

Research audit of social sciences fisheries research

Dr Beverley Clarke

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Australian Government

**Fisheries Research and
Development Corporation**

FINAL REPORT



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1. Non Technical Summary

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OBJECTIVES:

1. To improve understanding, by way of a research audit, about the research that has been conducted into the social aspects of NRM with regard to fishing and aquaculture industries.
2. To assist in the development of targeted future research effort.

1. Non Technical Summary

OUTCOMES ACHIEVED

A range of potential areas of research, research questions and methodologies have been identified that will benefit targeted investment into social research into fisheries and aquaculture in the future. The benefits of this will be more successful and holistic fisheries management and policy development.

The Social Research Coordination Program (SSRCP) called for an audit of research that has been undertaken in Australia between 1995 to present in the social sciences domain of NRM, with a focus on fisheries.

The audit was framed around five statements proposed by the SSRCP. Themes covered integrated decision making, social carrying capacity, adoption of innovations and new technologies, adaptation, role of social values in fisheries management and policies, and social aspects specific fishing industries.

A literature search was conducted using a wide variety of databases and data sets. The references were collected, annotated and stored in Endnote (bibliographic data storage and retrieval software).

The references were sorted and synthesised according to the five themes and research questions identified by individual papers and reports were collated. These findings were analysed and research gaps identified. Both the research questions and suggestions of prior studies and identification of gaps will assist in the development of targeted research effort in the future.

KEYWORDS: Fisheries, social science, NRM, literature audit.

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Fisheries Research and Development Corporation
Flinders University
Flinders Partners
Rural Solutions SA

2. Background

This project set out by way of an Australia-wide research audit to improve understanding around the social aspects of the fishing and aquaculture industry within Natural Resource Management (NRM). The project aim was to assist in the development of targeted future research effort. A number of key issues and research areas have been identified by the Social Sciences Research Coordination Program (SSRCP) within the FRDC and this project has aligned itself with these existing initiatives.

The key themes as proposed by FRDC and used to frame the audit are as follows:

1. Integrated decision making (integration of both the economic realities and social values in the context of ecological drivers to provide a triple bottom line basis for management decisions)
2. Social carrying capacity (capacity of civil society to accept and incorporate greater levels of fishery activity - both aquaculture and wild-catch. How is this assessed and can it be increased?)
3. Adoption and Adaptation identification and support of the ability to adapt to new circumstances and adopt innovations, technologies, business frameworks.
4. Identifying and translating social values: identifying and articulating the social values and impacts around fishing and interpreting these in the context of fisheries management and policy.
5. Industry characteristics: characteristics of both sectors of the industry and the supporting regional communities are articulated and explored for strengths and weaknesses.

2.1 Need

The need for this project was identified by the SSRCP within the FRDC. The SSRCP called for 'an audit of research that has been undertaken to date in the social sciences domain of NRM'. (Australian Government FRDC Call for Expression of Interest).

3. Objectives

The aim of this audit was first to produce a product that would draw on research completed in Australia in the last fifteen years (since 1995) that identified research potential, but which perhaps remained latent, and second, on the basis of deduction, identify additional and new directions for needed research. The objectives of this project were to:

1. Improve understanding, by way of an Australia-wide research audit, about what research has been conducted into the social aspects of NRM with regard to fishing and aquaculture industries.
2. Assist in the development of targeted future research effort.

4. Methods

The project sought Australian research literature across commercial, recreational and indigenous sectors. It included an exploration into the array of various possible interests and considerations within the industry incorporating individual, business, groups and sectors and research that considered perspectives of fishers, managers, general public, researchers, and special interest groups. More specifically, it sought research that has focussed to date on the following key issues: community perceptions and attitudes (social impact assessments, research exploring social barriers to the uptake of new innovations, resistance to industry developments, knowledge transfer); human capital (capacity to adapt); and indigenous cultural and social practices.

An intensive Australia-wide literature audit was undertaken between December 2009 and February 2010. Through an interpretation of the five key themes above a list of key words was generated by the principal investigator and two research assistants from Rural Solutions. The key words were approved by the Social Science Research Coordination Program (SSRCP) and the key word search list is provided in Appendix 2. Applying the key words, the research assistants sought government, academic, NGO and industry publications and reports. Academic papers were sought using online databases; Australian and State Government fisheries and environment agencies publications were accessed through a range of web addresses. Current and past FRDC social science research projects were also scrutinised for their appropriateness and publications/significant findings were included in the audit accordingly. A bibliographic data

storage and manipulation program, EndNote, has been utilised to manage and sort the collection.

The abstracts from journal articles and paraphrased executive summaries form the basis of the annotations collected by the researchers. A second pass through the references by the principle investigator was carried out to sort the collection according to the five main audit areas; this served as a useful checking procedure. Some items collected in the first trawl by research assistants were culled during the second pass because on closer inspection some collected items did not truly fit the themes of the audit. The collection was subsequently synthesised by theme. A third pass, on writing the synthesis, allowed for further detailed consideration of the content of each reference and provided an opportunity for further refining of the data set. Appendix 4 lists references culled from the original collection. An assessment of the content and coverage of items collected was undertaken. The results were used to prepare an inventory of suggested future research. Potential future areas for research were constructed by noting the suggestions made in previously completed reports and projects, and by identifying gaps in the existing body of work that suggested potential new avenues for research direction.

5. Results/Discussion - Synthesis of literature

In total, 163 items were included in the literature audit. Table 5.1 shows that research effort into social science aspects of fisheries can be seen to grow considerably over time from 19 items between 1995 and 1999, to 87 items between 2005 and 2009. There has also been a wide geographical spread of research effort around Australia. Almost one third of the items comprise research of national coverage. Of all the states Queensland has received the greatest attention; it should be noted that one third of the focus of Queensland-based research was focussed upon the Great Barrier Reef.

Among the one-off studies there are three key series represented in the audit collection. The first series includes the reports produced for the regional marine planning processes (the south-east, south-west, and northern regional planning); these studies cover the communities that are spread along great lengths of the Australian coast. The second series includes the array of studies that investigated community perceptions of aquaculture. Finally a series of reports and articles were written about the ESD reporting framework.

The nature of research in this collection is primarily empirically based or applied, with much lesser attention devoted to conceptual or theoretical studies. Just over one-third of publications were produced or sponsored by government agencies. Many government agencies have been involved, the majority have been federal (a large portion of these are FRDC sponsored research publications). Other agencies include AFFA (and its other guises: DAFF and AFMA); Bureau of Rural Sciences; Environment (too in its various assemblages e.g. with Water, Heritage and the Arts, with Water Resources etc.); Primary Industry and Energy; National Oceans Office and most recently Department of Climate Change. Just over one fifth of the collection includes frameworks, toolkits or guides for researching the social aspect of fisheries. Almost one fifth of the collection is devoted to better understanding indigenous engagement in fisheries management.

The remainder of this chapter provides a discussion around the five audit themes.

Table 5.1 Overview of the audit collection (total n=163)

Number of items published	
1995-1999	19
2000-2004	57
2005-2009	87
2010	1
Geographical spread	
National	47
Queensland	28
New South Wales	17
Tasmania	14
South Australia	11
Victoria	10
Western Australia	7
Northern Territory	4
'Southern Australia'	1
'Southeast Australia'	3
'Eastern Australia'	1
'Northern Australia'	5
Marine planning regions	
East marine planning region	4
Northern marine region	4
South east marine region	4
South west marine region	1
Research design	
Conceptual (theory and model making)	9
Empirical (case studies, focus groups, qualitative and quantitative surveys)	68
Applied (evaluation, risk assessment, models)	29
Applications	
Frameworks/toolkits/guides	24
Models	14
Indigenous focus	29
Agency research or agency supported research	56

5.1 Integrated decision making (integration of both the economic realities and social values in the context of ecological drivers to provide a triple bottom line basis for management decisions)

Twenty seven items identified in the audit corresponded to the theme of 'integrated decision making'. These items comprise a mix of policy documents and journal articles and range from broad policy perspectives to case-based studies. Very few of the studies/reports match the exact concept identified in the theme heading. Indeed there is no use of the term 'triple bottom line' in any of the studies. However, the intent of the papers included in the audit address attempts by industry and government either to meet or evaluate the combination of environmental, social and economic considerations in decision making.

The literature sourced for this section show some time delimited features. Papers written in the late 1990s centre their discussions upon the recognised problem of fragmentation of decision making and the lack of integration of sectors (aquaculture features prominently) and government legislation and policy. For example around this time the Commonwealth was heavily engaged in developing its oceans policy (Claridge & Claridge 1997; Sainsbury et al 1997) and there was a general push for more integrated approaches to management. These earlier papers commonly reference the need for programs and policies to abide by sustainable development principles and call for moves away from sectoral based management to more collaborative styles. Some of these papers propose new frameworks or new models of management (Anutha & Johnson 1996; Brown & Spink 1997). Others evaluate existing programs against sustainability principles (Carvalho & Clarke 1998; Clarke 1996; Edyvane 1999). Waitt and Hartig (2000) explore the degree of success of sustainable fishery management through the use of ITQs in the South-East fishery and Bradshaw and Wood (2003) undertake a similar assessment for a Tasmanian fishery.

There is a clear shift in the focus of later studies indicating that the call for sustainable practice has been widely accepted and that there have been moves to act to address it. The papers and reports post 2003 tend to either be broad scale reflections of practice (New South Wales Fisheries 2002; Scandol et al 2005; Young 1999), blueprints for future practice (National Aquaculture Development Committee 2002), policy development (Australian Government 2008; Commonwealth Department of Agriculture Fisheries and Forestry Australia 2003) or, specific place-based case studies (Moore et al 2007). Common themes suggest that despite the

acceptance of the need to marry economic, social and environmental goals there are considerable ongoing challenges. Successfully meeting triple bottom line outcomes are reported to be difficult to achieve in practice. Common difficulties in achieving sustainability outcomes included a direct clash of interests (e.g. differences between MPA and fisheries management goals (Baelde 2005), or the changed role of state agency in relation to private interests, specifically regarding the implementation of ITQs (Bradshaw 2004). A lack of coordination and communication between different stakeholder groups is an additional challenge often cited.

One author in particular closely addresses the parameters of Theme 1. The work of Fletcher around ESD indicators and reporting is represented through a series of papers (Fletcher 2005; Fletcher 2006; Fletcher et al 2002a; Fletcher et al 2002b; Fletcher et al 2005). This work builds from conceptual pieces that explain the design and development of an ESD reporting framework through to implementation.

A few papers present examples of multi-stakeholder planning success. Williams et al (2009) report on the success of a planning project that did manage to build 'strong relationships' between rival stakeholders. The National Oceans Office (2004b) prepared a scoping document to ensure marine planning for the Northern region was sustainable for the long term. Scandol et al (2005) claim that progress towards sustainable fisheries has been made by using environmental impact assessment to drive ecosystem-based fisheries management in Australia. Mapstone et al (2008) worked closely with a diverse stakeholder group in a Queensland fishery to reach agreed goals for conservation, commercial and recreational harvest.

Other place-based case studies assess sustainability of fisheries. A study of an indigenous community in Torres Strait (Kwan et al 2006) explored the economic, social and environmental parameters that influenced hunting activity and the analysis served to inform management strategies.

References for Theme 1

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5.2 Social carrying capacity (capacity of civil society to accept and incorporate greater levels of fishery activity - both aquaculture and wild-catch. How is this assessed and can it be increased?)

The literature search failed to generate papers that directly addressed Theme Two. Acceptance of civil society to accept greater levels of fishery activity has not been a focus of research. Three papers were accessed that have a rough correlation to the intent of this theme and are included here to provide an example of the kind of studies being undertaken to promote the increase of seafood consumption rather than to achieve acceptance of greater activity. Ham (2001) is a promotional guide for industry, providing advice for the sector as to how to improve the image and raise the profile of the seafood industry. McManus et al (2007) undertook a Perth-based study on seafood consumption in children and explored mechanisms for increasing consumption patterns. The final paper (Queensland Seafood Marketers Association 2008) is an example of the Queensland prawn industry using marketing (product branding) to improve the appeal of the prawn product. Papers by Mazur and colleagues that explored community perceptions about aquaculture have been placed in Theme 4, as they do not specifically address increased levels of fishery activity – although it is recognised that intended growth may be an implicit reason for industry to need community acceptance.

References for Theme 2

- Ham, J. 2001, *Community communication guide strategies for positive action*, Fisheries Research and Development Corporation (FRDC), Canberra.
- McManus, A., Burns, Howat, P., L, C. & Fielder 2007, 'Factors Influencing the consumption of seafood among young children in Perth: A qualitative study', *BioMed Central (BCM) Public Health*, vol. no. 7, pp. 119-125.
- Queensland Seafood Marketers Association 2008, *Establish the acceptability of the Queensland Endeavour prawn as a product of choice in the Queensland domestic market - Final Report*, Project 2007/247, Fisheries Research and Development Corporation (FRDC), Canberra.

5.3 Adoption and Adaptation identification and support of the ability to adapt to new circumstances and adopt innovations, technologies, business frameworks.

Theme Three spans a number of different topics: adoption – or uptake of innovations (including new technologies and/or business strategies) and adaptation to changed circumstances (this includes research that is anticipatory as well as examples and practice of adaptation). Fifty eight papers and reports found in the literature search meet these parameters. Several sub-themes became evident including overarching ‘big thinking’ frameworks down to localised and specific case-based studies and as such items range from national reports to localised examples. Sub-themes included in the following discussion include frameworks, governance and strategic policy that support the ability to adapt; and the use of tools and instruments that support adaptation and adoption of new practices.

5.3.1 Frameworks to support the ability to adapt to new circumstances

Some reports and papers in this third theme introduce broad conceptual frameworks for addressing big adaptation issues or tasks. Chesson et al (1999) for the Bureau of Rural Sciences, evaluate the uptake of ESD principles among Australian Commonwealth fisheries. They assess the extent to which fisheries have adopted these principles. The final example of adaptation is a report that sets a national framework to support and guide future action needed to respond to climate change. While the Commonwealth of Australia (2009) climate change report does not focus specifically on fisheries, part of its ambit includes the fishing industry.

5.3.2 Governance, Strategic Policies and strategies

Several papers identified in the literature review relate to how government or administration can offer support to communities/sectors through appropriate strategic direction and policy making. In this section the cover of literature includes a) proposals intended to respond to change in the near future or b) reviews of efforts and actions that have been implemented in response to changed circumstances.

5.3.2 a) Governance

Lebel et al's (2006) international study (using the Great Barrier Reef as one of their case studies) explores how institutions, actors, and social processes shape the politics of managing resilience and vulnerability. They use examples of increasing participation and improved governance to make their case. McIlgorm et al (2010), addressing climate change, document

the necessity of fisheries governance to be able to address uncertainty in natural systems and governance frameworks. Grafton et al (2007) developed a benchmarking framework to improve fisheries governance. Two papers address the concept of adapting to new circumstances from a legislative perspective. Mason and Gullet (2006) explore the management of non-compliance (as stated in the Fisheries Management Act 1991) and the implications of replacing existing cancellation of fishing concessions for a financial penalty. Lugten (2000) explores how conflicting parties successfully negotiated an altered fisheries management regime in Tasmania (TAC and quota allocations) and suggests that modelling cooperation as espoused in the UN Charter for Law of the Sea Convention is a realistic option for conserving and managing world marine capture fisheries. Nursey-Bray (2005), Nursey-Bray & Rist (2009) and Palmer (2004a) examine the increasing role of indigenous communities in NRM. Their papers reflect considerable research effort towards a better understanding of indigenous perspectives of NRM. Nursey-Bray (2005) urges for 'broker engagement processes' to better understand local governance and improved co management. Stacey (2001) examines the success of an MoU between Indonesia and Australia that recognises the indigenous fishing rights of the Indonesian Bajo people.

5.3.2 b) Strategic Policies and strategies

Two national reports introduce strategic policies or business frameworks to increase and improve aquaculture production (Australian Aquaculture Industry 2007; Lee & Nel 2001); the first industry report seeks federal government support to improve profitability and grow business, especially in terms of industry capacity and increased understanding of socio-economic aspects of markets. The second, Lee & Nel's 2001, Commonwealth (AFFA), report promotes acceleration of engagement in aquaculture by indigenous communities and produces an implementation strategy. Evans and Johnstone's review (2006) urged for a strategy-based approach to improve 'people development' in the Australian fishing industry.

Pitts' analysis (2007) of marine planning frameworks in Australia presents recommendations for uptake of best practice planning for sustainable resource use. Three papers examine resource management schemes moderated by policy instruments. The first by Minnegal and Dwyer (2008b) analyses the process and outcomes of a buyback of commercial fishing concessions across Australian Commonwealth managed fisheries through 2006. The second by Momtaz and Gladstone (2008) examines the impact of fishing bans on commercial fishers in New South

Wales and suggests improved consultation practice. Last, Kearney (2001) explores the concept of property rights in fisheries resource allocation in relation to conflict between commercial and recreational fisheries. Three studies explain the approach to developing indigenous fishing strategies recognising the interests of Aboriginal people in protection and use of fisheries resources and reporting on the development of the strategy implementation process: Franklyn (2003) and Fraser (2004) have produced reports about the introduction of the WA Aboriginal Fishing Strategy, and the New South Wales Government (2002) recounts the development of their indigenous fisheries plan. Fisheries Victoria (2008) have purposefully developed a long term sustainability strategy for fisheries and aquaculture to adapt to climate change.

5.3.3 Tools/Models/Techniques

A number of items in Theme Three are distinguished by their application of various tools, models or techniques to illustrate either a) the effort that has been undertaken directly by fisheries communities and marine planners to innovate or adapt or, b) research that explores how communities may be influenced to adapt and adopt. The different tools used to explain progress in fisheries management and to better understand/accommodate/support stakeholders include the use of zoning; production of instructive print information (handbooks/toolkits or guides); Environmental Management Systems (EMS) and risk assessment. Fuary's evaluation (2009) of previous and current methods and models for researching Indigenous resource use and purposes, based on the Wet Tropics, offers best practice guidance on how to engage indigenous communities.

5.3.3 a) Zoning

The Day (2002) and Fernandez et al (2005) papers explain the benefits of engaging the interested public in zoning decisions for the Great Barrier Reef multiple-use park while Lynch et al's New South Wales study (2004) explored conflicting attitudes of user groups to better understand their relative positions. This was used to develop appropriate sanctuary zones which, it was argued, would in turn improve environmental protection.

5.3.3 b) Instructive print information (maps, report cards, handbooks)

The audit turned up a number of references that discuss 'instructive documents' which, although they vary greatly in style and topic content, offer examples of tools designed to support the adoption of innovation. Brooks et al's (2001) report and Larcombe et al's (2002; 2006) fishing atlases give comprehensive accounts of where fishing occurs – commercial, recreational and

indigenous, and have proven to be well utilised resources for marine planning and understanding of the social components of fishing communities. Schirmer and Casey (2005) produced a handbook to guide the assessment of community wellbeing where people are reliant on fisheries for their livelihood. The Social Sciences Program of the Bureau of Rural Sciences (2005) produced a socio-economic impact assessment toolkit to evaluate displaced fishery effort post implementation of marine protected areas. Ham's (2003) community communication guide provides advice for the seafood industry to achieve improved community perception of the industry. The NCARF Report card (Poloczanska et al 2009) is a highly condensed summary of climate change knowledge gaps and offers a 'first benchmark of climate change impacts on marine ecosystems and options for adaptation', suggesting broad insights for needed research, again not directly but rather implicitly related to fisheries.

5.3.3 c) Environmental Management Systems (EMS)

Four items address the use of Environmental Management Systems (Casement & Rural Solutions SA and Seafood Services Australia 2006; Lawrence & Hewitt 2004; Seafood Services Australia 2006; Seafood Services Australia Ltd & Ocean Watch Australia 2005) and emphasise the benefit of its application in fisheries management towards improved business frameworks. The Seafood Services papers are promotional pieces espousing the benefits of EMS while Casement (funded by Seafood Services Australia's 'EMS Pathways for the seafood industry project') and Lawrence and Hewitt (using New South Wales commercial estuary fishers and oyster farmers) report on research projects designed to explore how to encourage the uptake of EMS. Smith's work (1999) commenting on the usefulness of Management Strategy Evaluation (MSE) by AFMA is a further example of a related management tool designed to assist in the administration of highly complex and multiple-stakeholder industries.

