeed eager to discuss deep emotional attachments and spiritual perceptions. Indeed, the breadth of spiritual concepts that emerged indicates that, at least for some respondents, spirituality is integral to their lives, and not restricted to ‘special’ places. One respondent related the catching, cooking and eating of salmon and the flow of nutrients through the body of her family to the life-giving role of salmon to the entire coast; another perceived an identity between the flow of blood and the tides of the sea. It is noteworthy that respondents assigned more relative value to areas associated with spirituality than any other intangible non-monetary value (Klain 2010:Figure 3.5).

In another study on place-based values, Pike *et al.* (2010) set out to review the social value of marine and coastal protected areas in the UK since this had been “largely ignored relative to conservation and economics” because tools for intangible value are largely lacking. Rising prosperity has brought about assessment of ‘amenity value’ (Krutilla 1967; Berman and Sumaila 2006), while increasing pressure on lifestyles is serving to make “aesthetic qualities and spiritual value” more important (e.g., Harmon and Putney 2003; Verschuuren 2006). Pike *et al.* (2010)

conducted 24 structured interviews with marine conservation area practitioners who were asked to rank nine “social criteria”. “Ecological interest” scored highest at 110 points out of 120, with “Spiritual value” last at 31 points. The researchers attributed the low ranking to “less organizational interest”, although one participant interviewed on an “Area of Outstanding Natural Beauty” observed that, “Countryside and landscape should be about spirit. I think this means heart and soul and mind to a lot of people.” Pike *et al.* (2010) concluded that the disparity between management agency and practitioners’ priority reflects the need for a fuller understanding of all social values.

There are also some studies which show that the concept of ecoliteracy as the incorporation of a broader base of values is taking hold. Morgan (2006) speaks of the Maori concept of *Mauri* as the “binding force between the physical and spiritual” (Durie 1998) and a “common attribute of all things”. *Mauri* pervades all aspects of existence, but can be thought of as a nested structure corresponding to family, community, cultural and environmental well-being, i.e., a “culturally-based template within which indigenous values are explicitly empowered alongside ‘western’ thinking (Morgan 2006:Figure 2). The *Mauri* concept implies responsibility at all levels. The “physical and spiritual integrity” of the ecosystem is reflected in the vitality of all its attributes and creatures. The well-being of the environment reflects well or badly on the “identity standing and authority” of the *hapū* or clan group and their ability to care for lands and waters and pass knowledge to the next generation. “Community” includes the traditional owners, the non-Maori population and Maori from other regions. Community well-being includes present and future needs for land, water, housing, employment opportunities, access and ability to enjoy the tangible and intangible attributes of the environment. The consequences of change in environmental state, including monetary cost are thought to be best assessed at family (*Whenua*)

level. The *Mauri* concept of social groups as embedded and responsible for the environment is consonant with a concept of “Ecoliteracy” developed and taught by the Okanagan people in BC and the US (Armstrong 2000) and the multiple levels at which Indigenous knowledge operates (Berkes 2008 Figure 1.1).

5.5 Values at coast-wide or national scale

Methods discussed so far rely on values and knowledge related to specific places. The question of what values should operate at coastwide scale, or in questions such as salmon farming, or the proposed Enbridge pipeline from the Alberta tar sands to the BC coast, requires more general principles that can then be adapted to local situations. The economic arguments are clear. The climate of fear, outrage and violation that motivates protest is also clear, but harder to represent in the absence of a consistent mechanism for including the values and qualities that are perceived to be violated in the process itself and the fear of loss of community social, cultural, economic and spiritual identity. As Brunk (2004) observes, there are entire dimensions of moral concern that are not part of such assessments. The sacred and spiritual values perceived to be at risk cannot be adequately represented or spoken for by social scientists with any consistency or comfort as witnessed by the struggle of anthropologists to report experiences which clash with reality as understood by natural science (Goulet and Miller 2007 and contributions therein). They can only be spoken for by the people themselves.

Where this authority runs counter to accepted wisdom, there is a need to include spiritually literate experts alongside the social and natural scientists. Until this is done, the spiritual dimension of projects will be unspoken for until someone, probably Aboriginal, brings it up. This narrows the spiritual to belonging only to Aboriginal people and puts them in the invidious

position of sole spokespersons for the sacred while they also have to protect their very real economic interests. Burton (2002) gives two examples where rulings to protect Aboriginal sacred sites were challenged in court on the basis that spiritual considerations are inappropriate in resource management or “irrelevant” in environmental assessment (Howard and Widdowson 1996).

5.6 Deliberative democracy

Deliberative democracy is based on the proven ability of a jury of twelve ordinary people to reach a just decision when presented with sufficient evidence, argument and time (Sagoff 1998). The approach is considered to be a balance between reliance on ‘experts’ who may be out of touch with public concerns and the information overload confronting lawmakers faced with multiple and complex decisions. The BC Citizens’ Assembly on Electoral Reform that examined and recommended on proposed changes in the BC electoral system is a good example (Ratner 2005). Kopp and Portney (1999) propose something similar in ‘mock referenda’. Deliberative democracy has been applied in BC to the ethics of sequencing the wild salmon genome (Tansey and Burgess 2006; Secko *et al.* 2008). The project provided 25 ‘average’ British Columbians with information on salmon and genomics through background information, expert presentations and two weekend retreats facilitated by a team of researchers and doctoral students. The intent was to determine the effectiveness of the approach in providing advice to policy-makers. Participants report that initial feelings of overload and lack of confidence in their ability to provide policy advice gave way to increasing comfort as materials were digested and discussed, leaving them with a sense of the value of the process and of their contribution to it. Secko *et al.* (2008) conclude that applying deliberative democracy to complex issues is an important step towards democratizing science policy and technology development. It is also suitable for

“highly polarised and potentially divisive” topics (O'Doherty *et al.* 2010).

A 2010 seminar on the project at the UBC Liu Centre reported that Aboriginal people played a strong role, most notably in the introduction of spiritual considerations in sequencing the genome of wild salmon. This perspective was widely appreciated by the researchers and participants, as indicated by session transcripts, but was absent from the project design and initial ‘expert’ presentations to the participants (O'Doherty and Burgess n.d.). The analogy to a trial by jury is striking. The ability of 12 citizens to reach a just and fair verdict is a cornerstone of civil society. The strength is that when all the evidence has been heard and all the arguments made, the jury then retire to consider their verdict. They do this as whole persons, with their entire complex of beliefs and values, in the absence of ‘experts’, whose words may linger but whose personal presence and power are offset by their own reflection and the views of other jurors. Failures in the jury process are generally attributable to incomplete or slanted evidence. Deliberative democracy would be suitable for consideration of a policy framework for the coast and ocean, but would require a research project beyond the scope of this dissertation.

5.7 Q methodology

Various social and political factors often block the emergence of good ideas - e.g., the presence of an overbearing leader, the loquaciousness of some actors and the shyness of others, conventional and doctrinal thinking, the political climate, etc. (Gargan and Brown 1993).

There are two methodologies that remain to be discussed: *R* and *Q* methodologies. The core difference between *Q* and *R* methodology is that *Q* (named after the type of factorial analysis used) seeks in-depth understanding of individual thinking, while *R* attempts to understand a population through a representative sample (Shilin *et al.* 2003 Table 13-2). Webler *et al.* (2009)

summarize the difference between *R* and *Q* methodology as follows. The population for *R* is a *representative sample of the general public*, for *Q* it is a *representative set of statements*. The goal of *R* is to find patterns in responses to different survey questions. In *Q*, the goal is to find patterns in the rankings of different statements in different *Q* sorts. A good survey question deals with one thing at a time, is clear, so that all respondents interpret it the same way and can be read and reacted to independently of the previous question. In contrast, good *Q* statements have “excess meaning”, i.e., can be interpreted in different ways by different participants, but too much “excess meaning” will create problems of interpretation. *R* methodology, that is, is a survey methodology designed to identify the acceptance or rejection in the broad population of a product or proposition. *Q* methodology on the other hand, is a way to identify common interests that may exist in areas that the media tend to portray in black and white, or that get lost in the “emotional turmoil of political debate” (Clarke 2002). *Q* is particularly effective in capturing voices that are not normally heard (Brown 2006). For these reasons, then, *Q* is the appropriate method for this study.

Useful introductions and summaries of the range of topics covered in *Q* studies are found in Brown (1993), van Exel and de Graaf (2005), Webler *et al.* (2005) and Hooker (2002). There are six steps in a typical *Q* study (e.g., van Exel and de Graaf 2005; Swedeen 2006). The first step is to identify the topic or area of interest. Step two is to identify the full range of perspectives, or “communication concourse” (Stephenson 1978; cited in Addams 2000). This can be done through workshops, documents and internet sources, interviews, news media or any combination. The concourse is considered complete when no more diversity of opinion is discovered (Brown 1993 cited in Swedeen; 2006). The third step is to boil down the concourse to a manageable but representative number of statements, the ‘*Q* sample’. Step four is to select

participants holding the widest possible range of views in the concourse. Step 5 is the actual Q sort where participants rank the statements. This can be done in a workshop, by mail or on the Internet. Ranking is a two part process. Participants are first asked to read and sort all the statements into three piles—*Agree*, *Disagree* and *Neutral*. They are then asked to re-read the *Agree* statements, select the one with which they agree most strongly, and place it on a scorecard, e.g., under “4” in Figure 5.1. They are next asked to place the statement they most strongly disagree with under “-4” and continue to alternate between positive and negative statements until the card is full.

[illegible]

Figure 5.1 Scorecard for Q study with 38 statements.

The shape or “kurtosis” of the distribution depends on the degree of controversy. Where interest or the number of statements expected to be relevant is low, the scorecard would approximate a normal distribution. A scorecard for highly-contested topics such as wild salmon vs industrial salmon feedlots or the Enbridge pipeline would be flatter to allow for more extreme statements (van Exel and de Graaf 2005). In step five, statistical (factor) analysis is used to extract ‘typical’ Q sorts which represent distinct collective understandings of an issue. These do not so much mirror any one person’s ranking, but rather a particular a way of seeing the world (Stephenson 1962). In step six, the highest and lowest ranking statements in these typical Q sorts are used to describe shared perspectives.

Q has been applied to contentious issues including sustainable forestry in Washington State, (Swedeen 2006) and reintroduction of large carnivores to farm and rangeland in the US Rocky Mountains (Mattson *et al.* 2006). *Q* has also been used in the marine sector (e.g., Fairweather *et al.* 2006 fisheries; Wilson 2007 ocean policy). Addams (2000) notes that, “In *Q*, each person is not being matched or scored against any outside criterion... ...*Q* is therefore a ‘reconstructive’ technique, as it allows subjects to speak for themselves, and incorporates their subjectivity into the analysis.” A web-based project was selected because of the prohibitive cost of a workshop involving all perspectives on the BC coast. Studies reviewed by van Exel and de Graaf (2005) revealed no real difference between computer and workshop formats, except that workshops allow for brief exit interviews which help the researcher to develop a better understanding of the topic and a more insightful interpretation.

Shilin *et al.* (2003) used *Q* to investigate the variety in how scientists thought about ecological concepts and problems. *Q* methodology was selected based on the need for a psychological and social method to determine underlying ‘beliefs’. Beliefs, as opposed to ‘opinions’ and ‘notions’, are not easily found in the concourse, but emerge through the course of research (Stephenson 1967). The “*Communication Concourse*” consisted of statements drawn from “ecologists, philosophers and environmental thinkers” from different “schools of thought”. The final selection of 39 statements was reviewed by experts. The participants were 30 people from different states, universities and agencies, young and old, but all actively engaged in assessment of the coastal environment.

Six distinct groups were identified; “Neo-Malthusians” believed in population control and saw themselves as trustees of the environment. “Nature partners” believe that humans should be part

of a harmonious system, not try to change it. “Romantics” see cultural outweighing material benefits and are unwilling to reduce the wealth of the actual system to abstract models that lose properties of phenomena and relationships. “Ecological economists” see value simply in terms of human needs. Humans can achieve ‘coastal zone management’, which should be based on economic factors. “Nature Users” divide environmental attributes into useful and useless, while “Nature doctors” are confident in human ability to restore ecological damage. There is a basic split between those who believe in intrinsic value and those who see ‘nature’ in terms of benefits to humans (Shilin *et al.* 2003 Figure 13-1).

Shilin and colleagues identify some major differences, but also some important areas of consensus. All participants rejected extreme exploitation that foreclosed options for future generations and supported preserving life support systems by preserving their integrity, stability and beauty. All agreed on the need for an interdisciplinary discussion of environmental values and goals, which would lead to a new “integrative language,” possibly even a new, “more comprehensive and more action-oriented science than either ecology or economics can be.” Aggressive ecological and environmental education is critical to public and policy maker awareness of marine issues. The study concludes by quoting Gargan and Brown (1993), that Q methodology, “serves to locate elements of consensus (if they exist) that might otherwise go unnoticed in the emotional turmoil of political debate”.

Neff (2011) was interested in why ecologists study some subjects rather than others. Neff cites Haraway (1991) and Hacking (1999) on how knowledge shapes how we conceptualize natural systems and threats towards them, a point made eloquently for the marine environment by Callon

(1986). Individual ecologists do not have ‘free rein’²⁵, but are constrained by institutional goals and objectives. The net effect is to limit the policy tools and options. 540 statements of “research priorities, knowledge needs, and disciplinary imperatives” drawn from 31 scientific and policy documents were boiled down to a structured sample of 32 statements. Eighty seven ecologists who completed the study, fell into four distinct groups. The first saw the business of ecologists to document and convey ecological damage to the public and policy makers. This group was against restoration as a possible license for present damage in the hope of future repair. The second group was the only one to use the concepts of social-ecological systems and ecosystem services and to see a key role for social science in influencing policy-makers. Group three saw their business as improving theory and publishing in the peer-reviewed literature. Science as lobbying could vitiate their status as non-biased observers. Group three would avoid questions bordering on social science and economics. Group four saw an active role for science in both restoration and management. The four groups were unified round a belief that greater knowledge would improve decision-making, but had very different ideas on how this might be achieved. Diversity of views may be an index of health, but can be problematic when not debated, what some see as useful, others see as useless or outright dangerous. Policy development in a democratic society is the matter of an ongoing debate which should include decision-makers, political scientists, environmental psychologists, managers and others. If policy is to be “timely credible, salient and perceived as legitimate” ecologists must be involved both in the objective process of policy development and in bringing it about.

²⁵ Individual ecologists may of course attain sufficient stature to acquire freedom of choice, but this ‘freedom’ is itself shaped by their career path and has a ‘knock on’ effect on the next generation.

These studies indicate considerable potential for *Q* to analyze deep-seated beliefs motivating research and attitudes in the marine environment. For present purposes, what is particularly interesting is the persistence of the tension between ‘use and non-use’ and instrumental and existence value. It is also intriguing that the focus on economics and values in Shilin *et al.* (2003) is not mirrored in Neff (2011) where only two statements addressed economic value. Both emphasize the need to broaden the disciplinary base. Miller *et al.* (2008) suggest that “epistemological pluralism” is essential to understand coupled social-ecological systems. They note that the integrated world prior to European contact in Alaska was to some extent mirrored in the early days of the University of Alaska, but was later subsumed into disciplinary “silos”. Growing awareness of Indigenous knowledge has led to a split between projects based on one or another way of knowing. They argue that exclusion hampers interdisciplinary work and frustrates a “more integrated understanding”, reinforcing the argument that exclusion of religious and spiritual perspectives and insights impoverishes not only the academy but also society. “Epistemological sovereignty” works against broadening the knowledge base and increasing public engagement with complex issues such as climate change.

None of the above studies specifically call for inclusion of expertise on the sacred or spiritual, much less for the inclusion of artists in developing understanding of social-ecological systems and tackling ‘wicked problems’ in general, although these perspectives might be included under “others” in Neff (2011) and under the general rubric of “epistemic pluralism.” This absence, the power of *Q* to elicit underlying beliefs, dissatisfaction with purely economic and scientific perspectives amongst environmental professionals and the ready endorsement of spiritual perspectives subsequent to introduction by Aboriginal people provide the rationale for *Q* in the present study. Brown (2006) observes that, “Q methodology is particularly suited to illuminating

and clarifying perspectives, including those of marginalized populations.” It is thus ideal for the marginalized voice of the spirituality of Aboriginal people and other coastal communities and the excluded spirituality of the professionals engaged in ecosystem-based management. Lastly, Q methodology provides an opportunity for an empirical test of whether large areas of moral concern are excluded from standard ethical analysis as suggested by Brunk (2004).

5.7.1 Pilot project

A pilot project on the highly-polarized issue of wild salmon vs industrial salmon feedlots was conducted in April-May 2010 using the free Internet software *FlashQ* (Hackert and Braelher 2007). A concourse of over 1,000 statements was generated from sources including over 800 written responses to the BC Special Committee on Sustainable Aquaculture (2007), the online Hansard record (n.d.) of numerous hearings throughout the province, over 100 media articles, public forums, video, scientific literature, websites and reports by Aboriginal and other organizations. Informal *FlashQ* tests on family and colleagues with 36 representative statements were a failure. People simply were not prepared to work through that many. This may be an artifact of Internet expectations, as successful sorts of 64 statements have been conducted at workshops where participants were committed to the process and passionate about the issue (e.g., Dryzek and Berejikian 1993; Mattson *et al.* 2006; Swedeen 2006).

Based on negative feedback from the 36-statement trial and successful studies with smaller numbers (Brown 2006; Fairweather *et al.* 2006; Wilson 2007), a revised pilot with 26 statements was completed by 15 participants. The number of statements was deemed to be workable. One interesting finding from the pilot is that the sacred or spiritual dimension of nature in the BC wild and farmed salmon debate is strongly associated with Aboriginal people. The pilot project

concourse contained 186 statements with the words “sacred”, “spiritual” or “reverent”. Of these, 38 were made by Aboriginal people, 22 were associated with Aboriginal people and 12 were endorsements of remarks by an Aboriginal person. The presence of the explicitly spiritual in the *Q* statements, and the reflective process of individual ranking may therefore elicit a positive response from participants who might not endorse such values in public.

5.8 Conclusion

This chapter has reviewed a range of ways of measuring value, and pointed to the weak or non-existent ability of most of them to deal adequately with intrinsic value, or to provide a general enough set of principles that they would not be bogged down in particularities of place. *Q* methodology was found to be the most appropriate method for this study, and the pilot project allowed further refinement. Weblar *et al.* (2009) note that, “An advantage that *Q* method has over other forms of discourse analysis is that the participants’ responses can be directly compared in a consistent manner, since everyone is reacting to the same set of *Q* statements.” Danielson *et al.* (2010) note that, “*Q* method allows participants to express their viewpoints with minimal researcher interference. It also forces people to prioritize their preferences. It is effective with a smaller number of people than a survey, because only a few individuals are needed to define each factor, whereas surveys require large sample sizes to produce statistically valid result.” These qualities were all essential to this study, and I therefore selected the *Q* methodology, confirming its applicability with the superior performance of reflective pencil and paper exercises over interview formats in eliciting values which respondents consider part of their private lives (Satterfield 2001). The next chapter will report on the results of the major *Q* methodology study, and discuss the issues that arose.

Chapter 6: Research project, results and analysis

6.1 Introduction

This chapter reports on a *Q methodology* study designed to investigate whether a broad cross section of people living and active on the BC coast consider that spiritual, religious and artistic perspectives and expertise belong in marine ecosystem-based management. My hypothesis is that existing natural resource legislation and policy is inadequate to deal with a coast and ocean that is increasingly crowded and contentious. Contention includes allocation disputes within commercial fisheries, between commercial and sport fisheries, between wild and farmed salmon and the vexed question of oil and gas development and transport. I suggest that the frameworks in place, whether for fisheries or ecosystem-based management, were not designed to accommodate the present level of complexity. Frustration with existing regimes and review processes widens the split between those who desire to expedite projects they deem in the larger national interest and those who fear catastrophic impacts on the entire social-ecological system. Issues such as overfishing, industrial salmon feedlots and oil and gas development and transport raise moral and ethical questions that are not well addressed by existing processes. The study is therefore designed to test the importance of spiritual or immeasurable values to a broad cross section of people living and working on or in the BC coast and ocean.

6.2 Selection of statements

The study required a set of statements that cover the range of principles and values that might be considered relevant to coast and ocean management, such as was contained in the preamble to Canada's Species at Risk Act, which makes a clear statement of the importance of the intrinsic value of wildlife, followed by a list of other significant values:

wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons (Canada 2002).

Any framework for coast and ocean management should be large enough to contain at least all these values. The communications concourse for this project therefore draws on the literature on ecosystem-based management and on sources that address the spiritual and sacred from the Aboriginal perspective. It also extends beyond the Pacific Northwest to draw on pronouncements and declarations from world religions and international organizations on the moral dimensions of the global ecological crisis. Exploring the communications concourse and developing a representative set of statements or *Q sample* has been described as more of an art than a science and commonly consumes most of the research effort and time. The 21 statements used in this study are presented in Table 6.1. Appendix B provides the argument for the number of statements used and their relevance to coast and ocean management. Statement numbers in Table 6.1 are necessary to the sorting process, but have no other significance.

Table 6.1 *Q sample* of statements.

Statements (Q Sample)

1. An ecosystem services approach can reflect the full range of human values without recourse to spiritual, religious or mystical 'dimensions'.	12. We need an aggressive preschool to college 'ocean literacy' program to inspire the next generation of scientists, fishers, business and political leaders to value and protect the oceans.
2. The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.	13. The year-round availability of farmed salmon relieves fishing pressure on wild salmon, and creates jobs and spinoff industries that revitalize coastal communities. It should be encouraged.
3. Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.	14. Salmon farms threaten wild salmon vital to forests, fisheries, tourism and Aboriginal people, divert protein from poor countries and burn fuel to catch, process and distribute feed. They cannot be justified.
4. Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.	15. We have sufficient knowledge to achieve sustainable and fair management. The only thing lacking is sufficient investment in monitoring, control and surveillance.

Statements (Q Sample)	
5. Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.	16. Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.
6. Fisheries allocation and management should be transferred to regional boards that combine scientific, traditional and local ecological knowledge and values.	17. The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.
7. Aboriginal and local knowledge can reveal hidden human-ecological linkages and bring a fuller set of ecological, social, cultural and spiritual values into decision-making.	18. The most compelling argument for conservation is preservation of species for their own sake and for the long-term flourishing of the linked human-environmental community.
8. Emotional connections and values such as awe, wonder, reverence and respect have no place in ecosystem-based management.	19. The notion that relationships between people, other species, lands and waters are 'greater than the sum of their parts' has no useful meaning in coastal and ocean management.
9. Oil pipelines and tankers threaten the environmental legacy of all Canadians. They should not go ahead until Aboriginal and coastal communities are satisfied of their safety.	20. We should not be overly concerned about depletion of wild fish and seafood; the history of land-based agriculture proves that we can vastly increase the productivity of marine life.
10. Ownership of aquatic species and their habitat should be held in trust by governments on behalf of the people, and not conferred irrevocably to private parties.	21. We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.
11. The self-interest and private business of different stakeholders are the most powerful and effective forces in bettering coast and ocean management.	

6.3 Ethical review and informed consent

The study meets the “minimum risk” criterion of the UBC Behavioural Ethics Review Board *per* the approval certificate identified in the Preface to this dissertation. Initial contact with potential participants was by phone and email contact letter providing information on the project website and an individual access code so that participants did not have to identify themselves online. The informed consent process was described in the website’s introductory screens (Appendix C), with clarification that participation was entirely voluntary and that a participant could withdraw at any time. Participants understood that submission of data at the end (i.e., when the participant had completed their personal ranking of the statements and had provided basic personal demographic data) constituted informed consent. This ensured that a participant was fully aware of what was required. Two or three potential participants were concerned about whether they or

their organization would be quoted and were informed that, while they were invited because of their experience, what was required was their own perspective on values. They were also assured that they would not be quoted or their organization named and that, in the unlikely event that a direct, attributed quote was desired, separate permission would be sought. Comments on the individual statements and on the process, however—in particular the description of the idealized sorts or ‘factors’—would inform the analysis.

6.4 Participant selection

Q requires a choice of participants “who are expected to have a clear and distinct point of view regarding the problem and, in that quality, may define a factor.” (Brown 1980 cited in; van Exel and de Graaf 2005). Most *Q* technique studies involve far fewer than is the case, say, in survey research. Brown (2011) states that numbers “should be limited to 40 or 50; fewer would probably be quite adequate.” I considered the range of communities, constituencies, interests and expertise that are to be found on the BC coast. The membership of the Pacific North Coast Integrated Management Area (PNCIMA²⁶) includes all the ‘traditional’ interests: Aboriginal people, commercial and sport fisheries as well as people involved in finfish and invertebrate aquaculture, marine transportation, ecotourism, sport fishing, sea kayaking, wilderness tourism, oil and gas, renewable energy, regional districts and conservation organizations. PNCIMA is one of the most comprehensive attempts to assemble a truly representative group of stakeholders and may be described as the lifeworld of ecosystem-based management, i.e., what might reasonably be expected to constitute a complete constituency.

²⁶ <http://pncima.org/site/who.html> (Accessed May 19, 2012).

Schutz and Luckman (1973) describe the “lifeworld” as what the ordinary person, as distinct from the scientist, artist or mystic, takes for granted: the ‘social consensus’, what any member of the community can talk about without raising an eyebrow. In contrast, the ‘becoming indigenous’ concept introduced in Chapter 1 did not distinguish a separate realm or dimension for ‘art’, ‘science’, or ‘spirituality’ because the lifeworld of pre-industrial, indigenous and many contemporary communities includes interaction with spiritual entities. The sample of participants for this project deliberately included artists and members of faith communities because their perspectives are not usually seen to be part of the lifeworld of fisheries, ecosystem-based management or integrated management, and whose language moves beyond that of business and the marketplace which has no room for the sacred (Somerville 2006:74-6).

Potential participants were identified through personal contacts developed over my 14 years of experience on the BC coast as consultant and policy advisor on fisheries and ecosystem-based management and 16 years as a researcher on projects designed to increase collective understanding of ecosystems (e.g., Just Fish, Coward *et al.* 2000; Back to the Future, Pitcher 2005; Coasts Under Stress, Ommer and Team 2007). Contacts and colleagues in the research community were asked to suggest others. Considerable effort was put into recruiting arms length participants, i.e., those whose views were not likely to ‘stack’ the sample with perspectives resembling those of this author. Of 177 invitations and reminders, 61 completed the *Q sort* or a 30% participation rate. 61 is high for a *Q* study (Brown 2011), but was deemed advisable given the number of activities and perspectives.

Table 6.2 presents the occupational data as provided by all 61 respondents:

Table 6.2 Demographic and occupational data.

Participant	Gender	Age Bracket	Earnings bracket (1,000s)	Educational Level	Occupation / Sector	Occupation / Sector (contd)	Where you live
1	F	61-70	\$20-39	MA or MSc	Artist	ENGO	Large town
2	M	41-50	\$40-49	BA or BSc	Sci / Researcher		Small town
3	F	Decline	\$100+	PhD	Sci / Researcher		Metro area
4	M	41-50	\$100+	BA or BSc	Sport Fishing Industry		Metro area
5	M	41-50	\$50-59	BA or BSc	Commercial fishing		Metro area
6	M	41-50	\$50-59	MA or MSc	Sci / Researcher	Educator	Non-metro area
7	M	51-60	\$89-99	PhD	Sci / Researcher		Metro area
8	M	41-50	\$50-59	MA or MSc	Marine Transport	Consultant	Metro area
9	M	61-70	\$100+	Elementary sch.	Commercial fishing		Rural Area
10	M	51-60	\$100+	College	Non-salmon aquaculture		Rural Area
11	F	61-70	\$89-99	PhD	Sci / Researcher		Metro area
12	M	51-60	\$89-99	MA or MSc	Oil & Gas Indus		Small town
13	F	51-60	\$100+	MA or MSc	Commercial fishing	Consultant	Metro area
14	M	70+	\$100+	PhD	Educator	Educator	Metro area
15	F	41-50	\$50-59	PhD	Sci / Researcher		Rural Area
16	F	51-60	\$40-49	MA or MSc	Educator	Educator	Metro area
17	F	31-40	\$60-79	PhD	Sci / Researcher		Metro area
18	F	41-50	\$50-59	PhD	Educator	Artist	Metro area
19	F	61-70	\$100+	PhD	Church or Religious org.	Consultant	Non-metro area
20	M	61-70	\$100+	High school	Municipal govt.		Village
21	M	51-60	\$50-59	College	Commercial fishing		Rural Area
22	M	61-70	\$100+	BA or BSc	Non-salmon aquaculture		Village
23	F	31-40	\$40-49	PhD	Consultant		Non-metro area
24	M	41-50	\$20-39	MA or MSc	Educator	Educator	Rural Area
25	M	31-40	\$50-59	BA or BSc	Forest Industry		Village
26	M	51-60	\$40-49	College	Policy Advisor		Metro area
27	M	51-60	\$89-99	PhD	Consultant		Metro area
28	F	61-70	\$60-79	BA or BSc	Aboriginal Elder		Aboriginal Community
29	M	31-40	\$20-39	Grad student	Student	Educator	Metro area
30	M	31-40	\$89-99	PhD	Sci / Researcher		Metro area
31	M	51-60	\$89-99	PhD	Sci / Researcher		Metro area
32	M	51-60	\$100+	BA or BSc	Salmon Farming		Small town
33	F	41-50	\$89-99	College	Sci / Researcher		Metro area
34	F	51-60	\$89-99	PhD	Sci / Researcher		Metro area
35	M	51-60	\$60-79	BA or BSc	Salmon Farming		Small town

Participant	Gender	Age Bracket	Earnings bracket (1,000s)	Educational Level	Occupation / Sector	Occupation / Sector (contd)	Where you live
36	M	41-50	\$100+	College	Aboriginal Elder	Aboriginal comm. member	Decline
37	F	31-40	\$89-99	MA or MSc	ENGO		Metro area
38	F	31-40	\$40-49	PhD	Educator		Metro area
39	M	31-40	\$20-39	Grad student	Student	Sci / Researcher	Metro area
40	F	18-30	\$20-39	MA or MSc	Church or Religious org.		Metro area
41	F	31-40	\$20-39	PhD	Sci / Researcher		Metro area
42	F	18-30	\$100+	MA or MSc	Sci / Researcher		Metro area
43	F	61-70	\$40-49	BA or BSc	Administrator		Metro area
44	F	41-50	\$50-59	College	Municipal govt.	Educator	Small town
45	M	70+	\$100+	BA or BSc	Commercial fishing	Consultant	Metro area
46	M	51-60	\$89-99	PhD	Sci / Researcher	Educator	Metro area
47	F	31-40	\$50-59	PhD	Federal Govt.		Village
48	M	31-40	\$40-49	MA or MSc	Student		Metro area
49	F	31-40	\$20-39	MA or MSc	Non-salmon aquaculture	Educator	Rural Area
50	M	51-60	\$89-99	MA or MSc	Consultant		Village
51	F	31-40	\$40-49	PhD	Sci / Researcher		Metro area
52	M	31-40	\$50-59	PhD	Sci / Researcher		Metro area
53	F	31-40	\$100+	PhD	Homemaker		Metro area
54	M	41-50	\$100+	MA or MSc	ENGO		Metro area
55	M	51-60	\$89-99	MA or MSc	Provincial Government	Policy Advisor	Metro area
56	F	41-50	\$20-39	Grad student	Church or Religious org.	Student/Educator	Metro area
57	M	51-60	\$50-59	MA or MSc	Policy Advisor	ENGO	Small town
58	F	61-70	\$100+	College	Aboriginal Elder	Student/Educator	Aboriginal Community
59	M	51-60	\$89-99	High school	Aboriginal Elder	Artist	Metro area
60	M	61-70	\$50-59	High school	Commercial fishing		Village
61	F	31-40	\$40-49	PhD	Student	ENGO	Metro area

Table 6.2 requires some additional comment on flow between the occupational categories as provided. Within the population, there were seven artists, some of whom were also researchers and educators and at least one former political leader. There were also members of religious or interfaith organizations who are actively engaged in marine issues. Ocean industry was represented by one participant from the oil and gas industry, one from shipping and two

consultants experienced in environmental assessment of major projects including oil and gas. Six natural scientists were divided between those who worked for government departments engaged with the environment, quantitative fisheries scientists and those whose work included interaction with coastal communities. Social scientists included two who could equally be described as environmental philosophers, and others were working on various issues of fisheries sustainability, coast and ocean management and relationships with water. Fisheries economics were heavily represented: one senior economist, two recent PhDs and three graduate students. Of six Aboriginal participants, two are “Traditional Knowledge Keepers”, one is engaged in fisheries management, two are Artists, one a scientist working on water and two working at the interface of Aboriginal spirituality and theology. The categories of “Educator” and “Science/Researcher” included 5 university professors (Art, Oceanography, Sustainability studies, fisheries and one feminist scholar at the interface between biotechnology, ecological resilience or fragility and water). Various others were working in the policy arena in federal and provincial government departments. There were two participants from Regional Districts, one of whom is the Mayor of a coastal town. Participants were also sought from offshore mining and fish processing, but to no avail. The group is weighted towards the scientific and economic, but this is because these professions have major influence on coastal policy, and because professional status provides little insight into private beliefs or what, if any, spiritual or religious perspective people think should or should not apply to coast and ocean management.

6.5 Results

Factor analysis using the software “PQMethod” (Schmolck and Atkinson 2002) generates a 61x61 cell correlation matrix, where values between -1 and +1 indicate the degree of similarity or difference between individual Q sorts. Principal component analysis generates 8 “Factors” or

clusters of similarity as a default. Choice of which factors to retain is based on the strength of the factor as indicated by its ‘eigenvalue’. Standard practice is to ignore eigenvalues less than one, or where there is a distinct break in a ‘scree plot’ (Cattell 1966), Figure 6.1. The plot indicates little difference between factors E-H, so factors A-D were retained.

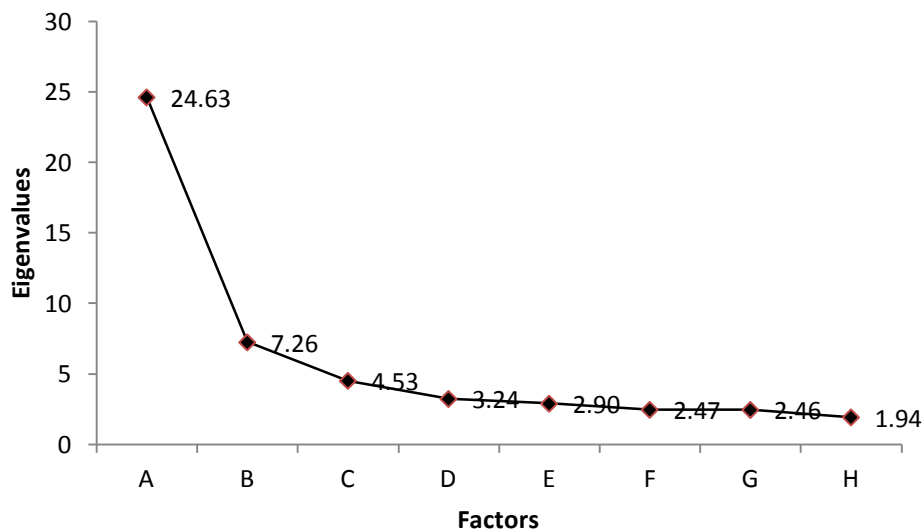


Figure 6.1 Scree plot of eigenvalues for 8 factors generated by principal component analysis in PQmethod (Schmolck and Atkinson 2002).

Figure 6.1 shows that the majority of proponents clustered on Factor A. In such a case, Q provides for manual rotation of pairs of factors to highlight a particular perspective. This does not, of course change the individual sorts, i.e., distances between the factors do not change. Rotation is however useful to determine support for a particular perspective. In this case, Factors C and A were rotated by 30° to align participants whose individual sorts were consistent with inclusion of spiritual, religious and artistic input to ecosystem-based management (statements 16, 17 and 21). Inspection of the raw sorts identified participants who scored these statements highly. These sorts were then highlighted in PQMethod. Factor rotation is done by specifying two factors, which then appear on a graphic display with the highlighted sorts identified as in Figure 6.2. The top panel of Figure 6.2 shows that many participants who ranked statements 16, 17, and 21 highly are strongly associated with Factor A.

The degree of rotation is therefore a compromise, made easier in this case by the fact that participants 6 and 7 scored these statements highly. Rotation by 30° located these individuals on either side of Factor C, as shown in the bottom left panel of Figure 6.2. An additional minor rotation of 8° (not shown) helped to define an ‘economic’ perspective. The result avoids plundering Factor A, but defines Factor C well against Factors B and D, as shown in the top and bottom of the right panel in Figure 6.2.

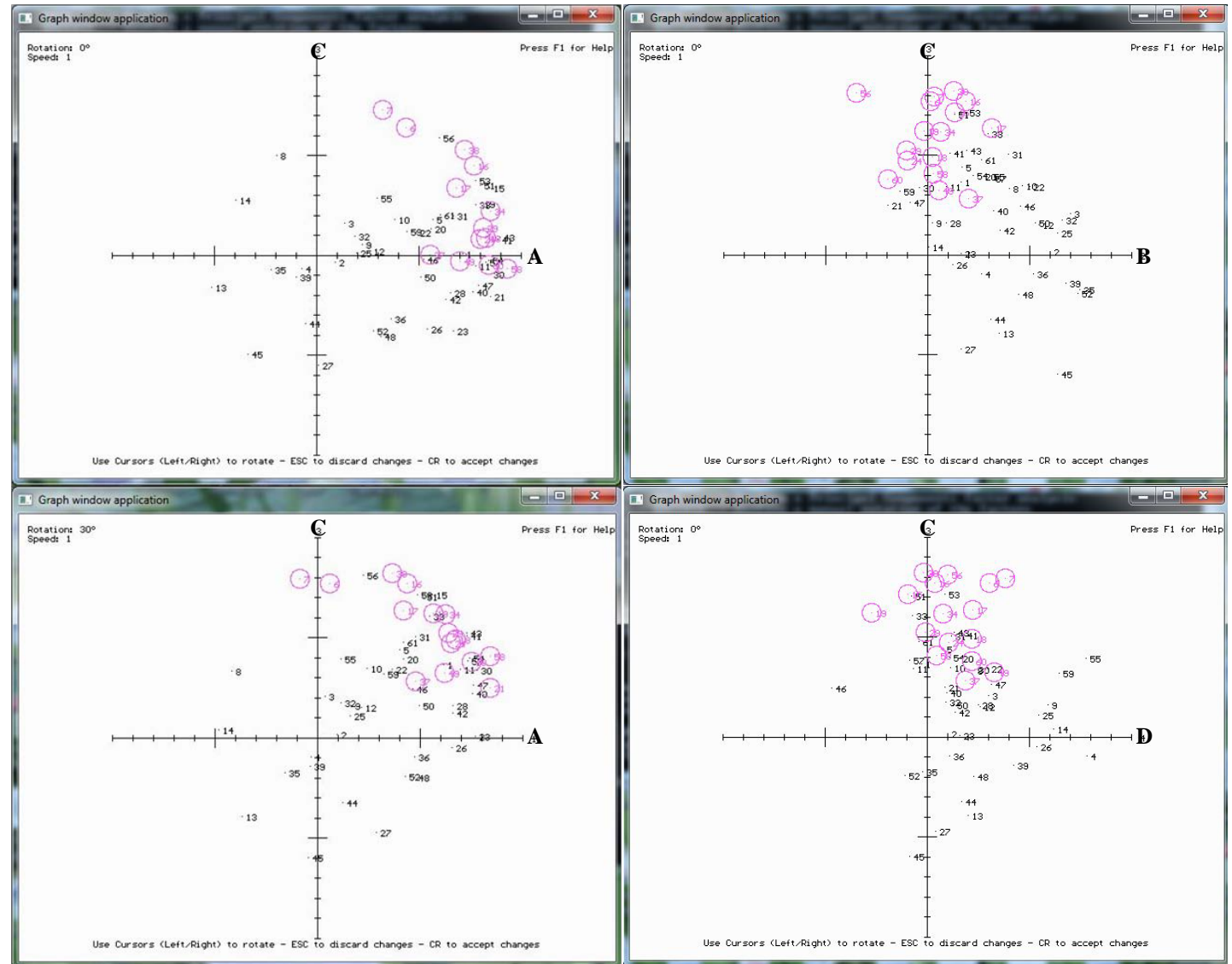


Figure 6.2 Left panel shows unrotated matrix at top and 30° rotation at bottom to align participants 6 and 7 with factor C. Right panel shows that Factor C is well defined against Factors B and D.

Table 6.3 shows the amount of explained variance by all four factors before and after rotation.

The effect of the rotation was to spread the variance amongst the factors and increase definition between them.

Table 6.3 Percentage of variance explained by each factor before and after rotation.

Rotation (Degrees)	Factors rotated	Percentage of variance			
		A	B	C	D
0	None	37	13	8	7
30	C & A	26	13	19	7
-8	B & D	26	12	19	8

Table 6.4 shows the factor loadings for each participant. Asterisks indicate sorts that help to define a particular factor. No ‘defining’ sort indicates a split between factors, as for participant 8 whose highest loading is split between factors B and C.

Table 6.4 Loadings on each factor. Asterisk indicates a defining sort, i.e., participant #1 contributes to Factor A, participants 2 and 3 to B and so on. Participant #8 loads almost equally on B and C, so is not a ‘defining’ sort.

Partici- pant	Factor				Partici- pant	Factor			
	A	B	C	D		A	B	C	D
1	0.65*	0.16	0.30	(0.05)	32	0.13	0.67*	0.17	(0.00)
2	0.10	0.61*	0.01	0.02	33	0.61	0.28	0.55	(0.11)
3	0.06	0.74*	0.21	0.20	34	0.68*	0.08	0.55	0.07
4	(0.04)	0.37	(0.09)	0.74*	35	(0.17)	0.74*	(0.15)	(0.12)
5	0.44*	0.18	0.40	0.05	36	0.46	0.53*	(0.14)	0.03
6	0.14	0.06	0.76*	0.30	37	0.51*	0.22	0.23	0.16
7	(0.00)	0.09	0.80*	0.37	38	0.45	0.12	0.78*	(0.03)
8	(0.38)	0.43	0.38	0.17	39	(0.05)	0.73*	(0.14)	0.33
9	0.18	0.10	0.14	0.58*	40	0.77*	0.33	0.15	0.05
10	0.28	0.47*	0.32	0.05	41	0.78*	0.13	0.43	0.16
11	0.73*	0.08	0.27	(0.08)	42	0.67*	0.37	0.06	0.08
12	0.23	0.57*	0.13	0.18	43	0.78*	0.21	0.45	0.10
13	(0.41)	0.37	(0.35)	0.15	44	0.09	0.33	(0.33)	0.12
14	(0.47)	0.09	0.09	0.61*	45	(0.11)	0.62	(0.59)	(0.17)
15	0.63	0.12	0.65*	(0.11)	46	0.49	0.38	0.20	(0.53)
16	0.52	0.19	0.72*	0.01	47	0.78*	(0.04)	0.19	0.32
17	0.48	0.34	0.59	0.18	48	0.45	0.47	(0.24)	0.16
18	0.72*	0.05	0.42	0.21	49	0.65*	0.10	0.26	0.32
19	0.62	(0.05)	0.56	(0.27)	50	0.51	0.54*	0.11	0.05
20	0.46	0.28	0.35	0.12	51	0.58	0.12	0.65*	(0.10)

Partici- pant	Factor				Partici- pant	Factor			
	A	B	C	D		A	B	C	D
21	0.86*	(0.18)	0.16	0.11	52	0.41	0.72*	(0.23)	(0.21)
22	0.40	0.54	0.31	0.22	53	0.56	0.19	0.66*	0.06
23	0.77*	0.18	(0.07)	0.14	54	0.78*	0.24	0.32	0.08
24	0.69*	(0.08)	0.40	0.12	55	0.15	0.41	0.38	0.72*
25	0.17	0.71*	0.09	0.45	56	0.31	(0.33)	0.79*	0.15
26	0.65*	0.20	(0.12)	0.52	57	0.77*	0.30	0.31	(0.13)
27	0.23	0.17	(0.50) *	0.02	58	0.88*	0.04	0.32	0.04
28	0.67*	0.13	0.09	0.24	59	0.35	(0.04)	0.29	0.65*
29	0.69*	(0.10)	0.46	0.01	60	0.78*	(0.16)	0.30	0.24
30	0.81*	(0.01)	0.26	0.23	61	0.47	0.25	0.43	(0.07)
31	0.53	0.41	0.45	0.06					

6.6 Interpreting the results

Factor narratives are based on the generalized sorts, where the perspective is defined by the highest and lowest highly-ranked statements. The format followed here is to present a table showing the generalized sort, followed by the interpretation. A useful first step is to identify broad areas of agreement across the four factors. The analysis identified one “Consensus statement” (s20) where all perspectives rejected the idea that aquaculture on the scale of terrestrial agriculture could replace wild fish. There was also broad agreement on secure access to fishing for Aboriginal and local communities (s4) and around the ability of traditional and local knowledge to bring a “fuller set of ecological, social, cultural and spiritual values into decision-making” (s7). These statements are consistent with the basic ecosystem-based management principles of adjacency and inclusivity and, because of the consensus, will not figure largely in individual factor narratives.

The present study departs from typical Q procedure where the scorecard runs from positive to negative numbers, i.e., this study ranked statements from 1-7, rather than from -3 to +3. This follows the example of Bateson’s (2009) study of priorities for the Missinabe Cree in moving back to their traditional territory, where community members felt that they did not want to treat

another community member's view negatively. Similarly, in this case, all statements represent sincere, if divergent views. For this reason, the factor narratives emphasize the high scores; low-scoring statements serve to indicate divergent positions. Table 6.5 presents the generalized Q sort for Factor A with scores from Factors 2, 3 and 4 provided for comparison.

Table 6.5 Generalized Q sort for Factor A (bold), with scores from Factors 2, 3 and 4 for comparison.

Statement	Factor score			
	A	B	C	D
9. Oil pipelines and tankers threaten the environmental legacy of all Canadians. They should not go ahead until Aboriginal and coastal communities are satisfied of their safety.	7	3	4	4
10. Ownership of aquatic species and their habitat should be held in trust by governments on behalf of the people, and not conferred irrevocably to private parties.	6	7	4	5
4. Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.	6	6	5	6
6. Fisheries allocation and management should be transferred to regional boards that combine scientific, traditional and local ecological knowledge and values.	6	4	4	3
7. Aboriginal and local knowledge can reveal hidden human-ecological linkages and bring a fuller set of ecological, social, cultural and spiritual values into decision-making.	5	5	7	6
18. The most compelling argument for conservation is preservation of species for their own sake and for the long-term flourishing of the linked human-environmental community.	5	6	6	3
14. Salmon farms threaten wild salmon vital to forests, fisheries, tourism and Aboriginal people, divert protein from poor countries and burn fuel to catch, process and distribute feed. They cannot be justified.	5	2	4	4
12. We need an aggressive preschool to college 'ocean literacy' program to inspire the next generation of scientists, fishers, business and political leaders to value and protect the oceans.	5	4	5	5
21. We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.	4	3	6	5
15. We have sufficient knowledge to achieve sustainable and fair management. The only thing lacking is sufficient investment in monitoring, control and surveillance.	4	6	3	6
1. An ecosystem services approach can reflect the full range of human values without recourse to spiritual, religious or mystical 'dimensions'.	4	4	3	4
16. Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.	4	1	5	3
17. The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.	4	2	5	4
2. The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.	3	5	6	3
8. Emotional connections and values such as awe, wonder, reverence and respect have no place in ecosystem-based management.	3	5	1	2
3. Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.	3	4	3	7
19. The notion that relationships between people, other species, lands and waters are 'greater than the sum of their parts' has no useful meaning in coastal and ocean management.	3	3	2	1
20. We should not be overly concerned about depletion of wild fish and seafood; the history of land-based agriculture proves that we can vastly increase the productivity of marine life.	2	2	2	2
5. Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.	2	4	2	2
13. The year-round availability of farmed salmon relieves fishing pressure on wild salmon, and creates jobs and spinoff industries that revitalize coastal communities. It should be encouraged.	2	5	4	5
11. The self-interest and private business of different stakeholders are the most powerful and effective forces in bettering coast and ocean management.	1	3	3	4

6.7 Factor A narrative

This is a ‘local’ factor focused on maintaining the *status quo*. Possible impacts of oil and gas transport are the greatest concern, witnessed by top ranking given to the requirement for approval by Aboriginal and coastal communities who stand to lose most. This priority was borne out by three participant comments, one doubting the possibility of safe systems, one endorsing local input to design of safe systems, and one deploring lack of respect for Aboriginal concerns. Salmon farming is seen as a threat rather than as a source of employment and boost to the coastal economy. High importance for the responsibility of government as trustee for natural resources is underscored by the bottom ranking of private ownership and self-interest as effective agents of management improvement. Economic and technological efficiency are insufficient justification for fisheries management that harms small communities. Intrinsic value and the linkage between long-term social and ecological flourishing (s18) are endorsed as opposed to a view of natural diversity as valuable only to humans (s3). This contrasts sharply with Factor D.

Factor A supports the notion that ecosystem services can represent the full scope of human values without recourse to “spiritual, religious or mystical dimensions”. Those loading heavily on this factor are at best, lukewarm on the inclusion of spiritual and religious experts, but do believe that “*Emotional connections and values such as awe, wonder, reverence and respect*” are important for ecosystem-based management. Factor A represents an endorsement of Aboriginal and local spirituality with possibly a notion of the secular sacred as indicated by support of the language of, “beauty, mystery, fascination and fragility” (s21) and “awe, wonder, reverence and respect” as previously noted.

6.8 Factor B narrative

Table 6.6 presents the generalized sort for Factor B with relevant scores in boldface (column 3):

Table 6.6 Generalized Q sort for Factor B (bold), with scores from Factors A, C and D for comparison.

Statement	Factor score			
	A	B	C	D
10. Ownership of aquatic species and their habitat should be held in trust by governments on behalf of the people, and not conferred irrevocably to private parties.	6	7	4	5
4. Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.	6	6	5	6
18. The most compelling argument for conservation is preservation of species for their own sake and for the long-term flourishing of the linked human-environmental community.	5	6	6	3
15. We have sufficient knowledge to achieve sustainable and fair management. The only thing lacking is sufficient investment in monitoring, control and surveillance.	4	6	3	6
13. The year-round availability of farmed salmon relieves fishing pressure on wild salmon, and creates jobs and spinoff industries that revitalize coastal communities. It should be encouraged.	2	5	4	5
2. The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.	3	5	6	3
8. Emotional connections and values such as awe, wonder, reverence and respect have no place in ecosystem-based management.	3	5	1	2
7. Aboriginal and local knowledge can reveal hidden human-ecological linkages and bring a fuller set of ecological, social, cultural and spiritual values into decision-making.	5	5	7	6
6. Fisheries allocation and management should be transferred to regional boards that combine scientific, traditional and local ecological knowledge and values.	6	4	4	3
1. An ecosystem services approach can reflect the full range of human values without recourse to spiritual, religious or mystical 'dimensions'.	4	4	3	4
3. Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.	3	4	3	7
5. Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.	2	4	2	2
12. We need an aggressive preschool to college 'ocean literacy' program to inspire the next generation of scientists, fishers, business and political leaders to value and protect the oceans.	5	4	5	5
19. The notion that relationships between people, other species, lands and waters are 'greater than the sum of their parts' has no useful meaning in coastal and ocean management.	3	3	2	1
11. The self-interest and private business of different stakeholders are the most powerful and effective forces in bettering coast and ocean management.	1	3	3	4
21. We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.	4	3	6	5
9. Oil pipelines and tankers threaten the environmental legacy of all Canadians. They should not go ahead until Aboriginal and coastal communities are satisfied of their safety.	7	3	4	4
20. We should not be overly concerned about depletion of wild fish and seafood; the history of land-based agriculture proves that we can vastly increase the productivity of marine life.	2	2	2	2
14. Salmon farms threaten wild salmon vital to forests, fisheries, tourism and Aboriginal people, divert protein from poor countries and burn fuel to catch, process and distribute feed. They cannot be justified.	5	2	4	4
17. The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.	4	2	5	4
16. Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.	4	1	5	3

Factor B puts the highest value on government as trustee for aquatic species and habitat and high value on security of access for Aboriginal and local communities. Intrinsic value and the long-term flourishing of the linked human ecological community are very important, aligning this factor with Factors A and C, but distancing somewhat from Factor D. Factor B shows considerable faith in the competence of our current state of knowledge to achieve ecosystem-based management (s15), and so might be described as a '*Science perspective*'. The faith in science statement ranks slightly ahead of the contribution of traditional and local knowledge and values, and is reinforced by the lowest overall ranking of need for an 'ocean literacy' program and an even lower ranking of the need for writers, artists, poets and painters in ecosystem-based management. It is intriguing that Factor B is almost equally vehement in distancing "Emotional connections and values such as awe, wonder, reverence and respect" from ecosystem-based management as it is in rejecting a summative ecosystem services approach to capture qualities of "beauty, contemplation, mystery and belonging". This may be attributable to a value of scientific objectivity, which distances emotions, values and emergent qualities from the work of ecosystem-based management. Similarly, the Factor B perspective is reasonably satisfied that ecosystem services can represent, "*the qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging.*" without recourse to spiritual dimensions.

Lack of serious concern over the impact of oil and gas may be attributable to faith in science and technology to avoid a catastrophic spill. Factor B is supportive of the role of salmon farming in coastal economic development. Belief that the concerns around social, ecological and environmental injustice raised by salmon farming (s14) can be addressed is borne out by participant comments on risk reduction and a claim that salmon farming has significantly less environmental impact than terrestrial agriculture. Spiritual values of Aboriginal and local people are supported (s4) and there is further support for bringing "a fuller set of ecological, social,

cultural and spiritual values into decision-making.” (s7). In contrast, the involvement of “spiritual and religious leaders” (s16 and 17) in ecosystem-based management is rejected.

6.9 Factor C narrative

Table 6.7 presents the generalized sort for Factor C.

Table 6.7 Generalized Q sort for Factor C (bold), with scores from Factors A, B and D for comparison.

Statement	Factor score			
	A	B	C	D
7. Aboriginal and local knowledge can reveal hidden human-ecological linkages and bring a fuller set of ecological, social, cultural and spiritual values into decision-making.	5	5	7	6
18. The most compelling argument for conservation is preservation of species for their own sake and for the long-term flourishing of the linked human-environmental community.	5	6	6	3
2. The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.	3	5	6	3
21. We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.	4	3	6	5
4. Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.	6	6	5	6
16. Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.	4	1	5	3
12. We need an aggressive preschool to college 'ocean literacy' program to inspire the next generation of scientists, fishers, business and political leaders to value and protect the oceans.	5	4	5	5
17. The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.	4	2	5	4
6. Fisheries allocation and management should be transferred to regional boards that combine scientific, traditional and local ecological knowledge and values.	6	4	4	3
9. Oil pipelines and tankers threaten the environmental legacy of all Canadians. They should not go ahead until Aboriginal and coastal communities are satisfied of their safety.	7	3	4	4
10. Ownership of aquatic species and their habitat should be held in trust by governments on behalf of the people, and not conferred irrevocably to private parties.	6	7	4	5
14. Salmon farms threaten wild salmon vital to forests, fisheries, tourism and Aboriginal people, divert protein from poor countries and burn fuel to catch, process and distribute feed. They cannot be justified.	5	2	4	4
13. The year-round availability of farmed salmon relieves fishing pressure on wild salmon, and creates jobs and spinoff industries that revitalize coastal communities. It should be encouraged.	2	5	4	5
11. The self-interest and private business of different stakeholders are the most powerful and effective forces in bettering coast and ocean management.	1	3	3	4
3. Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.	3	4	3	7
1. An ecosystem services approach can reflect the full range of human values without recourse to spiritual, religious or mystical 'dimensions'.	4	4	3	4
15. We have sufficient knowledge to achieve sustainable and fair management. The only thing lacking is sufficient investment in monitoring, control and surveillance.	4	6	3	6
5. Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.	2	4	2	2
20. We should not be overly concerned about depletion of wild fish and seafood; the history of land-based agriculture proves that we can vastly increase the productivity of marine life.	2	2	2	2
19. The notion that relationships between people, other species, lands and waters are 'greater than the sum of their parts' has no useful meaning in coastal and ocean management.	3	3	2	1

Statement	Factor score			
	A	B	C	D
8. Emotional connections and values such as awe, wonder, reverence and respect have no place in ecosystem-based management.	3	5	1	2

Factor C is the most accepting of spiritual and religious perspectives including, but not limited to, Aboriginal values. Highest place is accorded to the role of traditional and local knowledge in bringing a fuller set, “of ecological, social, cultural and spiritual values into decision-making”. Intrinsic value and flourishing of the linked human ecological community are important, although this importance is shared by Factors A and B, though not so much by D. Factor C is distinguished by a rejection of a summative ecosystem services perspective in favour of the need for artists to convey the mysterious, beautiful and fragile qualities of the sea. Factor C is unique in endorsing the need for “spiritual and religious experts” to include immeasurable values and to address the ethical and moral dimensions of activities that have profound, long-term implications. It puts ecological literacy ahead of ‘faith in science’. The “*qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging*” are important, as are ‘emergent qualities’ (rejection of s8) and the “emotional connections and values of awe, wonder, reverence and respect”.

6.10 Factor D narrative

Table 6.8 presents the generalized sort for Factor D.