5.3.3 d) Risk Assessment

Astles et al (2006), Carey (2007), and Crawford (2003) promote the adoption of risk assessment protocols toward the development of robust management plans and strategies. Each affirms the capacity of risk assessment to handle complex data, improve transparency of programs and to include multiple stakeholder perspectives. McPhee et al (2007) present the findings of their risk assessment for the proposed rezoning of Moreton Bay Marine Park. Minnegal and Dwyer (2008a) set out to understand the factors behind the risk management success of the locally-

owned Lakes Entrance fishing fleet on the basis the lessons may be transferred to other fisheries.

5.3.3 e) Modelling

Some modelling papers provided robust theoretical considerations for understanding social change and resilience. Fenton and Marshall (2000, 2001) and Fenton et al (2003) use a Town Resource Cluster Analysis (TRC) framework to provide a conceptual basis for understanding social impacts of changes to resource dependent fishing communities. Marshall (2007a) and Marshall et al (2007) applied social resilience models for resource dependent users in Queensland. They argue their approach can be used to identify vulnerability to institutional change. Pierce (2008) uses a 'community capitals' approach to explain how the aquaculture oyster industry in Cowell, South Australia is adapting to external forces and uses this method to measure how well the community is coping with change. Linder et al (2006) developed a dynamic model to measure changes in marginal net benefits between commercial and recreational fishers by relating the benefits to changes in significant socio-economic variables.

Modelling was also used in empirically based studies. Davis and Tisdell's (2000) review of the impacts of divers in MPAs suggests a model to explore the relationship between SCUBA diver density (as measured by the number of individual dives) and threshold stress level to the MPA. Allen et al (2009) used modelling of a Murray Cod population to better understand catch effort and thus develop appropriate policy; better understanding of the fishery through modelling allowed for cogent explanation of the basis of policy to anglers.

5.3.3 f) Incentive instruments

Several papers, national and local, showcase how adoption of innovative mechanisms is encouraged by way of incentive instruments. Greiner et al's (2007) report discusses the potential of the application of a variety of instruments (economic, legal, managerial) to improve the health of Australia's oceans. Wilcox and Donlan (2007) discuss a bio-economic approach, 'compensatory mitigation' or a market influenced approach that builds relationships between conservationists and fishers. Woodhead et al (2000) use multi-stakeholder benchmarking to resolve management conflict around acid sulphate soils in New South Wales. Young et al's work (1996) explores the potential of incentive instruments to promote conservation biodiversity also in New South Wales. Illegal fishing has been identified as a problem that requires urgent

attention. Palmer's (2004b) review states that there are insufficient instruments to change the existing culture around illegal catch. Bose and Crees-Morris (2009) research into illegal fishing also concludes that enhanced enforcement capacity is required to manage fisheries compliance.

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5.4 Identifying and translating social values: identifying and articulating the social values and impacts around fishing and interpreting these in the context of fisheries management and policy.

The literature search revealed a considerable degree of activity (53 items) around the concepts of Theme Four. Understanding the different and often contrasting/conflicting social perspectives about fishing and fisheries has been a popular area of study. Formal assessments of social impacts of change too have generated major studies and comprehensive reports. Initiatives of the Commonwealth (like the regional marine planning process) can be seen to have triggered and sponsored major projects. Several sub-themes again emerged including broad studies that speak generally about the social importance of the fishing industry. Several papers provide detailed explorations of contrasting perspectives of fishing. There has been targeted research into understanding indigenous perspectives about fishing. Fourteen papers report on the outcomes of completed social impact assessments. Six papers identify the importance of including the fishery/industry perspective in designing research (in conjunction with government or academically driven research).

5.4.1 Understanding importance of social values

Zann (1995) and Beeton et al (2006) have produced broad spectrum, national scale reports that in part emphasise and describe the social value of the coast to Australians. Fisheries practice is recognised for social, cultural and commercial values.

5.4.2 Community Perceptions of Fishing

Aslin and Byron (2003) undertook a national survey of the public perception, attitude and knowledge of the fishing industry (commercial, recreational and traditional sectors). Aslin et al (2000) also researched the role of women in Australian fisheries. The federal government undertook a comprehensive evaluation of community perception of aquaculture in both South Australia and Victoria culminating in a series of reports (Mazur 2004; Mazur et al 2004a; Mazur et al 2004b; Mazur et al 2005; Mazur & Curtis 2006; and 2008). Pascoe et al (2009) explore preferences of stakeholders involved in Australian Commonwealth fisheries towards the development of management objectives. Minnegal et al (2003) and Minnegal and Dwyer (2008a) explored the perception of threats to the life-style of small-scale fishers in Victoria.

Some studies compared and contrasted perceptions of conflicting stakeholder groups. Kearney (2002) compared concerns of both commercial and recreational fishers regarding increasing fishing pressure in Victoria and contrasted these to actual fishing effort. Similarly, Tobin et al (2005) studied the perceptions and attitudes of both recreational and commercial fishers about the other. Priskin (2003) compares tourist perceptions of tourist impacts in the Central Coast Region of Western Australia; fishing impacts were considered as a discrete variable in the study.

5.4.3 Indigenous perspectives

An abundance of research (scoping studies, literature reviews and social surveys) has been undertaken as part of the implementation process of National Oceans policy in particular in relation to indigenous views and perspectives and uses of seas and coasts both for the Northern Regional Planning Area (Balkanu Cape York Development Corporation 2004; Memmott et al 2004; National Oceans Office 2004a; and b; Northern Land Council 2004) and the South-East Marine Region (National Oceans Office 2002a; and b). Initial studies were carried out by Dermot Smyth and Smyth and Bahrdt Consultants in Cultural Ecology (1997) and Sutherland (1996). In addition to the work supporting the policy directives of the federal government there have been numerous other efforts to better understand and find pathways to

co-management with indigenous people over marine resource use. The New South Wales Government in 2002 developed an indigenous fishing strategy to improve acceptance of indigenous perspectives surrounding traditional fishing practice in that state (New South Wales Government 2002). Nursey-Bray has produced numerous papers, a thesis, and book with Palmer documenting indigenous understandings and perspectives of indigenous hunting in northern Australia (Nursey-Bray 2006; Nursey-Bray 2008; Nursey-Bray 2009; Nursey-Bray & Palmer 2008). Morphy and Morphy (2009), Palmer (2004a) and Sharp (1998) explore the contrasts between indigenous communities conceptualisation of NRM, 'seas' and fisheries, to those of other western stakeholders. These papers explain that successful co-management outcomes are based on shared respect and understanding.

Consideration of the practices of other traditional groups was also found during the literature search. The Federation of Ethnic Communities' Councils of Australia (1997) undertook a study to better understand reasons for non-compliance among Indo-Chinese communities.

5.4.4 Social Impact Assessments

Numerous studies have assessed various impacts on fishing communities. Theme Three noted the handbook produced by Schirmer and Casey (2005), a guide to assessing community wellbeing, where people are reliant on fisheries for their livelihood. Schirmer has also produced a number of reports of empirical social assessments of specific fisheries: Schirmer et al (2004) use a socio-economic impact assessment to determine the effects on commercial fishers of a proposed cod grounds MPA in Commonwealth waters adjacent to New South Wales. Schirmer and Pickworth (2005a; and b) also undertook a social assessment of commercial fishing in the East Gippsland region. The implementation of marine protected areas is analysed by Taylor-Moore (2006) for the Great Barrier Reef Marine Park (Buxton et al 2006), and Stump and Kriwoken (2006) investigate the views of Tasmanian fishers in relation to the implementation of the Tasmanian marine protected area strategy. Other impact assessments were undertaken on the basis of a change in fishing management strategies (Huddleston 2006; Huddleston & Tonts 2007) such as amendment to quotas (Bradshaw et al 2001) or the introduction of ITQs (Aslin et al 2001; Dwyer et al 2008; Phillips et al 2002). Sutton's work (2007) on the GBR attempts to understand the potential socio-economic issues and information gaps surrounding deployment of artificial reefs. The paper outlines a strategy to guide decision-making and maximize the socio-economic value of artificial reefs.

5.4.5 Recognising local values in research and management

Seven papers argued for the need to include local knowledge into decision making and defining research and for recognition of the value of that (industry/recreational fisher) knowledge. Knuckley et al (2008) reported on the success of their initiative designed specifically to assist and include fishing industry representatives in the development of research and development proposals. Marshall (2007b) argues that understanding the way fishers perceive resource policies provides fisheries managers with the opportunity to refine policy design and delivery so as to better protect system resilience. Smith et al (2001) compare Australian stock assessment practice with international approaches and conclude that Australia is unique in including fishers in the process. Baelde (2001) focussing of the Australian South-Eastern trawl fishery was able to show that effective collaboration between scientists and fishers improved fisheries management and could assist in the targeting of research. Gartside et al (1999) used Northern New South Wales recreational fishing records to show that their data is valuable for tracing and understanding fishing trends; Grantham's thesis (2009) explored the value of locally derived data in the Lower Lakes and Coorong Region of South Australia to inform research direction and management practice; Jones et al's (2006) Queensland study of a coral reef fishery found that there were improved management outcomes when the views of industry partners were incorporated in the research process.

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5.5 Industry characteristics: characteristics of both sectors of the industry and the supporting regional communities are articulated and explored for strengths and weaknesses.

Twenty four items sourced for the literature search pertain to describing industry characteristics. Three sectors are discussed (commercial, recreational and indigenous). The majority of these references are reports or journal papers publishing the findings of empirical studies. Not all studies set out to make an assessment of positive or negative effects of particular fishing activity but rather made a direct effort to describe the socio-economic or demographic characteristics of fisheries either as national overviews or for specific locales. These studies have been included in this audit as they proclaim to be starting points, offering valuable baselines from which new research may emerge. Three key themes surfaced for this section: a) increased understanding of recreational fishing effort and, in several cases, how this intersects with commercial enterprises b) characterising and assessing indigenous fishing effort and again, in some cases, how traditional hunting overlaps and affects commercial fishing activity and c) analysis and assessment of the socio-economic condition of commercial fishing enterprises and their associated communities.

5.5.1 Recreational Fishing Effort

Twelve papers investigate characteristics and/or the nature of recreational fishing. McGlennon's (1995) early piece sets out, by way of a literature review, to provide an overview or synthesis of all previous research related to recreational fisheries in Australia. Later, a national survey jointly administered by federal and state governments, designed to provide a range of comparable and

consistent data about non-commercial fishing in Australia, culminated in two broad, descriptive pieces: Department of Primary Industries in New South Wales (2007) and Henry and Lyle (2003). There is now a comprehensive data base which serves as a useful baseline. Three discrete studies unearthed in this literature search compare catch effort of commercial fisheries with that of recreational anglers (Bucher 2006; Frisch et al 2008; Murray-Jones & Steffe 2000). Bucher's motivation was to find ways to reduce conflict between recreational and commercial fishers in New South Wales estuaries; Frisch et al (Great Barrier Reef, Queensland) and Murray-Jones and Steffe (Coorong, South Australia) were more focussed upon understanding the relative catch efforts for improved management solutions. In addition, Stoeckl et al's (2006) North-Queensland study, Stuart-Smith et al's (2008) Tasmanian study and Sutton's (2006) Queensland based study investigate the impacts of visitor activity on local communities and discuss the boost to local economies at the expense of depletion of fish stocks. Smith and Pollard (1996) use case studies of recreational fishing in New South Wales to better understand how their Fisheries' management strategies affect recreational fishers.

5.5.2 Characterising and assessing indigenous fishing effort

Eight papers describe and document indigenous fishing, characterising this effort. A literature review of indigenous interests in the East Marine Planning Region (C&R Consulting Pty Ltd. 2007) provided the Commonwealth with baseline information as part of its Marine Bioregional Planning process. Two papers seek to promote and identify industry specific issues (e.g. permit systems) with a view to encouraging indigenous engagement (Commonwealth of Australia 2004; Tedesco & Szakiel 2006). The Carter (2008) and Carter and Hill (2007) papers describe an initiative designed to involve indigenous people in a commercial fishing enterprise and reflect upon why the enterprise didn't work. Williams et al's (2008) work is concerned with the conflict between the commercial indigenous and non-commercial indigenous fisheries in Eastern Torres Strait. This work created a data set of catch effort by both sectors to assist with management of the fishery.

5.5.3 Analysis and assessment of the socio-economic situation of commercial enterprises and their associated communities

Herrer et al's (2004) study produced a national social profile of those employed in agriculture, fisheries and forestry. It allows for trend analysis and will inform discussion about the likely impacts from changing government policy or markets. Large scale initiatives such as the

Commonwealth's regional marine planning process and the Marine Atlas prompted studies into characteristics of specific local fishing communities. For example, Brooks et al's study (2001) of the Fishing Charter Boat operators in St Helens, Tasmania explored their connection and contribution to the local economy. Likewise, Gardner et al (2007) describe the main commercial marine users from Kangaroo Island in South Australia, to Shark Bay in Western Australia, as part of the planning for the South West Marine Region, and examine their socio-economic links with adjacent communities. Putt and Anderson (2007) and Putt and Nelson (2008) describe the findings of national assessments of fisheries related criminal activity. Dominion Consulting Pty Ltd's reports (Dominion Consulting Pty Ltd 2003; and 2005) are state based (New South Wales) studies. The first is an assessment of the impact of recreational fishing licences on angler expenditure and the second is an industry specific (abalone) study of the economic and social characteristics of the fishery towards improved strategic planning and management. Pickworth et al's study (2006) of the marine scale fishery in South Australia produced a detailed profile of the industry, including demographic and social considerations, such as quality of life of fishers.

6. Research Gaps

According to Aslin et al (2001: 86)

‘the sociology of Australian fisheries remains almost completely uncharted waters. There are many opportunities for social researchers working with other disciplinary specialists to develop new approaches and insights to inform future management decisions, and contribute to a better understanding of the ‘human dimensions’ of fisheries’.

Since Aslin et al wrote this statement considerable research effort has gone into better understanding the social aspects of fishing from a number of perspectives and over a range of contexts. Having said this it is also clear that research in many respects remains patchy.

There are spikes of activity around new policy directions set by the Commonwealth, most notably around marine planning and the implementation of marine protected areas, the Ocean’s Policy, and most recently through the work of the Department of Climate Change. The targeted areas of the National Climate Change Adaptation Facility (NCCARF) will also likely generate a new round of research activity, some of which will likely have direct relevance for fisheries. Similarly in some states implementation of specific fishing strategies has also generated reports and research papers.

The next section provides a discussion of research gaps related to the five themes of the audit and the potential for new research to leverage past findings.

6.1 Integrated decision making (integration of both the economic realities and social values in the context of ecological drivers to provide a triple bottom line basis for management decisions)

The difficulties of meeting triple bottom line outcomes encountered by previous research suggest this is an area for continued investigation and closer inspection. Conflict of interest between sectors (e.g. between commercial and recreational fishing, or MPA development and fishing) while recognised is not yet well managed. Very few studies have provided practical solutions to reducing these tensions, while several identify ongoing problems and challenges. Fewer studies have produced evidence of a triple bottom line rationale for decision making. Studies to date tend to explore a combination of economy and environmental trade-offs, or economic and social interaction. As identified in the synthesis only two reports could be seen to have used an integrated framework for research that could translate to improved decision making.

One of these documents, the Australian Government's 'Co-management: Managing Australia's fisheries through partnership and delegation' (Australian Government 2008), is a 'How To' report; and is a valuable springboard for future research activity and should be consulted by researchers undertaking integrated, triple-bottom line focussed studies in the future.

6.2 Social carrying capacity (capacity of civil society to accept and incorporate greater levels of fishery activity - both aquaculture and wild-catch. How is this assessed and can it be increased?)

There is clearly room for research that explores social acceptance of increased fishing effort. Very little research has been directed at social preferences either for wildcatch or aquaculture. While considerable research effort has been undertaken about aquaculture, this spate of work sought perceptions related to the activity, but not specifically about increasing that activity. Lacking are demonstration projects that explain a methodology for determining social 'carrying capacity' as well as outcome-based case studies that show measures of acceptance. Having said this, the numerous studies by Mazur and colleagues around aquaculture can provide a basis for future research design in relation to consultation methods, understanding existing community perspectives of aquaculture and designing communication strategies. These methods could be considered also for investigating perceptions about wildcatch fisheries.

6.3 Adoption and Adaptation identification and support of the ability to adapt to new circumstances and adopt innovations, technologies, business frameworks.

A broad array of research has been undertaken to explore the affect of 'changed circumstances' e.g. changes in policy such as the introduction of ITQs or fishing bans. Similarly, changed governance through the introduction of protected areas or altered fishing rights have also been a focus of some research in some states (New South Wales, Tasmania, Queensland). The research effort appears to be rather piecemeal.

Many tools and technologies are showcased through the literature and serve to be taken up or applied in new settings. For example, EMS is promoted as a valuable means of improving business. Similarly risk assessment is encouraged for developing management plans. Lacking are generic fisheries specific guides on how to do EMS or risk assessment that include social considerations as part of their methodology.

The audit shows that work has only just begun which anticipates the impacts of climate change on fisheries; there will be a need for adaptation and adoption of changed practice. This is an

area likely to demand considerable attention in the near future. At the time of writing, Victoria was the only state to have produced a fisheries specific climate change strategy outlining ongoing research needs:

- To better understand the vulnerability of fisheries and aquaculture sectors and communities to climate change (including the social and economic impacts).
- The impacts to consider will include changes to the resources, changes to market conditions and changes to policy responses in Australia and abroad.
- Identify how the fisheries and aquaculture sectors and communities are likely to respond to the climate change challenge and of some of the impediments to adaptation.

Such information will be required by all states and the federal government. It should be noted that the National Climate Change Adaptation Research Facility (NCCARF) may also be a source for funding and research direction setting through their 'Primary Industries' theme; NCCARF has been in the process of writing theme plans (March 2010) to:

Identify critical gaps in the information available to decision-makers in key vulnerable sectors and regions, set national research priorities, and identify science capacity that could be harnessed to conduct priority research
(NCCARF <http://www.nccarf.edu.au/national-adaptation-research-plans>)

However, fisheries will be in direct competition with terrestrial focussed sectors within this Primary Industry group for NCCARF funding.

6.4 Identifying and translating social values: identifying and articulating the social values and impacts around fishing and interpreting these in the context of fisheries management and policy.

Considerable effort has been invested towards better understanding of social values about fishing (recreational, commercial and indigenous). There has also been concerted effort to refine social impact assessment techniques. Many tools, guides and frameworks have been developed that can assist future research in the area of social impact assessment around fisheries and identifying the social impacts of changed circumstances. These are included as Table 6.1.

As indicated, there is going to be increased interest in the social impacts of climate change on communities whose primary industries are directly affected. Many fishing communities will feel the effects of climate change either directly, as an environmental change or through changed policy. It is also likely that co-management disputes are likely to intensify as the resource base changes.