Table 6.8 Generalized Q sort for Factor D (bold), with scores from Factors A, B and C for comparison

Statement	Factor score			
	A	B	C	D
3. Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.	3	4	3	7
4. Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.	6	6	5	6
15. We have sufficient knowledge to achieve sustainable and fair management. The only thing lacking is sufficient investment in monitoring, control and surveillance.	4	6	3	6
7. Aboriginal and local knowledge can reveal hidden human-ecological linkages and bring a fuller set of ecological, social, cultural and spiritual values into decision-making.	5	5	7	6
12. We need an aggressive preschool to college 'ocean literacy' program to inspire the next	5	4	5	5

Statement	Factor score			
	A	B	C	D
generation of scientists, fishers, business and political leaders to value and protect the oceans.				
10. Ownership of aquatic species and their habitat should be held in trust by governments on behalf of the people, and not conferred irrevocably to private parties.	6	7	4	5
13. The year-round availability of farmed salmon relieves fishing pressure on wild salmon, and creates jobs and spinoff industries that revitalize coastal communities. It should be encouraged.	2	5	4	5
21. We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.	4	3	6	5
11. The self-interest and private business of different stakeholders are the most powerful and effective forces in bettering coast and ocean management.	1	3	3	4
9. Oil pipelines and tankers threaten the environmental legacy of all Canadians. They should not go ahead until Aboriginal and coastal communities are satisfied of their safety.	7	3	4	4
1. An ecosystem services approach can reflect the full range of human values without recourse to spiritual, religious or mystical 'dimensions'.	4	4	3	4
14. Salmon farms threaten wild salmon vital to forests, fisheries, tourism and Aboriginal people, divert protein from poor countries and burn fuel to catch, process and distribute feed. They cannot be justified.	5	2	4	4
17. The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.	4	2	5	4
18. The most compelling argument for conservation is preservation of species for their own sake and for the long-term flourishing of the linked human-environmental community.	5	6	6	3
16. Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.	4	1	5	3
2. The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.	3	5	6	3
6. Fisheries allocation and management should be transferred to regional boards that combine scientific, traditional and local ecological knowledge and values.	6	4	4	3
5. Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.	2	4	2	2
8. Emotional connections and values such as awe, wonder, reverence and respect have no place in ecosystem-based management.	3	5	1	2
20. We should not be overly concerned about depletion of wild fish and seafood; the history of land-based agriculture proves that we can vastly increase the productivity of marine life.	2	2	2	2
19. The notion that relationships between people, other species, lands and waters are 'greater than the sum of their parts' has no useful meaning in coastal and ocean management.	3	3	2	1

Factor D is anthropocentric, or possibly better described as neoliberal. It differs most sharply from Factors A, B and C in giving highest ranking to the notion of diversity as valuable only to humans. Factor D also gives the overall highest ranking to self-interest and private ownership as contributors to good ecosystem-based management (s11). Faith in science is high, coming slightly ahead of recognition of the potential of traditional and local knowledge to contribute to ecosystem-based management. Factor D has a relatively poor opinion of transferring allocation and management to local boards, which, according to one participant “promotes special interests”. Ecological literacy and the public trust are important. This perspective shows the

weakest support for intrinsic value and the long-term flourishing of social-ecological systems. Support for the inclusion of non-traditional perspectives is indicated by the second-highest ranking for the inclusion of artists to convey intangible values and modest support for a role for “religious and spiritual leaders”. This is consistent with liberal support for the arts and tolerance for diverse views. Lowest ranking for #19 indicates the strongest support for emergent values, i.e., “relationships between people, others species, lands and waters are greater than the sum of their parts”.

6.11 Discussion

Participant comments raised a number of issues about the process. The most substantive comments were objections that the statements were incomplete, i.e., did not include specific reference to recreational fisheries and a number of other issues of local importance. The objection is valid, but the purpose of the project was to test support for inclusion of spiritual values in the overall management framework, rather than to cover every aspect of coast and ocean management. Three participants objected that the statements were not ‘principles and values’, which appears to connect with the difference between a principle as a ‘should’ statement as opposed to a ‘characteristic’ such as complexity and connection. Several participants also objected to the ‘leading’ nature of the statements. This goes to the nature of *Q* statements as essentially ‘self-referent’, i.e., a proposition with which someone would agree or disagree in the context of other statements, as opposed to a good survey question which is distinct from the previous and subsequent questions and can be answered ‘yes’ or ‘no’ (please see section 5.2). This problem would not arise in a workshop where the process can be fully explained, and discussed. It could possibly have been addressed by fuller instructions, but material on the Internet must strive for balance between brevity and detail. The scorecard headings “Least appropriate”, “Appropriate” and “Most appropriate” caused a level of confusion when combined

with statements such as #19, as in the following comment, “so if think the whole IS greater than the sum of the parts but the sentence says it is not, then I would put that sentence under LEAST APPROPRIATE, is that correct[?].” The standard *Q* headings of “Least agree”, “Neutral” and “Most agree”, or even “Most like I think”, “Neutral” and “Least like I think” (Webler *et al.* 2009), would avoid such confusion, but require a negative to positive scoring as opposed to the positive distribution selected.

Two prospective participants gave up on the sort and two were incensed to the point of deeming the exercise biased to the point where results would be meaningless. By contrast, several felt the exercise to be valuable and timely, while a majority experienced, or at least reported, no difficulty. There were no technical issues with the software and data transmission. There were two objections that the scorecard forced lumping of too many statements in the “Appropriate” category. Stretching the scorecard from 1-7 to 1-9 would have eased this problem and also aided in interpreting the factors. The shape of the scorecard was a deliberate compromise based on the expectation that some participants would do the sort on small screens where a stretched distribution makes the font hard to read.

6.12 Analysis

The factor narratives indicate at least three concepts of the sacred or spiritual and somewhat different ideas as to whether they should be welcomed, excluded, distanced or separated from coast and ocean management. The first concept welcomes the spiritual or spiritual values of Aboriginal and local people as indicated by high ranking of #7. The second indicates overall support for a concept of the secular sacred. The third relates to the explicit inclusion of “religious and spiritual experts” in the lifeworld of marine ecosystem-based management. As

noted, there is widespread support for inclusion of the first concept, the spirituality of Aboriginal and local communities.

The second concept of the secular sacred includes conservation for the sake of intrinsic value and inter-generational equity, as recognized by the long-term flourishing of the linked human biotic community. Statement 18 (which endorses the concept of intrinsic value and interdependence as opposed to an anthropocentric view of the world) drew 20 comments, by far the highest number. Secular spirituality is also characterized by awe, wonder, reverence and respect (s8) and by emergent qualities of “beauty, contemplation, mystery and belonging” (s2). Statement 21 on the inclusion of artists also carries aspects of spirituality in “beauty, mystery, fascination and fragility”. This spirituality or the secular sacred is indistinguishable from three standard theological characteristics of the sacred: First it is *tremendous*; it inspires awe, wonder and terror. Second, it is *mysterious*; no matter how much we learn about nature, there is always more ... as is also true of human relationships of friendships and love. Third, it is *fascinating*; no matter how awesome or daunting, we are drawn towards it (Otto 1958; Johnson 2008:8-9).

Table 6.9 indicates support for the secular sacred across all Factors, albeit weakest in Factor D.

Table 6.9 Ranking of statements indicative of spirituality.

Statement	Factor score			
	A	B	C	D
18. The most compelling argument for conservation is preservation of species for their own sake and for the long-term flourishing of the linked human-environmental community.	5	6	6	3
2. The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.	3	5	6	3
8. Emotional connections and values such as awe, wonder, reverence and respect have no place in ecosystem-based management.	3	5	1	2
21. We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.	4	3	6	5

The third concept is associated with more standard notions of religion, i.e., in the suggestion that “religious and spiritual “leaders” or experts” have a role to play in ecosystem-based management. This is a step beyond appeals to mainstream religion to mobilize their adherents,

financial resources and / or political power in support of conservation. Table 6.10 shows the different response to this suggestion.

Table 6.10 Response to inclusion of ‘spiritual and religious experts’ in coast and ocean management.

Statement	Factor score			
	A	B	C	D
17. The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.	4	2	5	4
16. Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.	4	1	5	3

Factor A which strongly supports Aboriginal and local knowledge and spiritual values is ‘tolerant’, B is strongly opposed, C is clearly supportive, D is lukewarm at best. Given overall support for *some* aspect of the spiritual in coast and ocean management, it is time to consider participant comments. On the negative side, one participant felt that spiritual and religious experts could add little to “serious conversations” on coast and ocean management. Another felt that spiritual and religious experts are not the sole authority on “ethical and moral issues”, i.e., are not required. A stronger objection was that such involvement would lead to “irrational decisions not based in reality”, adding that decisions based on sustainable development for future generations would bring the “immeasurable values” while poverty “erodes love, compassion, gratitude and generosity.” Of two remaining comments, one found the suggestion “totally irrelevant” in anything but a local context and one did not understand #16, particularly the use of “include”. One participant strongly supportive of #16 was a practicing member of the clergy.

These comments indicate that rejection of religious leaders and experts is more of a rejection of caricatures of religious leaders as purveyors of the irrational (e.g., Dawkins 2006; Hitchens 2007), and the correct observation that such people are not the sole arbiters of “moral and ethical issues”. One participant’s final comment was that values are inseparable from personal experience, and that the “the importance of spiritual and religious connection is tough for secular

managers embedded in science”. Another participant believed that the health of a democracy can be judged by the quality of public debate around “ownership and stewardship of aquatic species and their habitat”, and that a “functioning and healthy democracy is known by the quality of public debate which will, over time, move policy in the direction of the greatest ‘public interest’...that is not informed solely by science. It is informed by consensus through exposure to information and opinions provided by spiritual sources (be they sacred or secular) and economic sources (local and national communities) as well as scientific.” This comment provides a clear argument for inclusive public debate in the spirit of “epistemic pluralism” or “flexibility” and the “epistemic virtue” of listening (please see section 4.4).

6.13 Conclusions

Overall, the Q methodology provided useful insights into how people think about the ocean and the coasts. The clustering of thinking around sets of concepts was indicative of patterns of agreement underpinning sets of general attitudes: those normally attributed to (for example) business, civil service, Aboriginal people, science managers, academics. It was clear from all responses that people of all walks of life included in the study carried some sense of the need for a sea ethic – that is, thought the oceans and coasts *should* be cherished and protected. There was also general (if somewhat inchoate), recognition of some kind of spiritual attribute that inheres in oceans and coasts.

Chapter 7: Becoming indigenous: Summary, policy implications and future work

7.1 Summary

The regional context of this thesis is the depletion and degradation of BC coastal and marine ecosystems and the impact on fishing communities and human well-being; the same is true globally. Chapter 1 set out a concept of becoming indigenous, based on the process of confronting the limits of lands and waters to support human existence and learning not only to live, but to flourish within those limits. It also spoke of the ecological and social diversity that has, over time given rise to a rich variety of eco-social-spiritual communities that shaped and sustained themselves, and sometimes each other, for thousands of years. Chapter 1 further explored the process of becoming indigenous and illustrated how an eco-social-spiritual community speaks to the multiple ways in which human and non-human entities adjust to each other. The process of adjustment was conceived as a conversation taking place over thousands of years, at the end of which time, all of the participants, people, biota and environment were profoundly changed. The extreme variability of local ecology and human response led to great eco-social-spiritual diversity, even within relatively short distances. The diversity of this local 'bottom-up' spirituality contrasts with the more unified 'top-down' narratives of world religions and in particular of science.

In British Columbia, the case study for this dissertation, fisheries were a significant part of the early economy and still serve as a cultural and spiritual icon. Chapter 2 showed how, over time, resource depletion and the growth of other economic sectors have reduced fisheries to a tiny fraction of the present day economy. As regionally, so globally to the point where resource practices of various kinds threaten not just fisheries but life as we know it. That is why this

dissertation has argued for the need to counter an approach to fisheries management that relies heavily on commodity values, and high-level decision-making that responds primarily to measures such as gross domestic product. It has offered an alternative approach that involves moral, spiritual or religious considerations as well as economic ones.

To some degree that has already been happening. Chapter 3 showed that the ecological economics literature identifies spiritual values as important to many, but that the proper venue for their consideration is the parliament or legislature where no consistent mechanism for their consideration exists. Meanwhile, major studies such as the Millennium Ecosystem Assessment and UK National Ecosystem Assessment focus on the monetary impact of change in ecosystem state to influence the same decision-making process. Lack of consistency between ecological valuation studies and deep confusion in the resource management literature between *existence value* based on willingness to pay and *intrinsic value*—the value of species and environment as good in themselves, point strongly to immeasurable values. The language of spirituality is now included in the ecosystem services literature, albeit only as one item on a list. Love as a descriptor and motivator for “cherishing and protecting the earth” is neither part of the resource management literature, nor is it integral to the emerging approaches of marine ecosystem-based management and social-ecological systems. Chapter 3 argued that what is now needed is a framework or ‘sea ethic’ that includes the spiritual as an integrative dimension of experience.

Chapter 4 argued that the core concepts of spirituality and religion are as essential to science as they are to other aspects of existence. The issue is not the disappearance of an ancient way of life, but of an imbalance of power where things that can be measured, counted and modeled dominate social decision-making, where people somehow exist outside of the ‘environment’. The challenge is to overcome the epistemic injustice that is inherent in discounting Aboriginal

sacred values and excluding the insights (as opposed to the dogmas) of religion from resource management. This imbalance has its roots in an educational system which values abstract knowledge over emotional, physical and spiritual intelligence. *In short, the language in which we learn about the things that we love does not allow us to love them.*

Chapter 5 explored methods to elicit values of love, compassion, cherishing and protecting that many people hold to be private and personal. Some methods are very effective at local level, but showing that the spiritual matters to British Columbians at a coastwide level demands a different approach. Q methodology was selected based on ability to sample the full range of discourses around the principles and values that should contribute to a sea ethic of long-term flourishing of the human-biotic community. Q methodology provides a way to identify common or overlapping beliefs in highly-polarized and contentious matters, and to identify support for marginalized perspectives.

Chapter 6 reported and discussed the results of the Q study to determine how important spiritual, religious, moral or generally immeasurable values are to a cross-section of people living and working on the BC coast. Overall, the Q methodology provided useful insights into how people think about the ocean and the coasts. The clustering of thinking around sets of concepts was indicative of patterns of agreement underpinning sets of general attitudes. It was clear from all responses that people of all walks of life included in the study carried some sense of the need for a sea ethic – that is, they thought the oceans and coasts *should* be cherished and protected. There was also general (if somewhat inchoate), recognition of some kind of spiritual attribute that inheres to oceans and coasts.

The dissertation as a whole argues that modern humans are in the same position as every group of people who came up against limits since the dawn of time, except that we have encountered planetary limits. *We have to become indigenous because there is no 'next valley' to expand into, no neighbouring tribe to conquer, no 'New World' to 'discover' and exploit.* Unlike our forebears, we lack a common language in which to address the limits we have encountered. Instead, we have a variety of different discourses including high level declarations from religions, science and international organizations, the spiritual traditions and practices of Aboriginal people and the predominantly scientific and economic discourse of ecosystem-based management. Unlike our distant ancestors, or those few of us who still maintain a subsistence or small scale farming economy, we lack the opportunity to become socialized and attuned to the web of relationships. Politicians are torn between the scientists who tell us life has to change abruptly and the economists who tell us we can't afford it.

Core concepts of spirituality and religion are as essential to science as they are to other aspects of existence. The sacred is understood by an ethics or spirituality of attention, whether through the process of socialization and attunement to animals, plants, lands, waters and spiritual entities of a traditional education or through attention to a fish population, marine ecosystem or social-ecological system. The points of contact between 'traditional' and 'scientific' spirituality are the physical, emotional and intellectual engagement and commitment. The difference is that one is expressed in the language of cherishing, protecting, complicity and restoration, the other in the detached and dispassionate language of scientific reporting. This distinction is already under tension if the field of ecosystem services is understood as gifts for which we should be grateful as opposed to services to which we are entitled. The work of ecosystem-based management and social-ecological systems also requires natural and scientists to engage with communities where spirituality is part of everyday lived reality. There is an urgent need for a concept of the spiritual

or sacred that draws on the spirituality and knowledge of science, indigenous communities, ordinary people and world religious traditions, but does not *belong* to any of them.

A more robust concept of the sacred emerges from the literature reviewed and the Q study. The concept of multiple eco-social-spiritual communities recognizes that the sacred is personal, often place-based and not always mutually comprehensible. The sacred can therefore be *described* as it manifests in various forms within and between maritime communities, but is not amenable to ‘*replication*’, i.e., resists the scientific method. We can say with some confidence that the sacred is recognizable by awe, wonder, mystery and fascination. That it seeks flourishing of the eco-social-spiritual community and is *recognized* rather than *assigned* by an external authority. That it engenders the deep feelings of connection and commitment that underlie much of the work of fisheries science, ecosystem based management and social ecological systems. That the secular sacred fuels a passion that is as evident in the actions of ordinary people to protect species and places as it is in the declarations of world religious leaders, documents such as the Earth Charter and the eloquence and actions of Aboriginal people. The sacred is therefore, a *common* experience, emergent from relationships between people, plants, animals, lands and waters, whether woven into the development of an ancient culture, or a career-forming experience in the life of an individual.

7.2 Transformative impact and potential

A robust concept of the secular sacred must move beyond tolerance or admiration of indigenous peoples. It must liberate all those who are engaged in understanding and valuing the ocean to express their love and commitment as well as their knowledge. It must bridge the separate realms of *is* (science) and *should* (religion) and encourage those knowledgeable in both realms to

build both spiritual and ecological literacy on both sides. It must bring this new collaboration to bear on today's Pacific Northwest and beyond.

Chapter 5 provided examples of transformative collaboration in the fields of ecosystem services, maritime archaeology and ecology and the resilience and flourishing of communities on the east and west coast of Canada. The precondition for transformation is the willingness to pay attention to things and concepts outside our field and experience—to open the doors of perception. Initial resistance has to be overcome. Natural scientists smarting at failure to avert the collapse of Atlantic cod and other species were not initially overjoyed at the 'irruption' of social scientists critical of their work and more disposed to listen to local fishers than to government and industrial fleets. This initial discomfort has now changed with interdisciplinary collaboration and social ecological systems. Incorporation of immeasurable values can be equally if not more transformative. By definition, the secular sacred does not *belong* to any tradition, religious, spiritual, scientific or other. It can therefore draw on the strengths of the perspectives appropriate to a specific local situation. At the global level, the secular sacred has the potential to develop the concept of our planetary home as sacred and worthy of protection.

The difference between 'traditional' and 'scientific' education and practice is not that one is spiritual and the other is secular. Both proceed through an ethics of attention to species, connections and interstitial spaces. Both require dedication and self-sacrifice. The difference is that traditional education is focused on enhancing relationships that contribute to flourishing of the eco-social-spiritual community and unpicking those that are destructive. This is a *spirituality of belonging* where moral authority resides in both possession of knowledge and application to the benefit of the community. The moral authority of science derives also from knowledge of relationships, but scientific honesty requires a *spirituality of detachment*. The personal

commitment may well be the same. The moral authority of religion comes not from blind belief in one or another concept of ‘God’, but from the faith, hope, love, compassion and commitment to justice for the poor, oppressed, sick and powerless, be they human or non-human.

The moral authority of Aboriginal and other maritime communities comes from their fine-scale knowledge and the associated social, economic, spiritual and other values that contribute to resilience and long-term sustainability. The moral authority of ordinary people—many with no religious affiliation—comes from their spiritual connection to nature actualized in commitment to cherish and protect places they know and love and often those to which they have no personal connection. The moral authority of artists comes from their ability to reinterpret and represent complex realities and tensions in ways which scientific and bureaucratic language cannot. The potential to combine these five sources of knowledge and authority is described in Chapter 4, but can be likened to the way in which the gentle pull of a starfish can, over time, open the most obdurate clam.

The five components of this conversation are of course oversimplified, as members of the public also have scientific, artistic and spiritual if not religious skills and knowledge, while “scientists” includes natural and social scientists, philosophers, psychologists, humanists who are also members of the public. This strengthens rather than weakens the potential for liberating and transformative conversations. The transformative potential comes from the epistemic pluralism of the conversation, i.e., all perspectives are legitimate and all parties will listen with attention and respect to perspectives very different from their own. The experience of interdisciplinary research has proved transformative in the sense of opening the mind to new ideas—the epistemic virtue of listening essential to entertain what was formerly deemed incommensurable.

Introduction of the language of love, cherishing, compassion, gratitude, generosity and justice can transform coast and ocean management by:

- *Liberating* science from the double jeopardy of losing credit through advocacy or abandoning morality to the moralists;
- *Liberating* religion from definition in terms of dogma, intolerance and bad science;
- *Liberating* traditional and local knowledge from the labels of anecdote; and,
- *Redressing* the epistemic sovereignty of science and economics; by,
- *Welcoming* the Aboriginal and local values of reverence, respect, reciprocity and relationship;
- *Appreciating* the need to work at the different scales of local and scientific knowledge.

7.3 Policy implications for governance and management

At the governance level The inadequacy of yesterday's policy framework for today's crowded and contentious coast and ocean points to a need to examine existing frameworks. The preamble to the Species at Risk Act (SARA) recognizes the importance of intrinsic value and a long list of tangible and intangible values, but the earlier Fisheries and Oceans Acts do not. Values in the preamble to SARA and some of the analysis in this dissertation could form the basis for a framework review. Terms of reference for past public processes such as enquiries into the pros and cons of salmon farming and the Enbridge panel could serve as case studies for how an overarching framework of principles might apply in such situations and how the composition of future panels might be expanded to explicitly address spiritual values. Such efforts would engage all parties in a long-term effort as opposed to resolutions, declarations and letters of protest as important as these may be.

The interaction between communities and local people and experts can also be considered, with the suggestion that a deliberative model where experts present the evidence, but ordinary people decide may have some advantages. It is time for a meeting of the minds to examine and re-draft policy, legislation and mechanisms to ensure that at a minimum, the values recognized in the preamble to Species at Risk Act are explicit and spoken for—a preamble after all provides

context, but does not have the force of law. The sources reviewed and the Q study show that this meeting must include those who can speak clearly for the secular sacred, for the spirituality of Aboriginal and local communities and, albeit with reservations, leaders from the mainstream religions. It should also include artists who can represent the tension between values as well as the beauty, wonder, fascination and mystery of the sea.

The values expressed in the preamble to Species at Risk Act are consistent throughout the ecological-economic literature, and in major studies such as the Millennium Ecosystem Assessment and the UK National Ecosystem Assessment. They also inform international initiatives such as the Earth Charter. Given the evidence that these are indeed widely held human values, there is a case for their application in other walks of life, including, but not limited to global industrial and financial structures that appear to contribute to inequality and ecological damage.

7.4 Future work

While the state of the oceans is cause for concern, there is also good reason to hope that the language of love and relationship can again inform resource management as it did throughout most of human history. The next step is to hold a conversation between the practice of resource management scholarship and the core messages of compassion and extension of the Golden Rule, in order to care for depleted fish populations and damaged ecosystems. This requires an effort on both sides: for the scientists to become spiritually literate and mainstream religion to become as or more ecologically literate at a local level as it is becoming at global level. In other words, the top down approaches of science and mainstream religion both have to mesh with the bottom-up spirituality of Aboriginal and local communities and British Columbians who are

connected to plants, animals, lands and waters and committed to cherish and protect them. Three examples illustrate how this might take effect.

At the global policy level, fisheries scientists and economists have demonstrated the role of subsidies in driving levels of overfishing that preclude international agreement on meeting food security targets. The work has drawn international attention and support from world leaders, but has had little success in reducing subsidies. Drawing world religious leaders into the conversation, with some exemplary case studies of ecological and human impact, could greatly increase public support. The 1992 declaration “Preserving and Cherishing the Earth” signed by over 40 leading scientists and 270 religious leaders (Sagan 1990) provides a clear precedent for focus on a more specific but equally urgent global problem.

At the Canadian marine policy level, public support for a coherent role for the spiritual or secular sacred demonstrated in the literature review and support from a broad cross-section of those living and active in the BC marine environment indicated in the Q study set the stage for a review of ocean policy. This review could take as its starting point the range of values in the Preamble to the Species at Risk Act, and would include scientists and stakeholders representative of Canada’s ocean and aquatic environments, plus the missing elements of spiritual and religious leaders, theologians and artists. The desired outcome would be a policy framework that includes all values important to Canadians.

At the BC level, the statements used in the Q methodology study could be reviewed to produce a vetted and fuller (although possibly shorter) set of principles and values. This work could be done under the auspices of one or more of the current ecosystem-based management initiatives or broad-based consultative bodies. The revised set of statements could then be used in a Q

methodology workshop with a full range of participants identified by the partners. This work is potentially synergistic with the coast and ocean policy review suggested above.

Our journey has come full circle from an Aboriginal ethic of cherishing and protecting the sea through a period of depletion and undervaluing to new calls for a sea ethic. Fisheries management has seen the displacement of 19th and early 20th Century naturalists by quantitative science and modelling, catastrophic management failures and the return of social science in social-ecological systems. It is time to put the spiritual and the local and planetary sacred on equal footing. A full conversation can liberate experts from the silos of their expertise. Deliberative democracy can liberate communities from the tyranny of experts.

References

- Acuña, J.L., López-Urrutia, Á. and Colin, S. (2011) Faking Giants: The Evolution of High Prey Clearance Rates in Jellyfishes. *Science*, **333**(6049): 1627-1629.
- Addams, H. (2000) Q methodology. Pages 14-40 in: *Social Discourse and Environmental Policy: An Application of Q Methodology*. Addams, H. and Proops, J. (eds). Edward Elgar, Cheltenham, UK.
- Agardy, T. (2007) 10 Solutions to Save the Ocean. *Conservation Magazine*, 8(3).
- Ainsworth, C. and Sumaila, U.R. (2005) Intergenerational valuation of fisheries resources can justify long-term conservation: a case study in Atlantic cod. *Canadian Journal of Fisheries and Aquatic Sciences*, **62**(5): 1104-1110.
- Alder, J. and Sumaila, U.R. (2004) Western Africa: A fish basket of Europe past and present. *The Journal of Environment and Development*, **13**(2): 156-178.
- Aldred, J. (1994) Existence value, welfare and altruism. *Environmental Values*, **3**(4): 381-402.
- Allison, E.H., Perry, A.L., Badjeck, M.C., Neil Adger, W., Brown, K., Conway, D. *et al.* (2009) Vulnerability of national economies to the impacts of climate change on fisheries. *Fish and Fisheries*, **10**(2): 173-196.
- Anderson, E.N. (1996) *Ecologies of the Heart. Emotion, Belief, and the Environment*. Oxford University Press, New York, 272p.
- Anderson, E.N. (1994) Fish as gods and kin. Pages 139-160 in: *Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management*. Dyer, C.L. and McGoodwin, J.R. (eds). Colorado University Press.
- Anderson, E.N. (1972) *Essays on South China's Boat People*. Orient Cultural Service Taipei, Taipei, 146p.
- Anderson, M.K. (2005) *Tending the Wild: Native American Knowledge and the Management of California's Natural Resources*. University of California Press, Berkeley, 555p.
- Anon. (n.d.) Atlantic Dawn replaces 7000 traditional African fishermen. URL: [http://www.noble-house.tk/html/engels/Fishes/Atlantic Dawn replaces fisherman.htm](http://www.noble-house.tk/html/engels/Fishes/Atlantic_Dawn_replaces_fisherman.htm), Accessed May 5, 2012.
- Anon. (n.d.) Japan - Location and size, Population, Taxation, Agriculture, Farming, Forestry, Fisheries, Manufacturing. URL: <http://www.nationsencyclopedia.com/economies/Asia-and-the-Pacific/Japan.html>, Accessed May 5, 2012.
- ARC (n.d.) Alliance of Religions and Conservation. URL: <http://www.arcworld.org>, Accessed May 5, 2012.

- Archibald, J.A. (2008) *Indigenous Storywork: Educating the Heart, Mind, Body, and Spirit*. UBC Press, Vancouver, 192p.
- Arkema, K.K., Abramson, S.C. and Dewsbury, B.M. (2006) Marine ecosystem-based management: from characterization to implementation. *Frontiers in Ecology and the Environment*, **4**(10): 525-532.
- Armstrong, J. (2000) Let us begin with courage. Pages 8-10 in: *Ecoliteracy: Mapping the Terrain*. Learning in the Real World, Center for Ecoliteracy, Berkeley, CA.
- Armstrong, K. (2011) *Twelve Steps to a Compassionate Life*. Vintage Canada, Toronto, 224p.
- Arnason, R. (1999) Fisheries subsidies, overcapitalization and economic losses. *Overcapacity, Overcapitalization and Subsidies in European Fisheries*. CEMARE, University of Portsmouth.
- Arrow, K.J. and Fisher, A.C. (1974) Environmental Preservation, Uncertainty, and Irreversibility. *Quarterly Journal of Economics*, **88**(2): 312-319.
- Arrow, K.J., Cropper, M.L., Eads, G.C., Hahn, R.W., Lave, L.B., Noll, R.G. *et al.* (1996) Is there a role for benefit-cost analysis in environmental, health, and safety regulation? *Environment and Development Economics*, **2**(02): 195-221.
- Astudillo, N., Chryssavgis, F.J., Hessel, D., Hoyt, T.L.J., Johnston, C., Marcova-Barnett, T., *et al.*, (2005) God's Earth is Sacred: An Open Letter to Church and Society in the United States. URL: <http://www.nccusa.org/news/14.02.05theologicalstatement.html>, Accessed May 5, 2012.
- Atleo, E.R. (2004) *Tsawalk: A Nuu-chah-nulth Worldview*. UBC Press, Vancouver, 146p.
- Attfield, R. (1998) Existence value and intrinsic value. *Ecological Economics*, **24**(2-3): 163-168.
- Auster, P.J., Fujita, R., Kellert, S.R., Avise, J., Campagna, C., Cuker, B. *et al.* (2009) Developing an Ocean Ethic: Science, Utility, Aesthetics, Self-Interest, and Different Ways of Knowing. *Conservation Biology*, **23**(1): 233-235.
- Baldwin, J. (1953) Stranger in the village. Pages 352-362 in: *The Norton Reader*. Eastman, A.M., Blake, C.R., English, H.M.J., Hartman, J.E. *et al.* (eds). W.W. Norton and Co., New York and London.
- Barange, M. and Perry, R.I. (2009) Physical and ecological impacts of climate change relevant to marine and inland capture fisheries and aquaculture. Pages 7-10 in: *Climate change implications for fisheries and aquaculture: overview of current scientific knowledge*. Cochrane, K., De Young, C., Soto, D. and Bahri, T. (eds). *FAO Fisheries and Aquaculture Technical Paper*. No. 530. FAO, Rome.
- Barbier, E.B. (1994) Valuing environmental functions: tropical wetlands. *Land Economics*, **70**(2): 155-173.