Table 6.1 Tools, guides and frameworks that can assist future research

Bradshaw et al (2001: 85)	'The approach taken here to a social impact assessment of a management change in a fishery blends data from qualitative and quantitative sources within a framework that could be repeated for other analyses of change' pp85.
Brooks et al (2001)	The social inputs identified in this report could be used as a reference for future marine park planning decisions around Australia.
Buxton et al (2006)	Buxton et al urge that the template developed during this study which assesses the impacts of MPA's on a regional basis, be referred to when future MPA's in Australia are being proposed. This template includes the consideration and assessment of a range of issues, including social impacts
Mazur (2004a)	A number of the social indicators identified in this study should be used in other investigations to identify public perception of aquaculture industries across Australia
Nursey-Bray (2006)	A socially just conservation methodology to guide future collaborations between Indigenous peoples and Management Agencies when addressing the ongoing cultural harvest of wildlife (such as Green turtles and Dugongs) in protected areas
Schirmer and Pickworth (2005)	This handbook represents the first comprehensive guide to methods for assessing the social well being of those who are engaged in or dependent on fishing activities in Australia. The handbook recommends methods and approaches for assessing social sustainability. It could be picked up and utilised by many sectors and groups involved in the Seafood Industry and provides a list of future reading on, ESD, social assessments and social impact assessments, which would be relevant for industries such as aquaculture
Social Sciences Program Bureau of Rural Sciences (2005)	The toolkit comprises a general guide to undertaking socio-economic impact assessment (SIA), followed by specific guides to methods and sources of information which can be used in assessing the potential impacts of proposed MPAs on these selected sectors. It provides a range of options for assessing social and economic impacts, and advice on appropriate methods for particular situations.
Sutton (2006)	Provides an extensive database on the social aspects of recreational fishing in Queensland. As such, it should begin to give managers and other stakeholders a better understanding of the recreational fishing sector, and allow the needs, concerns, and values of recreational fishers to be incorporated into the management process

6.5 Industry characteristics: characteristics of both sectors of the industry and the supporting regional communities are articulated and explored for strengths and weaknesses.

As explained in the synthesis, many of the empirical studies describing the state of specific fisheries are valuable starting points for continued research. The need for continuous monitoring was emphasised by Henry (2003) who invites further, deeper analysis of the national recreational dataset and a repeat of the survey.

7. Benefits and adoption

The information presented in this report provides a valuable resource for current and future researchers. It is anticipated that its content has the capacity to reduce duplication of effort; researchers will be able to check what research/work has already been undertaken, where and by whom. The audit has produced a series of tables that point to research questions posed by prior studies, thus opening the way to leverage future projects. In addition some prior studies recommend repeat surveys and studies or methods that could be replicated in new situations. The audit has also pointed to gaps in the existing literature.

8. Further Development — Identified research needs

The process of annotating each reference in addition to creating an overview of each paper also involved recording the suggested potential for future research or research gaps identified for each item. Table 8.1 offers the future research suggestions by author. It should be noted that since the time of publication of some of the papers it is possible that their recommendations may have been taken up (through government policy) or new government initiatives may have superseded those through which the proposed research was generated. The following discussion provides an overview of the detail within Table 8.1.

Table 8.1 Potential future research

<p>Aslin et al (2001)</p>	<p>The future research suggestions below are based upon Aslin's et al's research on the social outcomes of applying Individual Transferable Quotas (ITQs) to manage wild catch fisheries, with particular reference to Australia's South East Fishery (SEF).</p> <p>Research Needs</p> <p><i>Species-specific fishery studies</i> The sociology of boom and bust in the gemfish and orange roughy fisheries</p> <p><i>Alternative economic opportunities for fishers</i></p> <ul style="list-style-type: none"> • Availability of other suitable fisheries open to exiting vessels • Extent of alternative economic opportunities in fishing-dependent coastal communities <p><i>Structural factors affecting responses to new management regimes</i></p> <ul style="list-style-type: none"> • What are the opportunity costs for vessels and labour? • Possible confounding effects of prior input controls on responses to ITQ systems • Socio-economic and cultural heterogeneity in fisheries and their relative influence on responses to new management regimes <p><i>Stakeholder responses to new management regimes</i></p> <ul style="list-style-type: none"> • Adaptation of fishing methods and patterns to changing socio-economic-biological conditions • Information on quota trading in ITQ-managed fisheries - particularly prices
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	<ul style="list-style-type: none"> • Conflict between fishers and regulatory agencies over quota allocations • Structural changes in industrial organisation within fisheries <p><i>Institutional factors</i></p> <ul style="list-style-type: none"> • Regulatory agencies' structures, and particularly the relative priority these agencies give to education, extension and communication activities as compared with other activities • Institutional commitment to policy research and development <p><i>Consultative structures and processes</i></p> <ul style="list-style-type: none"> • Effects of different types of industry and community representative structures on outcomes of consultative or participatory processes in particular, effects of different structures on TAC-setting outcomes.
Aslin et al (2000)	<p>The future research suggestions below are based upon Aslin et al's previous research that gathered information about women in the Australian fishing industry.</p> <p>Research Needs Key areas for further research include:</p> <ul style="list-style-type: none"> • Developing a comprehensive list/statistics of women in industry • Identifying gender imbalances currently existing in fisheries organisations • Increasing communities understanding on Aboriginal Women's role in the traditional fishing sector • Undertaking specific studies of women working in specialist sectors of industry and women's ownership of property and property rights • Investigating health and safety standards for vessels operating in the wildcatch sector • Build upon existing women's networks to provide a forum to meet other industry women and promote industry related opportunities and training.
Australian Aquaculture Industry (2007)	<p>The 2007 Aquaculture Strategy identified the following research needs:</p> <p>NRM Program</p> <ul style="list-style-type: none"> • There is a need to explore social indicators for aquaculture, so that more information and data can be used in Ecological Sustainable Development (ESD) public reporting frameworks. • There is a need to develop a database that enables industry and the public to access monitoring information and to review and improve these arrangements whilst ensuring Australia drives socially responsible prawn farming in Asia.
Baelde (2001)	<p>Baelde's article of fishers' descriptions of changes in fishing gear and fishing practices in the Australian South East Trawl Fishery concluded that "poor understanding of fishing strategies continues to undermine the validity of scientific assessment and limit the effectiveness of management" pp. 416.</p> <p>Research Needs When analysing fisheries more studies need to explore fishers' socio-economic needs, because of the major influence that these needs have on fishers strategies, decisions and associated catch behaviour.</p>

<p>Baelde (2005)</p>	<p>Baelde's paper explores challenges created by interactions between the implementation of marine protected areas and right-based fisheries management in Australia.</p> <p>Research need There is a need to address inconsistencies between conservation, and fisheries' approaches to the spatial management of natural resources.</p>
<p>Balkanu Cape York Development Corporation (2004)</p>	<p>This report summarises the key aspirations of Indigenous peoples within the Northern Marine Planning Area (NMPA).</p> <p>Research need In order for Traditional Owners to embrace management a large investment in saltwater ethno-ecological research and research partnerships needs to be provided. Such research would provide the substance for real management.</p>
<p>Beeton (2006)</p>	<p>The 'Coasts and Oceans' theme report of the 2006 State of the Environment report indicates value of coasts to Australians.</p> <p>Research need To address the balance to be achieved between the value of the land and the value of the coastal environment, a whole-of-catchment approach to resource management is worth pursuing. Marine management should in the future look at the pressures and people's interactions with the environment, rather than strictly the management of the resource.</p>
<p>Bucher (2006)</p>	<p>Bucher completed a pilot study of spatial and temporal patterns of recreational angling effort in a warm-temperate Australian estuary.</p> <p>Research need To build on the results of the fishing effort surveys, "a thorough, year-long survey of catch rates is needed in all sections of the estuary, to accommodate seasonal variations in catch rates and changes in species composition" p.93.</p> <p>There is scope for further monitoring of recreational fishing activity and consideration of resource-sharing management arrangements on the basis that recreational effort may increase with urban expansion of coastal population centres and commercial production may decline as the fishable area is reduced: To assess if recreational catch, at least for some species, approaches or exceeds commercial catch, (Bucher 2006: pp. 94)</p>
<p>Carter (2008)</p>	<p>Carter's paper explains there are now many principles and protocols for cross-cultural collaboration on projects, many of these have been written and produced by agency staff rather than by community representatives</p> <p>Research need The use of existing principles is encouraged, but in new methodologically and epistemologically devised frameworks that will better fulfil an Australian commitment to equitable research partnerships between Indigenous and non-Indigenous people.</p>

Carter and Hill (2007)	<p>Carter and Hill describe the reasons for the failure of a community-based fisheries initiative between commercial fishers and indigenous people in Australia. Their case study exposed an absence of political will and statutory backing which might have prevented encroachment of commercial fishing into an area where additional effort was unsustainable.</p> <p>Research need These authors argue the need for a critique of the usefulness and outcomes of participatory program design with indigenous Australians in order to provide genuine access to fisheries resources for indigenous Australians.</p>
Carvalho and Clarke(1998)	<p>Carvalho and Clarke evaluated of the sustainability of the aquaculture industry in South Australia .</p> <p>Research need An investigation is warranted to establish whether or not management of aquaculture in South Australia has improved since the paper was written in order to ascertain whether current aquaculture management practices are now based on ecosystem based principles of management and integrated management.</p>
Casement and Rural Solutions SA and Seafood Services Australia (2006)	<p>Casement suggests that Industry recognise the need for EMS.</p> <p>Research need To what extent has industry gone forward and engaged in the EMS process and implemented EMS systems into their businesses?</p>
Commonwealth of Australia (2009)	<p>The Department of Climate Change first pass national vulnerability assessment reports on Climate Change risks to Australia's coast:</p> <p>Research need National assessments are required in key sectors and regions to facilitate or inform decisions on adaptation action by policy-makers, business and industry, resource managers and the community.</p>
Dominion Consulting Pty Ltd (2005)	<p>The assessment of economic and social issues in the New South Wales Abalone fishery.</p> <p>Research need A survey of the secondary level of the seafood industry is recommended for future work. Ideally annual financial surveys of the primary and secondary sectors would give a time series and an improved understanding of inter annual variability.</p>
Fisheries Victoria (2008)	<p>Victorian Climate Change Strategy for Fisheries and Aquaculture 2008-2018</p> <p>Research need</p> <ul style="list-style-type: none"> • To better understand the vulnerability of fisheries and aquaculture sectors and communities to climate change (including the social and economic impacts). The impacts to consider will include changes to the resources, changes to market conditions and changes to policy responses in Australia and abroad. • Identify how the fisheries and aquaculture sectors and communities are likely to respond to the climate change challenge and of some of the impediments to adaptation. This information will assist the Department of Primary Industries (Vic) in working with its stakeholders to facilitate adaptation to climate change

<p>Gardner et al (2007)</p>	<p>The socio-economic assessment of industries in the South West Marine Region</p> <p>Research need The authors identified a range of information gaps:</p> <ul style="list-style-type: none"> • “data on the economic impacts of various commercial uses on local and regional economies, incorporating a consideration of employment and other economic multipliers. • data on the potential economic and social impacts of new industries in the region. • information relating to the economic and social linkages between different users in the region, in terms of resource use and employment . • an understanding of the social values of the region, particularly as they relate to marine uses and activities. • analysis of the demographic trends in the region, focusing on future population structures (e.g. age/sex, socio-economic status), migration patterns, and settlement sizes. • scenario analysis with the users of the region to determine future threats and opportunities for different areas and sectors” pp169.
<p>Henry and Lyle (2003)</p>	<p>The National Recreational and Indigenous Fishing Survey July 2003</p> <p>Research need There is the capability for more detailed analyses of the survey database. The survey could be repeated in part or in full.</p> <p>NB This survey can be used as “a baseline or benchmark against which future developments can be assessed” pp99. “Key components of the survey instrument require only limited further development and, therefore, cost savings would be envisaged if the survey was repeated” pp.99</p>
<p>Huddleston and Tonts (2007)</p>	<p>Analysis of the Social Impact of the Western Rock Lobster Industry Management Options on Fleet Hosting Communities</p> <p>Research need There is “an opportunity to monitor the nature and impact of changes over a longer timescale. On a global scale, there are only a few longitudinal studies or monitoring programs that exist with regard to the social and socioeconomic characteristics of fishers and their communities. In line with the principles of ESD, this report sets the groundwork for a longer term monitoring program which has the potential to make a significant contribution to policy and management” pp.iv.</p>
<p>Kearney (2002)</p>	<p>Kearney’s paper about co-management arrangements between commercial and recreational fishers in Victoria, Australia offers an approach to identifying misconceptions and data gaps which contribute to conflict between resource users.</p> <p>It demonstrates how resource sharing issues can be identified and explored to determine appropriate management of resources. The learning (processes, engagement strategy and recommendations) could be utilised by other fisheries/locations in Australia.</p> <p>Research need How successful was Victoria’s management approach, now 8 years on. Has it/implementation been a success in stakeholders’ opinion? Is data being effectively used/ data management systems improved, what have been the triple bottom line outcomes? Have other areas/fisheries followed a similar management approach and what were the outcomes; were there differences in application and outcomes?</p>

Kwan et al (2006)	<p>Kwan's paper addresses gaps in understanding around the influences (economic, social and environmental) that affect hunting by community members of the Mabuiag Island.</p> <p>Research need "Understanding the impacts of human hunting or fishing behaviour on prey populations is basic to the development of sustainable harvest strategies" pp.170 "To identify, understand and acknowledge the relevant influences on harvest rates on a case-by-case basis" pp 170.</p> <p>There is the potential for social research when developing sustainable harvest strategies for other threatened marine species or for other parts of the country.</p>
Linder et al (2006)	<p>Linder's study of Dynamic Modelling of the Socially Optimal Allocation of Fish Resources Between Commercial and Recreational Use.</p> <p>Research need</p> <ul style="list-style-type: none"> • "Given the primary focus of this research is methodological, further research would be necessary for the framework to be used to inform actual resource allocation decision making processes in the case study fisheries. • In particular, some of the data deficiencies identified would need to be addressed to allow better estimates of the key variables that drive changes in the relative commercial and recreational values. • On the commercial side, greater understanding is needed such as the price elasticity of demand for fish and the degree of substitutability between local wild stock, imported and aquaculture product. • On the recreation side, economic literature was found to be lacking information that could assist in the quantification of key characteristics of recreational fishing demand. For instance, the application of the dynamic model would benefit greatly if there were methodologically sound estimates of the sensitivity of recreational fishing demand in various fisheries to changes in income and of changes in participation rate with age and over changes in the stage of the family life cycle" pp17. • "The current level of understanding of recreational fishing behaviour is not as well developed as it could be for the application of the evaluation framework and dynamic allocation modelling. • Further information is required in the future to ensure effective policy development and management around resource allocation. • There is a need for improved understanding of the biomass as it pertains to the effort of recreational and commercial fishers" pp17. • To facilitate the adoption of the framework, there is a need for particular socio-economic data sets to be collected.
Marshall (2007a)	<p>Marshall suggests that despite the apparent appeal of resilience as a framework for sustaining human-environment relations and theoretical advancements in the field, natural resource managers do not explicitly apply this concept very often. He applies social resilience theory to commercial fisheries in northern Australia.</p> <p>Research need Surveys identified substantial variation among fishers in their ability to plan for and adapt to change imposed by external forces. This suggests that "measurements of these characteristics might be particularly useful in discriminating among individuals with different levels of resilience" p.8 The study recommends that perception of "risk be included as a key dimension in conceptual models of social-ecological resilience" pp 9.</p>

<p>Mazur (2004)</p>	<p>Community perceptions of aquaculture</p> <p>Research need</p> <ul style="list-style-type: none"> • Need to devote time with the community and stakeholders to determine values and beliefs about issues such as Ecological Sustainable Development (ESD) and how this relates to aquaculture. • Evaluation of community consultation to detect changes in public perceptions and to ensure improvement in delivery.
<p>Mazur (2005)</p>	<p>Community perceptions of aquaculture: Final Report</p> <p>Research need</p> <ul style="list-style-type: none"> • There is a need to “regularly monitor public opinion, as public perceptions can change quickly and can vary across different aquaculture sectors” pp43. • Undertake “more regional case studies in areas featuring aquaculture industry sectors and focus on understanding the causes and prevention of social conflicts associated with aquaculture” pp47. • “Systematic use of the full range of social assessment tools is required earlier in aquaculture decision making. A more consistent and comprehensive range of social criteria could be used through social profiling, social assessment and social impact studies to complement the biophysical criteria that is used in aquaculture site and project feasibility studies” p 46. • Needed are tools to build government and industry capacity for conducting and/or commissioning a range of social assessments. • “A systematic stocktake and evaluation of social assessments/social analysis and community consultation and engagement programs used by the Australian and State/Territory Governments and the Aquaculture industry-at a sectoral and/or regional scale. This would seek to identify best practice principles”pp47. • Develop “an inventory of aquaculture education and training and extension activities in the tertiary and vocational sectors. This would help identify skill and knowledge areas required for understanding and responding to aquaculture’s social dimensions” pp47.
<p>Mazur (2004a)</p>	<p>Mazur et al identified a lack of social data available on public perceptions of aquaculture</p> <p>Research need</p> <ul style="list-style-type: none"> • An evaluation of media coverage of aquaculture stories to provide a clearer picture of the apparent negative or alarmist nature of the impact some aquaculture industry’s have on the environment and therefore the community. • “There is a need for better coordination and integration of social surveys at the national and State/Territory level by governments, which would allow for more systematic investigations that produce comparable findings across jurisdictions’ p33. • To identify and utilise “regular social survey data and apply it to the aquaculture sector e.g. research undertaken by Australian Bureau of Statistics (ABS) on environmental attitudes and behaviours” pp.33.

<p>McPhee et al (2007)</p>	<p>Fishing Industry Response to the Proposed Rezoning of the Moreton Bay Marine Park</p> <p>Research need Need to monitor and quantify:</p> <ul style="list-style-type: none"> • “The redistribution of recreational and commercial fishing effort. • The presence of the spillover effect (which could include social related impacts) and whether this is of sufficient magnitude to provide a net benefit to recreational and commercial fisheries. • Changes in seafood supply as a result of the rezoning plan • The performance of the artificial reefs” pp41. <p>Consideration of social impacts on marine park planning: Are “social impacts offset by financial support such as structural adjustment? Social impacts are not restricted to the commercial sector, and such impacts on the recreational fishing sector also need to be considered. Equity relative to other anglers is an important consideration” p.41.</p> <p>Opportunity for monitoring programs To implement an “ongoing monitoring program of no-take zones. It represents an opportunity for stakeholder participation by user (and other) groups in the development of research” pp41.</p>
<p>Momtaz and Gladstone (2008)</p>	<p>The authors identified a lack in exploration and understanding of the social impacts of closing a fishery. It is argued that a social impact assessment would have picked up many of the serious social impacts being experienced by the fisherman and community result from the fishery closure.</p> <p>Research need There is a need for further research in order to gain a better understanding of the social and economic impacts of the decision [to close fisheries] on commercial fishing in New South Wales coastal waters.</p>
<p>New South Wales Fisheries (2002)</p>	<p>New South Wales Estuary Prawn Trawl Fishery Environmental assessment under the EPBC Act</p> <p>Research need Little work has been undertaken to understand the cumulative impacts on communities from successive management strategies.</p>
<p>Pickworth et al (2006)</p>	<p>The case study outlined by Pickworth et al illustrates the breadth and scope of information that social assessments can provide.</p> <p>Research need</p> <ul style="list-style-type: none"> • Investigate improvements in the transfer of fishing skills and knowledge. “The shift to new, inexperienced entrants may result in the loss of important fishing skills and knowledge” pp.15. • How satisfactory are support networks for new and younger entrants to fisheries, and for other employees (particularly women)? • Investigate the negative perception of commercial fishers by the broader community. • Investigate ways to encourage greater participation in fishing groups and attendance at meetings.