- Barsh, R.L. (1994) Canada's Aboriginal peoples: Social integration or disintegration. *The Canadian Journal of Native Studies*, **14**(1): 1-46.
- Basso, K.H. (1996) *Wisdom Sits in Places: Landscape and Language Among the Western Apache*. University of New Mexico Press, Albuquerque, 171p.
- Bateman, I., Mace, G., Fezzi, C., Atkinson, G. and Turner, K. (2011) Economic Analysis for Ecosystem Service Assessments. *Environmental Resource Economics*, **48**(2): 177-218.
- Bateson, G. and Bateson, M.C. (1987) *Angels Fear: Towards an Epistemology of the Sacred*. MacMillan Publishing Company, New York, 224p.
- Bateson, G. (2000) *Steps to an Ecology of Mind*. University of Chicago Press, Chicago, 533p.
- Bateson, K.E. (2009) Contemporary and Traditional Values of a Landless Cree First Nation in Northern Ontario. Masters thesis, University of British Columbia. URL: <http://circle.ubc.ca/handle/2429/4612>.
- Bateson, M.C. (2008) Angels Fear Revisited: Gregory Bateson's Cybernetic Theory of Mind Applied to Religion-Science Debates. Pages 15-26 in: *A Legacy for Living Systems: Gregory Bateson as Precursor to Biosemiotics*. Springer Publishing, New York.
- Bavington, D. (2010) *Managed Annihilation: An Unnatural History of the Newfoundland Cod Collapse*. UBC Press, Vancouver, 178p.
- BBC World Service. (2008) Nature Inc. URL: <http://www.bbcwwchannels.com>, Accessed May 23, 2012.
- BC (2007) *British Columbia's Fisheries and Aquaculture Sector*. British Columbia Ministry of the Environment, Victoria, BC. 108p.
- BC (2006) *Report of Proceedings (Hansard) Special Committee on Sustainable Aquaculture*. Second Session, 38th Parliament: Province of British Columbia, Victoria.
- BC Claims Task Force. (1991) *Report of the British Columbia Claims Task Force*. BC Claims Task Force, Vancouver, BC. 84p.
- BC-SCSA. (2007) *Special Committee on Sustainable Aquaculture: Final Report*. Legislative Assembly of BC, Victoria. 67p.
- Berkes, F. and Turner, N.J. (2006) Knowledge, Learning and the Evolution of Conservation Practice for Social-Ecological System Resilience. *Human Ecology*, **34**(4): 479-494.
- Berkes, F., Folke, C. and Colding, J. (2000) *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge University Press, Cambridge, 476p.
- Berkes, F., Hughes, T.P., Steneck, R.S., Wilson, J.A., Bellwood, D., Crona, B. *et al.* (2006) Globalization, Roving Bandits, and Marine Resources. *Science*, **311**(5767): 1557-1558.

- Berkes, F. (2012) *Sacred Ecology*. 3rd Edition, Taylor and Francis, New York, 392p.
- Berkes, F. (2010) Devolution of environment and resources governance: trends and future. *Environmental Conservation*, **37**(04): 489-500.
- Berman, M. and Sumaila, U.R. (2006) Discounting, amenity values, and marine ecosystem restoration. *Marine Resource Economics*, **21**(2): 211-219.
- Beston, H. (1928) *The Outermost House: A Year of Life on the Great Beach of Cape Cod*. Owl Books, 1992, Doubleday and Doran, New York, 218p.
- Beverluis, J.D. (2000) *A Sourcebook for Earth's Community of Religions*. 3rd Edition, New World Library, Novato, CA, 420p.
- Beynon, W. (1915) The Adorh of Nugwen'aks (The Story of Moore Island). As told by Arthur Wellington Clah of Port Simpson.
- Bishop, R.C., Boyle, K.J. and Welsh, M.P. (1987) Toward Total Economic Valuation of Great Lakes Fishery Resources. *Transactions of the American Fisheries Society*, **116**(3): 339-345.
- Boas, F. (1921) Ethnology of the Kwakiutl. *Annual Report of the Bureau of American Ethnology*, 1913-1914, **35**: 1320-1324.
- Boero, F., Bouillon, J., Gravili, C., Miglietta, M.P., Parsons, T. and Piraino, S. (2008) Gelatinous plankton: irregularities rule the world (sometimes). *Marine Ecology Progress Series*, **356**: 299-310.
- Boff, L. (1997) *Cry of the Earth, Cry of the Poor. Ecology and justice*, Orbis Books, Maryknoll, NY, 242p.
- Borgmann, A. (2000) The moral complexion of consumption. *Journal of Consumer Research*, **4**: 418-422.
- Borgmann, A. (1987) *Technology and the Character of Contemporary Life: A Philosophical Inquiry*. University of Chicago Press, Chicago, 310p.
- Boyd, R.T. (1999) *The coming of the spirit of pestilence: introduced infectious diseases and population decline among Northwest Coast Indians, 1774-1874*. UBC Press; University of Washington Press, Vancouver; Seattle, 403p.
- Brander, K.M. (2007) Global fish production and climate change. *Proceedings of the National Academy of Sciences*, **104**(50): 19709-19714.
- Brashares, J.S., Arcese, P., Sam, M.K., Coppolillo, P.B., Sinclair, A.R.E. and Balmford, A. (2004) Bushmeat Hunting, Wildlife Declines, and Fish Supply in West Africa. *Science*, **306**(5699): 1180-1183.
- Bratton, S. (2004) Thinking Like a Mackerel: Rachel Carson's Under the Sea-Wind as a Source for a Trans-Ecotonal Sea Ethic. *Ethics and the Environment*, **9**(1): 1-22.

- Broadhurst, C.L., Cunnane, S.C. and Crawford, M.A. (2007) Rift Valley lake fish and shellfish provided brain-specific nutrition for early Homo. *British Journal of Nutrition*, **79**(01): 3-21.
- Brotz, L., Cheung, W.W.L., Kleisner, K., Pakhomov, E. and Pauly, D. (2012) Increasing jellyfish populations: trends in Large Marine Ecosystems. *Hydrobiologia*, **690**(1): 1-18.
- Brown, D. (2005) *Salmon Wars: The Battle for the West Coast Salmon Fishery*. Harbour Publishing, Madeira Park, BC, 408p.
- Brown, S.R. (2006) A Match Made in Heaven: A Marginalized Methodology for Studying the Marginalized. *Quality and Quantity*, **40**(3): 361-382.
- Brown, S.R. (1993) A primer on Q methodology. *Operant Subjectivity*, **16**(3/4): 91-138.
- Brown, S.R. (2011) Re: Selecting the best fit of data for a large P sample. URL: <https://listserv.kent.edu/cgi-bin/wa.exe?A2=ind1108&L=Q-METHOD&F=&S=&X=0F834C61BFEC4818BC&Y=nhaggan%40gmail.com&P=34973>, Accessed May 5, 2012.
- Brown, S.R. (1980) *Political Subjectivity: Applications of Q Methodology in Political Science*. Yale University Press, New Haven, CT, 355p.
- Brown, F. and Brown, Y.K. (eds) (2009) *Staying the Course, Staying Alive – Coastal First Nations Fundamental Truths: Biodiversity, Stewardship and Sustainability*. Biodiversity, BC, Victoria, 82p.
- Brueggemann, W. (2001) *The Prophetic Imagination*. 2nd Edition, Augsburg Fortress Press, Minneapolis, 151p.
- Brueggemann, W. (1997) *Theology of the Old Testament: Testimony, Dispute, Advocacy*. Augsburg Fortress Press, Minneapolis, 777p.
- Brunk, C. (2004) Religion, risk and the technological society. Pages 45-58 in: *The Twenty-first Century Confronts Its Gods: Globalization, Technology and War*. Hawkin, D.J. (ed.). SUNY Press, Albany.
- Bshary, R., Hohner, A., Ait-el-Djoudi, K. and Fricke, H. (2006) Interspecific communicative and coordinated hunting between groupers and giant moray eels in the Red Sea. *PLoS Biology*, **4**(12): e431.
- Buber, M. (1937) *I and Thou*. Reissued 1984 by T. and T. Clark Ltd., Edinburgh, *Original title: Ich und Du*. Translated by: Walter Kaufman. Charles Scribners' Sons, New York, 185p.
- Burkholder, J.M., Noga, E.J., Hobbs, C.H., Glasgow Jr, H.B. and Smith, S.A. (1992) New "phantom" dinoflagellate is the causative agent of major estuarine fish kills. *Nature*, **358**(6385): 407-410.
- Burton, L. (2002) *Worship and Wilderness: Culture, Religion, and Law in Public Lands Management*. University of Wisconsin Press, Madison, WI, 312p.

- Bushe, G.R. and Kassam, A.F. (2005) When Is Appreciative Inquiry Transformational?: A Meta-Case Analysis. *The Journal of Applied Behavioral Science*, **41**(2): 161.
- Cajete, G. (2000) *Native Science: Natural Laws of Interdependence*. Clear Light Publishers, Santa Fe, NM, 339p.
- Callicott, J.B. and Back, E. (2008) The conceptual foundations of Rachel Carson's sea ethic. Pages 94-117 in: *The conceptual foundations of Rachel Carson's sea ethic*. Sideris, L.H. and Moore, K.D. (eds). SUNY Press, New York.
- Callicott, J.B. (1994) *Earth's Insights: A Multicultural Survey of Ecological Ethics from the Mediterranean Basin to the Australian Outback*. University of California Press, Berkeley, 283p.
- Callon, M. (1986) Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. Pages 196-233 in: *Power, Action and Belief: A New Sociology of Knowledge?* Law, J. (ed.). Routledge and Kegan Paul, London.
- Campbell, S.K. and Butler, V.L. (2010) Archaeological Evidence for Resilience of Pacific Northwest Salmon Populations and the Socioecological System over the last ~7,500 years. *Ecology and Society*, **15**(1).
- Canada (2004) *Canada Gazette, Part I*. 138 No. 43: Government of Canada, Ottawa.
- Canada (2002) *Species at Risk Act*. (S.C. 2002, c. 29).
- Canada (1990) *Regina v. Sparrow*, 1 Supreme Court Registry. 1075.
- Canada (1982) *Constitution Act. Enacted by the Canada Act, 1982*.
- Capra, F. (1996) *The Web of Life: A New Scientific Understanding of Living Systems*. Anchor Books, New York, 368p.
- Caputo, J. (2008) Having Faith in Reason: A Response to Professor Wiebe. *Council of Societies for the Study of Religion Bulletin*, **37**(3): 85-86.
- Caputo, J.D. (1997) *The Prayers and Tears of Jacques Derrida: Religion Without Religion*. Indiana University Press, Bloomington, IN, 379p.
- Carlson, K.T. (2007) Reflections on Indigenous history and memory: Reconstructing and considering contact. Pages 46-68 in: *Myth and Memory: Stories of Indigenous-European Contact*. Lutz, J.S. (ed.). UBC Press, Vancouver.
- Carlton, J.T. (2000) Global change and biological invasions in the oceans. Pages 31-53 in: *Invasive Species in a Changing World*. Mooney, H.A. and Hobbs, R.J. (eds). Island Press, Washington, DC.
- Carlton, J.T., Geller, J.B., Reaka-Kudla, M.L. and Norse, E.A. (1999) Historical extinctions in the sea. *Annual Review of Ecology and Systematics*, **30**: 515-538.

- Carson, R.L. (1951) *The Sea Around Us*. Reissued 2003 with additions by Levinton, J.S. and Zwinger, A.H., Oxford University Press, Oxford, 288p.
- Castro, F. (2007) The Internationalization of Genocide: Transforming Food into Fuel. The colossal squandering of cereals destined to fuel production. *Global Research*, March 5, 2007.
- Cattell, R.B. (1966) The scree test for the number of factors. *Multivariate Behavioral Research*, **1**(2): 245-276.
- Center for Ocean Solutions. (2009) Pacific Ocean Scientific Consensus Statement. URL: http://centerforoceansolutions.org/sites/default/files/pdf/consensus_statement.pdf, Accessed May 5, 2012.
- Chan, K., Pringle, R.M., Ranganathan, J., Boggs, C.L., Chan, Y.L., Ehrlich, P.R. *et al.* (2007) When agendas collide: human welfare and biological conservation. *Conservation Biology*, **21**(1): 59-68.
- Chapin, F.S., Kofinas, G.P. and Folke, C. (eds) (2009) *Principles of Ecosystem Stewardship: Resilience-Based Natural Resource Management in a Changing World*. Springer Verlag, 402p.
- Cheung, W.W.L., Lam, V.W.Y., Sarmiento, J.L., Kearney, K., Watson, R. and Pauly, D. (2009) Projecting global marine biodiversity impacts under climate change scenarios. *Fish and Fisheries*, **10**(9999): 235-251.
- Cheung, W.W.L., Lam, V.W.Y., Sarmiento, J.L., Kearney, K., Watson, R., Zeller, D. *et al.* (2010) Large-scale redistribution of maximum fisheries catch potential in the global ocean under climate change. *Global Change Biology*, **16**(1): 24-35.
- Chichilnisky, G. (1996) An axiomatic approach to sustainable development. *Social Choice and Welfare*, **13**(2): 231-257.
- Chuenpagdee, R. (1998) *Damage schedules for Thai coastal areas: an alternative approach to assessing environmental values*. Economy and environment program for Southeast Asia (EEPSEA).
- Chuenpagdee, R., Knetsch, J.L. and Brown, T.C. (2001) Environmental damage schedules: community judgments of importance and assessments of losses. *Land Economics*, **77**(1): 1.
- Cisneros-Montemayor, A.M., Sumaila, U.R., Kaschner, K. and Pauly, D. (2010) The global potential for whale watching. *Marine Policy*, **34**(6): 1273-1278.
- Clark, C.W. (1990) *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*. John Wiley and Sons, New York, 386p.
- Clark, C.W., Munro, G.R. and Sumaila, U.R. (2010) Limits to the Privatization of Fishery Resources. *Land Economics*, **86**(2): 209-218.
- Clark, C. (2006) Moral character in social work. *British Journal of Social Work*, **36**(1): 75-89.

- Clark, C.W., Clarke, F.H. and Munro, G.R. (1979) The optimal exploitation of renewable resource stocks: problems of irreversible investment. *Econometrica: Journal of the Econometric Society*, **47**(1): 25-47.
- Clark, M.R. and Koslow, J.A. (2007) Impacts of fisheries on seamounts. Pages 413-441 in: *Seamounts: Ecology, Fisheries, and Conservation*. Blackwell, UK.
- Clark, C.W. (1973) The economics of overexploitation. *Science*, **181**(4100): 630-634.
- Clarke, A.H. (2002) Understanding sustainable development in the context of other emergent environmental perspectives. *Policy Sciences*, **35**(1): 69-90.
- Clover, C. (2008) *The End of the Line: How Overfishing is Changing the World and What we Eat*. University of California Press, Berkeley, 314p.
- Coastal First Nations. (n.d.) *Into the Deep Blue: Marine Ecosystem-based Management*. Coastal First Nations Truning Point Initiative, Vancouver. 8p.
- Conover, D.O. (2007) Fisheries: nets versus nature. *Nature*, **450**(7167): 179-180.
- Cooperrider, D.L. and Srivastva, S. (1987) Appreciative inquiry in organizational life. *Research in Organizational Change and Development*, **1**: 129-169.
- Costanza, R., Batker, D., Day, J., Feagin, R., Martinez, M.L., Roman, J. *et al.* (2010) The Perfect Spill: Solutions for Averting the Next Deepwater Horizon. *The Solutions Journal*, **1**(5): 17-20.
- Costanza, R., Andrade, F., Antunes, P., van den Belt, M., Boesch, D., Boersma, D. *et al.* (1999) Ecological economics and sustainable governance of the oceans. *Ecological Economics*, **31**(2): 171-187.
- Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B. *et al.* (1997) The value of the world's ecosystem services and natural capital. *Nature*, **387**: 253-260.
- Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds) (2000) *Just Fish: Ethics and Canadian Marine Fisheries*. ISER Press, St. John's, 304p.
- Craig, P.P., Glasser, H. and Kempton, W. (1994) Ethics and values in environmental policy: the said and the UNCED. *Envirnmental Values*, **2**(2): 137-157.
- CREST. (n.d.) *Responsible Travel: Global Trends & Statistics*. Center for Responsible Travel, Stanford University & Washington, DC. <http://www.responsibletravel.org>. Accessed May 5, 2012.
- Crowder, L. and Norse, E. (2008) Essential ecological insights for marine ecosystem-based management and marine spatial planning. *Marine Policy*, **32**(5): 772-778.
- Cruikshank, J. (2005) *Do Glaciers Listen?: Local Knowledge, Colonial Encounters, and Social Imagination*. UBC Press, Vancouver, 312p.

- Daily, G.C. (ed) (1997) *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press, Washington, DC, 392p.
- Daily, G.C. and Ellison, K. (2002) *The New Economy of Nature: The Quest to Make Conservation Profitable*. Island Press, Washington, DC, 260p.
- Dallmeyer, D.G. (2005) Toward a sea ethic. Pages 410-421 in: *Marine Conservation Biology: The Science of Maintaining the Sea's Biodiversity*. Norse, E.A. and Crowder, L.B. (eds). Island Press, Washington, DC.
- Daly, H.E. and Cobb, J.B. (1994) *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future*. Beacon Press, Boston, 534p.
- Daly, H.E. (1995) Science, religion and sustainable development. Pages 62-66 in: *Revelation and the Environment*. Hobson, S. and Lubchenco, J. (eds). World Scientific, Singapore, New Jersey, London, Hong Kong.
- Daly, H.E. and Farley, J. (2011) *Ecological Economics: Principles and Applications*. 2nd Edition, Island Press, Washington, DC, 511p.
- Danielson, S., Webler, T. and Tuler, S.P. (2010) Using Q Method for the Formative Evaluation of Public Participation Processes. *Society & Natural Resources*, **23**(1): 92-96.
- Dasgupta, P. (2006) Comments on the Stern Review's Economics of Climate Change. www.Econ.Cam.Ac.uk/faculty/dasgupta/Stern.Pdf.
- Davis, C.H. and Michelle, C. (2011) Q Methodology in Audience Research: Bridging the Qualitative/Quantitative 'Divide'? *Participations*, **8**(2): 559-593.
- Davis, S.G. (2005) Touch the magic. Pages 204-232 in: *Uncommon Ground: Rethinking the Human Place in Nature*. Cronon, W. (ed.). Rowman and Littlefield, New York and London.
- Davis, W. (2009) *The Wayfinders: Why Ancient Wisdom Matters in the Modern World*. House of Anansi Press, Toronto, 240p.
- Davis, W. (2004) The Ethnosphere and the Academy. Indigenous Knowledge: Transforming the Academy, Interinstitutional Consortium for Indigenous Knowledge, Penn State University, Pennsylvania, May 27-28.URL: <http://www.ed.psu.edu/icik/2004Proceedings/section7-davis.pdf>.
- Dawkins, R. (2006) *The God Delusion*. Houghton Mifflin, Boston, 406p.
- de Groot, R. (2006) Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multi-functional landscapes. *Landscape and Urban Planning*, **75**(3-4): 175-186.
- de Groot, R.S. and Hein, L. (2007) Concept and valuation of landscape functions at different scales. Pages 15-36 in: *Multifunctional Land Use: Meeting Future Demands for Landscape*

- Goods and Services*. Mander, U., Wiggering, H. and Helming, K. (eds). Springer, Netherlands.
- de Groot, R.S., Wilson, M.A. and Boumans, R.M.J. (2002) A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics*, **41**(3): 393-408.
- de Young, C., Charles, A. and Hjort, A. (2008) *Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods*. Technical Paper. No. 489: FAO, Rome. 152p.
- DeFries, R., Adamowicz, W.L., Ash, N., Adamowicz, W.L., Akçakaya, H.R., Arcenas, A., Babu, S., Balk, D., Confalonieri, U., Cramer, W., Falconí, F., Fritz, S., Green, R., Gutiérrez-Espeleta, E., Hamilton, K., Kane, R., Latham, J., Matthews, E., Ricketts, T., Yue, T.X., Ash, N. and Thonell, J. (2005) Millennium Ecosystem Assessment: Analytical Approaches for Assessing Ecosystem Condition and Human Well-being. Pages 39-71 in: *Ecosystems and human well-being: current state and trends*. Ceballos, G., Lavorel, S., Orians, G., Pacala, S. *et al.* (eds). Island Press, Washington, DC.
- Diaz, R.J. and Rosenberg, R. (2008) Spreading dead zones and consequences for marine ecosystems. *Science*, **321**(5891): 926.
- Dillard, A. (1974) *Pilgrim at Tinker Creek*. Harper's Magazine Press, New York, 290p.
- Dixon, J. and Pagiola, S. (1998) Economic Analysis and Environmental Assessment. *Environmental Assessment Sourcebook Update*, **23**.
- Dryzek, J.S. and Berejikian, J. (1993) Reconstructive democratic theory. *The American Political Science Review*, **87**(1): 48-60.
- Dulvy, N.K., Sadovy, Y. and Reynolds, J.D. (2003) Extinction vulnerability in marine populations. *Fish and Fisheries*, **4**(1): 25-64.
- Dunham, S. and Coward, H.G. (2000) World religions and ecosystem justice in the marine fishery. Pages 47-66 in: *Just Fish: Ethics and Canadian Marine*. Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds). ISER Books, St John's.
- Durie, M. (1998) *Te Mana Te Kāwanatanga: The Politics of Maori Self-Determination*. Oxford University Press, Oxford, 288p.
- Eagleton, T. (2009) *Reason, Faith, and Revolution: Reflections on the God Debate*. Yale Univ Press, New Haven and London, 185p.
- Eaton, S.B. and Eaton Iii, S.B. (2000) Paleolithic vs. modern diets—selected pathophysiological implications. *European Journal of Nutrition*, **39**(2): 67-70.
- ECL. (n.d.) The Earth Charter. URL: <http://www.earthcharterinaction.org/content/>, Accessed December 21, 2011.

- Ehrlich, G. (2010) *In the Empire of Ice: Encounters in a Changing Landscape*. National Geographic, Washington, DC, 319p.
- Einstein, A. (1954) *Ideas and Opinions*. 1988, *Original title: Mein Weltbild and other sources*. Translated by: S. Bargmann. Bonanza Books, New York, 377p.
- Eliot, T.S. (1941) The Dry Salvages. Pages 131-137 in: *T.S. Eliot: The Complete Poems and Plays: 1909-1950*. Houghton Mifflin Harcourt, Orlando.
- Ellis, G., Barry, J. and Robinson, C. (2007) Many ways to say 'no', different ways to say 'yes': applying Q-Methodology to understand public acceptance of wind farm proposals. *Journal of Environmental Planning and Management*, **50**(4): 517-551.
- Erlandson, J.M. (2001) The Archaeology of Aquatic Adaptations: Paradigms for a New Millennium. *Journal of Archaeological Research*, **9**(4): 287-350.
- Erlandson, J.M., Rick, T.C., Braje, T.J., Steniberg, A. and Vellanoweth, R.L. (2008) Human impacts on ancient shellfish: a 10,000 year record from San Miguel Island, California. *Journal of Archaeological Science*, **35**: 2144e-2152.
- Fairweather, T.P., Hara, M., van der Lingen, C.D., Raakjær, J., Shannon, L.J., Louw, G.G. *et al.* (2006) A knowledge base for management of the capital-intensive fishery for small pelagic fish off South Africa. *African Journal of Marine Science*, **3**(4): 645-660.
- FAO (n.d.a) Fishery and Aquaculture Country Profiles. URL: <http://www.fao.org/fishery/countryprofiles>, Accessed December 10, 2009.
- FAO (n.d.b) Ecosystem approach to fisheries management. URL: <http://www.fao.org/fishery/topic/13261/en>, Accessed December 22, 2009.
- FAO (2010) *The state of world fisheries and aquaculture*. UN Food and Agriculture Organization, Rome. 88p.
- FAO (2008) *The State of World Fisheries and Aquaculture*. UN, Rome. 84p.
- FAO (1995) *Code of Conduct for Responsible Fisheries*. Food and Agriculture Organization of the United Nations, Rome, 41p.
- Farber, S., Costanza, R., Childers, D.L., Erickson, J., Gross, K., Grove, M. *et al.* (2006) Linking ecology and economics for ecosystem management. *Bioscience*, **56**(2): 121-133.
- Farber, S.C., Costanza, R. and Wilson, M.A. (2002) Economic and ecological concepts for valuing ecosystem services. *Ecological Economics*, **41**(3): 375-392.
- Fearnley-Whittingstall, H. (2010) Hugh's Fish Fight. URL: <http://www.channel4.com/programmes/hughs-fish-fight/4od>, Accessed April 4, 2011.

- Fedje, D.W., Wigen, R., McClaren, D. and Mackie, Q. (2004) Pre-Holocene Archaeology and Environment from Karst Caves in Haida Gwaii, West Coast, Canada. 57th Northwest Anthropology Conference, Eugene, Oregon, March 2004.
- Fishbane, M.A. (2008) *Sacred Attunement: A Jewish theology*. University of Chicago Press, Chicago, 256p.
- Foley, M.M., Halpern, B.S., Micheli, F., Armsby, M.H., Caldwell, M.R., Crain, C.M. *et al.* (2010) Guiding ecological principles for marine spatial planning. *Marine Policy*, **34**(5): 955-966.
- Folke, C. and Berkes, F. (1995) Mechanisms that link property rights to ecological systems. Pages 121-137 in: *Property Rights and the Environment: Social and Ecological Issues*. Hanna, S. and Munasinghe, M. (eds). World Bank and the Beijer International Institute of Ecological Economics, Sweden.
- Forbes, P. (2001) *The Great Remembering: Further Thoughts on Land, Soul, and Society*. San Francisco Trust for Public Land, San Francisco, 95p.
- Fossey, K., Ghosananda, S.P.M., Bakula, S.K. and Teng, V.N.K. (2003) Buddhism. Pages 77-82 in: *Faith in Conservation: New Approaches to Religions and the Environment*. Palmer, M. and Finlay, V. (eds). The World Bank, Washington, DC.
- Frank, K.T., Petrie, B., Choi, J.S. and Leggett, W.C. (2005) Trophic cascades in a formerly cod-dominated ecosystem. *Science*, **308**(5728): 1621-1623.
- Freeman, A.M. (1993) *The Measurement of Environmental and Resource Values: Theory and Methods*. 2nd edition 2003, Resources for the Future, Washington, DC, 496p.
- Freeman, A.M. (2003) *The Measurement of Environmental and Resource Values: Theory and Methods*. Resources for the Future, Washington, DC, 491p.
- Fricker, M. (2007) *Epistemic Injustice: Power and the Ethics of Knowing*. Oxford University Press, London, 208p.
- Frost, R. (1930) Education by poetry. Pages 598-606 in: *The Norton Reader: Sixth Edition Shorter*. W.W. Norton and Co., New York and London.
- Fumano, D. (2012) Vancouver Aquarium gifted \$12.5-million donation from Teck Resources. *The Globe and Mail*, April 28.
- Gallaughier, P., Penikett, J. and Wood, L. (eds) (2005) *Getting The Missing Fish Story Straight: A Ten-Year Retrospective On Fraser Sockeye Salmon*. Continuing Studies in Science, Simon Fraser University, Burnaby, BC, 124p.
- Garcia, S.M. and Cochrane, K.L. (2005) Ecosystem approach to fisheries: a review of implementation guidelines. *ICES Journal of Marine Science*, **62**(3): 311.

- Gardner Pinfold. (2009) *Economic Impact of Marine Related Activities in Canada*. 2009: 123p. <http://www.dfo-mpo.gc.ca/ea-ae/cat1/no1-1/no1-1-eng.htm>. Accessed May 5, 2012.
- Gardner, G. (2010) Engaging religions to shape worldviews. Pages 23-29 in: *2010 State of the World Report: Transforming Cultures from Consumerism to Sustainability*. World Watch Institute, Austin and London.
- Gardner, J. (2006) Big Eddy Ecosystem Symposium. Sharing Oceans Ecosystems – Bridging gaps between nations, science and management, Big Eddy Steering Committee, Tin Wis Resort, Tofino, BC, October 11-13.
- Gargan, J.J. and Brown, S.R. (1993) ‘What is to be done?’ Anticipating the future and mobilizing prudence. *Policy Sciences*, **26**(4): 347-359.
- Garibaldi, A. and Turner, N.J. (2004) Cultural Keystone Species: Implications for Ecological Conservation and Restoration. *Ecology and Society*, **9**(3): 1.
- Gaydos, J.K., Dierauf, L., Kirby, G., Brosnan, D., Gilardi, K. and Davis, G.E. (2008) Top 10 principles for designing healthy coastal ecosystems like the Salish Sea. *EcoHealth*, **5**(4): 460-471.
- Gerwing, K. and McDaniels, T. (2006) Listening to the Salmon People: Coastal First Nations' Objectives Regarding Salmon Aquaculture in British Columbia. *Society and Natural Resources*, **19**(3): 259-273.
- Gislason, G., Lam, E. and Mohan, M. (1996) *Fishing for Answers: Coastal Communities and the BC Salmon Fishery: A report prepared for the BC Job Protection Commission*. ARA Consulting Group Inc., Victoria.
- Given-Wilson, C., Brand, P., Curry, A., Ormrod, W.M. and Phillips, J.R.S. (eds) (2005) *The parliament rolls of Medieval England, 1275-1504 [rotuli parliamentorum]*. Boydell Press, London, 9800p.
- Gosselink, J.G., Odum, E.P. and Pope, R.M. (1974) *The Value of the Tidal Marsh*. LSU-SG-74-03: Center for Wetland Resources, Louisiana State University, Baton Rouge. 34p.
- Gould, S.J. (1997) Nonoverlapping magisteria. *Natural History*, **106**(2): 16-22.
- Gould, S.J. (1980) Darwin's middle road. Pages 558-565 in: *The Norton Reader: Sixth Edition Shorter*. W.W. Norton and Co., New York & London.
- Goulder, L.H. and Kennedy, D. (1997) Valuing ecosystem services: Philosophical bases and empirical methods. Pages 23-47 in: *Nature's Services: Societal Dependence on Natural Ecosystems*. Daily, G. and Myers, J.P. (eds). Island Press, Washington, DC.
- Goulet, J.G. and Miller, B.G. (eds) (2007) *Extraordinary Anthropology: Transformations in the Field*. University of Nebraska Press, Lincoln and London, 456p.