Schirmer et al (2004)	<p>Socioeconomic impact assessment of the proposed Cod Grounds Marine Protected Area</p> <p>Research need</p> <ul style="list-style-type: none"> • Strategies to obtain data from fishers who have retired or left the area permanently • Obtaining data more specific to the actual Cod Grounds • More research into the price of catch sold at a local level compared to that sold at Sydney Fish Market • Research into impacts at a community level and the flow on effects, not just those directly related to Cod Fishing
Schirmer, J. & Pickworth (2005b)	<p>Social impacts of the South Australian Marine Scalefish Fishery</p> <p>Research need</p> <ul style="list-style-type: none"> • A follow up survey two to five years post this study to allow a detailed assessment of how well being and quality of life changes over time. • This report found that “women were more likely to be working unpaid in a fishing business, usually part-time” and that “the contribution of women often goes unacknowledged. The impact of changes to fishing on these participants in the fishery needs to be better understood” pp88. <p>NB The author identified the importance of working with those in the fishery to design meaningful questions, rather than using existing questions sets from previous surveys which may not be applicable.</p>
Sutton (2007)	<p>Socio-economic aspects of artificial reefs: Considerations for the Great Barrier Reef Marine Park</p> <p>Research need</p> <p>In order to foster a participative approach to decision-making, “managers will need to identify and understand stakeholder groups and their values” pp832. Data concerning “attitudes, preferences and opinions of stakeholders regarding artificial reefs in the GBRMP have not been formally collected” pp832.</p> <p>It has been previously identified “there is a need for a more integrated and interdisciplinary approach to artificial reef research and management that includes the expertise of marine scientists, social scientists, and planners. However, most research on artificial reefs and artificial reef management is still ecological in nature, with few studies focusing on the socio-economic aspects” pp843. The authors suggest that “a strong social science research program in support of decision-making will give managers and other stakeholders the information they need to deal effectively with issues that will arise regarding the potential development of an artificial reef program in the GBRMP” pp.843.</p>
Taylor-Moore (2006)	<p>A case study of the socio-economic impacts of the representative areas program for the Great Barrier Reef marine park on the Queensland Seafood Industry</p> <p>Research need</p> <p>Assessment of the potential economic and social impacts (including flow on effects) of modifying the fishing industry's access to resources should be undertaken and considered during the planning process of MPA's.</p>

Proposed or potential research varies from specific applied studies to evaluation of past efforts and follow-up investigations to provide longitudinal information about fisheries. Below is a brief synopsis of ideas presented by authors.

8.1 Suggested future research for integrated decision making

The previous discussion noted the ongoing challenges of integration and partnership development between sectors. Future research suggestions target this issue:

- In 2007, well after the preparation of the ESD framework guidelines, there was a call by the Australian Aquaculture Industry (2007) for the application of social indicators to assist in publicly reporting on ESD for aquaculture.
- Baelde (2005) infers that future research could focus on establishing an enhanced understanding or response to inconsistencies between the values of conservation and fisheries that would assist in developing improved NRM outcomes.
- Kearney (2002) called for evaluating aspects of a prior co-management study to determine whether interventions and practices have improved resource management.
- Mazur's studies urge follow-up surveys to trace change in perception to ESD reporting over time. Mazur (2004a) also calls for better coordination and integration of social surveys nationally. Much work has been undertaken, but there has been some reinvention of methodologies. Lack of research coordination inhibits the potential to compare across jurisdictions and hence the potential for improved integration.
- Linder et al (2006) identify a lack of socio-economic data sets to support modelling of the social aspects of fisheries.

8.2 Suggested future research for Adoption and Adaptation

Several studies point to the on-going need for deeper investigation into the social impacts of policy and management decisions that directly effect fishing communities. For example:

- There is a need to understand how the affects of changes to fishery management regimes (e.g. introduction of or trading quotas), are influenced by the social heterogeneity within the fishing industry; and by institutional practices (Aslin et al 2001).
- Baelde calls for more studies into fishers socio-economic circumstances in order to better appreciate why and how strategies and decisions that determine fishing behaviour arise.
- Momtaz and Gladstone (2008) suggest further research into understanding the consequences (social and economic) for fisheries communities when decisions are made to close fisheries.
- Taylor-Moore similarly calls for assessment of potential social impacts of modification to fishers' access to resources, in this instance during the planning process for MPAs.
- New South Wales Fisheries (2002) suggest there is little understanding of cumulative effects of successive management strategies on fishing communities.
- Pickworth (2006) points to a need to investigate: the transfer of skills and knowledge to new entrants into the fishing industry and the role of support of networks.

8.3 Suggested future research for Identifying and Translating Social Values

Much of the future research potential for translating social values stems from the projects engaging indigenous fishing communities.

- To encourage Traditional Owners to embrace management of sea country Balkanu Cape York Development Corporation (2004) call for improved ethno-ecological research.
- Carter (2008) calls for new methodological and epistemological frameworks for developing equitable partnerships between indigenous and non-indigenous people.
- Carter and Hill (2007) call for an evaluation of effectiveness of the outcome of participatory program designs to assess whether genuine access to fisheries resources has been sustained for indigenous peoples.

Some caution should be taken here before planning new research as a considerable body of work has been completed over the past decade working towards improved methodologies and management/partnership approaches with and between indigenous peoples. These should be scrutinised carefully before commencing afresh.

The requirement to evaluate past effort is noted in this 'social values' theme.

- Mazur (2005) study about community perceptions of aquaculture recommended a systematic 'stock take and evaluation' of social assessments or social analysis used by different fisheries at a range of scales to determine best practice

There appears to be an opportunity to follow up of Aslin et al's (2000) and Pickworth's (2006) call for exploring women's roles in the fishing industry.

8.4 Suggested future research for Industry Characteristics

Within the timeframe of this audit several significant baseline studies were completed for fisheries and fishing communities around Australia. These studies provide the foundation from which to build new projects.

- Huddleston and Tonts (2007) and Schirmer and Pickworth (2005b) point out there are few long-term monitoring studies measuring the social characteristics of fishers or fisheries. Their respective studies about the Western Rock Lobster Fishery and the South Australian Marine Scale Fishery could be followed-up and the methodologies applied in other fisheries.
- Henry and Lyle (2003) invite researchers to repeat their survey of recreational fishers in part or in-full, to assist in maintaining a longitudinal picture of activity and social values associated with this fishery.

9. Planned outcomes

This report and its companion dataset, the Endnote database, will be placed on the Australian Agriculture and Natural Resources On-line (AANRO) website for ease of access by interested researchers. The database will be submitted along with the final report.

10. Conclusion

This report presents an extensive audit of Australian literature around the social science perspectives of fisheries activity and management in Australia written in the last fifteen years. The audit was designed around five broad themes produced by the SSRCP of the FRDC.

An array of published materials was collected for the audit including policy documents, government reports and journal articles. The audit reveals that considerable attention has been paid to social elements of fishing practice. The bulk of research effort is empirically based or applied research and ranges from broad policy driven targeted blocks of study to numerous one-off localised projects. There are far fewer examples of theoretical or conceptual inquiry. However, important work has begun in this area, for example, the use of social resilience models and the work of Marshall, and Fenton, using Town Resource Cluster Analysis.

10.1 Suggested Research

This audit specifically sought suggestions or ideas for new research as identified by researchers within the body of published works. Section 8 and Table 8.1 provide a detailed summary of these suggestions. Three key broad areas of research effort have been identified. Previous research effort suggests that in Australia there is the need to:

- Evaluate the outcomes of previous research effort, particularly where this has potential to influence policy and on-ground management
- Consolidate on past efforts by undertaking follow-up investigations of baseline studies. Very few long-term assessments of fishing communities exist. However, detailed foundational studies have been completed so there are very good opportunities for follow-up and implementation of longitudinal research projects.
- Place a greater focus on monitoring of both community values (as these are changeable over time) and ongoing assessment and improved understanding of the social circumstances of fishing communities around Australia as they are directly affected by successive policy and management decisions.

There has also been considerable learning over the last fifteen years and much effort has been expended designing methodologies and frameworks for assessing social aspects of

fishing communities. There is great potential for broader application of such approaches across more fishing communities than has currently been achieved to date.

10.2 Research Gaps

The audit revealed there are significant opportunities for future targeted research. These gaps are discussed below.

It is well recognised that positive triple bottom line outcomes rely on sound collaborative management. The papers in this audit report ongoing 'exasperating' difficulty of achieving practical cross-sectoral practice. However, the audit reveals that two guides or ESD reporting frameworks have been produced to assist fisheries towards meeting improved triple bottom line outcomes. The Australian Government (2008) has devised a flexible framework, or how to guide, to facilitate the development of a sustainable fishery (i.e. to achieve the best economic, environmental and social outcomes). Fletcher's earlier work produced a guide to smooth the path for ESD reporting. It is unclear how useful these frameworks have proven to be. It would be timely to investigate how widespread is the uptake of these instruments because these guides have the potential to be broadly applied and use of these frameworks could greatly assist in improving integrated decision making.

Practitioner/Research partnerships could be developed to increase the rate of application of such approaches. There is room for developing improved theoretical understanding of this highly complex aspect of fisheries management.

Very little attention has been devoted to understanding the 'social carrying capacity of civil society to accept and incorporate greater levels of fishery activity'. Aslin and Bryon's (2003) national study of perceptions of fishing recommended that social surveys be repeated at regular intervals to provide insight into ongoing social trends that influence natural resource use and changes in public perception. A considerable body of work was also completed around community perceptions of aquaculture in mid 2000. The final report (Mazur 2005) depicted a range of potential indicators that could be used to meet future benchmarks and to ensure aquaculture's progress towards social sustainability. This audit suggests that since the completion of these perception studies there has been no reporting of the up-take of the recommendations. Indeed as noted in the previous section, the Australian Aquaculture Industry

(2007) calls for the need to explore social indicators for aquaculture to improve acceptance levels. There is considerable potential for increased research focus in this area. Clearly any future research intending to test social carrying capacity should be mindful to review the previously concluded comprehensive studies and consider using the indicators and reapplying the survey methods.

Climate change and sea level rise pose some of the most pressing current research needs. Research is essential to better understand the vulnerability of fisheries and aquaculture sectors and communities to climate change (including social and economic impacts). As noted by the Victorian Climate Change Strategy (Fisheries Victoria 2008) impacts to consider will be the social implications of changes to the resource base, changes to market conditions and changes to policy responses in Australia and overseas. It is yet unknown how fisheries and aquaculture sectors and communities will respond to the climate change challenge and what the impediments to adaptation in the fisheries sector are likely to be. In responding to these needs future researchers should be mindful to reflect upon and access the comprehensive suite of social assessment tools readily available. Table 7.1 provides a summary of these various methods and guides.

The combination of suggested research ideas and the gaps that exist in this collection of work point to the need for sustained and ongoing research effort to continue towards improved understanding of the complex interaction of people and environment in relation to fisheries management in Australia.

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Appendix 1a Intellectual Property

Appendix 1b Staff

Beverley Clarke (Principal Investigator)
James Harris (Co-investigator, advisory role)
Claire Lock (Research Assistant)
Cherie Heyes (Research Assistant)

Appendix 2 Key Word list

Aboriginal
Aborigines
Adoption
Adaptation
Aquaculture
Australia
Biosecurity
Cancellation provisions
Capacity to adapt
Capacity building
Catch allocations
Change management
Climate change
Collaboration
Co-management
Commercial fisheries
Commercial fishers
Communication
Community
Community adaptation
Community attitudes
Community consultation
Community participation
Community perceptions
Community-based fisheries
Compliance
Conflict
Consumer
Cost recovery
Cultural practice
Cultural preservation
Data-deficient fisheries
Demographic
Design principles
Ecologically sustainable
development (ESD)
Economic viability
Ecosystem based fisheries
management
Ecosystem components
EMS Engagement
Engagement
Families
Equitable research
partnerships
Fisheries
Fisheries compliance
Fisheries management
Fishing Effort
Fishing rights
Illegal take
Impacts
Indigenous
Indigenous Australians
Indigenous hunting
Industry capacity
Innovation
Joint-management
Knowledge transfer
Leadership
License buyback
Management
Management plan
Marine Pest
Marine protected areas
Market access
Method assessment
Multi-sector conflict
NRM
Natural Resource
Management
Ownership
Partnership approach
Partnerships
People development
Poaching
Politics
Property rights
Public interest
Qualitative and quantitative
research
Qualitative risk assessment
Recreational fisheries
Recreational fisheries
management
Recreational fishers
Recreational fishing haven
Recruitment
Regional impact assessment
Resource access
Resource allocation
Resource sharing
Resource use conflict
Research and Development
Research and Development
Adoption
Risk perceptions
Seafood consumption
Skills audit
Social
Social adaptation
Social barriers
Social capital (networks)
Social impact assessment
Social Indicators
Social research
Social resilience
Socio-economics
Sociological
Stakeholder participation
Stakeholder preferences
Stakeholders' view
Statutory fishing rights
Stewardship
Sustainability
Sustainable
Total allowable catch
Tourism
Tradable permits
Traditional knowledge
Traditional fishing knowledge
Values
Wellbeing
Wildcatch

Appendix 3 Annotated Bibliography

Allen, M., Brown, P., Douglas, J., Fulton, W. & Catalano, M. 2009, 'An assessment of recreational fishery harvest policies for Murray cod in Southeast Australia', *Fisheries Research*, vol. 95, no. 2-3, pp. 260-267.

Objective

Murray cod, *Maccullochella peelii peelii*, is one of the world's largest freshwater fish and supports popular fisheries in southeast Australia, but no previous modelling efforts have evaluated the effects of fisheries regulations or attempted to develop sustainable harvest policies.

Method

We compiled existing population metrics and constructed an age-structured model to evaluate the effects of minimum length limits (MLLs) and fishing mortality rates on Murray cod fisheries. The model incorporated a Beverton and Holt stock recruit curve, age-specific survivorship, and vulnerability schedules, and discard (catch and release) mortality for fish caught and released. Output metrics included yield (kg), spawning potential ratio (SPR), total angler total harvest, and the proportion of angler trips that would be influenced by each regulation based catch, on recent creel survey data.

Findings

The model suggested that annual exploitation (U) should be held to less than 0.15 under the current MLL of 500 mm total length to achieve an SPR > 0.3, a target usually considered to prevent recruitment overfishing. Exploitation rates at or exceeding 0.3 would cause SPR values to drop below typical management targets unless the MLL was set at or above 700 mm. Regulations that protected Murray cod from overfishing created higher angler catches and higher catch of trophy fish, but at a cost of reducing the proportion of angler trips resulting in a harvested fish.

Conclusion

Expressing model output on a per-angler trip basis may help fishery managers explain regulation trade offs to anglers.

Theme: 3

Anutha, K. & Johnson, D. 1996, 'Aquaculture planning and coastal management in Tasmania', *Ocean & Coastal Management*, vol. 33, no. 1-3, pp. 167-192.

The development of a substantial marine aquaculture industry in the State of Tasmania, Australia, has led to considerable resource conflict during the past decade. In response to this conflict Tasmanian government has undertaken a number of planning exercises for popular waterways to accommodate future expansion of aquaculture. At the same time, the government has been developing a new system for integrated coastal management and is moving towards introducing a state-wide coastal policy as part of its resource management and planning reforms.

Objective

To demonstrate how an aquaculture planning system has been developed in parallel to a new coastal management system in Tasmania raising a number of issues in relation to the effectiveness of resulting institutional arrangements.

Findings

This paper provides a thorough description and analysis of the development of aquaculture planning and coastal management in the State and addresses a number of issues in relation to the resulting institutional arrangements, noting the linkages between the various elements.

Conclusion

The paper concludes with the position that the opportunity to establish a single integrated planning system that encompasses both land and water existed and was missed. Rather, a new sectoral approach to planning for aquaculture was established parallel to the general land and marine use planning mechanisms. The resulting system was more complex, but it featured a number of integrating mechanisms such as the use of a single set of sustainable development principles in all relevant legislation and cross-membership on respective planning bodies.

Theme 1

Aslin, H. & Byron, I. 2003, *Community perceptions of fishing: implications for industry image, marketing and sustainability*, Fisheries Research and Development (FRDC), Canberra.

In this article, Aslin and Byron discussed findings of a national Australian study of public perceptions, attitudes and knowledge of the fishing industry (commercial, recreational and traditional sectors) and consumption patterns.

Objective

The overall objective of the study was to conduct a survey of general public perceptions of the fishing industry. More specific objectives were to:

1. Conduct focus groups with selected sub-groups of the Australian public to serve as a basis for developing a structured survey instrument
2. Develop the survey instrument in discussion with the advisory group, conduct a pilot, and administer the survey to a statistically representative sample of the Australian adult population
3. Identify the implications of the survey findings for industry communication, education and marketing activities
4. Identify the implications of survey findings for Ecologically Sustainable Development (ESD) monitoring and reporting frameworks
5. In discussion with the advisory group, develop options and strategies for addressing negative perceptions of the industry
6. Communicate overall survey results to stakeholders in a meaningful and useful form.

Methods

The authors used data gained through a literature review, focus group discussions and telephone surveys.

Findings

The authors were the first to examine perceptions of the fishing industry on a national basis. Survey findings indicate considerable community knowledge about recreational fishing and high participation. Very few members of either the focus groups or telephone sample (collectively referred to as 'respondents') had direct experience with the commercial wild-catch sector or traditional fishing, but many focus group members knew about or had visited local aquaculture ventures. Respondents generally viewed recreational and traditional fishing and aquaculture positively, but not commercial wild-catch fishing. Respondents' most important source of information about the industry was the mass media, particularly television. Recreational fishers relied more on books, magazines and fishing clubs than non-recreational fishers. Government and industry were very minor sources of information for most respondents and were not viewed as highly credible sources. Members of most of the focus groups and the majority of survey respondents rated their knowledge of the industry as relatively low but interest levels higher.

Conclusion

The study concludes that unless they have a special interest, members of the public are unlikely to actively seek information about the industry nor to make much use of the sources they regard as most credible. The authors raised a number of issues that warranted further investigation. In particular they identified the need to increase the amount of 'good news' stories in the mass media to improve perceptions of wildcatch fisheries, the need for government and industry groups to better design and target industry communication, education and marketing strategies and the need to address the low levels of public knowledge about the traditional sector. Aslin and Bryon recommended that social surveys are repeated at regular intervals to provide insight into ongoing social trends that influence natural resource use and changes in public perception and that results are communicated to stakeholders in a useful form. The study also highlighted how critical it is to ensure ESD frameworks are made more meaningful to the community and less dominated by expert judgements and specialised knowledge.

Theme 4

Aslin, H., Conner, R. & Fisher, M. 2001, *Sharing in the catch or cashing in the share? Social impacts of individual Transferable Quotas and the South East Fishery*, Bureau of Rural Sciences, Canberra.

This report discusses the findings of research on the social outcomes of applying Individual Transferable Quotas (ITQs) to manage wild catch fisheries, with particular reference to Australia's South East Fishery (SEF).

Objectives

The broad aims of this study were to:

- assist in identifying the social impacts of ITQs,
- contribute to understanding the values, attitudes and motivations influencing fishing industry responses to ITQs
- potentially help produce more economically efficient and ecologically sustainable Australian fisheries by providing insights which might assist in the design and implementation of future ITQ systems
- potentially help reduce costs of managing Australian fisheries.

In this wider sense, the study is intended to inform policy makers and resource managers about research that can be undertaken to anticipate responses to new policy or management regimes.

Methods

To meet its objectives this study reviews previous research on social responses to introducing ITQs in fisheries and in any other relevant natural resource management contexts

- identifies and describes the social impacts of introducing ITQs, and draws comparisons between using ITQs in a specific Australian fishery, the SEF, and other national or international fisheries
- identifies fisheries managers' and policy makers' views on fishing industry responses to the introduction of ITQs in the SEF; and compares these views with findings of relevant studies undertaken by ABARE and the Australian fisheries' structural adjustment study (Metzner and Rawlinson 1998),
- to draw some conclusions about processes used to implement ITQs.

The interviewees included fisheries policymakers, managers, researchers and consultants, but did not include current fishing operators, who are intended to be the focus of a separate study.

Findings

At the time of publication there were few studies representing serious attempts by policy or management agencies to use social science to enhance decision-making or to inform other jurisdictions of the lessons learned. ITQs have different effects in different fisheries. Fisheries are complex systems of interactions among social, cultural, economic, ecological and institutional factors. This study shows the outcomes of changed policies and programs are not necessarily easy to predict. How impacts are judged depends fundamentally on the value system and perspective from which judgements are made, and whether they occur at all depends on contextual factors in the fishery in question.

Conclusion

Uncertainty can be reduced by better-informed design of fisheries policies and programs; by learning from what has happened in other fisheries where similar changes have been made; and by better understanding the unique nature of each particular fishery system, including its social uniqueness. A set of measures and indicators could be developed for the impacts of most concern to policy makers, and could serve as the basis for an ongoing social monitoring system for the fishery in question. On the basis of SIA analysis, managers and policymakers may need to consider carefully the range of socio-economic and political factors, as well as ecological ones, applying in particular fisheries before deciding to proceed with or design new quota management systems. There is a need to develop social profiles for fisheries stakeholders, and to better understand wild catch fishers' knowledge systems. The relative lack of information on the social aspects of Australian fisheries and fishing industry points to a serious deficiency in critical information for managing it under ITQs, or any other type of controls.