- Goulet, J.A. (2007) Moving beyond culturally bound ethical guidelines. Pages 208-236 in: *Extraordinary Anthropology: Transformations in the Field*. Goulet, J.G. and Miller, B.G. (eds). University of Nebraska Press, Lincoln and London.
- Grafton, R.Q., Kompas, T. and Hilborn, R.W. (2007) Economics of overexploitation revisited. *Science*, **318**(5856): 1601.
- Green, J. (2008) Reclaiming Haisla Ways: remembering oolichan fishing. *Canadian Journal of Native Education*, **31**(1): 13-23.
- Grescoe, T. (2008) *Bottomfeeder: How to Eat Ethically in a World of Vanishing Seafood*. Bloomsbury, New York, 336p.
- Grotius, H. (1633) *The Freedom of the Seas: The Right which Belongs to the Dutch to take part in the East Indian Trade*. Reissued 2000, *Original title: Mare Liberum*. Translated by: Ralph Van Deman Magoffin. Batoche Books, Kitchener, 63p.
- Gudeman, S. (2008) *Economy's Tension: The Dialectics of Community and Market*. Berghahn Books, Oxford and New York, 192p.
- Gunderson, L.H., Folke, C. and Janssen, M. (2006) Generating and fostering novelty. *Ecology and Society*, **11**(1): 50.
- Gunn, N.M. (1941) *The Silver Darlings*. Faber and Faber, London, 584p.
- Hackert, C. and Braelher, G. (2007) FlashQ: Sorting by internet. URL: <http://www.hackert.biz/flashq/faq/>, Accessed May 5, 2012.
- Hacking, I. (1999) *The Social Construction of What?* Harvard University Press, New Haven, CT, 272p.
- Haggan, N. (2000) Back to the Future and Creative Justice: Recalling and Restoring Forgotten Abundance in Canada's Marine Ecosystems. Pages 83-99 in: *Just Fish: Ethics in the Canadian Coastal Fisheries*. Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds). ISER Books, St. John's.
- Haggan, N. and Neis, B. (2007) The changing face of Fisheries Science and Management. Pages 421-432 in: *Fishers' Knowledge in Fisheries Science and Management*. Haggan, N., Neis, B. and Baird, I.G. (eds). Coastal Management Sourcebooks 4. UNESCO Publishing, Paris.
- Haggan, N., Jackson, G.D. and Lacroix, P. (2009) Salmon and Eulachon in Ecosystem Space and time: A Plea for Better Collaboration and Data Integration. Pages 619-636 in: *Challenges for Diadromous Fishes in a Dynamic Global Environment*. Haro, A.J., Smith, K.L., Rulifson, R.A., Moffitt, C.M. *et al.* (eds). American Fisheries Society, Symposium 69, Bethesda, MD.
- Haggan, N., Neis, B. and Baird, I.G. (2007a) Introduction: Fishers' Knowledge in Fisheries Science and Management. Pages 35-40 in: *Fishers' Knowledge in Fisheries Science and Management*. Haggan, N., Neis, B. and Baird, I.G. (eds). UNESCO, Paris.

- Haggan, N., Ainsworth, C., Pitcher, T.J. and Heymans, J.J. (2007b) Life in the Fast Food Chain: Où sont les poissons d'antan? Pages 51-74 in: *Resetting the Kitchen Table: Food Security, Culture, Health and Resilience in Coastal Communities*. Parrish, C.C., Turner, N.J. and Solberg, S. (eds). Nova Science Publishers, Inc., New York.
- Haggan, N., Turner, N.J., Carpenter, J., Jones, J.T., Menzies, C. and Mackie, Q. (2006) *12,000+ years of change: Linking traditional and modern ecosystem science in the Pacific Northwest*. 2006-02: UBC Fisheries Centre Working Papers, Vancouver. 30p.
- Haggan, N. (2011) You don't know what you've got till it's gone: The case for spiritual values in marine ecosystem management. Pages 224-245 in: *World Fisheries: A Social-Ecological Analysis*. Ommer, R.E., Perry, I., Cury, P. and Cochrane, K. (eds). Wiley-Blackwell, Oxford.
- Haig-Brown, C. (2008) Working a Third Space: Indigenous Knowledge in the Post/Colonial University. *Canadian Journal of Native Education*, **31**(1): 253.
- Hall, P. (2000) Illustrations to Just Fish. *Just Fish: Ethics and Canadian Marine Fisheries*. Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds). ISER Press, St John's.
- Hansard. (n.d.) Special Committee on Sustainable Aquaculture, 2nd Session, |38th Parliament | Committees, Legislative Assembly of BC. URL: <http://www.leg.bc.ca/CMT/38thparl/session-2/aquaculture/5-38-2-18-7.htm>, Accessed December 21, 2010.
- Haraway, D. (1991) *Simians, Cyborgs and Women: The Reinvention of Nature*. Routledge, New York and London, 312p.
- Harley, C.D.G. (2011) Climate Change, Keystone Predation, and Biodiversity Loss. *Science*, **334**(6059): 1124-1127.
- Harmon, D. and Putney, A.D. (2003) *The Full Value of Parks: From Economics to the Intangible*. Rowman and Littlefield, Lanham, Md., 345p.
- Harper, J., Haggerty, J. and Morris, M.C. (1995) *Final Report: Broughton Archipelago clam terrace survey*. Coastal and Ocean Resources, Sidney, BC. 39p.
- Harris, D.C. (2001) *Fish, Law, and Colonialism: The Legal Capture of Salmon in British Columbia*. University of Toronto Press, Toronto, 306p.
- Hart, J. (2009) Salmon as Icon. To Swim with the Salmon: Spirituality and Ecojustice in the Pacific Northwest, Corvallis, Oregon, April 25. URL: <http://oregonstate.edu/conferences/event/swimwithsalmon2009/>.
- Hart, J. (2006) *Sacramental Commons: Christian Ecological Ethics*. Rowman & Littlefield, Lanham, MD, 251p.
- Haudenosaunee Environmental Task force (ed) (1992) *Words that come before all Else: Environmental Philosophies of the Haudenosaunee*. Native North American Travelling College, Cornwall Island, Ontario, 160p.

- Hauser, L., Adcock, G.J., Smith, P.J., Bernal Ramírez, J.H. and Carvalho, G.R. (2002) Loss of microsatellite diversity and low effective population size in an overexploited population of New Zealand snapper (*Pagrus auratus*). *Proceedings of the National Academy of Sciences of the United States of America*, **99**(18): 11742.
- Hawken, P. (2007) *Blessed Unrest: How the Largest Social Movement in History is Restoring Grace, Justice and Beauty to the World*. Penguin Books, New York, 342p.
- Hawking, S. (1993) *Black Holes and Baby Universes and Other Essays*. Bantam Books, New York, 182p.
- Heal, G. (2000a) *Nature and the Marketplace: Capturing the Value of Ecosystem Services*. Island Press, Washington, DC, 203p.
- Heal, G. (2000b) *Valuing the Future: Economic Theory and Sustainability*. Columbia University Press, New York, 226p.
- Heidegger, M. (1949) The question concerning technology. Pages 99-113 in: *Technology and Values: Essential Readings*. Hanks, C. (ed.). Blackwell Publishing, Oxford, 2010.
- Hessel, D.T. and Ruether, R.R. (eds) (2000) *Christianity and Ecology: Seeking the Well-Being of Earth and Humans*. Harvard University Press, 768p.
- Hilborn, R. (2007) Moving to sustainability by learning from successful fisheries. *AMBIO: A Journal of the Human Environment*, **36**(4): 296-303.
- Hitchens, C. (2007) *God is Not Great: How Religion Poisons Everything*. McLelland and Stewart, Toronto, 320p.
- Hobson, S. and Lubchenco, J. (eds) (1997) *Revelation and the Environment Ad 95-1995*. World Scientific Publishing Inc., 220p.
- Hoegh-Guldberg, O., Mumby, P.J., Hooten, A.J., Steneck, R.S., Greenfield, P., Gomez, E. *et al.* (2007) Coral reefs under rapid climate change and ocean acidification. *Science*, **318**(5857): 1737.
- Hope, S. (2001) *The Outcasts of the Islands: The Sea Gypsies of South East Asia*. HarperCollins, London, 294p.
- Howard, A. and Widdowson, F. (1996) Traditional knowledge threatens environmental assessment. *Policy Options*, #17 November. 34-36.
- Husserl, E. (1936) *The Crisis of European Sciences and Transcendental Phenomenology*. Reissued 1970, Original title: *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie, Eine Einleitung in die phänomenologische Philosophie*. Translated by: David Carr. Northwestern University Press, Evanston, IL.
- Hutchings, J.A. and Reynolds, J.D. (2004) Marine fish population collapses: Consequences for recovery and extinction risk. *Bioscience*, **54**(4): 297-309.

- Huxley, T.H. (1883) Inaugural address, International Fisheries Exhibition, London. Pages 1-22 in: *Ecosystems-based fisheries management: A report to Congress, 1998*. Ecosystems Principles Advisory Panel, Seattle.
- ICTSD. (2006) *Fisheries, International Trade and Sustainable Development*. International Centre for Trade and Sustainable Development, Geneva. 114p.
- Ingold, T. (2000) *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*. Routledge, Oxford, 465p.
- Jackson, J.B.C., Kirby, M.X., Berger, W.H., Bjorndal, K.A., Botsford, L.W., Bourque, B.J. *et al.* (2001) Historical Overfishing and the Recent Collapse of Coastal Ecosystems. *Science*, **293**(5530): 629-637.
- Jamieson, G., Livingston, P. and Zhang, C. (eds) (2010) *Report of Working Group 19 on Ecosystem-based Management Science and its Application to the North Pacific*. North Pacific Marine Science Organization (PICES), Sidney, BC, 184p.
- Japan. (n.d.) Statistics Bureau: Chapter 5 Agriculture, Forestry and Fisheries. URL: http://www.stat.go.jp/english/data/handbook/c05cont.htm#cha5_4, Accessed August 10, 2010.
- Jastrow, R. (2000) *God and the Astronomers*. WW Norton & Company, New York, 149p.
- Jay, T. (1992) The salmon of the heart. *Chicago Review*, **37**(4): 20-45.
- Jentoft, S. and Chuenpagdee, R. (2009) Fisheries and coastal governance as a wicked problem. *Marine Policy*, **33**(4): 553-560.
- John Paul II. (1990) The Ecological Crisis: A Common Responsibility. URL: http://www.vatican.va/holy_father/john_paul_ii/messages/peace/documents/hf_jp-ii_mes_19891208_xxiii-world-day-for-peace_en.html, Accessed January 17, 2011.
- Johnson, E.A. (2008) *Quest for the Living God*. Continuum, New York, 234p.
- Jones, R.R. (2000) The herring fishery of Haida Gwaii: An ethical analysis. Pages 201-224 in: *Just Fish: Ethics and Canadian Marine Fisheries*. Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds). ISER Books, St. John's.
- Jones, R.R. and Williams-Davidson, T. (2000) Applying Haida ethics in today's fishery. Pages 100-117 in: *Just Fish: Ethics and Canadian Marine Fisheries*. Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds). ISER Books, St. John's.
- Jones, R.R., Shephert, M. and Sterritt, N.J. (2004) *Our place at the table: First Nations and the BC Fishery*. BC Aboriginal Fisheries Commission, Vancouver. 88p. <http://www.fns.bc.ca/pdf/FNFishPanelReport0604.pdf>.
- Kaczynski, V.M. and Fluharty, D.L. (2002) European policies in West Africa: who benefits from fisheries agreements? *Marine Policy*, **26**(2): 75-93.

- Kant, I. (1785) *Groundwork for the Metaphysics of Morals*. Reissued 2002, Translated by: A. W. Wood. Yale University Press, New Haven, CT, 224p.
- Keeney, R.L. (1996) *Value-Focused Thinking: A Path to Creative Decisionmaking*. 2nd Edition, Harvard University Press, Cambridge, MA, 432p.
- Kellert, S.R. (2003) Human values, ethics, and the marine environment. Pages 1-18 in: *Values at Sea: Ethics for the Marine Environment*. Dallmeyer, D.G. (ed.). The University of Georgia Press, Athens and London.
- Kellert, S.R. (1999) Ecological Challenge, Human Values of Nature, and Sustainability in the Built Environment. Pages 39-53 in: *Reshaping the Built Environment: Ecology, Ethics, and Economics*. Island Press, Washington, DC.
- Kennelly, S.J. and Broadhurst, M.K. (2002) By-catch begone: changes in the philosophy of fishing technology. *Fish and Fisheries*, **3**(4): 340-355.
- Kinne, O. (1997) Ethics and eco-ethics. *Marine Ecology Progress Series*, **153**: 1-3.
- Klain, S. (2010) Navigating Marine Ecosystem Services and Values. M.Sc., University of British Columbia, Vancouver.
- Klain, S. and Chan, K.M. (In press) Navigating coastal values: participatory mapping of ecosystem services for spatial planning. *Ecological Economics*,.
- Kleypas, J.A., Feely, R.A., Fabry, V.J., Langdon, C., Sabine, C.L. and Robbins, L.L. (2006) Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers: A Guide for Future Research, Report on a workshop held at St. Petersburg, FL, 18-20 April, 2005. Contribution No. 2897 from NOAA/Pacific Marine Environmental Laboratory, 88p.
- Kopp, R.J. and Portney, P.R. (1999) Mock Referenda for Intergenerational Decision-Making. Pages 87-98 in: *Discounting and Intergenerational Equity*. Portney, P.R. and Weyant, J.P. (eds). Resources for the Future, Washington, DC.
- Kroll, G. (2008) Rachel Carson's The Sea Around Us, ocean-centrism and a nascent ocean ethic. Pages 118-135 in: *Rachel Carson: Legacy and Challenge*. Sideris, L.H. and Moore, K.D. (eds). SUNY Press, New York.
- Krutilla, J.V. (1967) Conservation Reconsidered. *American Economic Review*, **57**(4): 777-786.
- LaDuke, W. (2005) *Recovering the Sacred: The Power of Naming and Claiming*. South End Press, Cambridge, MA, 300p.
- Lanoue, G. (2007) Experiences of power among the Sekani of Northern British Columbia. Pages 237-254 in: *Extraordinary Anthropology: Transformations in the Field*. Goulet, J.G. and Miller, B.G. (eds). University of Nebraska Press, Lincoln & London.
- Lapham, L.H. (2003) *30 Satires*. New Press, New York, 263p.

- Laplante, B. (2005) *Economic analysis of the environmental and social impacts of the Nam Theun 2 Hydroelectricity Power Project*. The World Bank, Washington, D.C. 101p.
- Larkin, P. (1977) An epitaph for the concept of maximum sustained yield. *Transactions of the American Fisheries Society*, **106**(1): 1-11.
- Lassiter, L.E. (2001) From "Reading over the Shoulders of Natives" to "Reading Alongside Natives," Literally: Toward a Collaborative and Reciprocal Ethnography. *Journal of Anthropological Research*, **57**(2): 137-149.
- Latour, B. (2004) *Politics of Nature: How to Bring the Sciences Into Democracy*. Original title: *Politiques de la nature*. Translated by: C. Porter. Harvard University Press, Cambridge, Mass., 307p.
- Latour, B. (1993) *We Have Never Been Modern*. Original title: *Nous N'avons Jamais Été Modernes*. Translated by: C. Porter. Harvard University Press, Cambridge, Mass., 157p.
- Law, R. (2000) Fishing, selection, and phenotypic evolution. *ICES Journal of Marine Science*, **57**(3): 659.
- Le Guin, U.K. (1985) *Always Coming Home*. University of California Press, Berkeley, 525p.
- Leahy, S. (2012) Building Sustainable Future Needs More Than Science, Experts Say. *Reuters*, 19 Feb 2012.
- Leopold, A. (1949) *A Sand County Almanac*. Reissued 1986, Ballantine Books, New York, 320p.
- Leopold, A. (1940) Song of the Gavilan. *Journal of Wildlife Management*, **4**(3): 343-346.
- Levin, P.S., Fogarty, M.J., Murawski, S.A. and Fluharty, D. (2009) Integrated ecosystem assessments: developing the scientific basis for ecosystem-based management of the ocean. *PLoS Biology*, **7**(1): e1000014.
- Levin, S.A. and Lubchenco, J. (2008) Resilience, robustness, and marine ecosystem-based management. *Bioscience*, **58**(1): 27-32.
- Limburg, K.E., Hughes, R.M., Jackson, D.C. and Czech, B. (2011) Human Population Increase, Economic Growth, and Fish Conservation: Collision Course or Savvy Stewardship? *Fisheries*, **36**(1): 27-34.
- Locke, J. (1690) *The Second Treatise of Government*. Reissued 1980, edited by C.B. McPherson and digitized by Dave Gowan, Dover Publications, Indianapolis and Cambridge.
- Longhurst, A. (2006) The sustainability myth. *Fisheries Research*, **81**(2): 107-112.
- Lubchenco, J., Davis-Born, R. and Simler, B. (2002) Lessons from the land for protection in the sea: the need for a new ocean ethic. *Open Spaces*, **5**: 10-19.

- Lucas, C.S. (2008) Everything is One. Pages 505-513 in: *Reconciling Fisheries with Conservation: Proceedings of the Fourth World Fisheries Congress*. Nielsen, J., Dodson, J.J., Friedland, K., Hamon, T.R. *et al.* (eds). American Fisheries Society, Bethesda, MD.
- Lucas, C.S. (2007) Life supports life. Pages 61-70 in: *Fishers' Knowledge in Fisheries Science and Management*. Haggan, N., Neis, B. and Baird, I.G. (eds). UNESCO, Paris.
- Lucas, C.S. (2004) Aboriginal Values. Pages 114-115 in: *Back to the Future: Advances in Methodology for Modelling and Evaluating Past Ecosystems. Fisheries Centre Research Reports, 12(1)*. Pitcher, T.J. (ed.). UBC Fisheries Centre, Vancouver.
- Lucas, C.S. (1988) The Thriving of Wild Salmon. *The Fisherman, Reissued in the Rainforest Action Handbook of the Friends of Clayoquot Sound, 1994*, (December 13).
- Ludwig, D. (2000) Limitations of economic valuation of ecosystems. *Ecosystems*, **3**(1): 31-35.
- Ludwig, D. (2001) The era of management is over. *Ecosystems*, **4**(8): 758-764.
- Lutz, J.S. (2007) First contact as a spiritual performance: Encounters on the North American west coast. Pages 30-45 in: *Myth and Memory: Stories of Indigenous-European Contact*. Lutz, J.S. (ed.). UBC Press, Vancouver.
- Maathai, W.M. (2010) *Replenishing the Earth: Spiritual Values for Healing Ourselves and the World*. Doubleday, New York, London, Toronto, Sydney, Auckland, 208p.
- Maathai, W.M. (2003) *The Green Belt Movement: Sharing the approach and the experience*. Lantern Books, New York, 117p.
- Mace, P.M. (2001) A new role for MSY in single-species and ecosystem approaches to fisheries stock assessment and management. *Fish and Fisheries*, **2**(1): 2-32.
- Macinko, S. and Bromley, D.W. (2003) Property and fisheries for the twenty-first century: seeking coherence from legal and economic doctrine. *Vermont Law Review*, **28**: 623-661.
- Mackey, J.P. (2007) *The Scientist and the Theologian: On the Origin and End of Creation*. The Columba Press, Dublin, 308p.
- Mann, C.C. (2005) *1491: New Revelations of the Americas Before Columbus*. Alfred a Knopf, New York, 541p.
- Margulis, L. (1986) From ecology to geognosy. *The Ecologist*, **16**(1): 52-53.
- Marsden, S. (2002) Adawx, Spanaxnox, and the geopolitics of the Tsimshian. *BC Studies*, **135**: 101-135.
- Marsden, S. and Galois, R. (1995) The Tsimshian, the Hudson's Bay Company, and the Geopolitics of the Northwest Coast Fur Trade, 1787-1840. *The Canadian Geographer*, **39**(2): 169-183.

- Martindale, A. (2006) Methodological Issues in the Use of Tsimshian Oral Traditions (Adawx) in Archaeology. *Canadian Journal of Archaeology*, **30**: 158-192.
- Mattson, D.J., Byrd, K.L., Rutherford, M.B., Brown, S.R. and Clark, T.W. (2006) Finding common ground in large carnivore conservation: mapping contending perspectives. *Environmental Science and Policy*, **9**(4): 392-405.
- McCauley, D.J. (2006) Selling out on nature. *Nature*, **443**: 27-28.
- McClenachan, L., Jackson, J.B.C. and Newman, M.J.H. (2006) Conservation implications of historic sea turtle nesting beach loss. *Frontiers in Ecology and the Environment*, **4**(6): 290-296.
- McFague, S. (2008) *A New Climate for Theology: God, the World, and Global Warming*. Fortress Press, Minneapolis, 176p.
- McFague, S. (2001) *Life Abundant: Rethinking Theology and Economy for a Planet in Peril*. Fortress Press, Minneapolis.
- McFague, S. (1993) *The Body of God: An Ecological Theology*. Fortress Press, Minneapolis.
- McFague, S. (1997) *Metaphorical Theology: Models of God*. Fortress Press, Minneapolis.
- McIlwraith, T.F. (1948) *The Bella Coola Indians*. 2 vols. Reissued 1992: University of Toronto Press, Toronto.
- McLaughlin, N. (2004) *Out of Wonder: The Evolving Story of the Universe*. Leinster Leader, Dublin, 238p.
- McLeod, K.L., Lubchenco, J., Palumbi, S.R., Rosenberg, A.A., Boesch, D.F. and Carr, M.H. (2005) Scientific Consensus Statement on Marine Ecosystem-Based Management. URL: http://www.compassonline.org/science/EBM_CMSP/EBMconsensus, Accessed May 5, 2012.
- McMillan, A.D. (1999) *Since the Time of the Transformers: The Ancient Heritage of the Nuuchah-Nulth, Ditidaht and Makah*. UBC Press, Vancouver, 264p.
- McNiven, I.J. (2010) Navigating the human-animal divide: marine mammal hunters and rituals of sensory allurements. *World Archaeology*, **42**(2): 215-230.
- MEA. (2005) *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC, 137p.
- MEA (2003) Concepts of ecosystem value and valuation approaches. Pages 127-147 in: *Ecosystems and Human Well-being: A Framework for Assessment*. Island Press, Washington, DC.
- Meggs, G. (1991) *The Decline of the BC Fishery*. Douglas and McIntyre, Vancouver /Toronto, 265p.

- Menzies, C. (2008) *Weather the Storm: the fight to stay local in the global fishery*. Producer: Charles Menzies. Ethnographic Film Unit, University of British Columbia, Vancouver.
- Menzies, C.R. and Butler, C.E. (2007) Returning to Selective Fishing through Indigenous Fisheries Knowledge. *American Indian Quarterly*, **31**(3): 441-464.
- Migliore, D.L. (2004) *Faith Seeking Understanding: An Introduction to Christian Theology*. 2nd edition, Wm. B. Erdmans Publishing. Ltd., Grand Rapids/Cambridge, 439p.
- Milazzo, M. (1998) *Subsidies in World Fisheries: A Reexamination*. World Bank Technical Paper 406, World Bank Publications, Washington, DC, 86p.
- Millar, C. and Yoon, H.K. (2000) Morality, goodness and love: a rhetoric for resource management. *Ethics, Place and Environment*, **3**(2): 155-172.
- Miller, B.G. (2007) *Be of good mind: essays on the Coast Salish*. UBC Press, Vancouver, 323p.
- Miller, T.R., Baird, T.D., Littlefield, C.M., Kofinas, G., Chapin III, F.S. and Redman, C.L. (2008) Epistemological pluralism: reorganizing interdisciplinary research. *Ecology and Society*, **13**(2): 46.
- Mitchell, A. (2009) *Sea Sick: The Global Ocean in Crisis*. McLelland and Stewart, Toronto, 240p.
- Mitchell, D. (2008) *A note on rising food prices*. World Bank Development Prospects Group, Washington, DC. 20p.
- Monbiot, G. (2011) An Answer to the Meaning of Life. *Manchester Guardian*, June 6, 2011.
- Morgan, T. (2006) An indigenous perspective on water recycling. *Desalination*, **187**(1-3): 127-136.
- Morris, J.G. (1999) Pfiesteria," The Cell From Hell," and Other Toxic Algal Nightmares. *Clinical Infectious Diseases*, **28**: 1191-1198.
- Moss, M.L. (2011) *Northwest Coast Archaeology as Deep History*. The SAA Press, Washington, DC, 183p.
- Munro, G. and Sumaila, U.R. (2002) The impact of subsidies upon fisheries management and sustainability: the case of the North Atlantic. *Fish and Fisheries*, **3**(4): 233-250.
- Munro, G.R. (1992) Mathematical bioeconomics and the evolution of modern fisheries economics. *Bulletin of Mathematical Biology*, **54**(2): 163-184.
- Musick, J.A., Harbin, M.M., Berkeley, S.A., Burgess, G.H., Eklund, A.M., Findley, L. *et al.* (2000) Marine, Estuarine, and Diadromous Fish Stocks at Risk of Extinction in North America (Exclusive of Pacific Salmonids). *Fisheries*, **25**(11): 6-30.
- Myers, N. (1998) Lifting the veil on perverse subsidies. *Nature*, **392**(6674): 327-328.

- Myers, R.A. and Worm, B. (2003) Rapid worldwide depletion of predatory fish communities. *Nature*, **423**(6937): 280-283.
- Myers, R.A., Baum, J.K., Shepherd, T.D., Powers, S.P. and Peterson, C.H. (2007) Cascading Effects of the Loss of Apex Predatory Sharks from a Coastal Ocean. *Science*, **315**(5820): 1846.
- Nabhan, G.P. (2004) *Cross-Pollinations: The Marriage of Science and Poetry*. Milkweed Editions, Minneapolis, 107p.
- Nabhan, G.P. (1997) *Cultures of Habitat: on Nature, Culture, and Story*. Counterpoint Press, Washington, DC, 338p.
- Nadasdy, P. (2007) The gift in the animal: The ontology of hunting and human–animal sociality. *American Ethnologist*, **34**(1): 25-43.
- Narcisse, A. (2007) My grandfather's knowledge: First Nations fishing methodologies on the Fraser River. Pages 71-82 in: *Fishers' Knowledge in Fisheries Science and Management*. Haggan, N., Neis, B. and Baird, I.G. (eds). UNESCO, Paris.
- Naylor, R.L., Goldburg, R.J., Primavera, J.H., Kautsky, N., Beveridge, M.C.M., Clay, J. *et al.* (2000) Effect of aquaculture on world fish supplies. *Nature*, **405**(6790): 1017-1024.
- NCNTC. (n.d.) Uu-a-thluk Strategic Plan. URL: http://www.uuathluk.ca/Uu-a-thluk_Strategic_Plan_final.pdf, Accessed December 1, 2011.
- Neff, M.W. (2011) What research should be done and why? Four competing visions among ecologists. *Frontiers in Ecology and the Environment*, **9**(8): 462-469.
- Neis, B. (2011) Moving forward: Social-ecological interactivity, global marine change and knowledge for the future. Pages 182-199 in: *World Fisheries: A Social-Ecological Analysis*. Ommer, R.E., Perry, R.I., Cochrane, K. and Curie, P. (eds). Wiley-Blackwell, Oxford.
- Nelson, G.A., Campbell, S. and Wozniak, P. (2002) *Beyond Earth Day: Fulfilling the Promise*. University of Wisconsin Press, Madison, 176p.
- Nelson, R.H. (2010) *The New Holy Wars Economic Religion Versus Environmental Religion in Contemporary America*. Penn State University Press, Philadelphia, 416p.
- Nelson, S. (2004) *Commercial Fishing License, Quota and Vessel Values. Prepared for Fisheries and Oceans Canada*. Nelson Bros. Fisheries, Vancouver. 71p.
- Newell, D. and Ommer, R.E. (eds) (1999) *Fishing Places, Fishing People: Traditions and Issues in Canadian Small-scale Fisheries*. University of Toronto Press, Toronto, 374p.
- Newhouse, D. (2008) *Ganigonhi:oh The Good Mind Meets the Academy*. *Canadian Journal of Native Education*, **31**(1): 184-197.
- Noble, B.F. (2000) Institutional criteria for co-management. *Marine Policy*, **24**(1): 69-77.

- Nordhaus, W.D. (2007) A Review of the "Stern Review on the Economics of Climate Change". *Journal of Economic Literature*, **XLV**: 686-702.
- Norse, E.A., Brooke, S., Cheung, W.W.L., Clark, M.R., Ekeland, I., Froese, R. *et al.* (2012) Sustainability of deep-sea fisheries. *Marine Policy*, **36**(2): 307-320.
- NRC (2005) *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*. National Academies Press, Washington, DC. 277p.
- O'Doherty, K., Burgess, M. and Secko, D.M. (2010) Sequencing the salmon genome: A deliberative public engagement. *Genomics, Society and Policy*, **6**(1): 16-33.
- O'Doherty, K. and Burgess, M. (n.d.) Sequencing the Salmon Genome: A Deliberative Public Engagement-Final Report. URL: <http://salmongenetalk.com/#/academic-publications/4535843384>, Accessed May 5, 2012.
- Okey, T.A., Alidina, H.M., Lo, V., Montenegro, A. and Jessen, S. (2012) *Climate Change Impacts and Vulnerabilities in Canada's Pacific Marine Ecosystems*. World Wildlife Fund/Canadian Parks and Wilderness Society, Vancouver. 157p.
- Ommer and Team. (2007) *Coasts under stress: Understanding Restructuring and Social-Ecological health in Coastal Communities*. McGill-Queens University Press, Montreal, 574p.
- Ommer, R.E. (2000) The ethical implications of property concepts in a fishery. Pages 117-139 in: *Just Fish: Ethics and Canadian Marine Fisheries*. Coward, H.G., Ommer, R.E. and Pitcher, T.J. (eds). ISER Books, St. John's.
- Ommer, R.E. and Turner, N.J. (2004) Informal rural economies in history. *Labour/Le Travail*, **53**: 127-157.
- Ommer, R.E. (2002) *The Resilient Outport: Ecology, Economy and Society in Rural Newfoundland*. ISER Books, St John's, 358p.
- Ommer, R.E., Perry, I., Cury, P. and Cochrane, K. (eds) (2011) *World Fisheries: A Social-Ecological Analysis*. Wiley-Blackwell, Oxford, 418p.
- Ommer, R.E., Holcapek, C.L., Hood, R.J. and Coasts Under Stress Team. (2006) *Voices on the Edge*. University of Victoria/CUS, Victoria, BC. 66p.
- O'Neil, P. (2012) Don't water down Fisheries Act, scientists urge Harper in letter. *Vancouver Sun*, March 22.
- Online Etymology Dictionary. (n.d.) Online Etymology Dictionary URL: http://www.etymonline.com/index.php?term=resurgent&allowed_in_frame=0, Accessed December 27, 2011.
- Orr, D.W. (1992) *Ecological literacy: Education and the transition to a postmodern world*. SUNY Press, New York, 210p.

- Orr, J.C., Fabry, V.J., Aumont, O., Bopp, L., Doney, S.C., Feely, R.A. *et al.* (2005) Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. *Nature*, **437**: 681-686.
- Otto, R. (1958) *The Idea of the Holy: An Inquiry into the Non-rational Factor in the Idea of the Divine and its Relation to the Rational*. Oxford University Press, Oxford, 232p.
- Padovano, A.T. (1984) *Contemplation and Compassion: Thomas Merton's Vision*. Peter Pauper Press, White Plains, NY, 61p.
- Parrish, C.C., Turner, N.J. and Solberg, S. (eds) (2008) *Resetting the Kitchen Table: Food Security, Culture, Health and Resilience in Coastal Communities*. Nova Science Publishers Inc., New York, 257p.
- Parrish, C.C., Turner, N.J. and Ommer, Rosemary E. Solberg, Shirley M. (2007) What Food Security in Coastal Communities Really Means. Pages 191-198 in: *Resetting the Kitchen Table: Food Security, Culture, Health and Resilience in Coastal Communities*. Parrish, C.C., Solberg, S. and Turner, N.J. (eds). Nova Science Publishers, Hauppauge, NY.
- Patterson, M.G., McDonald, G., Probert, K. and Smith, N. (2008) Biodiversity of the Oceans. Pages 51-73 in: *Ecological Economics of the Oceans and Coasts*. Patterson, M.G. and Glavovic, B.C. (eds). Edward Elgar Publishing, Cheltenham, UK.
- Pauly, D. (1995) Anecdotes and the shifting baseline syndrome of fisheries. *Trends in Ecology and Evolution*, **10**: 430.
- Pauly, D. and Maclean, J.L. (2003) *In a Perfect Ocean: the State of Fisheries and Ecosystems in the North Atlantic Ocean*. Island Press, Washington, DC, 175p.
- Pauly, D., Christensen, V., Dalsgaard, J., Froese, R. and Torres Jr, F. (1998) Fishing Down Marine Food Webs. *Science*, **279**(5352): 860.
- Pauly, D. (2007) The Sea Around Us Project: Documenting and communicating global fisheries impacts on marine ecosystems. *AMBIO: A Journal of the Human Environment*, **36**(4): 290-295.
- Pauly, D., Watson, R. and Alder, J. (2005) Global trends in world fisheries: impacts on marine ecosystems and food security. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **360**(1453): 5-12.
- Pauly, D., Palomares, M.L., Froese, R., Sa-a, P., Vakily, M., Preikshot, D. *et al.* (2001) Fishing down Canadian aquatic food webs. *Canadian Journal of Fisheries and Aquatic Sciences*, **58**(1): 51-62.
- Pauly, D. (2009) Toward a conservation ethic for the sea: Steps in a personal and intellectual Odyssey. *Bulletin of Marine Science*, **57**(2).

- Pearse, P.H. and Larkin, P. (1992) *Managing Salmon in the Fraser. Report to the Minister of Fisheries and Oceans on the Fraser River Salmon Investigation*. Department of Fisheries and Oceans, Vancouver. 36p.
- Peterson, C.H. and Lubchenco, J. (1997) Marine ecosystem services. Pages 177-194 in: *Nature's Services: Societal Dependence on Natural Ecosystems*. Daily, G. (ed.). Island Press, Washington, DC.
- Peterson, J. (2010) *Reality and the Sacred*. The Ontario Educational Communications Authority (TVO), Toronto. <http://ww3.tvo.org/video/163256/jordan-peterson-reality-and-sacred>.
- Pew Oceans Commission. (2003) *America's Living Oceans: Charting a Course for Sea Change. A Report to the Nation*. Pew Oceans Commission, Arlington. 144p.
- Philcox, N. (2007) *Literature Review and Framework Analysis of Non-market Goods and Services Provided by British Columbia's Ocean and Marine Coastal Resources*. Government of British Columbia, Victoria. 92p.
- Pierotti, R. (2010) *Indigenous Knowledge, Ecology, and Evolutionary Biology. Indigenous peoples and politics*, Routledge, New York, 264p.
- Pike, K., Johnson, D., Fletcher, S., Wright, P. and Lee, B. (2010) Social Value of Marine and Coastal Protected Areas in England and Wales. *Coastal Management*, **38**(4): 412-432.
- Pitcher, T.J. (2005) "Back to the Future": A Fresh Policy Initiative for Fisheries and a Restoration Ecology for Ocean Ecosystems. *Philosophical Transactions of the Royal Society, Series B. Biological Sciences*, **360**(1543): 107-121.
- Pitcher, T.J. (2001) Fisheries Managed to Rebuild Ecosystems? Reconstructing the Past to Salvage the Future. *Ecological Applications*, **11**(2): 601-617.
- Pitcher, T.J. and Ainsworth, C. (2008) Back-to-the-Future: a candidate ecosystem-based solution to the fisheries problem. Pages 365-383 in: *Reconciling Fisheries with Conservation: Proceedings of the 4th World Fisheries Congress*. Nielsen, J., Dodson, J.J., Friedland, K., Hamon, T.R. *et al.* (eds). American Fisheries Society, Bethesda.
- Pitcher, T.J. and Preikshot, D. (2001) RAPFISH: a rapid appraisal technique to evaluate the sustainability status of fisheries. *Fisheries Research*, **49**(3): 255-270.
- Pitcher, T.J. and Power, M.P. (2000) Fish figures: Quantifying the ethical status of Canadian Fisheries, East and West. Pages 225-253 in: *Just Fish: Ethics and Canadian Marine Fisheries*. ISER Press, St John's.
- Pitcher, T.J. and Pauly, D. (1998) Rebuilding ecosystems, not sustainability, as the proper goal of fishery management. Pages 311-330 in: *Reinventing Fisheries Management*. Pitcher, T.J., Hart, P.J.B. and Pauly, D. (eds). Kluwer, Dordrecht.

- Pitcher, T.J., Kalikoski, D., Short, K., Varkey, D. and Pramod, G. (2009) An evaluation of progress in implementing ecosystem-based management of fisheries in 33 countries. *Marine Policy*, **33**(2): 223-232.
- Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M., Haggan, N. and Santos, R. (eds) (2007) *Seamounts: Ecology, Fisheries and Conservation*. Blackwell Publishing, Oxford, 527p.
- Pitcher, T.J., Ainsworth, C., Buchary, E.A., Cheung, W.W., Forrest, R., Haggan, N., Lozano, H., Morato, T. and Morissette, L. (2005) Strategic management of marine ecosystems using whole-ecosystem simulation modelling: the 'Back-to-the-Future' policy approach. Pages 199-258 in: *The Strategic Management of Marine Ecosystems*. Levner, E., Linkov, I. and Proth, J. (eds). *NATO Science Series: IV: Earth and Environmental Sciences*. Springer, New York.
- Pitcher, T.J., Kalikoski, D., Ganapathiraju, P. and Short, K. (2009) Not honouring the Code. *Nature*, **457**: 658-659.
- Plato (ca 375 BC) *The Republic*. Translated by: Desmond Lee. Reissued 1955 by Penguin Books, Harmondsworth, UK, 467p.
- Plottu, E. and Plottu, B. (2007) The concept of Total Economic Value of environment: A reconsideration within a hierarchical rationality. *Ecological Economics*, **61**(1): 52-61.
- Pollan, M. (2006) *The Omnivore's Dilemma: A Natural History of Four Meals*. Penguin Press, New York, 450p.
- Pollan, M. (2001) *The Botany of Desire: A Plant's Eye View of the World*. Random House, New York, 271p.
- Poovey, M. (1998) *A History of the modern fact: Problems of knowledge in the sciences of wealth and society*. University of Chicago Press, Chicago, 436p.
- Portney, P.R. and Weyant, J.P. (eds) (1999) *Discounting and Intergenerational Equity*. Resources for the Future, Washington, DC, 186p.
- Povinelli, E.A. (2001) Radical Worlds: The Anthropology of Incommensurability and Inconceivability. *Annual Reviews in Anthropology*, **30**(1): 319-334.
- Povinelli, E.A. (1995) Do rocks listen? The cultural politics of apprehending Australian Aboriginal labor. *American Anthropologist*, **97**(3): 505-518.
- Priesner, S. (1999) Gross National Happiness–Bhutan's Vision of Development and its Challenges. Pages 24-52 in: *Gross National Happiness: Discussion Papers*. Kinga, S., Galay, K., Raptan, P. and Pain, A. (eds). The Centre for Bhutan Studies, Thimphu.
- Punt, A.E. (2000) Extinction of marine renewable resources: a demographic analysis. *Population Ecology*, **42**(1): 19-27.

- Randall, A. (1991) Total and nonuse values. Pages 303-321 in: *Measuring the Demand for Environmental Quality*. Braden, J.B. and Kolstad, C.D. (eds). Elsevier, Amsterdam.
- Randall, A. and Stoll, J. (1983) Existence value in a total valuation framework. Pages 265-274 in: *Managing Air Quality and Scenic Resources at National Parks and Wilderness Areas*. Randall, A. and Stoll, J. (eds). Westview Press, Boulder.
- Rao, S., Sarasvati, S.C., Goswami, S., Acharya, V. and Teertha, S.V. (2003) Hinduism. Pages 91-96 in: *Faith in Conservation: New Approaches to Religions and the Environment*. Palmer, M. and Finlay, V. (eds). The World Bank, Washington, DC.
- Ratner, R.S. (2005) The BC Citizens' Assembly: The Public Hearings and Deliberations Stage. *Canadian Parliamentary Review*, (Spring issue): 24-33.
- Rick, T.C. and Erlandson, J.M. (eds) (2008) *Human Impacts on Ancient Marine Ecosystems: A Global Perspective*. University of California Press, Berkeley, 319p.
- Roberts, C. (2007) *The Unnatural History of the Sea*. Island Press, Washington, DC, 456p.
- Roberts, J.M., Wheeler, A.J. and Freiwald, A. (2006) Reefs of the deep: The biology and geology of cold-water coral ecosystems. *Science*, **312**(5773): 543-547.
- Robinson, J.G. and Bennett, E.L. (eds) (2000) *Hunting for sustainability in tropical forests*. Columbia University Press, New York, 614p.
- Rogers, A.D., Baco, A.R., Griffiths, H., Hart, T. and Hall-Spencer, J.M. (2007) Corals on seamounts. Pages 141-169 in: *Seamounts: Ecology, Fisheries and Conservation*. Pitcher, T.J., Morato, T., Hart, P.J.B., Clark, M.R. *et al.* (eds). *Fish and Aquatic Resources Series*. Blackwell, Oxford.
- Rose, D.B. (2007) Recursive epistemologies and an ethics of attention. Pages 88-102 in: *Extraordinary Anthropology: Transformations in the Field*. Goulet, J.G. and Miller, B.G. (eds). University of Nebraska Press, Lincoln & London.
- Rosenblatt, R. (1998) Sylvia Earle: Call of The Sea. *Time Magazine*, Oct 5.
- Sachs, J. (2011) *The Price of Civilization: Economics and Ethics After the Fall*. Random House, New York, 336p.
- Sadovy, Y. and Cheung, W.L. (2003) Near extinction of a highly fecund fish: the one that nearly got away. *Fish and Fisheries*, **4**(1): 86-99.
- Saenz-Arroyo, A., Roberts, C.M., Torre, J., Carino-Olvera, M. and Hawkins, J.P. (2006) The value of evidence about past abundance: marine fauna of the Gulf of California through the eyes of 16th to 19th century travellers. *Fish and Fisheries*, **7**(2): 128-146.
- Safina, C. (2003) Launching a Sea Ethic. *Wild Earth*, **12**(4): 2-9.

- Sagan, C. (1990) Preserving and cherishing the earth—an appeal for joint commitment in science and religion. *American Journal of Physics*, **58**: 615-617.
- Sagoff, M. (1998) Aggregation and deliberation in valuing environmental public goods: A look beyond contingent pricing. *Ecological Economics*, **24**(2-3): 213-230.
- Sagoff, M. (1991) Zuckerman's Dilemma: A Plea for Environmental Ethics. *The Hastings Center Report*, **21**(5): 32-40.
- Sagoff, M. (2002) On the value of natural ecosystems: The Catskills parable. *Politics and the Life Sciences*, **21**(1): 19-25.
- Sandel, M.J. (2012) *What Money Can't Buy: The Moral Limits of Markets*. Farrar, Straus and Giroux, New York, 256p.
- Santana, M. (n.d.) For the Love of Nature and Fellow Human Beings: A Tribute to Wangari Muta Maathai. URL: <http://msantana.hubpages.com/hub/For-the-Love-of-Nature-and-Fellow-Human-Beings-A-Tribute-Wangari-Muta-Maathai>, Accessed July 11, 2011.
- Satria, A. (2007) Sawen: Institution, local knowledge and myth in fisheries management in North Lombok, Indonesia. Pages 199-220 in: *Fishers' Knowledge in Fisheries Science and Management*. Haggan, N., Neis, B. and Baird, I.G. (eds). UNESCO, Paris.
- Satterfield, T. (2001) In Search of Value Literacy: Suggestions for the Elicitation of Environmental Values. *Environmental Values*, **10**: 331-359.
- SBECI. (n.d.) A Southern Baptist Declaration on the Environment and Climate Change. URL: <http://www.baptistcreationcare.org/node/1>, Accessed May 5, 2012.
- Schmolck, P. and Atkinson, G. (2002) PQMethod. URL: <http://www.lrz.de/~schmolck/qmethod>, Accessed September 24, 2010.
- Schutz, A. and Luckman, T. (1973) *The Structures of the Lifeworld*. Volume 1. Northwestern University Press, Evanston, IL, 335p.
- Scott, J.C. (1976) *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. Yale University Press, New Haven, 246p.
- Scow, P. (1987) *Analysis of Impacts on Federal Government Commercial Fisheries Licensing Policy and Regulations on Indian Fishing Communities and Proposals for Programs to Redress Adverse Impacts*. The Native Brotherhood of British Columbia, Vancouver.
- Secko, D.M., Burgess, M. and O'Doherty, K. (2008) Perspectives on Engaging the Public in the Ethics of Emerging Biotechnologies: From Salmon to Biobanks to Neuroethics. *Accountability in Research*, **15**(4): 283-302.
- Seel, R. (2008) Introduction to Appreciative Inquiry. URL: http://www.new-paradigm.co.uk/introduction_to_ai.htm, Accessed May 5, 2012.

- Shackeroff, J.M., Hazen, E.L. and Crowder, L.B. (2009) The oceans as peopled seascapes. Pages 33-54 in: *Ecosystem-Based Management for the Oceans*. McLeod, K. and Leslie, H. (eds). Island Press, Washington, DC.
- Sharp, B. and Kerr, G. (2005) *Option and Existence Values for the Waitaki Catchment*. Ministry for the Environment, Wellington, New Zealand. 23p.
- Shibley, M.A. (2004) Secular but spiritual in the Pacific Northwest. Pages 139-168 in: *Religion and Public Life in the Pacific Northwest: The None Zone*. Killen, P.O. and Silk, M. (eds). Rowman Altamira, Lanham, MD.
- Shilin, M.B., Durning, D. and Gajdamaschko, N. (2003) How American Ecologists Think about Coastal Zone Environments. Pages 239-259 in: *Values at Sea: Ethics for the Marine Environment*. Dallmeyer, D.G. (ed.). University of Georgia Press, Athens and London.
- Sideris, L.H. and Moore, K.D. (2008) *Rachel Carson: Legacy and Challenge*. SUNY Press, New York, 297p.
- Simpson, L. (2011) *Dancing on our Turtle's Back*. Arbeiter Ring Publishing, Winnipeg, 164p.
- Simpson, S. (2009) 10 solutions to save the ocean. *Conservation Magazine*, **8**(3): 1-12.
- Slaney, T.L., Hyatt, K.D., Northcote, T.G. and Fielden, R.J. (1996) Status of Anadromous Salmon and Trout in British Columbia and Yukon. *Fisheries*, **21**(10): 20-35.
- Sluka, R.D., Kaonga, M., Weatherley, J., Anand, V., Bosu, D. and Jackson, C. (2011) Christians, biodiversity conservation and poverty alleviation: a potential synergy? *Biodiversity*, **12**(2): 108-115.
- Smith, V.K. (2005) Non-market valuation of environmental resources: An interpretive appraisal. (Reprinted from *Land Economics* 1993:69-1). Pages 192-221 in: *Dimensions of Environmental and Ecological Economics*. Sahu, N.C. and Choudhury, A.K. (eds). Orient Longman.
- Smith, V.K. (1993) Non-market value of environment resources: An interpretive appraisal. *Land Economics*, **69**(1): 1-26.
- Smith, V.K. (1987) Nonuse Values in Benefit Cost Analysis. *Southern Economic Journal*, **54**(1): 19-26.
- Somerville, M.A. (2006) *The Ethical Imagination: Journeys of the Human Spirit*. House of Anansi Press, Toronto, 270p.
- Spash, C.L. (2000) Ecosystems, contingent valuation and ethics: the case of wetland re-creation. *Ecological Economics*, **34**(2): 195-215.
- Spash, C.L. (1999) The Development of Environmental Thinking in Economics. *Environmental Values*, **8**(4): 413-435.

- Spiller, P.T. and Tiller, E.H. (1996) Invitations to override: Congressional reversals of supreme court decisions. *International Review of Law & Economics*, **16**(4): 503-521.
- Spinner, G.P. (1969) *A Plan for the Marine Resources of the Atlantic Coastal Zone*. American Geographical Society, New York, 80p.
- Stephenson, W. (1978) The concourse theory of communication. *Communication*, **3**: 21-40.
- Stephenson, W. (1962) Ideal types. *Psychological Record*, **12**: 9-16.
- Stephenson, W. (1967) *The Play Theory of Mass Communication*. Reissued 1988, Transaction Inc., New Brunswick and New Jersey, 225p.
- Stern, N. (2007) *The Economics of Climate Change: The Stern Review*. Cambridge University Press, 712p.
- Sterritt, N.J., Marsden, S., Galois, R., Grant, P.R. and Overstall, R. (1998) *Tribal Boundaries in the Nass Watershed*. UBC Press, Vancouver, 332p.
- Stewart, H. (1977) *Indian Fishing: Early Methods on the Northwest Coast*. Douglas and McIntyre, Vancouver, 181p.
- Stiglitz, J.E., Sen, A. and Fitoussi, J.P. (2010) *Mismeasuring Our Lives: Why GDP Doesn't Add Up*. New Press, New York and London, 176p.
- Stokstad, E. (2008) Warm Sea Urchins on Acid. *ScienceNOW*, **2008**(218): 2.
- Sukhdev, P. (2009) Costing the earth. *Nature*, **462**(7271): 277.
- Sukhdev, P., Wittmer, H., Schröter-Schlaack, C., Nesshöver, C., Bishop, J., ten Brink, P., Gundimeda, H., Kumar, P. and Simmons, B. (2010) *Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*. Progress Press, Malta. 36p.
- Sumaila, U.R. (2008) Getting Values and Valuation Right: A Must for Reconciling Fisheries with Conservation. Pages 707-712 in: American Fisheries Society Symposium, Nielsen, J., Dodson, J., Friedland, K., Hamon, T.R., Musick, J. and Verspoor, E. (eds.) Vol. 49: 707-712.
- Sumaila, U.R. and Walters, C.J. (2005) Intergenerational discounting: A new intuitive approach. *Ecological Economics*, **52**: 135-142.
- Sumaila, U.R., Khan, A.S., Dyck, A.J., Watson, R., Munro, G., Tydemers, P. *et al.* (2010) A bottom-up re-estimation of global fisheries subsidies. *Journal of Bioeconomics*, **12**(3): 201-225.
- Sumaila, U.R., Khan, A., Watson, R., Munro, G., Zeller, D., Baron, N. *et al.* (2007) The World Trade Organization and global fisheries sustainability. *Fisheries Research*, **88**(1-3): 1-4.

- Sumaila, U.R., Cheung, W., Dyck, A., Gueye, K., Huang, L., Lam, V. *et al.* (2012) Benefits of Rebuilding Global Marine Fisheries Outweigh Costs. *PloS One*, **7**(7): e40542.
- Sumaila, U.R., Alder, J., Ishimura, G., Cheung, W.W.L., Dropkin, L., Hopkins, S., Sullivan, S. and Kitchingman, A. (2011) US marine ecosystem habitat values. Pages 281-290 in: *Coping with Change in Marine Social-Ecological Systems*. Ommer, R.E., Perry, I. and Cury, P. (eds). Wiley-Blackwell, Oxford.
- Šunde, C. (2008) The open horizon: Exploring spiritual and cultural values of the oceans and coasts. Pages 166-186 in: *Ecological Economics of the Oceans and Coasts*. Patterson, M.G. and Glavovic, B.C. (eds). Edward Elgar Publishing, Cheltenham, UK.
- Swedeen, P. (2006) Post-normal science in practice: A Q study of the potential for sustainable forestry in Washington State, USA. *Ecological Economics*, **57**(2): 190-208.
- Sweet, D.C. (1971) *The Economic and Social Importance of Estuaries*. Environmental Protection Agency, Washington, DC.
- Swidler, L. (2006) Universal Declaration of a Global Ethic. *International Journal of Buddhist Thought and Culture*, **7**: 159-167.
- Tacon, A.G.J. and Metian, M. (2008) Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds: Trends and future prospects. *Aquaculture*, **285**(1-4): 146-158.
- Tansey, J. and Burgess, M.M. (2006) Complexity of public interest in ethical analysis of genomics: Ethical reflections on salmon genomics/aquaculture. *Integrated Assessment*, **6**(2): 1-7.
- The Royal Swedish Academy of Sciences. (2011) Scientific Background on the Nobel Prize in Chemistry 2011: The discovery of Quasicrystals. URL: http://www.nobelprize.org/nobel_prizes/chemistry/laureates/2011/sciback_2011.pdf, Accessed May 5, 2012.
- Thompson, T. and Lickers, H. (1992) The Sun. Pages 141-145 in: *Words That Come Before All Else: Environmental Philosophies of the Haudenosaunee*. Haudenosaunee Environmental Task Force (ed.). The Native North American Travelling College, Cornwall, ON.
- Thompson, E.P. (1991) *Customs in Common*. Merlin Press, London, 540p.
- Thurstan, R.H., Brockington, S. and Roberts, C.M. (2010) The effects of 118 years of industrial fishing on UK bottom trawl fisheries. *Nature Communications*, **1**: 1-6.
- Tillich, P. (1960) *Love, Power, and Justice: Ontological Analyses and Ethical Applications*. Oxford University Press, Oxford, 144p.
- Tirone, S., Shepard, B., Turner, N.J., Jackson, L., Marshall, A. and Donovan, C. (2007) Celebrating and connecting with food. Pages 154-159 in: *Resetting the Kitchen Table: Food*

- Security, Culture, Health and Resilience in Coastal Communities*. Parrish, C.C., Turner, N.J. and Solberg, S. (eds). Nova Science Publishers, Inc., New York.
- Toman, M. (1998) Why not to calculate the value of the world's ecosystem services and natural capital. *Ecological Economics*, **25**(1): 57-60.
- Torras, M. (2000) The total economic value of Amazonian deforestation, 1978-1993. *Ecological Economics*, **33**(2): 283-297.
- Trosper, R. (2009) *Resilience, Reciprocity and Ecological Economics: Northwest Coast Sustainability*. Routledge, New York and London, 188p.
- Trosper, R.L. (2003) Resilience in pre-contact Pacific Northwest social ecological systems. *Conservation Ecology*, **7**(3), Article 6.
- Turner, N.J., Parrish, C.C. and Solberg, S. (2007) Introduction—Food security in coastal communities in the context of restructuring: *Coasts Under Stress*. Pages 1-12 in: *Resetting the Kitchen Table: Food Security, Culture, Health and Resilience in Coastal Communities*. Parrish, C.C., Turner, N.J. and Solberg, S. (eds). Nova Science Publishers, Inc., New York.
- Turner, N.J. (2004) *The Earth's Blanket: Traditional Teachings for Sustainable Living*. University of Washington Press, Seattle, 304p.
- Turner, W.R., Brandon, K., Brooks, T.M., Gascon, C., Gibbs, H.K., Lawrence, K.S. *et al.* (2012) Global Biodiversity Conservation and the Alleviation of Poverty. *Bioscience*, **62**(1): 85-92.
- Turpie, J., Lannas, K., Scovronick, N. and Louw, A. (2010) *Wetland ecosystem services and their valuation: A review of current understanding and practice*. Volume 1: University of Capetown 132p. Available from: Water Research Commission, Private Bag X03, Gezina, 0031.
- UN (2007) *Declaration on the Rights of Indigenous Peoples*. United Nations 15p.
- UN (2006) *Indigenous Peoples, Indigenous Voices*. 5th Session: UN Permanent Forum on Indigenous Issues http://www.un.org/esa/socdev/unpfii/documents/5session_factsheet1.pdf.
- UNDP (n.d.) Human Development Reports). URL: <http://hdr.undp.org/en/statistics/>, Accessed May 5, 2012.
- Union of Concerned Scientists (1992) *World scientists' warning to humanity*. Union of Concerned Scientists, Cambridge, MA. <http://www.ucsusa.org/about/1992-world-scientists.html>. Accessed May 5, 2012.
- Urión, C. (1991) Changing Academic Discourse about Native Education: Using Two Pairs of Eyes. *Canadian Journal of Native Education*, **18**(1): 1-9.
- van Exel, J. and de Graaf, G. (2005) Q methodology: A sneak preview. URL: <http://www.qmethodology.net/PDF/Q-methodology%20-%20A%20sneak%20preview.pdf>, Accessed January 7, 2010.

- van Zyl, M. (2009) Ocean, time and value: speaking about the sea in Kassiesbaai. *Anthropology Southern Africa*, **32**(1&2): 48-58.
- Veblen, T. (1927) *Theory of the Leisure Class: An Economic Study in the Evolution of Institutions*. Online 1899 edition by MacMillian of London, Vanguard press, New York.
- Verschuuren, B. (2006) Sociocultural Importance of Wetlands in Northern Australia. Pages 141-150 in: *Conserving Cultural and Biological Diversity: The Role of Sacred Natural Sites and Cultural Landscapes*. Schaaf, T. and Lee, C. (eds). IUCN/UNESCO.
- Walters, C.J. and Martell, S.J.D. (2004) *Fisheries Ecology and Management*. Princeton University Press, Princeton, 448p.
- Walters, C. and Kitchell, J.F. (2001) Cultivation/depensation effects on juvenile survival and recruitment: implications for the theory of fishing. *Canadian Journal of Fisheries and Aquatic Sciences*, **58**(1): 39-50.
- Ward, T.J., Tarte, D., Hegerl, E. and Short, K. (2002) *Policy Proposals and Operational Guidance for Ecosystem-based Management of Marine Capture Fisheries*. World Wildlife Fund, Australia. 83p.
- Waring, M. (2003) Counting for Something! Recognising Women's Contribution to the Global Economy through Alternative Accounting Systems. *Gender and Development*, **11**(1, Women Reinventing Globalisation): 35-43.
- Waring, M. (1988) *Counting for Nothing: What Men Value and What Women are Worth*. Allen & Unwin, Port Nicholson Press, Wellington, NZ, 290p.
- Warren, K.J. (1996) The power and the promise of ecological feminism. Pages 19-41 in: *Ecological Feminist Philosophies*. Warren, K.J. (ed.). Indiana University Press, Bloomington.
- Watling, L. and Norse, E.A. (1998) Disturbance of the Seabed by Mobile Fishing Gear: A Comparison to Forest Clearcutting. *Conservation Biology*, **12**(6): 1180-1197.
- Wattles, J. (1996) *The Golden Rule*. Oxford University Press, Oxford, 257p.
- WCC. (2009) Statement on eco-justice and ecological debt. URL: <http://www.oikoumene.org/gr/resources/documents/central-committee/geneva-2009/reports-and-documents/report-on-public-issues/statement-on-eco-justice-and-ecological-debt.html>, Accessed May 5, 2012.
- Webler, T., Danielson, S., Tuler, S., Kalof, L. and Shockey, I. (2009) *Using Q Method to Reveal Social Perspectives in Environmental Research*. Social and Environmental Research Institute, Greenfield, MA. 54p.
- Weisbrod, B.A. (1964) Collective-Consumption Services of Individual-Consumption Goods. *Quarterly Journal of Economics*, **78**(3): 471-477.