Theme 4

Aslin, H., Webb, T. & Fisher, M. 2000, *Fishing for Women: understanding women's roles in the fishing industry*, Bureau of Rural Sciences, Canberra.

Aslin et al. gather information about women in the Australian fishing industry, women's views about current and future roles, barriers preventing women becoming more involved in the industry, and the value of women's networks and services. The research deals with women in the commercial fishing industry, including wildcatch and aquaculture.

Objective

The research was based on the view that women's roles in the Australian fishing industry are poorly reflected in industry statistics, and women's contributions to industry output and productivity are poorly recognised. There is far more information available on fisheries' production and stock assessments than there is on women's contributions. As a result, this project is designed to address what is an immediate need for information to help build a picture of the roles women play and help them develop those roles. This information will provide insight into what areas of the industry interest women, what issues concern them, and how they might further develop their roles.

Methods

The objectives were met by:

- conducting a search of relevant literature
- conducting key informant interviews with 20 people with senior roles or extensive experience in a range of industry sectors (17 women, 3 men)
- sending a mail-back questionnaire to 401 industry women, resulting in a final sample size of 202 respondents
- analysing interview and questionnaire responses using social science methods

Findings

Results from this study should be viewed with the consideration that 41% of respondents belonged to an owner-operator category and 32% working in a government capacity. Results indicated respondents were largely satisfied with their industry role, however the majority wanted to make some change and would like better recognition for their role. Barriers for making changes included time commitments, lack of money and, and discrimination and prejudice from men. This research produced a number of useful suggestions about measures that can be taken to enhance women's overall contribution to the Australian fishing industry. Many of the barriers identified in this study appear similar to those identified in the "Missed opportunities" report undertaken/funded by Rural Industry Research and Development Corporation in 1998.

Conclusion

Key areas for further research include:

- Developing a comprehensive list/statistics of women in industry
- Identifying gender imbalances currently existing in fisheries organisations
- Increasing communities understanding on Aboriginal Women's role in the traditional fishing sector
- Undertaking specific studies of women working in specialist sectors of industry and women's ownership of property and property rights
- Investigating health and safety standards for vessels operating in the wildcatch sector
- Build upon existing women's networks to provide a forum to meet other industry women and promote industry related opportunities and training.

Theme 4

Astles, K., Holloway, M., Steffe, A., Green, M., Ganassin, C. & Gibbs, P. J. 2006, 'An ecological method for qualitative risk assessment and its use in the management of fisheries in New South Wales, Australia', *Fisheries Research*, vol. 82, no. 1-3, pp. 290-303.

Risk assessment has become a key part of management plans for wild capture fisheries. However, for data-deficient fisheries and those with limited knowledge of ecological interactions a qualitative risk assessment method is needed.

Objective

This paper seeks to demonstrate that a logical and systematic method for qualitative risk assessment provides effective estimates of risk for input into the management plans of any fishery lacking information about one or more of its ecological components.

Method

Using a risk analysis framework adapted from the Standards Australia/Standards New Zealand 4360 we used a multi-stage risk assessment process that consisted of risk context (defining the undesirable event to avoid for any component of the ecosystem), risk identification (sources of risk from the activities of a fishery) and risk characterisation (levels of risk for each species or component of the ecosystem). A qualitative risk matrix was developed to determine the risk from fishing for each component of the ecosystem. The matrix combined two independent factors (fishery impact profile and resilience) that described the factors that determined the likelihood (i.e. the risk) of an undesirable event. Specific issues arising from the risk assessment are then identified. These issues are used in the fishery management plan to generate specific responses that will lower risk levels. The strengths of this qualitative method include its adaptability to a range of different ecosystem components within a fishery (e.g. habitats and threatened species as well as target species) and its applicability to a wide range of different fisheries. The steps involved and the decision criteria used to determine risk levels are transparent and logical, thus are open to scrutiny by stakeholders.

Findings

This qualitative risk assessment method provides an important tool to fishery managers and scientists in developing robust management plans where there are minimal data about and knowledge of the fishery. The method is adaptable, repeatable and robust. Differences between the method used in this particular study and that of others are discussed [Fletcher, W.J., Chesson, J., Fisher, M., Sainsbury, K.J., Hundloe, T., Smith, A.D.M., Whitworth, B., 2002. National ESD reporting framework for Australian Fisheries; Fletcher, W.J., Chesson, J., Fisher, M., Sainsbury, K.J., Hundloe, T.J., Fisher, M., 2005. A flexible and practical framework for reporting on ecologically sustainable development for wild capture fisheries. *Fish. Res.* 71, 175-183].

Conclusion

The qualitative risk assessment method presented in this paper identifies four main strengths. First, it can be used in a wide range of fisheries. Second, the decision-making process is clearly documented throughout the qualitative risk assessment. Such documentation gives transparency at all stages so that the information used and the basis for decisions can be scrutinised by stakeholders and peer reviewers. Such transparency is a key characteristic of the ESD of fisheries worldwide. Third, systematic use and documentation of a large volume of information and decision rules in interpreting the information minimises the need to rely on collective expert judgement as other qualitative risk assessments do in various forms. Fourth, it is a method that is known to work in practice. It was developed in the process of doing an actual risk assessment on multi-species commercial fisheries in NSW.

Theme 3

Australian Aquaculture Industry 2007, *Sustainable Aquaculture Development Strategy, July 2008- July 2012*, Australian Government, Department of Agriculture, Fisheries and Forestry, Canberra.

The growth of the emerging aquaculture industry is dependent upon significant support from the Australian Government in key areas of policy.

Objectives

The strategy is designed to significantly improve the profitability of small to medium size aquaculture businesses and free up working capital for further investment into growing their businesses and improving national and international competitiveness. This strategy highlights those areas of need that are critical to a vibrant, profitable and sustainable aquaculture industry in rural and regional Australia. In developing this strategy document, due consideration has been given to the value proposition and how this fits with Government policy.

Findings

There is considerable institutional failure concerning the key issues identified in this strategy and consequently the need for government to partner industry in creating an environment conducive to industry investment and growth. A range of programmes are identified, with actions, performance indicators and costings in the following areas: Trade and Market Access, Human Capital Development, Natural Resource Management (NRM), Biosecurity, Government Initiatives Influencing Aquaculture Development, Communications, Promotions, Investment and Administration. Each of these programmes identifies areas requiring investment to ensure strong business growth and development.

Conclusions

The proposals in this report are critical to build the capacity in industry and Government and to ensure sustainable growth in industry. The Strategy recommends further research in 'social science'. In Natural Resource Management: the -need to explore social indicators for aquaculture, so greater information and data can be used in Ecological Sustainable Development (ESD) public reporting frameworks, -need to educate industry on the value and use of socio-economic information as a marketing and sustainability tool, -need to improve public perception of aquaculture as current acceptance levels are currently restricting approvals for industry expansion. Referral to BRS studies already undertaken concerning perceptions of aquaculture, -need to promote social and economic benefits that aquaculture brings to regions through appropriate public reporting. The Biosecurity Programme: -need to develop a database that enables industry and the public to access import testing information and to review and improve these arrangements whilst ensuring Australia drives socially responsible prawn farming in Asia. The Communications Programme: -serious need to address communication in the industry and extend outputs of this development strategy; -improve information flow to communities in rural and regional Australia and to other key stakeholders. Development of fact sheets to promote ESD credentials. It is intended for this strategy to be administered by a small team of dedicated stakeholders. This paper was written in 2007, so some of these programmes may have been supported and embraced by industry.

Theme 3

Australian Government 2008, *Co-management: Managing Australia's fisheries through partnership and delegation*, Report of the FRDC's National working group. FRDC, Canberra.

To obtain the best economic, environmental and social outcomes from fisheries, it is now well recognised that managers must interact well with commercial, recreational and indigenous fishers and with others in the community who seek to use fisheries natural resources. Genuine interaction and partnerships are at the heart of co-management, but practical ways of achieving it have proved exasperatingly difficult.

Objective

In 2006, responding to interest from government, industry and researchers, the Board of the Fisheries Research and Development Corporation commissioned a report to aid its understanding of the drivers behind co-management, the potential benefits and the conditions necessary for its successful implementation. The board then initiated a project (Fisheries co-management initiative — no. 2006/068) to report more comprehensively for a wider audience, including those proposing a number of individual co-management projects.

Findings

The report is a practical “How to...” guide, providing a flexible framework to tackle the challenges of co-management and reaping its many benefits. It can be applied at various levels, within different commercial, recreational or indigenous fisheries depending on the prevailing circumstances. The framework proposed facilitates an audit of a fishery to describe the management activities and the pre-conditions necessary to achieve co-management. A definition of co-management is provided; acknowledging the importance of mutual trust, without which co-management will founder. This report is a springboard for further decisions about the adoption and implementation of co-management arrangements by government and industry. The proposed framework will underpin efforts to measure and improve the performance of fisheries and their management. The report is taking Australia further on its journey to economic, environmental and social sustainability of its fisheries resources. The report contains a clear pathway and method for the development of co-management models for fisheries. The report is easy to follow and included is a five step process for implementing co-management.

Conclusion

Fisheries managers cannot manage wild fish — only the behaviour of fishers and, to a severely limited extent, some aspects of the ecosystems on which they depend. To obtain the best economic, environmental and social outcomes from fisheries, it is now well recognised that managers must interact well with commercial, recreational and indigenous fishers and with other people in the community who seek to use fisheries natural resources. Genuine interaction and partnerships are at the heart of co-management. However, practical ways of achieving it have proved exasperatingly difficult. Wide consultation is needed at the specific fishery level to assess the best approach to gain the benefits of co-management. Current management systems, while generally increasing consultation among all parties, still suffer from conflict and confrontation among fishers and other stakeholders. Often, the parties involved also lack an appropriate measure of trust, respect and responsibility among themselves.

Theme 1

Baelde, P. 2001, 'Fishers' description of changes in fishing gear and fishing practices in the Australian South East Trawl Fishery', *Marine and Freshwater Research*, vol. 52, no. pp. 411–17.

Between the mid 1980s and early 1990s, the concurrence of three major events significantly altered the structure and dynamics of the demersal trawl sector in the Australian South-East Fishery (SEF). These events included marked technological improvement, severe decline of major fish stocks and introduction of an Individual Transferable Quota system. They have led to a switch from maximizing catch volume to maximizing catch composition and quotas, with important associated changes in fishing practices and catches.

Objective

To better understand these changes and their effect on stock assessment and management, an industry survey asked SEF trawl fishers to describe their fishing gear and fishing practices in detail.

Method

This paper is a qualitative synthesis of current trends in fishing that most significantly affect the single-species, logbook-dependent assessment and management of the fishery. The study took place in 1997 and began with a series of pilot interviews from which a questionnaire was developed for subsequent in-depth interviews. Face to face, semi-structured interviews were then conducted using the questionnaire as a guide to ensure that the same topics would be addressed with each respondent.

Findings

It demonstrates how effective collaboration between scientists and fishers can benefit fisheries research and management, by helping scientists make more informed analysis and interpretations of fisheries data.

Conclusions

The study clearly shows the benefit that can be gained from collaborative work between scientists and fishers. The study of fishers should be a major part of fisheries research. Too few studies give consideration to factors such as fishers' socio-economic needs in analysing fisheries, despite the major influence that these factors have on fishing decision and associated catches. Until we seriously look into this, our poor understanding of fishing strategies will continue to undermine the validity of scientific assessment and limit the effectiveness of management.

Theme 4

Baelde, P. 2005, 'Interactions between the implementation of marine protected areas and right-based fisheries management in Australia', *Fisheries Management and Ecology*, vol. 12, no. 1, pp. 9-18.

The declaration of marine protected areas (MPAs) in Australia generates much confusion and controversy between government conservation and fisheries agencies, the fishing industry and NGOs. There are fundamental differences between the principles and practices underpinning the implementation of MPAs and fisheries management.

Objective

The principles and practices underpinning first the implementation of MPAs and second fisheries management in Australia are reviewed and their interactions analysed.

Findings

The paper highlights the difficulties in integrating the two effectively. The findings of the research suggest that major challenges for governments are: poor cooperation between fisheries and conservation agencies; in principle inconsistencies between allocation of fishing rights by fisheries agencies and loss of these rights through MPA declaration; re-allocation of resources between user groups through spatial zoning; lack of fisheries expertise in conservation planning, and inappropriate single-species/single-issue approach to fisheries management.

Conclusion

As fisheries agencies are now considering developing their own MPAs as tools for fisheries management, the need to address inconsistencies between conservation and fisheries approaches to the spatial management of natural resources increases further.

The author concludes that better collaboration between government agencies and better coordination of their activities would help more effective and less conflicting management of marine resources.

Theme 1

Balkanu Cape York Development Corporation 2004, *Living on Saltwater Country: Cape York Peninsula Sea Country Management, Needs and Issues*, CSIRO, Hobart.

The Northern Regional Marine Planning (NRMP) process is a response to requests by Traditional Owners for improved engagement. This report is a summary of the key aspirations of Indigenous peoples within the Northern Marine Planning Area (NMPA).

Objectives

The aims of the report were:

1. To provide some context for the planning process in relation to the Aboriginal world view and emphasise the primacy of Aboriginal people and interests on Cape York as part of the NMPA;
2. To catalyse and progress processes that support and maintain that reality, culturally, socially, economically and environmentally and identify roles for subregions, Cape York Land Council and Balkanu in the following phases of the NRMP process, including engagement with Northern Australian Indigenous Land & Sea Management Alliance (NAILSMA);
3. To provide information to the National Oceans Office about what Aboriginal people want for their saltwater country; what the range of Aboriginal aspirations and interests is and; where Aboriginal people have got to in pursuing those desires; what Aboriginal people need to fulfil those wishes.
4. To indicate how the above integrate with regional initiatives;
5. To contribute to the understanding and delivery of equitable management of resources;
6. To move on from what is known to practical action on-the-ground action.

Findings

Traditional owners want the National Oceans Office NRMP to acknowledge that Indigenous issues and opinions relating to marine management are an intrinsic part of mainstream land and sea management. Indigenous peoples are frustrated by and saturated with consultation processes. There is a widespread incredulity that 'anything will get done'. Some tangible benefits accruing from the NRMP need to be identified. Control of knowledge and other processes need to be formulated by Traditional Owners, their representatives and governments.

Conclusions

The report concludes by emphasising the importance of recording traditional knowledge and ideas for management solutions. It was recommended that a large investment in saltwater ethno-ecological research and research partnerships be made as such research would provide the substance for real management with which Traditional Owners could identify.

Theme 4

Beeton, R., Buckley, K., Jones G., Morgan, D., Reichelt, R. & Trewin, D. 2006 *Australia State of the Environment 2006. Coasts and Oceans Theme Report. Independent report to the Australian Government Minister for the Environment and Heritage, Canberra.*

Objective

This report was written to provide source material for Australian State of the Environment Committee's purposes. Independent contract authors prepared the supporting theme reports that the Committee considered during preparation of the SoE Report. The SoE reports provide summaries of various aspects of fishing (commercial, aquaculture, recreation and indigenous sectors). The themes reports address:

- The state of our coastal and marine environment
- Management of our coastal and marine environments
- Risks to the marine and coastal environments
- Emerging issues

Findings

This report found that in Australia there has been a major emphasis on the management of land and the value of agriculture to our economy and our communities. There has been less emphasis on the value of wetlands, estuaries and other coastal environments. The report also acknowledged that managing the activities of people in a way that conserves habitats while sustaining resources and industries is extraordinarily complex and difficult.

Conclusion

When environmental, social or cultural qualities are in decline, a key step in the remedy is for the public to be aware of the changes, and the causes of change.

Theme 4

Bose, S. & Crees-Morris, A. 2009, 'Stakeholder's views on fisheries compliance: An Australian case study', *Marine Policy*, vol. 33, no. 2, pp. 248-253.

Recent reports by the Australian Institute of Criminology (AIC) have clearly documented the States and the Commonwealth authorities' concerns in relation to the extent of non-compliance in the Australian fishing industry in general and abalone fisheries in particular.

Objective

Most of the existing studies on fisheries compliance have mainly focused on the investigation of factors that are likely to influence fishers' decision to comply or not to comply with existing regulatory measures using a deterrence model. This study, however, diverges from the existing literature in the sense that it is aimed at educating both primary and secondary stakeholders' views on fisheries compliance. In this regard, the main objective of the paper is to investigate if there are significant differences of views between primary and secondary stakeholders in deciding on the potential factors of non-compliance and the extent of their influence on non-compliance in the fishery.

Method

This study presents the results of a field survey that focused on the views of Tasmanian abalone fishery stakeholders (commercial and non-commercial divers, processor, enforcement agency and management) with regards to non-compliance in the abalone fishery. The primary data was collected through 22 face-to-face interviews with stakeholders and the Wilcoxon's signed-rank test was used to determine if significant differences existed between the means of responses from primary and secondary stakeholders.

Finding

It was found that there is no significant difference in mean responses of primary and secondary stakeholders in regard to the factors that have the potential in influencing the non-compliance in the fishery. The similarity of views between the regulators and resource users on the source and nature of non-compliance in the fishery could form the basis for improved compliance strategies.

Conclusion

Commitment from the management authority on its own is unlikely to induce immediate and sustain upturn in compliance performance. For this to be achieved requires an integrated approach involving all key stakeholders with the aim of enhancing enforcement capacity to respond to the multi-jurisdictional illegal activities.

Theme 4

Bradshaw, M. 2004, 'A combination of state and market through ITQs in the Tasmanian commercial rock lobster fishery: The tail wagging the dog?', *Fisheries Research*, vol. 67, no. 2, pp. 99-109.

Few fisheries are entirely state planned or market coordinated, but are a combination of both. In the case of the Tasmanian commercial southern rock lobster (*Jasus edwardsii*) fishery, the Tasmanian Government has effectively dealt itself out of the fishery as an owner–stakeholder. It owns no quota units itself and finds various social initiatives blocked by legally powerful quota holders who rarely view the fishery as a whole. These individuals profit from their strong access right, free of any responsibility for the biologically and socially sustainable management of the fishery. In some respects, the state body responsible for the management of the fishery finds itself disempowered, whereas those empowered by ITQs may seek solely to enhance the value of their holdings.

Objective

Two questions occur regarding this Tasmanian situation: first, how did it arise; and, second, what might have been done differently to avoid this imbalance between state and market? This paper addresses the first question by tracing the emergence of regulatory measures in the fishery, and the second question by posing that the 'Q' in ITQs may deliver biological sustainability, but that conditions associated with the 'T', especially, require careful consideration if ownership and control of a fishery are to remain in the hands of both fishers and the state.

Method

This paper draws on a 2-year social impact assessment of the introduction of individual transferable quotas (ITQs) in the Tasmanian commercial rock lobster fishery in Australia.

Findings

The principal lesson to be learnt from the Tasmanian case is that ownership and transferability of entitlements require careful consideration concerning the social character of the fishery as well as the state's stake in the fishery. In managing a fishery using ITQs, the state risks giving up too much power to the market as legally strong individual private access rights-holders can act as an impediment to responsible planning at the fishery-wide scale.

Conclusion

The challenge ahead is for the Tasmanian Government to reassert its rights at the same time as encourage a more responsible outlook from private rights-holders with whom it now has to share the fishery.

Theme 1

Bradshaw, M. & Wood, L. 2003, 'Zoning and the Tasmanian commercial rock lobster fishery', *Local Environment*, vol. 8, no. 5, pp. 513-525.

This paper uses the Tasmanian commercial rock lobster fishery to explore whether the political claim regarding sustainable management made by the Tasmanian Government to the Federal Government is in alignment with administration of the fishery on a Tasmania-wide basis. They suggest that technically, sustainability may not have been achieved in some places in the fishery.

Objectives

The paper explores the logic of managing the fishery as a single region. The authors purport that a 'convenient regulatory ignorance of local difference' exists in the current reporting process of the Tasmanian government to the Federal government.

Findings

The introduction of quota management has affected the socioeconomic sustainability of a number of port communities around Tasmania. The ports most affected are on the west coast—namely, Strahan, and Currie on King Island.

Conclusions

Treating differences among rock lobster stocks, as well as among fishers' operating practices, as management differences through zoning, encourages fishers better to match fishing effort with stock levels. One answer, is for a management frame not to ignore its various components but in some way to connect with them.

Theme 1

Bradshaw, M., Wood, L. & Williamson, S. 2001, 'Applying qualitative and quantitative research: a social impact assessment of a fishery', *Applied Geography*, vol. 21, no. 1, pp. 69-85.

Most fisheries research is biological rather than social, and what social research there is tends to be mainly economic.

Objective

The researchers objectives were: to provide a baseline socioeconomic profile of the Tasmanian rock lobster industry in late 1997, and 2. to assess the implications for coastal communities in Tasmania of the proposed shift to a quota-based management system. This paper addresses the issue of combining qualitative and quantitative research approaches using a concrete example: a social impact assessment of the rock lobster fishery in Tasmania.

Methods

A multi-methods approach.

Findings

The article provides a condensed account of the decision-making, conduct, report and outcomes associated with the Tasmanian social impact assessment for the rock lobster industry. It transpired that applications of more orthodox quantitative research methods and techniques – the postal questionnaire survey and the calculation of multiplier effects – were of limited use at a local level. It was qualitative methods and finer scales of resolution that highlighted possible effects on those in the industry, for example lessees, who, because they have no transferable rights of access to the base resource, tend to be ignored in official procedures. In short, quantitative research provided valuable general background context while qualitative research made possible deeper more specific insights.

Theme 4

Brooks, K., Charalambou, C., Coakes, S., Gabriel, M. & Roberts 2001, *The Right Bait - Social Contributions of tourism fishing charter operations to St Helens, Tasmania*, By and on behalf of: Social Sciences Centre Bureau of Rural Sciences, Department of Agriculture, Fisheries and Forestry – Australia, Canberra.

This social assessment report was commissioned by the National Oceans Office.

Objectives

To assist in the process of Regional Marine Planning in the South East Region of Australia. This work builds upon the research undertaken for the Marine Matters Atlas. Given that the Marine Matters case studies covered the South East Trawl and Oil and Gas industries, this study was undertaken to add a further dimension to the understanding of community impacts of different marine uses; in this case; charter boat fishing.

Method

The report deals with the qualitative research on tourism Fishing Charter Boat operations undertaken in St Helens, Tasmania (of which there are 128 verified operators) and it focuses on the interaction and contribution industry has and makes to the community. A range of methods including a case study approach were used as to assess the social contribution of the charter boat industry to the St. Helen community. 7 Charter boat operators participated in individual or group interviews and several representatives from state-wide agencies provided background information.

Findings

Community impacts and social contributions identified included, employment and economic, education and training, environment and marine use and management. There is growing recognition that the charter boat industry will need to be accounted for within any future marine and fisheries management plans the introduction of a licensing system for charter boat fishing. This report provides the opportunity for scientific baseline social inputs into the Regional Marine Planning processes, to minimising adverse community reactions to policy and decision making processes.

Conclusion

Although the Regional Marine Planning process in the South East Region of Australia has since been completed, the social inputs identified in this report could be used as a reference for future marine park planning decisions around Australia.

Theme 3

Brown, V. & Spink, M. 1997, *Caring for the commons: socio-cultural considerations in Oceans Policy development and implementation. Socio-cultural considerations - Issues Paper 4.*, Environment Australia, Canberra.

The worldwide decline in the sustainability of the oceans' resources brings with it the need to manage the oceans as one of the world's last commonly-held resource pools. Socio-cultural considerations will determine the policy options capable of achieving an effective management regime.

Objectives

Rather than further fragmenting approaches to oceans policy development by highlighting economic sector and social group differences, this Discussion Paper seeks to identify areas of potential agreement and the avenues by which these could be put into effect. The focus of the paper is therefore on the options for collaborative management and long-term stewardship identified by Australia's various socio-cultural interests.

Methods

The management priorities for a wide range of relevant stakeholder groups are identified through review of existing documents, submissions to the inquiry, and interviews with members of twenty major Australian initiatives with an interest in oceans policy such as CoastCare, Australian Seafood Industry Commission, Great Barrier Reef Marine Park Authority (GBRMPA).

Findings

All respondents and most commentators identify a need for a stewardship ethic for the oceans. Strongly held views by 80% of submission writers and respondents advocated some version of collaborative, multi-party management based on cooperation between industry, science, government, and community.

Conclusion

The paper concludes with a profile of Community Stewardship With Integrated Management (CSWIM), a tool kit for implementing the option preferred by almost all groups involved in the policy process. Policy implications and examples of current best practices for this approach are drawn from a wide range of examples including Convention on the Conservation of Antarctic Marine Living Resources, GBRMPA, Landcare, Integrated Local Area Planning, and Canadian community partnerships.

Theme 1

Bucher, D. 2006, 'Spatial and temporal patterns of recreational angling effort in a warm-temperate Australian estuary', *Geographical research*, vol. 44, no. 1, pp. 87-94.

Among the critical issues for the management of estuarine fish resources is the need to adequately identify the extent of use by recreational fishers, and the allocation of the resource between recreational and commercial users. Recreational anglers in estuaries often target a similar range of estuarine fish species to commercial fishers. Prior to the declaration of 'recreational fishing havens' (estuarine waters closed to commercial netting but remaining open to recreational angling) in many New South Wales (NSW) estuaries in May 2002, the estuary of the Manning River on the central NSW coast supported the tenth most productive commercial estuarine net fishery in the State.

Objective

To quantify the recreational angling effort in the Manning River estuary.

Method

Progressive counts were made of shore-based and boat-based anglers from a small power boat from June 2001 to May 2002. Sample days (eight per month) were chosen in a stratified random fashion, taking into account the proportions of weekends, public holidays and school holidays in each month.

Findings

The total recreational angling effort exerted on the estuary for the 12-month period was 144 892 ± 3248 angler-hours, indicating a low to medium effort compared to other NSW estuaries of similar size. Over half of the effort was exerted in the section nearest the northern entrance at Harrington. There was relatively little variation in shore-based angling effort throughout the year, whereas boat-based fishing increased markedly in summer. Months that coincided with NSW school holidays were most popular, especially January. More recreational fishing effort was exerted in the afternoons than in the mornings during winter, but this trend was reversed in summer. Although daily effort was much higher on weekends than weekdays, the total cumulative effort was generally similar, due to the greater number of weekdays in the year.

Conclusions

Pilot studies of catch per unit effort indicate that the recreational catch in the Manning River estuary is probably small compared to the pre-closure commercial catch. Therefore management strategies aimed at limiting the recreational catch are likely to have minimal impact on fish stocks in the estuary when compared with regulation of the commercial sector.

Theme 5

Buxton, C., Haddon, M. & Bradshaw, M. 2006, *Regional impact assessment for the marine protected areas proposed for the South-East Region*, The Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart.

In 2005 the Australian Government announced detailed proposals for the establishment of an extensive network of Marine Protected Areas (MPAs) in the South-East Region of Australia. Simultaneously, the Australian Government's fisheries management reform, including substantial reductions in Total Allowable Catch (TAC) and the purchase of fishing licenses to remove effort from over fished fisheries, was extended to fishers – both Commonwealth and State licensed – who were affected by the creation of the MPA network. This report investigates the considerable impacts that these announcements pose for the fishing industry and the considerable socio-economic implications for individual fishers who fish within the proposed areas, for entire fisheries, and on the overall supply of seafood to the Australian consumer (11 case studies were undertaken).

Objective

The objectives of this research were:

- To quantify the commercial fisheries catch for key species within the proposed MPAs for the South-East region;
- To quantify the commercial fisheries economic value associated with the catch within the proposed MPAs for the South-East region;
- To quantify the socio-economic impact of the proposed MPAs on the commercial fishing industry; and
- To outline in terms of the above, alternative approaches that minimize impacts on the fishing industry without compromising the biodiversity objectives of DEH.

Findings

On the understanding from the Commonwealth Department of Environment and Heritage (DEH), that the proposed areas were negotiable, Industry and management agencies believed the most appropriate response was to characterise and validate the impacts and make a scientifically defensible case for alternatives such as boundary changes or alterations to proposed MPA classifications. These alternatives were designed to minimise impacts on the fishing industry while at the same time preserving the conservation values of the proposed MPA network. With reference to sociological impacts, a number of general conclusions were apparent: Impacts were not a simple addition of the effects in each MPA, rather they were a complex interaction across the entire network; Blue-eye trevalla was a key species that leveraged the profitability of individual operations well above the GVP of the catch;

- The entire Tasmanian scallop fishery was at risk with significant consequences for the profitability of businesses
- The orange roughy fishery was significantly impacted, especially by the high proportion of seamounts and pinnacles in the system
- The proposed MPAs had a very significant impact on several communities notably St Helens and Triabunna in Tasmania, and Kangaroo Island in South Australia.
- Many jobs would be lost in rural communities. The sample alone (80 fishers and processors) suggested a loss of 52 permanent and 152 casual positions.
- Despite the impacts and the proposed restructure, many fishers would be forced to remain in the fishery. The obvious effect would be greater effort on remaining areas and stress on the sustainability and ecological health of adjacent areas.

Conclusion

Taking account of the findings of the study, and with the help and support of both Industry and DEH an alternative network of MPAs in the South-East region was proposed. This study forms a benchmark for similar MPA planning processes in other regions around Australia.

Theme 4

C&R Consulting Pty Ltd. 2007, *As far as the eye can see, Indigenous interests in the East Marine Planning Region*, C&R Consulting Pty Ltd for Department of the Environment and Water Resources, Canberra.

Objective

This literature review of Indigenous interests in the East Marine Planning Region (Figure 1) is one of the first steps in developing a Marine Bioregional Plan for the Commonwealth Waters off Australia's East coast

Findings

This report provides a summary of Aboriginal interests in the East Marine Region (EMR), pre- and post-European contact, including community identity, marine resource use, past and current associations with the Region, current issues, and aspirations of these communities. Whilst the focus is Australia's Eastern Commonwealth Waters (beyond 3 nm offshore), attention is also given to Indigenous interests in coastal and inshore areas as an indication of likely interests in waters further offshore, and in recognition of Indigenous perceptions of the connectivity between land and sea. The literature provides strong material evidence of long-standing Indigenous interests in the coast and inshore areas of South-East Queensland and New South Wales, including material culture, marine technology, and marine resource use. This long-term history has implications for interpretation of Sea Country along this coastline. The geographic scope of the report does not include the Great Barrier Reef Marine Park or the Torres Strait. Nonetheless it should be noted that the marine interests of Aboriginal communities adjacent to the Great Barrier Reef may extend beyond the outer boundaries of the Marine Park, particularly in the north. Likewise, Torres Strait Islanders have a rich history as seafarers, and are likely to have interests in the northern extreme of the East Marine Region. To date there are no Native Title claims or determinations over waters in the EMR, although the Report discusses six current claims that are awaiting decisions that may be relevant.

Conclusion

For coastal Aboriginal communities to maintain their connection with the waters of the EMR there must be an increased commitment from all levels of government to provide genuine opportunities for engagement and involvement in planning and management – at a scale that recognises the diversity of Indigenous interests.

Theme 5

Carey, J. 2007, 'Risk-based approaches to deal with uncertainty in a data-poor system: Stakeholder involvement in hazard identification for marine national parks and marine sanctuaries in Victoria, Australia', *Risk Analysis*, vol. 27, no. 1, pp. 271-281.

Management responsibilities for the system of marine national parks and sanctuaries declared in Victoria, Australia in 2002 have created imperatives for robust, scientifically defensible approaches to identifying threats to valued ecological attributes of the parks, setting management priorities, and developing monitoring systems.

Objective

To develop a protocol for ecological risk assessment in the parks that has due regard for the perception of risks by individuals, and ensures that stakeholder values are an intrinsic part of decision making. The inclusive and transparent protocol provides an opportunity for stakeholder involvement in the identification of valued attributes, as well as in the assessment of associated risks. Our approach brings together ideas about how science enters the community engagement domain in ways that promote collaboration and transparency in decision making.

Method

A series of stakeholder workshops across the state drew on the expertise of agency staff, community groups, fishers, industry representatives, academics, and knowledgeable park neighbours to identify hazards of major concern in the parks.

Findings

Many hazards involved predictable, tangible threats like pollution and exotic species, but the approach also identified a number of less obvious threats related to governance issues and the knowledge-base for the parks. Importantly, the workshops with their broad range of stakeholders identified threats not previously considered by the management agency in its internal assessments, and several of these “new” threats are already the subject of action by the agency. The deliberate incorporation of local knowledge and local networks in the risk assessment process also provided opportunities for greater engagement of stakeholders with the management agency.

Conclusion

The involvement of multiple stakeholders strengthens the validity of the ecological risk assessment process, enriching the pool of information, heightening discussions, and creating wider understanding among internal and external stakeholders about how the threats to valued attributes are assessed as part of environmental decision making.

Theme 3

Carter, J. 2008, 'Thinking outside the framework: Equitable research partnerships for environmental research in Australia', *Geographical Journal*, vol. 174, no. 1, pp. 63-75.

Many environmental science research programmes now adopt community-based philosophies and designs, although there are few applications in Australian Indigenous communities.

Objectives

This research was designed to develop and test a framework of engagement while implementing a participatory environmental science research project in two case study areas located on Aboriginal land in northern Australia. Specifically, the project aimed to assess trepang (sea cucumber) stocks in Aboriginal waters, and determine the commercial harvest potential of the resource to local people. Its objectives were to undertake trepang survey and mapping, integrate Indigenous knowledge about the resource, and model the existing catch data of commercial fishers operating in the region.

Method

The framework of engagement developed to guide the research process comprised a goal, research stages, and a number of guiding principles for collaboration, which were constructed from content analysis of available guidelines and literature and from data gathered during expert interviews. Further data were gathered using participant observation, while implementing the trepang research in accordance with this framework of engagement, and these data were analysed to test and evaluate the framework.

Findings

Findings indicate discursive and reflective approaches such as action research or adaptive management may better facilitate equitable research partnerships for sustainable development.

Conclusion

This research suggests if indigenous participation in environmental or sustainable development is to be genuine and equitable research partnerships are to be advanced then iterative approaches such as action research and adaptive management, rather than linear project designs, are needed.

Theme 5

Carter, J. & Hill, G. 2007, 'Indigenous community-based fisheries in Australia', *Journal of Environmental Management*, vol. 85, no. 4, pp. 866-875.

The commercial sea cucumber species known as Sandfish (*Holothuria scabra*) occurs intertidally and subtidally in the Northern Territory of Australia, on or adjacent to Aboriginal land. Shared dialogues increase the public knowledge-base and are inclusive of the social and economic needs of minority groups. An attempt to involve indigenous people in the sea cucumber fishery in northern Australia to assist them in securing a sustainable future provides an excellent case study. A 4-yr program of community-based fisheries research with Aboriginal Australians was implemented to assess the viability of indigenous Australians' involvement in the wild-stock fishery.

Objective

The aim of the paper was to describe the reasons for the failure of a community-based fisheries initiative with indigenous people in Australia. It tests the notion that the inclusive, community-based project design with participatory mechanisms and knowledge exchange structures would provide the required information to government authorities, and demonstrate the capacity of Aboriginal people to become involved in the fishery.

Method

The research involved extensive and intensive indigenous participation, unusual in Australian biophysical sciences research, during field survey and habitat mapping, complemented by commercial catch data modelling and discussion of its implications.

Findings

Field surveys produced Sandfish distribution and site-specific density, and revealed some areas that were not commercially fished. Catch data modelling results suggested that no additional effort could be sustained, however commercial fishers increased their effort, expanding their operations into the newly mapped areas. These actions effectively precluded indigenous peoples' aspirations of entry into the commercial fishery. No community-based fishery, nor any Aboriginal involvement in the fishery, has been established since the study.

Conclusion

The efficacy and outcomes of participatory program design with indigenous Australians need critique in the absence of the political will and statutory backing to provide equitable access to resources.

Theme 5

Carvalho, P. & Clarke, B. 1998, 'Ecological sustainability of the South Australian coastal aquaculture management policies', *Coastal Management*, vol. 26, no. 4, pp. 281-290.

Coastal aquaculture in South Australia has been going through a period of unprecedented growth during the past seven years. The value of the South Australian aquaculture industry has increased from US\$1.3 million in 1990-1991 to an estimated US\$31 million in 1996-1997. This growth has led to the implementation of planning and management policies by the state government. South Australian coastal waters have been divided into regions, and regional aquaculture management plans have been prepared. These management policies have generated concerns among interest groups and the community.

Objective

To present current planning and management of coastal aquaculture in South Australia and consider these in light of principles of ecological sustainability.

Findings

Coastal aquaculture planning and management policies are described and analysed, focusing on their contribution to the development of an ecologically sustainable industry. The need for an integrated approach to management is emphasized, especially given the great interest of the state government on the development of the industry.

Conclusion

The main challenge was found to be the need to cultivate the political will to improve the current management practices toward a more holistic and integrated style that reflects the diverse interests represented within the coastal zone.

Theme 1

Casement, D. & Rural Solutions SA and Seafood Services Australia 2006, *Engagement of seafood stakeholders: engaging stakeholders in environmental management systems for the seafood industry*, Rural Solutions SA, Adelaide.

This report was commissioned by Seafood Services Australia under the 'EMS Pathways for the seafood industry project'.

Objective

To identify the key requirements for engaging seafood stakeholders in environmental management systems for the seafood industry.

Method

Surveys, interviews, literature reviews and focus group activities were undertaken to gauge the key factors for engagement. This guided a recommended process for ensuring successful engagement with identified tools that can be considered in future engagement processes.

Findings

The study found that key factors for successful stakeholder engagement in EMS within the seafood industry, are:

1. Demonstrated benefits;
2. Personal Consultation/Interaction;
3. Early Involvement in the development/implementation of an EMS;
4. Generation of trust by facilitators;
5. Efficient and reliable Seafood industry EMS network (also assist in ongoing engagement and recognition);
6. Applicable/easily related to own industry/individual operation;
7. Easily accessible information sources

Conclusion

A stepwise process to the preferred approach of developing an EMS that incorporates the key factors for successful engagement and provides the best chance of achieving positive recognition by the seafood community was identified. The authors noted that it was most important that industry who now recognise the need for EMS, actually go forward and engage in the EMS process and begin implementing systems into their businesses.

Theme 3

Chesson, J., Clayton, H. & Whitworth, B. 1999, 'Evaluation of fisheries-management systems with respect to sustainable development', *Journal of Marine Science*, vol. 56, no. 6, pp. 980-984.

Australian legislation requires Commonwealth fisheries to be managed according to the principles of ecologically sustainable development. This imposes a complex set of potentially conflicting, multiple objectives on the management agency. The Bureau of Rural Sciences, a professionally independent scientific bureau within the Department of Agriculture, Fisheries, and Forestry, has developed a framework for specifying these objectives and evaluating progress over time using a variant of multi-criteria analysis.

Objective

To demonstrate how the framework can explore the impact of variability in views among stakeholders on the evaluation of fishery performance with respect to ESD.

Findings

The framework allows trade-offs to be recognized, compared, and integrated. It involves a hierarchical structure of objectives that can be developed to any level of detail desired. There are at least three ways in which uncertainty can be incorporated into or investigated by the framework. First, objectives at any point in the hierarchical structure can be specified and evaluated in terms of probabilities. Second, subjective weights can be used to quantify and explore the consequences of individuals attaching different values to particular objectives. Third, the framework itself can be the basis for evaluating performance of different management systems using Monte Carlo or other modelling techniques. Sensitivity to subjective weights is illustrated with a case study of the South-East fishery, a multi-species trawl fishery providing much of the fresh seafood to South-Eastern Australia.