- Weitzman, M.L. (2007) A Review of the Stern Review on the Economics of Climate Change. *Journal of Economic Literature*, **45**(3): 703-724.
- Weitzman, M.L. (2001) Gamma discounting. *The American Economic Review*, **91**(1): 260-271.
- White, R. (1996) 'Are You an Environmentalist or Do You Work for a Living?'. Pages 171-185 in: *Uncommon ground: Rethinking the human place in nature*. Cronon, W. (ed.). W.W. Norton and Co., New York.
- Whitehead, A.N. (1925) *Science and the Modern World*. Reissued 1997 by: Free Press (Simon & Schuster), 224p.
- Williams, J. (2006) *Clam Gardens: Aboriginal Mariculture on Canada's West Coast*. New Star Books, Vancouver, 112p.
- Wilson, E.O. (1992) *The Diversity of Life*. Harvard University Press, Cambridge, MA, 424p.
- Wilson, E.O. (1984) *Biophilia*. Harvard University Press, Cambridge, MA, 157p.
- Wilson, E.O. (2006) *The Creation: An Appeal to Save Life on Earth*. W.W. Norton and Co., London and New York, 175p.
- Wilson, L.A. (2007) Influence of Policy Actors' Values on the Role of Science in US Ocean Policy: Integrating Methods for Investigating Human Dimensions Issues in Environmental Policy. *Earth System Governance: Theories and Strategies for Sustainability*, Amsterdam, May 24-26 2007.URL: http://www.2007amsterdamconference.org/Downloads/AC2007_Wilson.pdf.
- Wilson, P. and Wheeler, D.P. (1997) *California's Ocean Resources: An Agenda for the Future*. State of California, Sacramento.
- Wilson, S. (2010) *Natural Capital in BC's Lower Mainland: Valuing the benefits from Nature*. David Suzuki Foundation and Pacific Parklands Foundation, Vancouver. 67p.
- Wolfensen, J.D. (2003) Foreword to Faith in Conservation. Pages xi-xii in: *Faith in Conservation: New Approaches to Religions and the Environment*. Palmer, M. and Finlay, V. (eds). World Bank, Washington, DC.
- Wood, A.W. and O'Neill, O. (1998) Kant on duties regarding nonrational nature. *Supplement to the Proceedings of the Aristotelian Society*, **72**(1): 189-210.
- Wood, D. (2011) The big chill of ocean warming. *The Georgia Strait, Vancouver*, October 20.
- Wood, P.M. (2000) *Biodiversity and Democracy: Rethinking Society and Nature*. University of British Columbia Press, Vancouver, 237p.
- Woods, D. (1987) *Biko*. Holt Paperbacks, New York, 418p.

- Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S. *et al.* (2006) Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science*, **314**(5800): 787-790.
- WSCC. (2001) *The Columbia River Watershed: Caring for Creation and the Common Good*. Washington State Catholic Conference, Seattle.
- Yarincik, K. and O'Dor, R. (2005) The Census of Marine Life: goals, scope and strategy. *Scientia Marina*, **69**(suppl. 1): 201-208.
- Zeller, D., Booth, S., Davis, G. and Pauly, D. (2007) Re-estimation of small-scale fishery catches for US flag-associated island areas in the western Pacific: the last 50 years. *Fisheries Bulletin*, **105**(2): 266-277.
- Zeller, D., Booth, S., Craig, P. and Pauly, D. (2006) Reconstruction of coral reef fisheries catches in American Samoa, 1950-2002. *Coral Reefs*, **25**(1): 144-152.

Appendix A Marine ecosystem-based management principles

Note on authorship: This appendix was prepared by Nigel Haggan as background to the discussion of principles that have been put forward for marine ecosystem-based management.

The ecosystem-based management literature frequently refers to complexity, scale, space-time connection and biodiversity as ‘principles’, however for the purpose of this discussion these are considered as characteristics or possibly desired outcomes. ‘Principles’ as used here state what should or should not be done to address these characteristics or achieve these desired states.

Whatever term we use ‘ecosystem’, ‘social-ecological system’ or ‘eco-social-spiritual community’, what we see today is the intersection of biotic, cultural and environmental trajectories, i.e., a cross-section of a process of human interaction with biota and environment. The terms ‘natural’, ‘pristine’ or ‘wilderness’ serve only to obscure the extent of mutual social and ecological ‘restructuring’ that took place before as well as after European contact. For example, societies exist in England to preserve ‘moorland’, itself the product of forest clearcutting by Iron Age farmers. ‘Ecosystem-based management’ necessarily entrains the ‘voices’ of multiple species, physical and chemical processes as well as people. Ecological, social and geographic diversity is reflected in equally diverse understandings of ‘eco-social-spiritual community’ and how the health of individual and emergent properties is perceived and expressed. A set of overarching principles for ecosystem-based management should therefore provide the minimum structure to ensure that all these voices participate fully from community to regional level. This appendix draws on international agencies, ocean commissions, review papers, scientific declarations and prescriptions for the Pacific Northwest.

A.1 Scientific principles of marine ecosystem-based management principles

The Lisbon principles for ocean governance (Costanza *et al.* 1999) are widely cited. The first principle limits individual and corporate access rights to ensure ecological sustainability and fairness. The remaining five principles are matching governance to ecological scale, the precautionary / reverse onus principle which restrains fishing until a safe level of catch can be determined, adaptive management, economics that account for externalities and ecosystem services and stakeholder awareness and participation to promote compliance with regulatory frameworks.

The UN Code of Conduct for Responsible Fishing (FAO 1995) (the Code) is the result of long consultation between UN member countries and thus represents some level of agreement. The Code sets out “principles”, i.e., ‘should’ statements to ensure that fishing is consistent with human and ecological well-being. The first principle (6.1) is that the present right to fish is subject to a duty to ensure sufficiency and diversity for present and future generations. The “duty” to conserve requires the acts or virtues of restraint or frugality. The right to fish is subject to the precautionary principle (6.5) that, when sustainability is in doubt, fishers must provide scientific evidence that their fishing levels are sustainable, i.e., will not deplete the target population or impact on “sufficiency and diversity for future generations”. This principle has been watered down in Canada to a “precautionary approach” where cost benefit analysis is applied to ensure that fishing restrictions do not “irrevocably or unnecessarily harm the economy” (Bavington 2010). Countries should apply the best scientific and traditional knowledge (6.4) to restore fish populations (6.3) and critical habitat (6.8) as necessary. The relevant acts or virtues are active inclusion of the knowledge of scientists, traditional and other fishers and restoration based on the application of that shared knowledge.

Selective fisheries that minimize environmental damage, bycatch, discards and waste should be encouraged and given priority (6.6). The right extends to a “secure and just livelihood” and preferential access to traditional fishing grounds for small-scale and artisanal fishers whose contribution to employment and food security is acknowledged (6.18). Food security is integral to the right to fish (6.2) and to processing and distribution (6.7). Food security is inseparable from nutritional quality (6.7) and social needs including what is “culturally appropriate” (Turner *et al.* 2007). Food security should not be negatively impacted by trade (6.14). Member states should monitor and control fishing, processing and distribution in their territorial sea (6.10) and under their flags (6.11). International collaboration is required in view of migratory and straddling stocks (6.12). States should establish broad based consultation mechanisms to develop laws and policies for fisheries management, development, lending and trade, while decision-making on “urgent matters” should be prompt and transparent (6.13). Successful implementation of the Code requires that states educate fishers and fish farmers on the conservation and management of their fisheries and have a voice in policy development and application (6.16) and ensure industrial safety, health and fairness (6.17). Two principles reach beyond the context of capture fisheries. Principle 6.9 requires that fisheries be taken into account along with other “multiple uses of the coastal zone”. Aquaculture should be considered to the extent that it promotes food security and employment without adversely affecting the environment and local communities (6.19).

Ward (2002) sets “maintaining natural structure and function”, “biodiversity”, productivity of natural systems and important species as the “focus” (goal) of EBM. Human values are central to establishing use and management objectives. These objectives should be based on a shared vision developed by “stakeholders”. The dynamic nature of ecosystems demands adaptive management based on knowledge and continual learning linked to monitoring. The success of

an EBM system requires supportive policy, recognition of economic, social and cultural interests and ecological values and, risk-averse (precautionary) fishing based on adequate information in a consultative and adaptive context that considers “environmental externalities”.

Ward (2002) outlines 11 steps to guide individual fisheries in an EBM context. The first essential is to identify the players, their partners, interests, relationships, values, what affects those values and ecological risk assessment. “Ecological risk assessment” provides the context for setting objectives and targets, strategies to achieve the targets, design of information and monitoring systems, performance assessment and review. Education and training packages for fishers are important. Core concepts not introduced in the principles and ingredients for overall success include risk, or ‘peril’, although perhaps hinted at under “environmental externalities”. Ward (2002) identifies a lack of coordination between initiatives to improve ecosystem thinking (Gaydos *et al.* 2008) and fisheries management, as do Gaydos *et al.* (2008) for the Salish Sea. Similarly, Arkema *et al.* (2006) identify a disconnect between “scientific” goals for EBM and social goals of fisheries management. Of nine gaps and 10 high-priority actions identified by Ward (2002), the following have not previously been noted:

- A global restoration fund to reduce fishing effort;
- Integration of EBM with “integrated management”.

The interaction of EBM with integrated management (multiple uses of ocean space from salmon farming, oil and gas and other ocean industry) is significant. Ecological and human poverty go hand in hand (e.g., Boff 1997; McFague 1997; Stern 2007) with rising costs of transfer payments and ecological restoration (Gaydos *et al.* 2008).

Ward bases his framework on the problematic term “stakeholders” which implies those directly involved in fishing. However, he uses an extremely wide interpretation of the term, going

beyond those immediately involved to include local community groups, indigenous people and government. Ward is particularly useful in defining what marine ecosystem-based management is *not*, notably that it will not be effective if it ignores “ethical and traditional issues in a fishery... human well-being, social fabric and small communities.” (Ward *et al.* 2002, Table 4) The document is otherwise silent on spiritual, sacred, moral or aesthetic values. It does however contain the interesting suggestion of an “ecological or environmental quota” to be allocated to the ecosystem “before indigenous, commercial, or recreational quotas are determined.”

Arkema *et al.*, (2006) derived 17 “criteria” from an extensive EBM literature review containing no less than 18 definitions of EBM. Three “General Criteria” (Sustainability, ecological health and inclusion of humans) readily boil down to ‘social-ecological health’ given that human well-being is specified. “Sustainability” defined as maintenance of one or more aspects of the ‘system’ is either a subset of, or a step towards, ecological health and human well-being. Alternatively, “sustainability” would fit better under their next rubric of “Specific ecological criteria” (complexity, temporal and spatial). These boil down to complexity as an attribute of ‘ecological space-time’. There is no mention of the deep past and deep future as crucial to comprehend complex social-ecological interactions and consequences. Of three “Specific human dimension criteria”, “ecosystem goods and services” and “economic” use can be combined, although neither is a ‘principle’ in the sense that ‘ecosystem services’ *should* be factored in, or economic goods *should* be fairly allocated between present and future generations.

Seven “Specific management criteria” reduce to three by considering science, interdisciplinarity and technology as subsets of adaptive management. “Co-management” would fit better under ‘human dimensions’, while the “Precautionary approach” is a general criterion. Rather surprisingly, there is no mention of either local or traditional ecological knowledge, nor is any

priority given to access for indigenous or small-scale fishes or consideration of inter-generational equity or food security. There is no mention of spiritual, cultural²⁷ or other ‘intangible’ values, unless these are deemed to be covered under the rubric of ecosystem services.

It is clear from both the title and content that the emphasis is on science. These are ‘criteria’, not principles in the sense of the FAO Code call to action, i.e., an ecosystem-based management framework could be said to be complete if all these boxes were checked. ‘Science’ is always happiest with something definite to measure. The “conceptual ecological objectives” for a Large Ocean Management Area such as the NW coast of BC (Jamieson *et al.* 2010:25) have to be linked to operational objectives, consisting of a verb (*e.g.*, maintain), a specific measurable indicator (*e.g.*, biomass) from a population analysis, and a reference point (*e.g.*, 50,000 t for a specific species or stock) (Jamieson *et al.* 2010, Table 2.2.1). This goes some way to account for the discomfort conveyed by the words “non-specific goals for ecosystem health or integrity.” On the credit side, they do conclude that a “Comprehensive EBM definition should go beyond an economic focus.” They also argue for specific inclusion of education and public awareness that they did not find in the 18 EBM definitions reviewed. Each conceptual objective must be “unpacked” to determine whether a “final operational objective” can be articulated.

The Pew Oceans Commission (2003) occupies a place between the scientific focus of Arkema *et al.* and the broad goals and aspirations for unheard-of levels of national and international cooperation in the UN Code (FAO 1995). The Pew Oceans Commission (2003) proposes six principles for a ‘sea ethic’. Pew is proactive in that the principles are accompanied by a verb, *e.g.*, “Public trust” is to be “upheld” by government, whose duty it is to protect their long-term interest and assure accountability of all ocean users. “Sustainability”, linked to long-term social-

²⁷ Other than a passing reference to a “Social, Economic, and Cultural Steering Committee” in a case study.

ecological well-being, requires “restraint” in fishing and in introduction of pollutants and entails “restoration”. “Precaution” is to be “applied” because our dependence on “ecological and economic goods and services” is absolute, but our knowledge is uncertain. “Interdependence” equates to land/sea linkages. Social-ecological health depends on respectful treatment. Social-ecological interdependence demands UN-style collaboration between government, public and resource users. An “ocean ethic” requires knowledge of connections. “Democracy” must be applied so that the rich and powerful cannot restrict benefits to all (see also Agardy 2007; Simpson 2009). This applies for example to quota fisheries for species such as blackcod and halibut in BC. It echoes Nuuchahnulth hereditary chief Larry Baird’s question about quota fisheries which effectively exclude his people from halibut fisheries, a species vital to the wealth, culture and existence of his people: “Who gave the Department of Fisheries and Oceans the authority to make individual Canadians rich?²⁸” Few explicitly include education and public awareness as recommended by Arkema *et al.* (2006). This education should include how ecosystem structure and function affect our daily lives. Wood (2000) argues that biodiversity and democracy are inseparable, as the well-being of future generations is totally dependent on maintaining biotic and ecological complexity.

Gaydos *et al.* (2008) propose 10 principles for the Salish Sea, a name officially adopted in 2010 for Puget Sound and The Strait of Georgia with their adjacent coastlines, cities, towns and villages. Their first principle “Think ecosystem” is appropriate for a region where the ancient territories of Aboriginal people span the Canada / US border. Ecosystem thinking is necessitated by political overlap, the cheerful disregard of salmon, killer whales and pollutants for political boundaries and the multiple values represented by “public trust” (Pew Oceans Commission 2003), the ‘sacred trust’ with which Aboriginal people regard their lands and waters, the more

²⁸ Comment at Native Brotherhood of BC Convention, Kelowna, BC ca. 1998 recorded by N. Haggan.

abstract ‘bequest’, ‘option’ and ‘quasi-option values’ of ecosystem valuation and the legal requirement to manage for present and future generations. Management focused if not based on discounted commodity value appears unable to achieve these ends. This suggests that ‘ecosystem’ while problematic as it puts people at some distance, can yet serve as a unifying metaphor for those who feel a sense of ownership or ‘belonging’. As such, it can serve to promote “collective understanding” of the sea (Haggan *et al.* 2007). Principles 2, 3 and 4 boil down to connection and interdependence. #5 “Respect ecosystem integrity” is related, but cites Leopold (1949) to make the point that an entire and healthy ecosystem with the full range of species, size and age classes is greater than the sum of its parts.

Principle #7, “Resilience” is an attribute of / essential to ecological health. It can depend on keystone species and on genetic diversity and can be enhanced or adversely affected by governance structures, economics and society. Principle #6, ecosystem services is an argument for conservation emphasized by the consideration that ecological damage is difficult to repair and extremely costly even when possible. #8, attention to wildlife health because of documented and increasing incidence of disease and transfer to humans, relates to a principle of ‘Attention’ as a pre-requisite for the first principle of “ecosystem consciousness”, ecological literacy (Orr 1992; Capra 1996), or its counterpart of ecological illiteracy (Nabhan 1997, 164). #9, plan for extremes reinforces the risk of peril from extreme natural events. #10, proposes knowledge sharing as key to ecological literacy. This includes public awareness and political leadership as critical to long-term social-ecological well-being.

The Scientific consensus statement on marine ecosystem-based management (McLeod *et al.* 2005) signed by over 200 ocean scientists is motivated by the threat which ocean depletion poses to “healthy, productive, resilient marine ecosystems that provide stable fisheries, abundant

wildlife, clean beaches, vibrant coastal communities and healthy seafood. The statement makes explicit mention of “spiritual, religious, and other nonmaterial benefits” in the context of numerous ecosystem services including “nutrient cycling; water purification; protection of shores from erosion and storm damage; moderation of climate and weather.” The juxtaposition of spiritual and nonmaterial benefits with vital, life-sustaining functions suggests a much broader understanding than a sub-subcategory in a list of ‘ecosystem services’. The resulting hint of a concept of ‘eco-social-spiritual’ flourishing is so far unique in the EBM literature. This may be because it is not in the ‘EBM literature’. The signatories, like those that signed the Declaration on Preserving and Cherishing the Earth (Sagan 1990), are outside their normal writing framework, i.e., not reporting their own research in the peer-reviewed literature. They have arrived at a point where their work forces them to step outside scientific objectivity and take a deeply moral position, although they stop short of the language of grief, anger and despair.

The natural world and the integrity of natural ecosystems also form an explicit or implicit part of the religious beliefs and cultural heritage of essentially all human religions and cultures. Such values need recognition. (Peterson and Lubchenco 1997).

The gist of the “consensus statement” is that humans are integral to ecosystems and interdependent. Although the signatories are outside of their research function, the document is an exposition of “our scientific understanding of marine ecosystems”, key elements of ecosystem-based management and appropriate actions. In a nutshell, ecosystems are nested, strongly connected, and complex at all scales. While ecosystems are resilient, there is a real peril of irreversible change, requiring increasing levels of precaution proportionate to the degree of disturbance.

Nine “key elements” drawn from the US and Pew Ocean Commissions provide significant overlap with sources cited earlier. New elements include a concept of ‘deep social-ecological

space-time' implicit in # 1 that protection and restoration of ecosystem services should override short-term economic or social goals and # 3 that “historical” levels of biodiversity should be maintained to ensure resilience against unforeseen extremes in natural variability and extreme weather events (#4). Seven actions to be implemented in an “integrated” way, parallel Ward (2002). They include long-term planning to address cumulative impacts of human and long-term environmental change, agreements on zoning at “large marine ecosystem” scale to govern multiple uses in ocean space and time and include networks of marine reserves to protect diversity, trophic and age structure, i.e., to mitigate peril. The Statement distinguishes zoning at the very large scale suggested from a piecemeal approach of “parks, refuges and sanctuaries”, as in the difference between a whole Persian carpet and the 36 “rugs” which it might be cut into (Nabhan 1997).

Pitcher *et al.* (2009) note that the “bewildering number” of EBM definitions are mostly implicit in the UN Code (FAO 1995) and explicit in Ward (2002). The framework of five “overall principles”, criteria and implementation steps in Ward was used to develop a framework to evaluate UN member countries for compliance with the Code. The results are troublesome and intriguing. Only a few developed world countries are moving towards ecosystem-based management. Some developing countries actually outperform their developed neighbours. Performance ratings correlate “quite well” with the UN Human Development Index (Table 4), which poses “a considerable challenge for international agencies, governments and conservation organizations seeking to encourage adoption”. The inference is that the concept of social-ecological health implicit in humans being integral to the ecosystem requires an evaluation scale from flourishing to impoverished. The concept of ecological poverty—nature as the new poor (McFague 1993; 2008)—lifts the mask of neutrality in terms such as ‘depletion’ and

‘decimation’ and inspires terms such as “robber bandits” for international corporate plundering of the oceans (Berkes *et al.* 2006).

The limitations of this study are also interesting. First, ecosystem-based management is considered outside of integrated management or multiple uses of ocean space, i.e., ignores the problems created by disparity in contribution to GDP as discussed in Chapter 2 and Haggan *et al.* (2009). Second, principles explicit and implicit in the Code are not reflected in Ward’s framework, e.g., a secure and just livelihood for fishers and preferential access to traditional grounds. This is somewhat surprising as an earlier rapid appraisal technique (RAPFish Pitcher and Preikshot 2001), contains an eight-criterion “ethical evaluation field” that includes the ‘adjacency principle’ of preferential access to traditional users and those with limited other options. Pitcher and some of the same colleagues (Pitcher *et al.* 2009) later applied RAPFish to rate 33 countries on the degree of illegal, unreported and unmandated (IUU) fishing with high rates described as “bad”. Low rates where “appropriate technology” is used to “reduce waste” are rated as “good”. If achieving ecosystem-based management is “good” and compliance with the Code is as close to an ‘absolute’ measure as we have of success, then there is a cogent argument for inclusion of an ethical or moral dimension.

A.2 Flourishing as a vision for ecosystem-based management

Principles link past, present and future based on a ‘vision’ of what constitutes social-ecological ‘health’. The vision is variously articulated as social-ecological health, or eco-social-spiritual well-being and can best be described as ‘flourishing’ as in the following examples from BC Aboriginal people:

Our vision for our land and resources is based on respect and the best definition of the term sustainable.” To us this means the wealth of the forests, fish, wildlife

and the complexity of all life will be here forever. It also means that we will be here forever. (Coastal First Nations n.d.);

Nuu-chah-nulth Ha'wiih [Hereditary Chiefs] are grateful for the gifts of the Creator and recognize our responsibility to watch over and care for those gifts and the health of our Ha-ha-houlthee [traditional territories]. (NCNTC n.d.).

Religious perspectives on flourishing include:

Other species have their own integrity. They deserve a “fair share” of Earth’s bounty—a share that allows a biodiversity of life to thrive along with human communities. (Astudillo et al. 2005);

[Ecological debt] warrants a re-ordering of economic paradigms from consumerist, exploitive models to models that are respectful of localized economies, indigenous cultures and spiritualities, the earth’s reproductive limits, as well as the right of other life forms to blossom. (WCC 2009);

Daoism has a unique sense of value in that it judges affluence by the number of different species. If all things in the universe grow well, then a society is a community of affluence. If not, this kingdom is on the decline. (ARC n.d.);

[From a Hindu perspective] a life without contribution toward the preservation of ecology is a life of sin and a life without specific purpose or use. (Rao et al. 2003);

Buddha taught that respect for life and the natural world is essential. By living simply one can be in harmony with other creatures and learn to appreciate the interconnectedness of all that lives. (Fossey et al. 2003).

From the Earth Charter

The resilience of the community of life and the well-being of humanity depend upon preserving a healthy biosphere with all its ecological systems, a rich variety of plants and animals, fertile soils, pure waters, and clean air. (ECI n.d.).

From the resource management literature:

maintenance of the quality, diversity and availability of fishery resources in sufficient quantities for present and future generations (FAO 1995);

We want to see flourishing salmon fisheries and diverse and abundant salmon populations, and we are actually willing to pay higher taxes if that is what it takes to see this. We are willing to make all kinds of sacrifices in order to achieve that. (Gallaughner et al. 2005);

Preservation of species, maintenance of biodiversity, and sustaining of natural processes feels morally right. Passing on the legacy of nature to future

generations should motivate most conservative actions (Peterson and Lubchenco 1997).

Chapter 4 identified principles as ‘should’ statements which relate an ‘is’, some present state of the world, to a vision of what it ‘*should*’ be. Single species fish stock assessment has a memory of 10 to 50 years, when abundance may well be a fraction of abundance and body size in the deep past. Hindcasting projects (e.g., Jackson *et al.* 2001; Yarincik and O’Dor 2005; Pauly 2007; Pitcher and Ainsworth 2008) seek to establish productivity levels prior to depletion by modern commercial fishing. Such projects generate explicit or implicit ‘should statements’ on rebuilding. Restoration targets based on such ‘prehistoric’ benchmarks do not simply seek to recapture some ‘golden age’, but have to be adjusted to account for natural variability and the profound changes occurring and anticipated from climate change. In many cases, the ‘should’ statement has both an ecological and a human component. For example, current fishing levels should be constrained so that future generations can enjoy the same or greater variety and abundance of fish and seafood as we have today (FAO 1995, principle 6.1). The Pew Oceans Commission (2003) calls for limits on the ability of powerful interests to impact the present and future well-being. Brown and Brown (2009) explicitly link restraint on consumption and reciprocity or cultivation to ecological and human flourishing now and in the deep future:

In turn, all the other lifeforms who share their existence with us – and all those to come – depend upon us not to squander them or use them carelessly, to be mindful of their fragility and to assist them, in every way we can, to live and thrive as vibrant populations along with ourselves.

Flourishing or thriving is therefore a vision based on eco-justice. We appreciate the flourishing of such old-growth forests as remain. Extraordinary levels of flourishing as in the redwood forests of California or Cathedral Grove on Vancouver Island were spared from logging. Where there is loss of diversity, we compare present situations with accounts of what past explorers saw, with books and with the stories our parents and grandparents. We contrast present

abundance with norms of eco-social-spiritual well-being in the past and formulate ‘should’ statements based on reestablishing some level of past flourishing. The time series or ‘memory’ of single species management is, in general, much too short to set a restoration target that approaches abundance, diversity and trophic structure prior to intensive human fishing. This is deeply problematic when upturns in remnant fish populations are used to make the case to reopen depleted fisheries (Walters and Martell 2004; Thurstan *et al.* 2010). Single species management goals such as ‘maximum sustained yield’ are problematic in themselves (Larkin 1977) and particularly so for ecosystem-based management, but can be useful as interim targets in a program designed to restore productive potential (Mace 2001).

Ecological restoration and increased human economic and social well-being are desired outcomes. The actual work of determining what can be restored, i.e., developing social-ecological literacy by researching benchmarks of past flourishing and accounting for anticipated natural /anthropogenic change is a spiritual activity and a work of love, as defined earlier. The disparity between what was and what is gives rise to powerful emotions of grief and often helplessness and despair at the loss of things we love and have fought passionately to understand and protect. This ‘dark night of the soul’ includes the emotions of mourning, shame and recognition of complicity, but gives way to faith in the restorative power of the sea and the ability of people to change and adapt. The powerful emotions of hope, anger and courage energize active virtues, whether restraint on the part of fishers, or ‘giving back’ by restoring salmon streams, or reducing pollution. A fully-stated principle then is based on a disparity between what is and what should be, an emotional response, i.e., how I feel about this (what should be done), an active virtue (how it is to be done) and an outcome (how action relates to the vision).

The core difference between the religious and scientific rhetoric is the notion of the world as something for which we are grateful and responsible as opposed to something we can measure and use. The core characteristics of ecological systems are complexity, connection, self-organization, resilience, dynamic change and uncertainty / peril. The common response, scientific and religious, is wonder, awe, reverence, precaution and attention. The split between the language of science and language of religion is essentially that between the language of distance and objectivity, vs that of love and relationship.

Appendix B Statement selection rationale

Note on authorship: This appendix was prepared by Nigel Haggan as background to the discussion of principles that have been put forward for marine ecosystem-based management.

B.1 Number and length of statements

According to Q founder William Stephenson, “self-referent” statements are the basic units of interpersonal and mass communication and are equivalent to notions and opinions. Attitudes are developed by reflecting on the given statements. Beliefs, values and the like are expressions of such attitudes. The number of beliefs is limited, while opinions and self-referent statements are “innumerable” (Stephenson 1967:14-16, 42). Table B.1 summarizes the topic, number of concourse statements, Q statements, participants and statement length for 12 Q studies.

Table B.1 Number of concourse statements, Q statements, participants and statement length for 12 Q studies.

Topic/Source	Concourse statement sources	Initial number	Q sample	Participants	# words
Democracy (Dryzek and Berejikian 1993)	Right and left wing press, voters pamphlets, quotation dictionaries, ethnographic studies and discussion groups convened for the study	30	64	37	9-40
Environmental values (Clarke 2002)	Environmental writers, e.g., Thoreau, Pinchot, Leopold, Christopher Stone, WCED, US Forest Service reports, industry statements, journal articles	400	60	189	11-40
How US ecologists think about coastal environments (Shilin <i>et al.</i> 2003)	Academic publications, university courses and seminar presentations from U. Georgia's Environmental Ethics program		39	30	12-44
Sustainable forestry (Swedeen 2006)	EIA, forest fish & wildlife protection codes, sustainable harvest calculations, private forestry applications, stakeholder websites, conference comments, Congressional hearings, semi-structured interviews.	200	64	30	10-60
Large carnivore conservation (Mattson <i>et al.</i> 2006)	‘Problem’ statements by workshop participants	300	51	27	<10
	‘Solution’ statements by workshop participants	300	49	21	<10
Perceptions of fishers and scientists (Fairweather <i>et al.</i> 2006)	20 in-depth interviews, covering a broad range of stakeholders (natural scientists, fishery managers, conservationists, fishing company managers)	20	20	45	10-50

Topic/Source	Concourse statement sources	Initial number	Q sample	Participants	# words
A marginal method to study marginalized (Brown 2006)	International Commission for Central American Recovery and Development meeting, San Jose, 1988		33	20	22-32
Influence of values on role of science in US ocean policy (Wilson 2007)	Testimony to the U.S. Commission on Ocean Policy, transcripts from PEW Commission, statements from both reports, transcripts of Congressional hearings, semi-structured interviews and group observations	400	64	15	
Offshore windfarms (Ellis <i>et al.</i> 2007)	Interviews with people identified through press cuttings and membership of key organizations.	458	50	71	11-37
Landless Cree (Bateson 2009)	Open-ended questionnaire, interviews and documents	40	40	59	10-40
Audience response to 'Avatar' (Davis and Michelle 2011)	Professional and lay film reviews, online Avatar fan message boards, Facebook group discussions, international news coverage, and media commentary.	250	32	120	
How ecological research priorities are set (Neff 2011)	Statements of, "research priorities, knowledge needs, and disciplinary imperatives" from scientific and policy documents.	540	32	87	10-42

The premise of *Q* is that providing an opportunity for private reflection on the range of perspectives will reveal areas of commonality and overlap which open the future to productive dialogue. Webler *et al.* (2009) concur: "people doing the *Q* sort are expected to respond to statements using personal internal yardsticks. Since the *Q* sort is wholly subjective, i.e., represents "my point of view", the factors which emerge from the analysis "must represent functional categories of the subjectivities at issue" (Brown 1993). *Q* makes it possible to sample from a communications concourse includes spiritual, religious and artistic perspectives and the day to day 'lifeworld' of ecosystem-based management. Ecosystem-based management seeks to create oceans that are healthy, thriving or flourishing, and this is reflected in the core 'principles' of biotic and habitat complexity and connection that confer resilience or the ability to recover from shock or stress. The goal of ecosystem-based management and of social-ecological systems management is health, whether expressed as flourishing, integrity, integrity of creation.

However present-day ecosystem-based management discourse excludes the spiritual and religious, and so a bridge must be built between it and the broader discourses of response to the ecological crisis from religious and secular organizations. A ‘concourse’ may contain several ‘discourses’, some of which are ‘immiscible’ or ‘incommensurable’, at least in their public representation.

B.2 Principles of statement selection

The statements used in the Q methodology have been selected based on a set of fundamental principles identified and discussed below.

B.3 Democracy and the public trust

The core principle is democracy, which depends on government to maintain the “public trust” that the coast and ocean are used in a just and sustainable way. Where past practices have resulted in overcapacity and unjust distribution of costs and benefits, there is a need for deconstruction and realignment of existing systems and structures. This requires restraint of powerful interests. “Ecological literacy” (see below), which includes public awareness, is essential both for understanding what is happening in the linked human-non-human community and to support major current deconstruction initiatives such as in redirecting global subsidies to rebuilding depleted marine life and impoverished fishing communities and to meet food security targets.

Democracy is critical to maintain the public trust in government to ensure that all values are recognized and maintained and that costs and benefits are equitably shared in the present and the future. Democracy is necessary to restrain powerful vested interests that can and do seize an unfair share of present benefits and compromise the future. Democracy is also vital to the inclusion of marginalized indigenous and small-scale communities and to ensure that the full

scope of tangible and intangible costs and benefits informs policy and decision-making. Democracy essentially is maintaining the public trust in the ability of government to ensure that the long-term public interest in clean air, water and amenities is not compromised by overfishing and other ocean industry. Democracy cannot be separated from the protection of ecological, social and cultural diversity as useful and as goods in themselves—the ‘Kantian synthesis’ (1785). Ocean literacy at all levels from kindergarten upwards is vital to the implementation of democracy and restoration of public trust. Our physical, emotional, spiritual, social, economic and creative well-being is entangled with the coast and ocean. This is well recognized in the preamble to Canada’s Species at Risk Act. Democracy therefore requires participation and leadership from the sciences, humanities, spiritual and religious communities and artists.

The scope of change required by the ecosystem-based management literature cannot be achieved under the current scientific and management regime as indicated by the degree of institutional change and boundary realignment contemplated in documents such as the FAO Code and the Pew Oceans Commission. Similarly, powerful interests and capital structures engendered by single species science and management will need to be dismantled and realigned to ensure ecological and social sustainability. The principle of democracy and public trust therefore requires a significant overhaul of current arrangements.

B.4 Deconstruction and realignment

Single-species science, management and licensing systems are deeply entrenched and reflected in the family and social structures of physical and virtual fishing communities, fleet and capital structures and consultative processes (Haggan *et al.* 2007). The need for radical change is recognized in the FAO Code, Pew Oceans commission and other studies (Crowder and Norse 2008; Foley *et al.* 2010). The “current patchwork of complex, uncoordinated, and often

disjointed rules and regulations governing use of coastal and ocean waters around the world” needs to be replaced (Foley *et al.* 2010). Recognition of the need for change ranges from cautious optimism that single species management can evolve with “top down guidance” to develop an “enabling institutional environment” (2005), to calls for a fundamental change in how we value the ocean (Pew Oceans Commission 2003) and “institutions and forums capable of managing on an ecosystem basis” (Pew Oceans Commission 2003). The need to deconstruct is urgent in the matter of subsidies that drive overfishing, but dismantling the structures that underlie the subsidies is critical. This cannot however be addressed in a *Q sort* focussed on BC coast and marine issues.

The need to transfer power from centralized single-species science and management to more local control informs *Q statements* 5 and 10:

(5) Fisheries allocation and management should be transferred to regional boards that combine scientific, traditional and local ecological knowledge and values;

(10) Ownership of aquatic species and their habitat should be held in trust by governments on behalf of the people, and not conferred irrevocably to private parties.

Statement #10 reinforces the idea of democracy and public trust as opposed to the transfer of ownership to private interests. Statement #10 is a direct quote expressing concern about a proposal for quota fisheries in salmon (Jones *et al.* 2004). It is also relevant to the issue of transferable quotas, which alienate fish catch from longstanding fishing communities, and the owner-operators of small boat fisheries. The statement also covers the expansion of industrial salmon feedlots and a current concern about the role of government in evaluating risk to species and habitat from major industrial projects such as the proposed Enbridge pipeline. Statement #10 is particularly timely in light of a controversial suggestion by Canada’s Fisheries Minister to remove habitat protection from the Fisheries Act (O’Neil 2012).

B.5 Adjacency and food security

Numerous discussions of the practical problems of fishery management created by the non-malleability of capital (both physical and human) can be found in the literature (Clark et al. 1979).

Adjacency is a key ecosystem-based management principle and refers to the right of communities, indigenous and non-indigenous; to be able to access traditional lands, waters and species for customary and evolving needs (FAO 1995; Noble 2000; Ommer 2000; Pitcher and Power 2000). Food security is linked to adjacency, but extends to all peoples that depend on marine protein, i.e., the depletion of West African fisheries by European fleets (Kaczynski and Fluharty 2002; Alder and Sumaila 2004) and the progressive emptying of the ocean of small ‘forage’ or ‘trash’ fish to feed industrial salmon feedlots, tiger prawn ponds, pigs, chickens and domestic dogs and cats (Tacon and Metian 2008). The question of food security is thus linked to democracy and to the need to dismantle the capital and fleet structures that compromise food security targets.

The principle of adjacency (FAO 1995; Noble 2000; Ommer 2000; Pitcher and Power 2000) argues for permanent fishing communities to have security of access to traditional grounds and species in sufficient diversity and abundance to meet economic and nutritional needs, including secure access to culturally important species. Adjacency is critical to local management and control (Noble 2000). In the context of Canadian law, this includes, but should not be limited to, the Aboriginal right to fish for “food, social and ceremonial” purposes (Canada 1990), “recognized and affirmed” under s. 35.1 of the Constitution (Canada 1982). The principle of adjacency is a *de facto* acknowledgement that the culture and identity of communities is inseparable from the abundance and diversity of species and habitats and the continuing ability to co-evolve, *per* Supreme Court of Canada rejection of the doctrine that Aboriginal rights are

“frozen”, either in their exercise prior to European contact, or as diminished and constrained by the “crazy patchwork” of DFO law and regulations in force in 1990 (Canada 1990:20). Aboriginal jurisdiction had been annihilated and share of commercial catch reduced to ~5% (Scow 1987; Pearse and Larkin 1992) by the time of enactment of the Supreme Court of Canada decision in BC²⁹. Other fishing communities on the BC coast have also seen their participation dwindle to a remnant as corporate interests with deep pockets bought out owner-operators who could not survive lean years and increasing catch limitations (Gislason *et al.* 1996).

The principle of adjacency relates also to the concept of “non malleability of capital³⁰” in the barbarous cant of economists, signifying that special consideration should be given to communities where employment opportunities outside the fishery are minimal or absent. The principle of adjacency is honoured in the preceding statement on transfer of allocation and management to regional boards. The principles of adjacency and food security are explicit in *Q statement #4* grounded in the FAO code of conduct (1995:6.18) and defining concepts of food security (Parrish *et al.* 2007):

(4) Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.

B.6 Ecological literacy

The ecology of the Pacific Northwest has changed profoundly in the 12,000 years since ice covered almost the entire coast. The eco-social-spiritual communities of Aboriginal people are the result of a long process of ‘becoming indigenous’, of the shaping of salmon populations to sustain people and of people to understand and care for salmon and hundreds of marine and

The same percentage applied south of the border where a US Supreme Court decision returned 50% of the fisheries to Washington Tribes (Boldt 1974).

³⁰ This illustrates the reductionist logic of economics where the entanglement of culture and place which the Supreme Court of Canada recognized as “necessary for the cultural and spiritual survival” of Aboriginal people (Canada 1990:27) is reduced to the presence or absence of work.

terrestrial species from clams to camas lilies. This level of ecological literacy or ‘intelligence’ (section 4.6.1) enabled Aboriginal people to thrive in the growing commercial fisheries and new arrivals to adapt European fishing technology. Knowledge and skills developed over 100s of years of a small boat fishery also shaped non-native communities with a profound sense of identity and belonging. The ecology of the Pacific Northwest was profoundly changed by corporate-industrial fisheries, is being changed by industrial salmon feedlots and will change further as global warming drives herring populations northwards and reduces the biodiversity of mussel beds in the Strait of Georgia (Harley 2011). Understanding the possible trajectories and interactions of marine species and human activities requires the knowledge, skills, wit and wisdom of the entire maritime community. The level of collaboration and trust cannot be achieved under single-species science and management. The notion of ecological literacy or ecological intelligence is summarized in Q statement #12:

(12) We need an aggressive preschool to college 'ocean literacy' program to inspire the next generation of scientists, fishers, business and political leaders to value and protect the oceans.”

Statement #12 draws on the Pew Oceans Commission (2003: 22). The idea of educating leaders to inculcate the “vision and stamina” necessary to focus on long-term restoration in the face of competing short-term interests is one of 10 principles for ecosystem-based management of the Salish Sea (Gaydos *et al.* 2008).

Ecological literacy goes a good deal farther than the standard prescription for ‘stakeholder education’. The term stakeholders’ refers to people with an interest in (something to gain or lose) in allocation of access between fisheries sectors, more recently between Aboriginal cultures and fishing livelihoods *vs* and oil and gas, between environmentalists and “those who work for a living” (White 1996). The industrial salmon feedlots of BC compromise global foodwebs and erode the food security of people in distant lands.

The ocean is essential to all life on the planet: we are all stakeholders. Redeveloping ecological literacy must include knowledge of climate change and the socio-economic forces from global fish trade to tar sands oil that impinge on the BC coast. Ecological literacy can in the long-term dissolve the barriers thrown up by single species science and management and between economic ‘sectors’ such as fisheries, industrial salmon feedlots, oil and gas, but must reach beyond educating fishers and fish farmers (FAO 1995:6.1). It must even reach beyond educating “those involved with fisheries management about the concept, principles and operational implementation of EBM (Ward *et al.* 2002) to creating genuine public awareness. It requires something inspirational; the Pew Oceans Commission (2003) contemplate a national “ocean literacy” initiative on the scale of the NASA school space education program. While it is hard to contemplate Canada embarking on a program of this scale, there is support for more public education. A participant in the deliberative democracy project on mapping the Pacific salmon genome would like to see BC children learn about salmon from daycare, through trips to see spawning salmon, other hands-on and study programs through high school (O'Doherty and Burgess n.d.).

Chapters 1 and 2 suggested that a narrow view of ecosystem values is acting as a major deterrent to investment in ecosystem-based management (Haggan *et al.* 2007). Total economic value and ecosystem services have potential to significantly increase monetary value, but much less attention has been paid to ‘intangible values’. For this reason, Statement #21 suggests a need to include artists to represent the many voices of the sea (Eliot 1941; Ommer *et al.* 2006). Art was integral to the Just Fish project to recontextualize Canadian fisheries conflicts in the context of justice (Hall 2000), but is not the first thing that comes to mind when it comes to public support for cherishing and protecting the sea. The Pew Oceans Commission (2003: 22) notes that broad public support for “restoring and sustaining” the ocean begins with, “greater awareness of just

how valuable—and vulnerable—the oceans are”. The need for ‘ocean literacy’ and multiple representations of our relationship with the sea to give voice to the grief, compassion and courage that underlie scientific reports and graphs of depletion makes the case for *Q statement* #21 calling for direct involvement of artists in coast and ocean management. #21 also invokes a concept of the ‘secular sacred’ in the terms “*beauty, mystery, fascination and fragility*”:

(21) We are spellbound by the sea. Coast and ocean management needs writers, poets, painters and storytellers to remind us of beauty, mystery, fascination and fragility.

B.7 Inclusivity of cultures and knowledge

The principle of inclusivity encompasses human communities with direct interest, including those excluded and marginalized. The general public has an interest in food security and maintenance of clean air, water, material and intangible values for present and future generations. This interest is at best obscured by the competing voices of conservation organizations, government and industry. Inclusivity of cultures and different ways of knowing is variously described as “epistemological pluralism” (Martindale 2006) or “flexibility” (Gunderson *et al.* 2006). The complexity and connections inherent in ecosystem-based management require collaboration between communities and ‘experts’, which includes spiritual and religious leaders and artists.

Many words have been expended on ‘bringing ‘traditional and local knowledge’ into fisheries and ecosystem-based management, it is probably fair to say that desire outstrips performance. Statement #6 discussed above introduced the idea of transferring fisheries management to regional boards that combined “scientific” and “traditional and local knowledge”. Incorporating traditional and local knowledge can provide direct benefits in revealing connections not immediately apparent to fisheries science and broadening the scope of values, as suggested by *Q statement* #7:

(7) Aboriginal and local knowledge can reveal hidden human-ecological linkages and bring a fuller set of ecological, social, cultural and spiritual values into decision-making.

Statement #7 is designed to recognize the potential of traditional and local knowledge to contribute to knowledge of human interdependence with coasts and oceans and to broaden the scope of fisheries value. The core argument of this thesis is that emotional, physical and spiritual connection to the coast and ocean should have an equal voice with economic value in coastal decision-making. Put another way, that measurement and market value, have been the dominant voices in fisheries for far too long. When dealing with communities, it is unethical to disregard or discount aspects of their lived reality (Goulet 2007; Rose 2007).

B.8 Inclusivity of values

Inclusivity of interests, cultures and values is a key principle of democracy and is reflected in the ecosystem-based management literature and to an even greater extent in the statements of world religious leaders on how the ecological crisis impacts ‘nature’ as well as the human poor with which they were previously preoccupied. Ecosystem-based management must also provide for consideration of values that emerge from the interaction of people, species, lands and waters, as opposed to focusing management on one objective (Gaydos *et al.* 2008).

Ecosystem services represent a significant extension of ecological value by exploring the many ways in which ecosystem structure (natural capital) and function support human life, work, leisure and general well-being. As noted in s. 2.7.1, ecosystem services include spiritual values as a sub-sub category. *Q statements* 1 and 19 are designed to suggest that the ecosystem services approach is sufficient:

(1) An ecosystem services approach can reflect the full range of human values without recourse to spiritual, religious or mystical ‘dimensions’.

(19) The notion that relationships between people, other species, lands and waters are ‘greater than the sum of their parts’ has no useful meaning in coastal and ocean management.

The understanding of ecosystem services that the value of ‘nature’ is captured by its value to humans is reinforced by *Q statement* #3 which rejects the notion of intrinsic value:

(3) Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.

#3 is designed to capture the utilitarian perspective that is integral to a neoclassical economic view that emphasizes economic efficiency, as in statements #5 and 11:

5. “Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.”

11. “The self-interest and private business of different stakeholders are the most powerful and effective forces in bettering coast and ocean management.”

Statements 3 and 11 are borrowed with minor edits from the ecological values study of Shilin *et al.* (2003). Statement #5 captures the business perspective that private interests as opposed to fishing communities or the public can best ensure the sustainability of fish populations. The pragmatic economic view, also consistent with faith in science, is captured in *Q statement* #15:

(15) We have sufficient knowledge to achieve sustainable and fair management. The only thing lacking is sufficient investment in monitoring, control and surveillance.

B.9 Principles of the gift paradigm

Principles of the gift paradigm frequently link emotions to action. The emotions of awe, wonder, fascination and reverence are recognized by scientists as motivation for their actions, but do not form part of the discourse of ecosystem-based management. The key principles are gratitude, restraint in personal consumption and generosity in sharing the gifts of God/Creator/nature with others, particularly the less fortunate. The gift paradigm expresses a bond, covenant or stewardship relationship between people and ‘nature’, although Aboriginal understandings of covenant describe the relationship of caring as originating with older, wiser and ecologically

fitter plants and animals, vs religious understandings where superior humans are charged with care of the rest of creation. A comprehensive set of principles of the gift paradigm would be far too long, unfamiliar and unwieldy for an online survey. Instead, *Q statements* have been devised that express the acceptability of expanding the framework of coast and ocean management to include such values and those who speak for them.

Explicit inclusion of ‘ethical’, ‘moral’, spiritual and religious dimensions in the policy framework for coast and ocean management is captured by Statements #16 and #17:

(16) Coast and ocean management needs spiritual and religious leaders to include the immeasurable values of love, compassion, gratitude and generosity.

(17) The ethical and moral issues of overfishing, salmon farming, oil and gas etc., can only be addressed by opening policy and implementation to spiritual and religious experts.

Read along with Statement #21 on the inclusion of artists, these statements should provide the context and support for an adequate reflection on all the values in play.

Statement #2 encapsulates the idea of values and relationships that emerge from the conversation between people, biota, lands and waters introduced in Chapter 1 and Figure 1.1. The terms “*places of beauty, contemplation, mystery and belonging*” in #2 also test the idea of the ‘secular sacred’ or ‘spiritual connection’ to nature discussed for statement #21. Statement #2 suggests that ecosystem services cannot capture emergent properties:

(2) The qualities of coasts and oceans as places of beauty, contemplation, mystery and belonging cannot be captured by adding lists of ecosystem services.

B.10 Statements on threat and the precautionary principle

Statement #9 uses the principle of adjacency and the current debate on transport of oil as a test of support for the precautionary principle:

(9) Oil pipelines and tankers threaten the environmental legacy of all Canadians. They should not go ahead until Aboriginal and coastal communities are satisfied of their safety.

Q statements #s13 and 14 summarize arguments for and against salmon farming and, with #9, were included to provide a sense of relevance in a set of statements which might otherwise seem hopelessly detached from current issues:

(13) The year-round availability of farmed salmon relieves fishing pressure on wild salmon, and creates jobs and spinoff industries that revitalize coastal communities. It should be encouraged.

(14) Salmon farms threaten wild salmon vital to forests, fisheries, tourism and Aboriginal people, divert protein from poor countries and burn fuel to catch, process and distribute feed. They cannot be justified.

Appendix C Informed consent process

This appendix presents the introductory letter and figures illustrating the informed consent process and project procedures.

C.1 Initial contact letter

Dear _____:

As someone familiar and engaged with the BC coast and ocean, you are cordially invited to participate in an online PhD research project on principles and values. The **scope** is the entire range of human activity from contemplation to ecotourism to fisheries and supertankers.

Study procedures: You will be asked to rank 21 statements of principles and values drawn from a wide range of local, regional and international sources. The statements therefore represent sincere, but very different beliefs on the values that can best contribute to long-term sustainability. The topic is vast, so you may well find the list incomplete in both concepts and language. Your participation and comments on what is missing can help to suggest a more complete set of principles, values and expertise. **Time:** 20-40 minutes. **Turnaround:** Return is requested by April 17.

To proceed:

Please copy the following access code: (5 or 6 digit code) Log on to the Survey Website (Password required for *second* screen)

Thank you for your consideration.

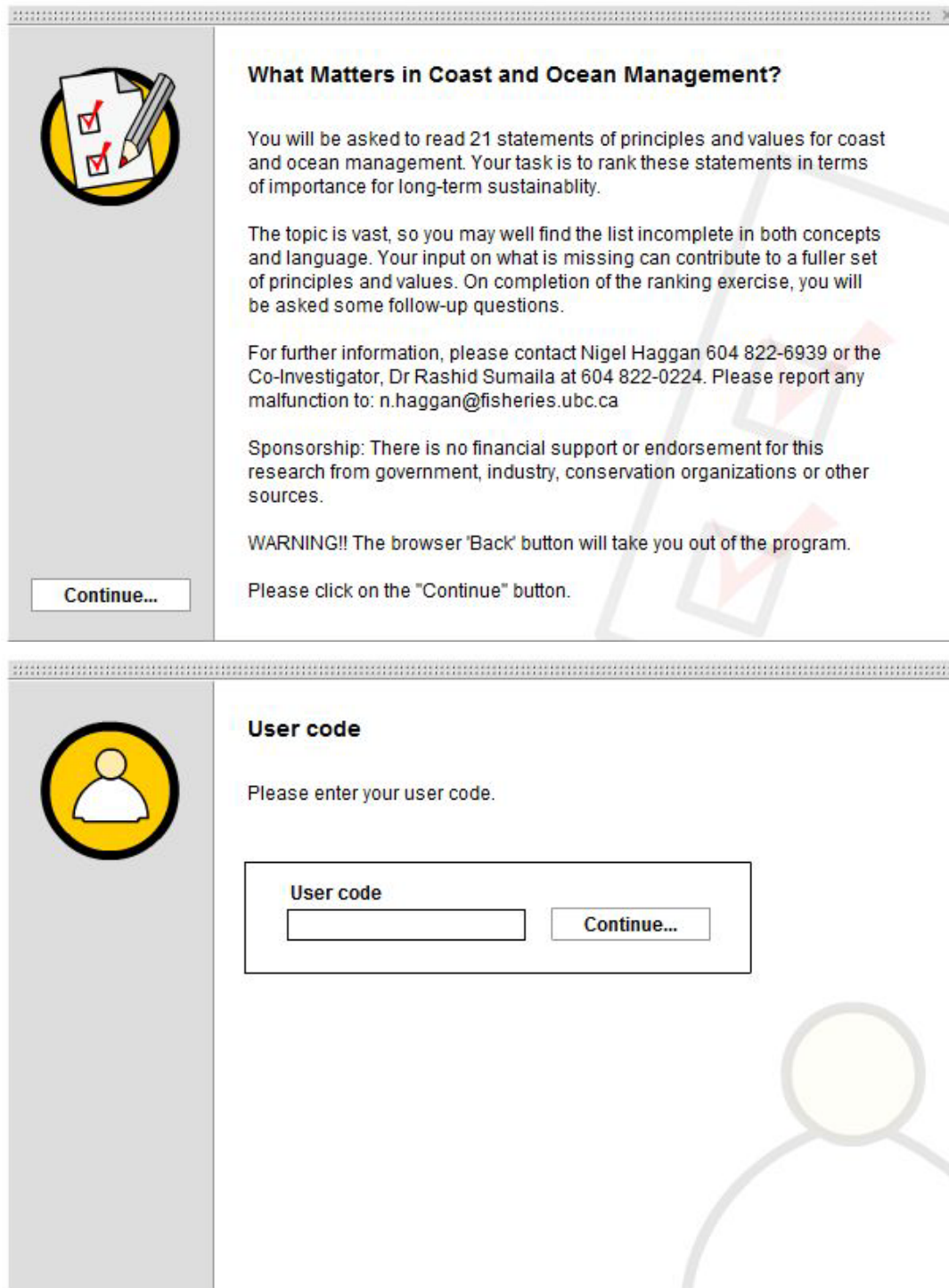
Nigel Haggan

--

Nigel Haggan

PhD Candidate, UBC Interdisciplinary Studies
UBC Fisheries Centre
#341-2202 Main Mall
Vancouver, BC. V6T 1Z2
Tel: (604) 822-6939
<http://www.fisheries.ubc.ca/students/nigel-haggan>

Figure C.1 Screenshot of Introduction and Login screens for FlashQ



What Matters in Coast and Ocean Management?

You will be asked to read 21 statements of principles and values for coast and ocean management. Your task is to rank these statements in terms of importance for long-term sustainability.

The topic is vast, so you may well find the list incomplete in both concepts and language. Your input on what is missing can contribute to a fuller set of principles and values. On completion of the ranking exercise, you will be asked some follow-up questions.

For further information, please contact Nigel Haggan 604 822-6939 or the Co-Investigator, Dr Rashid Sumaila at 604 822-0224. Please report any malfunction to: n.haggan@fisheries.ubc.ca

Sponsorship: There is no financial support or endorsement for this research from government, industry, conservation organizations or other sources.

WARNING!! The browser 'Back' button will take you out of the program.

Please click on the "Continue" button.

Continue...

User code

Please enter your user code.

User code

Continue...

Figure C.1 Introductory screens for Q survey. Top explains what is required. Bottom panel allows for personal user code.

Figure C.2 Screenshot of Informed consent and Instructions for rough sort in FlashQ

Informed Consent

Your participation is entirely voluntary. You will not be identified by name and may withdraw at any time. Submission of the data on completion confirms your consent to participate.

Personal and social benefits: There is no financial compensation or benefit to you other than the opportunity to give your considered opinion on the values and principles that you will believe will contribute to the sustainability of BC's coasts and ocean. Your participation in this research project is acknowledged and appreciated.

If you have any concerns about your treatment or rights, please contact the UBC Office of Research Services at 604 822-8598 or e-mail to ORSIL@ors.ubc.ca.

To learn more about this research technique (Q Methodology), you can access: www.qmethod.org/about.php.

Please maximize your browser window ("View Fullscreen" in PC, "Tools" & "Zoom" for Mac) and click on "Continue" to start the survey.

Continue...

Step 1 - Rough Sort

Statements of principle and value for coast and ocean management will appear individually on the following page.

Please consider each one carefully, then use the mouse to drag into three columns:

- "LEAST APPROPRIATE"
- "APPROPRIATE", and
- "MOST APPROPRIATE"

To return to this instruction, press the "Help" button at the bottom right corner of the next screen.

REMINDER!! Do not use the the browser 'Back' button

Continue...


Figure C.2 Top: Informed consent information. Note option to withdraw at any time. **Bottom:** Instructions for rough sort.

Figure C.3 Screenshots of Rough sort (Top) and Detailed Sort (Bottom) in FlashQ.

(5) Fisheries should be conducted in the most economically and technologically efficient manner even if this impacts small communities.

4/21

LEAST APPROPRIATE (#1)	APPROPRIATE (#2)	MOST APPROPRIATE (#3)
<div style="border: 1px solid black; background-color: #ffe6e6; padding: 5px; margin-bottom: 10px;"> <p>(3) Natural diversity is valuable as a resource for us; it is nonsense to talk about value except as value for humans.</p> </div>	<div style="border: 1px solid black; background-color: #e6e6ff; padding: 5px; margin-bottom: 10px;"> <p>(4) Aboriginal and local fishing communities should have secure access to traditional grounds and sufficient variety of species for economic, cultural and spiritual needs.</p> </div>	<div style="border: 1px solid black; background-color: #e6ffe6; padding: 5px; margin-bottom: 10px;"> <p>(19) The notion that relationships between people, other species, lands and waters are 'greater than the sum of their parts' has no useful meaning in coastal and ocean management.</p> </div>



Step 2 - Detailed Sort

Use the scroll bar to read your "LEAST APPROPRIATE" statements again. Drag the statement you most disagree with into the "1" box on the far left.

Tip: you can "park" several statements outside the scorecard.

Now read the "MOST APPROPRIATE" statements again and drag the statement you feel to be most appropriate into the "7" box on the far right.

Continue to alternate between left and right columns until all statements have been assigned.

Finally, drag the "APPROPRIATE" statements into the remaining open boxes.

Note on terminology: 'Ecosystem services' signifies the ways in which 'structures' like forests and reefs and 'functions' such as weather, ocean currents, soil formation and water purification contribute to human society.

Continue...

Figure C.3 Top: Rough sort screen. Note random numbering. Bottom, instructions for detailed sort.

LEAST APPROPRIATE			MOST APPROPRIATE			
1	2	3	4	5	6	7
(3) Natural diversity is valuable as a resource for us; it is nonsense to...						(19) The notion that relationships between people, other species, lands and waters...
				(12) We need an aggressive preschool to college 'ocean literacy' program...		
				(6) Fisheries allocation and management should be transferred to...		
(18) The most compelling argument for conservation is preservation of...						

Figure C.4 Top: Partially completed scorecard showing statement ‘parked’ for consideration. Bottom: request for comments on choice of “Most and “Least Appropriate” statement.

Figure C.5 Screenshots of Comments on most and least appropriate statements in FlashQ (Top) and Final submission form in FlashQ.

The figure consists of two main parts. The top part shows two comment sections. The first section, titled "MOST APPROPRIATE (7)" in a green header, contains a statement: "(19) The notion that relationships between people, other species, lands and..." followed by a large text input box. The second section, titled "Least Appropriate (1)" in a pink header, contains a statement: "(3) Natural diversity is valuable as a resource for us; it is nonsense to..." followed by another large text input box. Below these is a "Continue..." button. The bottom part is a "Submit Data" form. It features a logo on the left: a yellow circle with a pencil and the letters "www". The text "Submit Data" is at the top, followed by the instruction "You've finished the survey. Please submit your data now." and a "Submit data" button. At the bottom of the form, there is a faint, stylized graphic of a hand pointing upwards.

Figure C.5 Top: Space for comments. **Bottom:** submission of data completes informed consent.