Conclusion

The framework is proving to be a flexible evaluation tool as it is applied to the major Australian Commonwealth fisheries.

Theme 3

Claridge, G. & Claridge, C. 1997, *Expanding the role of collaborative management and stewardship in the conservation management of Australia's marine and coastal resources*, Commonwealth of Australia, Canberra.

This paper examines the history of the stewardship ethic in Australia and relates this to the rise of a number of government-funded collaborative management programs.

Objective

To examine the potential for increasing the contribution of collaborative management and particularly the stewardship ethic to the conservation of marine and coastal resources in Australia.

Findings

The paper identifies a number of the characteristics of effective and sustainable collaborative management and suggests the most important as being:

- a supporting cultural and bureaucratic environment;
- participating stakeholders have adequate skills and knowledge;
- an adequate and appropriate organisational structure;
- collaborative activities are adequately funded;
- primary stakeholders (in decision-making roles) support collaborative activities;
- there is an established process of monitoring and review that takes into account process
- and performance and in which the community members participate;
- conflict resolution mechanisms exist; and
- clearly defined boundaries and membership for the collaborative arrangement.

Conclusion

A key conclusion is that, while increased awareness of environmental issues may help to generate a stewardship ethic in the individual, this will not be translated into changed behaviours until social norms emerge that will support and encourage this aspect. There is a need for public awareness campaigns that focus on changing behaviour. The paper concludes that Australia is beginning to embark on a range of initiatives with the potential to develop meaningful collaborative management arrangements in the marine and coastal environment. The success of these will be better assured if the range of initiatives suggested in this paper are undertaken.

Theme 1

Clarke, B. 1996, *Aquaculture management and planning in South Australia, blue farming revolution or goldrush?*, University of Adelaide, Adelaide.

In South Australia, coastal, sea-based aquaculture the controlled farming of aquatic organisms, has undergone significant growth. This growth has coincided with significant changes in the management and planning of the industry in the state. There has been a recent worldwide acceptance of the need to manage natural resources at an ecosystem level, reflected in the emergence and wide embrace of ESD and integrated coastal zone management principles.

Objectives

To assess the adequacy of planning and management for aquaculture in South Australia to meet internationally recognised principles and guidelines for ESD.

Methods

This research project reviewed several recognised national and international management policies, frameworks and guidelines, designed to assist in managing coastal environments in an ecologically sustainable manner. These documents provided the basis for assessing the adequacy of current aquaculture management processes in South Australia. Interviews with key, informed coastal and aquaculture managers and a media analysis enhanced the findings of the assessment of management processes.

Findings

Ultimately the findings of this research project indicate that numerous aspects of aquaculture management and planning are inadequate and do not award sufficient attention to protecting our unique and ecologically significant coastal environments in South Australia.

Theme 1

Commonwealth Department of Agriculture Fisheries and Forestry Australia 2003, *Looking to the future - A review of Commonwealth fisheries policy*, Commonwealth Department of Agriculture, Fisheries and Forestry – Australia (AFFA), Canberra.

The fundamentals of the policy and management framework for fisheries and aquaculture set out in the 1989 policy remains relevant today. However, the changing policy environment of Australia's fisheries during the intervening years requires an update.

Objectives

To review existing policy and management framework for fisheries and to provide updated recommendations on the basis of the review.

Findings

The report identifies the drivers of fisheries policy and management; gives overviews of Commonwealth fisheries; and presents the outcomes of a review of fisheries policy; and identifies a new set of strategies to secure the future for Australia's fisheries. The review highlighted strong support for:

- a continued focus on the principle of ecologically sustainable development (including social) in fisheries management
- maintaining the current institutional arrangements for managing Commonwealth fisheries
- Australia's participation in regional and international fisheries management
- effective and transparent decision making to allocate access rights among all sectors using fisheries resources.

Conclusion

This report is a policy document; therefore it identifies and guides a range of initiatives to meet community expectations to ensure the sustainability and appropriate management of Commonwealth fisheries. The initiatives provide a basis for new work that will enhance the future management of Australia's fisheries resource. Over 50 strategic initiatives are recommended and there are only very few that have a broad social and/or social science context.

Theme 1

Commonwealth of Australia 2004, *Working with Indigenous knowledge in Natural Resource Management - Sea Forum case study*, Canberra.

Objectives

The Sea Forum (IV) took place on Fraser Island in March 1999 to identify issues for which all Traditional Owner groups on the SGBR had concerns.

Findings

This short document, identified key issues under discussion, for example, co-management, permit and planning systems, fisheries and aquaculture issues and educational and cultural awareness.

Conclusion

The Sea Forum process involved the development of issue-based research papers for each identified topic covered during the forum. It was hoped these papers would be jointly developed between the Forum and agencies as a basis for negotiations on each issue.

Theme 5

Commonwealth of Australia 2009, *Climate change risks to Australia's coast: A first pass national assessment*, Department of Climate Change, Canberra.

The first pass national assessment of *Climate Change Risks to Australia's Coast* is one of the key actions identified in the *National Climate Change Adaptation Framework* endorsed by the Council of Australian Governments (COAG) in 2007. This report presents the findings of the first national assessment of the risks of climate change for the whole of Australia's coastal zone.

Objectives

The objectives of the first pass national coastal risk assessment are to:

- Provide an initial assessment of the future implications of climate change for nationally significant aspects of Australia's coast, with a particular focus on coastal settlements and ecosystems
- Identify areas at high risk to climate change impacts
- Identify key barriers or impediments that hinder effective responses to minimise the impacts of climate change in the coastal zone
- Help identify national priorities for adaptation to reduce climate change risk in the coastal zone

Findings

The Framework recognised that national assessments are required in key sectors and regions to support informed decisions on adaptation action by policy-makers, business and industry, resource managers and the community. The assessment focuses on risks to settlements and infrastructure, ecosystems and industries in the coastal zone. The spatial and quantitative analysis is restricted to risks to residential buildings at 2100. Analysis of other risks has been through literature review and expert opinion. The assessment has highlighted major current data and analytical capacity limitations which can inform future investment in capacity building.

Theme 3

Crawford, C. 2003, 'Qualitative risk assessment of the effects of shellfish farming on the environment in Tasmania, Australia', *Ocean & Coastal Management*, vol. 46, no. 1, pp. 47-58.

Community concerns about the detrimental effects of shellfish farming on the environment have been increasing over the last decade in many shellfish producing countries, including in Tasmania, Australia. Environmental effects of shellfish farming can be assessed and managed using risk management processes, which have been developed for a wide range of human activities.

Objectives

To undertake a risk assessment of shellfish farming activities to determine the whether and to what extent they were having detrimental impacts on the ecology of the Tasmanian marine environment.

Methodology

Standard risk assessment methodology. This was based on local environmental information and on the level of production, stocking densities, and known husbandry practices in Tasmania compared to farm operations and levels of impact observed in other countries. The risk management process used in this study appears to be applicable to a variety of aquaculture activities.

Findings

The qualitative risk assessment of detrimental impacts of shellfish farming rated the risk of spread of introduced pests and/or pathogens as high. However, this high risk rating would also apply to many other activities in the marine environment, such as commercial and recreational fishing and sea transport. The level of risk due to habitat disturbance was rated as moderate within the lease area, but would not be expected to extend outside the farm. Risks of organic enrichment of the seabed and reduced food resources for other filter feeders were both rated as low.

Conclusion

A qualitative risk assessment can play a very important role in identifying risks and documenting relevant data, and conducting an assessment of risk based on factual information, rather than personal perceptions of environmental impact.

Theme 3

Davis, D. & Tisdell, C. 2000, 'Recreational scuba-diving and carrying capacity in marine protected areas', *Ocean & Coastal Management*, vol. 26, no. 1, pp. 19-40.

Marine protected areas (MPAs) are declared principally to protect biological and environmental values in areas where such values are special. The declaration of MPAs is well accepted and widely used in a number of countries. Many recreation pursuits rely heavily upon marine resources, and marine-based tourism is growing at a significant rate. Scuba-diving is one recreational pursuit which is experiencing greater participation rates. Consequently, conflicts between recreation and conservation may occur in multi-use MPAs, with scuba-divers impacting the natural environment on which the sport relies. Heavy usage by scuba divers also reduces amenity values in MPAs.

Objective

To review the importance of MPAs (including economic values) and the impact of activities such as scuba-diving on MPAs.

Findings

The paper is a review of literature and commences with a discussion of the arguments for MPAs. The potential for conflict between different users of marine resources is raised and solutions considered. An increase in the number of scuba divers is anticipated, although, it is noted that for Australia reliable estimates of diving activity and divers is derived with some difficulty. The dive industry relies, to a considerable extent, on the use of MPAs for its operations. It is problematic as to whether the granting of protected area status makes these areas more well-known and, consequently, more heavily used for recreational pursuits. The review explores the reasons for why people dive and why they dive where they do. It then provides a comprehensive discussion about the potential damage caused by divers in MPAs. The review suggests there is little evidence that severe biological degradation or loss of biological diversity results from recreational scuba-diving in MPAs. However, a caveat follows explaining that little monitoring has been undertaken of diver-induced impacts, even in very heavily dived areas. A model of the relationship between diver density (as measured by the number of individual dives) and threshold stress level is provided and suggested as a way forward for assessing the impact of diving activity in MPAs.

Conclusion

The evidence is that critical social and biological thresholds exist. Above these thresholds amenity values are reduced severely, while biological impacts may also become significant. The interrelationships between amenity and biological values are worthy of further research to identify biological and social carrying capacities in MPAs and, subsequently, to formulate suitable management responses to reduced MPA values.

Theme 3

Day, J. 2002, 'Zoning - Lessons from the Great Barrier Reef Marine Park', *Ocean and Coastal Management*, vol. 45, no. 2-3, pp. 139-156.

The Great Barrier Reef Marine Park (GBRMP) is bigger than the United Kingdom, Holland and Switzerland combined. Over the last 25 years a range of management 'tools', including zoning plans, permits, education, and more recently management plans, have been applied to regulate access and to control and mitigate impacts associated with human use of the GBRMP. This paper outlines what aspects of zoning have worked well, what has necessarily changed, and the zoning lessons learned from over two decades of 'adaptive management'

Objective

To determine which of management tools have been effective in the rezoned Park.

Findings

A multiple-use zoning approach provides high levels of protection for specific areas whilst allowing reasonable uses, including certain fishing activities, to continue in other zones. Zoning has long been regarded as a cornerstone of Marine Park management, separating conflicting uses through application of the various zones and determining the appropriateness of various activities. Zoning in the GBRMP has evolved and changed considerably since the first zoning plan in 1981, along with other management approaches. Management must be addressed at various scales and, while zoning is effective in addressing the generic small scale/large area issues, it is not adequate for addressing many specific localised small area issues. Many zone boundaries have been described in ways that have not helped public understanding, compliance or enforcement.

Conclusion

One aspect that has contributed to the success of the Great Barrier Reef Marine Park has been the level of public involvement throughout the zoning process, usually well beyond the level required in the legislation.

Theme 3

Department of Primary Industries NSW 2007, *Survey of Recreational Fishing in New South Wales*, Department of Primary Industries, NSW.

Objective

A twelve month survey of recreational fishing in New South Wales was conducted in 2000-01. The survey was part of a broader national initiative to obtain fisheries statistics on non-commercial components of Australian fisheries. The project was funded by grants from the Fisheries Research and Development Corporation (FRDC), Natural Heritage Trust (NHT), and by State fisheries agencies. A team of scientists from the State fisheries agencies and several external consultants implemented the project as a series of independent State wide surveys under national coordination and management. The national project is currently being finalised and a report will be available early in 2003.

Method

The survey obtained estimates of the level of participation, fishing effort and catch by recreational fishers. The survey also sought information on the economic activity associated with fishing and the attitude of recreational fishers to prominent fisheries issues. The survey used remote (telephone and diary) survey methods as the primary source of information from recreational fishers.

Findings

Key findings indicated a substantial number of people (1 million fishers) were involved in the NSW recreational fishery, using a diverse range of fishing methods to harvest finfish, crustaceans and molluscs from State waters.

Conclusion

NSW needs an information base to support the management of commercial and recreational fishing.

Theme 5

Dominion Consulting Pty Ltd 2003, *Identifying the recreational fishing expenditure of Sydney's recreational fishers and its economic and social importance in regional communities of New South Wales*, a report to the recreational trust fund, NSW Department of Fisheries, November, Sydney.

In July 2001 the saltwater recreational fishing licence was introduced into NSW requiring all non-exempt anglers to purchase either a 3 day, one month, one year or three year licence.

This initiative prompted the need for a greater understanding of the fishing behaviour, expenditure and expectations of anglers. This information was sought to assist management committees and the government to make informed policy and management decisions. It was also intended to allow coastal local government and tourism bodies to better consider the needs of recreational fishers in planning and service delivery. The survey also examined social data from anglers and their expectations for a positive fishing experience.

Objective

This survey sets out to establish the level of angler expenditure in NSW, and by Sydney anglers in particular, in order to obtain a greater understanding of the impacts of recreational fishing licence holder (RFLH) expenditure on regional coastal economies in NSW.

Method

This study used a telephone survey of 1,254 holders of the NSW recreational fishing licences. All fishers were asked about their knowledge and previous use of recreational fishing havens (RFHs) and also about their likely future use of RFHs. The expenditure of Sydney anglers on travel statewide and on expenditure at fishing sites away from Sydney was also investigated. Anglers were also asked about their expectations of amenities and facilities at fishing sites. The socio-economic demography of Sydney fishers was also investigated.

Findings

The frequency of visits to different RFHs indicates the popularity of different RFHs along the NSW coast. Botany Bay, George's River were found to be most popular with Sydney residents. Lake Macquarie was most popular with Newcastle and Sydney residents. The attributes of desirable fishing locations required by Sydney anglers were: clean environment and catching one or more fish of legal size. Information on places to fish and places to launch boats were of lesser importance. The study found that that in this context recreational fishing was a socially diverse recreational activity and that while demography, social and motivational aspects almost certainly affect fishing behaviour, these aspects merit further study.

Conclusion

The study confirms that the desire of recreational fishers is to catch one or more legal sized fish through a satisfying recreational experience in a clean environment. Management needs to maintain and enhance fish availability to a level which encourages anglers to make more trips to the coastal regions of NSW, with subsequent revisits, bringing a stream of recurrent expenditure to coastal communities.

Theme 5

Dominion Consulting Pty Ltd 2005, *An assessment of economic and social issues in the NSW abalone fishery management strategy*, NSW Fisheries, Sydney.

The abalone fishery in New South Wales lacks information to guide planning and strategic development in areas of current economic and social information on fishing operations and the processing industry.

Objective

This study gathers and analyses economic and social information related to the NSW Abalone Fishery in order to appraise the proposed fisheries management strategy.

Method

To gain up to date information across all fishery primary producers in NSW, two surveys were commissioned by NSW Fisheries in May 2001.

Findings

The study presents a comprehensive set of data and background detail about the economic and social aspects of the fishery.

Theme 5

Dwyer, P., King, T. & Minnegal, M. 2008, 'Managing shark fishermen in Southern Australia: A critique', *Marine Policy*, vol. 32, no. 3, pp. 263-273.

The management of fish always entails the management of people. Constraints on access to fishing grounds, on time spent fishing, on gear used to catch fish or on quantities of fish that may be harvested all circumscribe the behaviour of people who may wish to catch fish for either recreational or commercial purposes. Government authorities often invite resource users and other stakeholders to participate in the decision making process. Arrangements of these kinds are commonly referred to under general labels such as "co-management" or "partnership".

Objective

This paper challenges the success of AFMA's partnership approach - the shift from input to output controls in Australia's Southern Shark Fishery.

Findings

The use of two management tools--individual transferable quotas and a "partnership approach"--was flawed and the authors argue that primary contributing causes were the unjustified expectation that quota management would serve as a 'technical fix' to a variety of presumed problems, the discounting of social effects and the extreme lack of stability in the organizational structure within which this fishery was situated.

Conclusion

The mantra "securing our fishing future" became AFMA's catch-cry during the 2006 buy-back process. The experience of fishermen, however, has been of instability and uncertainty, of heightened inequalities and tension and, especially for smaller-scale operators, material and social disadvantage. The introduction of ITQ management failed to achieve its explicit objectives and the 'partnership approach' to management was little more than rhetoric masquerading as consultation. To the authors the major factors in these failures were the unwarranted expectation by managers that ITQ management would lead to desired outcomes that were never clearly thought out, the discounting of social dimensions of management decisions, and the ceaseless reorganization of institutional arrangements that, on the one hand, generated uncertainty and stress for fishermen and, on the other, meant that rigorous analysis of the effects of a particular change could never be accomplished.

Theme 4

Edyvane, K. 1999, 'Coastal and marine wetlands in Gulf St. Vincent, South Australia: Understanding their loss and degradation', *Wetlands Ecology and Management*, vol. 7, no. 1-2, pp. 83-104.

Despite the vastness of South Australia's coastline, approximately 95% of the state's population of 1.4 million is on the Adelaide metropolitan coast of Gulf St. Vincent. The concentration of human activity around this shallow, sheltered gulf ecosystem has led to conflict and competition over the use of marine and coastal resources.

Objective

This paper aims to present our understanding of marine wetland loss in GSV in terms of the direct and indirect causes. This produces a clear picture of why wetland loss has continued unabated. From this perspective, the way forward can be identified. Strategies are suggested for ensuring the long-term conservation of these productive and ecologically significant ecosystems.

Findings

The gulf supports extensive areas of ecologically significant subtidal and tidal coastal wetlands, comprising seagrass meadows, mangroves and saltmarshes, with nine wetlands having recognized national importance. The wetlands support economic activities such as commercial and recreational fishing, tourism and aquaculture, and to a lesser extent, mineral and petroleum exploration and shipping. These environments and activities are threatened by the effects of land-based urbanization, coastal development, stormwater runoff effluent and industrial discharges, and the resultant decline in water quality and food-chain contamination. Marine activities can also have adverse effects (i.e., dredging, sea-dumping, overfishing, fishing methods, oil spills, antifoulants, ballast water introductions), including the developing aquaculture industry. The continued loss and degradation of marine and coastal wetlands in the gulf is exacerbated by inadequate protection measures, lack of integrated management structures and policies, and conflict between competing user groups.

Conclusion

Strong policies and integrated decision making based on sound information is required for the equitable and sustainable use of these wetlands. Gulf-level management of multiple-uses would limit the cumulative impacts of human use and coastal development. There is a particular need to protect areas with high conservation value and for future research and marine conservation to focus on the coastal nearshore ecosystem. High priorities are coastal and biodiversity inventories, understanding of ecological processes, linkages between coastal and offshore habitats, and coastal spatial mapping and information systems.

Theme 1

Evans, G. & Johnstone, I. 2006, *A review of people development in the Australian Fishing Industry - Final Report*, Report No. 2005/309, Fisheries Research and Development Corporation (FRDC), Canberra.

The Fisheries Research and Development Corporation (FRDC) has a commitment to investing in people development to support the fishing industry and to enhance its learning, innovation and professionalism.

Objective

The FRDC sought to take a more strategic approach to funding its people development program to ensure investments were closely aligned with industry priorities and needs. As a result, in 2006, the following project was funded: "*A review of people development in the Australian Fishing Industry*".

Findings

The authors made a wide range of recommendations that covered the needs of all sectors of the industry. They identified an urgent need to build capacity at the local and regional levels to address real and practical issues impacting on industry development. Evans and Johnstone also believed a strategy-based approach, rather than a project based approach would help address the largely uncoordinated and fragmented nature of people development that is currently occurring across the industry. There was a suggestion for FRDC to work with a range of peak industry bodies to ensure an industry-wide approach to people development that is based on agreed priorities and is best placed to lever investment at all government levels. Greater access to vocational education and training funding for the fishing industry was identified.

Conclusion

The authors noted FRDC will require immediate support as well as take steps to ensure it can sustain the program in the longer term. Input from key stakeholders on a continuing basis would ensure its people development strategies continue to reflect the priorities and needs of the broader industry.

Theme 3

Federation of Ethnic Communities' Councils of Australia 1997, *We fish for the future: Recreational fishing and people of Indo-Chinese background*, Commonwealth of Australia, Canberra.

Fishing is a common practice amongst Australians of Indo-Chinese, especially Vietnamese background, as well as amongst Pacific Islanders, those from the former Yugoslavia and those of Southern European origin. The presence of fishers of diverse cultural and linguistic backgrounds has dramatically revealed some important cultural differences. Evidence is emerging that illegal and damaging fishing practices persist in the community because the benefits of the collection of seafood and other intertidal organisms - entrenched cultural practice, enjoyable recreational past-time, "free" resource - is seen as outweighing the risk of being caught. This suggests that a comprehensive and strategic approach to modifying the recreational fishing practices of this community are needed, using both appropriate and targeted education and advertising as well as increased policing and higher penalties.

Objectives

The Project's key objectives are: To explore the appropriateness of Recfish's Code of Practice for communities of Indo-Chinese background; To explore the most strategic ways of getting the messages of the Code of Practice across to communities of Indo-Chinese background; To consider other programs and projects nationally which are of relevance to this project; To recommend appropriate strategies for increasing education and awareness about the issue in communities of Indo Chinese background.

Findings

Survey results of this community found a generally held perception was that the marine environment is viewed as a 'free' resource which is capable of replenishing itself. While many in the community do know that certain fishing practices are illegal under Fisheries rules and regulations there is generally little comprehension, and therefore little acceptance, of why this is so. Lack of English proficiency in particular, and illiteracy in the vernacular are widespread in the Indo-Chinese community. Due to cultural and language barriers, communities such as the Indo-Chinese are often excluded from mainstream involvement in policy making; the fact that damaging practices, whilst particularly widespread in certain communities, are by no means unique to them, and, that 'scapegoating' a particular community is not going to go very far in assisting to change or modify recreational fishing practices amongst this group.

Conclusion

The challenge for Recfish - as the peak lobby group representing Australia's Recreational and Sport Fishers - is how to engage its own constituency in working together with other relevant stakeholders towards assisting members of Indo-Chinese communities to replace damaging and illegal fishing practices with legitimate recreational ones. The report has a series of recommendations.

Theme 4

Fenton, M. & Marshall, N. 2000, Social assessment of the commercial fishing industry in the Great Barrier Reef Marine Park: The application of TRC-Analysis in identifying primary and secondary resource catchments, Proceedings 9th International Coral Reef Symposium, , Bali, Indonesia, 23-27 October 2000.

There are approximately 5,500 commercial fishers living in coastal communities in Queensland, Australia. It is becoming increasingly important that those involved in the management of the fishery understand the direct and indirect social and economic impacts of changes in fisheries management regimes within the Great Barrier Reef Marine Park.

Objective

To understand possible social and economic impacts of implementing the Great Barrier Reef Marine Park Authority's Representative Areas Program on communities that are dependent on fishing resources in Queensland.

Method

Baseline social assessment profiling of Queensland's commercial fishing industry has been undertaken. Town Resource Cluster Analysis (TRC-Analysis) was used to define clusters of coastal communities consisting of mutually interdependent towns that were associated with identifiable primary and secondary fisheries resource catchments.

Findings

Through TRC-Analysis the location and type of social impacts associated with changes in fisheries management regimes within specific geographic areas could be identified, allowing the inclusion of social data and information concurrently with ecological information in the identification of marine protected and other representative areas.

Theme 3

Fenton, D. & Marshall, N. 2001, *A guide to the fishers of Queensland. Part C: TRC-analysis and social profiles of Queensland's charter fishing industry*, CRC Reef Research Centre Technical Report No. 38, Townsville.

Objective

To provide a comprehensive profile of the charter fishing industry in Queensland that can assist in assessing potential social and financial impacts of changes in fisheries policy and management.

Method

The research is based on a framework known as Town Resource Cluster (TRC) Analysis. Social and financial information was collected from charter fishers using structured telephone interviews. (This framework best examines the relationship between resource systems and human social systems. Specifically, the analysis identifies clusters of mutually interdependent towns and communities (TRCs) that have relationships to specific areas of marine resource use.)

Findings

Twenty-two TRCs were identified along the Queensland coast from Karumba in the north to Southport in the south of Queensland. A detailed description of the social and financial profiles within each TRC is provided for those TRCs in which there were at least five charter operators. The social and financial profiles of charter fishing businesses may be developed further in terms of indicators of sensitivity to change.

Theme 3

Fenton, M., Coakes, S. & Marshall, N. 2003, 'Vulnerability and capacity measurement', in *The International Handbook of Social Impact Assessment*, ed. H. Becker and F. Vanclay, Edward Elgar Publishing Ltd., UK, pp. 211-230.

The chapter asserts that conceptual frameworks for SIA are few.

Objective

To provide a description of a conceptual framework of SIA, labelled town resource cluster analysis (TRC-analysis), using the Queensland commercial fishing industry in Australia as an example (based on a previous study by Fenton and Marshall 2000).

Method

Telephone interviews with commercial fishermen.

Findings

The chapter defines what is a social system: the meaningful spatial units or social catchments that define a community in question. The chapter explains how the TRC framework was used to identify the social catchment of the Queensland commercial fishing industry. The chapter also describes the findings of social analysis of the TRC. Resource dependency was also analysed using the framework. The authors argue that this analysis is a step up from previous one-dimensional research approaches. The combining of analysis of both social and resource systems allows for more conceptually and methodologically rigorous measures or indicators of resource dependency.

Conclusion

The use of TRC may assist in the assessment of social impacts arising from changes in the management, use or condition of natural resources.

Theme 3

Fernandes, L., Day, J., Lewis, A., Slegers, S., Kerrigan, B., Breen, D., Cameron, D., Jago, B., Hall, J., Lowe, D., Innes, J., Tanzer, J., Chadwick, V., Thompson, L., Gorman, K., Simmons, M., Barnett, B., Sampson, K., Death, G., Mapstone, B., Marsh, H., Possingham, H., Ball, I., Ward, T., Dobbs, K., Aumend, J., Slater, D. & Stapleton, K. 2005, 'Establishing representative no-take areas in the great barrier reef: Large-scale implementation of theory on marine protected areas', *Conservation Biology*, vol. 19, no. 6, pp. 1733-1744.

The Great Barrier Reef Marine Park, an area almost the size of Japan, has a new network of no-take areas that significantly improves the protection of biodiversity. The new marine park zoning implements, in a quantitative manner, many of the theoretical design principles discussed in the literature. For example, the new network of no-take areas has at least 20% protection per "bioregion," minimum levels of protection for all known habitats and special or unique features, and minimum sizes for no-take areas of at least 10 or 20 km across at the smallest diameter. Overall, more than 33% of the Great Barrier Reef Marine Park is now in no-take areas (previously 4.5%).

Objectives

The steps taken leading to this outcome were to clarify to the interested public why the existing level of protection was inadequate; detail the conservation objectives of establishing new no-take areas; work with relevant and independent experts to define, and contribute to, the best scientific process to deliver on the objectives; describe the biodiversity (e.g., map bioregions); define operational principles needed to achieve the objectives; invite community input on all of the above; gather and layer the data gathered in round-table discussions; report the degree of achievement of principles for various options of no-take areas; and determine how to address negative impacts.

Findings

Some of the key success factors in this case have global relevance and include focusing initial communication on the problem to be addressed; applying the precautionary principle; using independent experts; facilitating input to decision making; conducting extensive and participatory consultation; having an existing marine park that encompassed much of the ecosystem; having legislative power under federal law; developing high-level support; ensuring agency priority and ownership; and being able to address the issue of displaced fishers.

Theme 3

Fisheries Victoria 2008, *Victorian climate change strategy for fisheries and aquaculture 2008-2018*, Melbourne.

Objective

The Victorian Climate Change Strategy for Fisheries and Aquaculture 2008-2018 will help to ensure the long term sustainability of Victoria's fisheries resources by guiding activities to support the fishing and aquaculture sectors and fisheries managers to prepare for, and adapt to, the impacts of a changing climate. Research information obtained under the Strategy will assist Victoria's fishing and aquaculture sectors to implement actions to manage their own exposure to climate change risks and to successfully meet the challenges and opportunities ahead.

Method

The Strategy covers all fishing and aquaculture for both inland and marine waters. It explains the roles of the Victorian Government and the fishing sectors in preparing for climate change, and explains how the Victorian Government will support adaptation strategies.

Findings

For social context, the following strategies have been identified:

- Ensure when making resource allocation decisions that the impacts of climate change are taken into account.
- Ensure appropriate economic and social information is considered when making resource allocation decisions.
- Better understand the vulnerability of fisheries and aquaculture sectors and communities to climate change (including the social and economic impacts). The impacts to consider will include changes to the resources, changes to market conditions and changes to policy responses in Australia and abroad.
- Identify how the fisheries and aquaculture sectors and communities are likely to respond to the climate change challenge and of some of the impediments to adaptation. This information will assist the Department of Primary Industries in working with its stakeholders to facilitate adaptation to climate change
- Communicate likely impacts of climate change and options for adaptation to stakeholders.

Theme 3

Fletcher, W. 2005, *ESD reporting and assessment subprogram - strategic planning, project management and adoption*, Final Report. Fisheries Research and Development Corporation (FRDC), Canberra.

This is a final report of the outcomes of the Fisheries Research and Development Corporation (FRDC) Ecologically Sustainable Development (ESD) Subprogram.

Objective

The main objective of the three year Subprogram was to act as the coordinating hub for the development of this information and tools for ESD reporting and assessment. A substantial amount of work has been undertaken since 2001 to develop the methods to measure and assess the performance of fisheries across the full range of ESD issues (including social issues).

Findings

The tools that were developed within the projects include ESD reporting frameworks for wild capture fisheries and aquaculture; an assessment manual for assisting in the reporting on management of wild capture fisheries; the development of risk assessment modules for assisting to determine which ecological impacts of wild capture and aquaculture sectors require management; and a handbook for the completion of social assessments. These tools are considered to be world's best practice and are now being used not only within Australian agencies and the industry but are being taken up by external groups such as FAO. The Subprogram provided a forum for the discussion of ESD related issues amongst fisheries agencies, environmental agencies, the seafood industry and the environmental NGOs. This assisted in developing a greater level of partnership amongst all these stakeholders. A set of agreed ESD terminology was generated and these definitions have now been agreed by the Australian Fisheries Management Forum and the Marine & Coastal Committee of the Natural Resources Management Standing Committee.

Conclusion

The projects managed within the Subprogram have provided the ability for agencies and the industry to complete detailed management and assessment against all ESD principles for individual fisheries.

Theme1

Fletcher, W., Chesson, J., Sainsbury, K., Fisher, M., Hundloe, A., Smith & Whitworth, B. 2002a, *National application of sustainability indicators for Australian fisheries. Final report* Fisheries Research and Development Corporation (FRDC), Project 2000/145, Canberra, Australia.

Objective

To design a framework to document a fishery's contribution to ESD, capturing both the positive and negative impacts.

Method

A reference group of stakeholders (including fisheries managers, researchers, industry, conservation groups and conservation agencies) was used to develop this initial framework and to provide comments and advice during the life of the project.

Findings

The primary outcome of this project is that all Australian fisheries now have access to a National ESD Reporting Framework and tools for its application. A draft conceptual and reporting framework for ESD and fisheries was developed at a meeting held in June 2000 which divided ESD into eight major components relevant to fisheries:

Contributions of the fishery to ecological wellbeing

- Retained species
- Non-retained species
- Other aspects of the environment

Contributions of the fishery to human wellbeing

- Indigenous wellbeing
- Local and regional wellbeing
- National social and economic wellbeing

Ability of the fishery to contribute

- Governance
- Impact of the environment on the fishery

Conclusion

The project was successful in developing a practical system that allows reports on all elements of ESD to be generated for a fishery. Most of the case studies went well, even those that were in the first series before the addition of the Risk Assessment component. Subsequent trials in WA have proved the system is capable of operating across many types of fisheries and the material generated can be used to complete applications to other agencies (12 fisheries have now been completed).

Theme 3

Fletcher, W., Chesson, J., Sainsbury, K., Hundloe, T. & Fisher, M. 2005, 'A flexible and practical framework for reporting on ecological sustainable development for wild capture fisheries', *Fisheries Research*, vol. no. 71, pp. 175-183.

The principles of sustainable development (or ecologically sustainable development as it is known in Australia) are now accepted as the foundation for natural resource management worldwide and there are increasing community expectations that they will be implemented explicitly. Previous attempts to assess sustainable development for fisheries have mostly failed because the methods have been too restrictive, often attempting to develop a single set of indicators.

Objective

To develop a framework for assessing ESD in fisheries.

Method

In 2000, all the fishery agencies and major stakeholder groups in Australia supported the development of a National ESD Framework. This initiative resulted in a practical system being generated through the results of a series of case studies and stakeholder workshops.

Findings

The Australian National ESD Framework divides ESD into eight major components within the three main categories of ecological well-being, human well-being and ability to contribute: Four main steps are used to complete an ESD report for a fishery: (1) identify relevant issues, (2) prioritise these using risk assessment, (3) complete appropriately detailed reports on each issue and (4) compile the material into a report.

Conclusion

The tools to assist this process are now available and have been used to generate reports for many Australian fisheries.

Theme 3

Fletcher, W., Chesson, J., Sainsbury, K., Hundloe, T., Fisher, M., Smith, A. & Whitworth, B. 2002b, *National ESD Reporting Framework for Australian Fisheries: The 'How To' Guide for Wild Capture Fisheries*, Fisheries Research and Development Corporation (FRDC), Canberra.

In early 2000, the Fisheries Research and Development Corporation (FRDC) funded a study to develop an ESD reporting framework for Australian fisheries. One of the major outcomes required from this project was the production of a 'How To' Guide to assist individuals, agencies and the industry to provide comprehensive accounts of the current performance of their fisheries (this paper). Achieving ESD requires the integration of short and long-term economic, social and environmental effects in all decision-making. Fisheries agencies in Australia are committed to incorporating the principles of ESD into their management of fisheries resources - an important element of which is the ability to report on performance.

Objective

To develop a fisheries framework that enables reporting on performance with respect to ESD.

Findings

The How To Guide depicts:

- definition of ESD and why reporting is required
- how to identify and prioritise ESD issues for fisheries
- how to write performance indicators for each issue
- background information (fishery/environmental/social/economic) to include in ESD reports
- risk assessment tables for issues
- advice and examples for completion of reports (including environmental, social and economic reports)

The major social components identified in this guide within the ESD framework include:

Contributions of the fishery to human well-being (Indigenous well-being; Community and regional well-being; National social and economic well-being). Within each of these identified components, a generic component tree was generated; indicating a general description of well being. The concept of 'social capital' was also discussed, and is defined as the norms and networks that enable collective action. There was recognition that communities with high levels of social capital are better able to deal with and respond to adverse changes compared to those with low social capital. A number of methods for measuring community social capital were acknowledged.

Conclusion

The development of a national ESD reporting system for all Australian fisheries forms a major turning point in fisheries management.

Theme 3

Fletcher, W. 2006, 'Frameworks for managing marine resources in Australia through ecosystem approaches: Do they fit together and are they useful?', *Bulletin of Marine Science*, vol. 78, no. 3, pp. 691-704.

Many ecosystem-based terms have been generated to promote more holistic approaches to the management of natural resources. Within Australia, despite the progress made toward applying these concepts to fisheries management, the multitude of terms has often caused stakeholder confusion.

Objective

To assist with the implementation of ESD, the National ESD Reference Group (NESDRG) developed a framework for the reporting and assessment of wild capture fisheries

Method

This framework outlined a four-step, risk-based process to help generate reports on all relevant ESD issues for a fishery; including impacts on target species and the broader ecosystem, along with the social and economic outcomes from the fishing activities and the current governance systems. The NESDRG held a workshop in April 2004 where the differences in the scope and concepts associated with each of the commonly used terms for ESD, along with the general problem of dealing with different terminology among groups and countries, were discussed. To minimize confusion, the most common terminology already being used in Australia to describe a type of assessment was generally retained rather than replaced with any newly adopted alternative.

Findings

A national workshop concluded that ecologically sustainable development (ESD; known elsewhere as sustainable development) should be the overall goal for government and that the other terms discussed (ecosystem-based management, ecosystem-based fisheries management, etc.) described strategies that should be used by various agencies and industry sectors to work toward this goal. All ecosystem-based approaches can cover the direct and indirect environmental impacts, social and economic outcomes, and governance systems associated with an activity. The main difference among them is the scope of the regions and activities covered and therefore the breadth of issues to be managed. A hierarchy of ESD-related frameworks and tools, designed to operate at a number of levels (the individual fisher, local and multiregional management agencies), is described, and the elements needed for their implementation (correct scope, transparency, inclusiveness, measurable objectives) are discussed.

Conclusion

The suite of definitions outlined in the paper, along with the general ESD approach, has now been accepted by all relevant government agencies within Australia. These agreements may increase the efficiency of expanding the implementation of assessments to levels beyond the individual fishery by reducing the time previously spent discussing what should be assessed. The analysis of ecosystem-related concepts has already helped identify which agencies should be working collaboratively to ensure the efficient exchange of information among levels. Nonetheless, given the complexity of negotiations among sectors and agencies (including the frequent high turnover of staff), and despite the considerable progress already made at lower levels, the process will probably take a further 10 yrs to be fully implemented across all levels, sectors, and regions. These results from Australia should be directly relevant to the implementation of ecosystem-based approaches in other locations.

Theme 3

Franklyn, E. 2003, *Aboriginal Fishing Strategy: "Recognising the past, fishing for the future"*, Fisheries Management Paper No. 168, on behalf of the Government of Western Australia, Department of Fisheries, Aboriginal and Torres Strait Islander Commission, Fisheries Research and Development Corporation, Department of Indigenous Affairs, Perth.

Objective

The draft Aboriginal Fishing Strategy report is a comprehensive effort to recognise the interests of Aboriginal people in the protection and use of fish resources in Western Australia. It is perhaps the most comprehensive report of its kind in Australia.

Findings

This report highlights a government commitment to a more integrated approach to the management of fish resources, and represents an opportunity to ensure Aboriginal fishing interests are given appropriate recognition in a more holistic approach to ensuring fish stocks are sustained for future generations. A range of recommendations in this draft report are made in regard to customary fishing, involvement in fisheries management and economic development.

Conclusion

This report was released for public consultation and provided an opportunity for the public to contribute their views and ideas on how Aboriginal fishing should be recognised and included in the management of fish resources in Western Australia.

Theme 3

Fraser, B. 2004, *Western Australian Aboriginal fishing strategy*, Department of Fisheries, Government of Western Australia, Perth.

Objectives

The strategy was developed in response to growing needs to recognise and include customary fishing rights and interests in a sustainable fisheries management framework. For example, was a need to identify what customary fishing entails, to effectively manage that activity and to develop customary fishing policy and legislation.

Findings

The primary outcome from the strategy is a set of recommendations that set a policy framework and provide guidance for Government in recognising, acknowledging and addressing Aboriginal fishing rights and interests. The list includes/addresses the following requirements and issues: recognition that customary fishing is quite distinct to other types of fishing and thereby requires a separate management approach; there needs to be engagement of Aboriginal interests in fisheries management through consultation processes; there is a need for employment and training programs; there should be consideration of a development of a fund to purchase commercial fishing authorisations on the open market for the benefit of Aboriginal people.

Conclusion

There have been a number of outcomes resulting from the strategy development process, including:

- approval of ongoing funding for an Aboriginal Fishing Management Officer;
- funding for an Aboriginal Trainee Fisheries Officer Program; and
- drafting of an agreement between the Commonwealth and the Western Australian Government relating to joint funding of several initiatives.

Theme 3

Frisch, A., Baker, R., Hobbs, J.-P. & Nankervis, L. 2008, 'A quantitative comparison of recreational spearfishing and linefishing on the Great Barrier Reef: Implications for management of multi-sector coral reef fisheries', *Coral Reefs*, vol. 27, no. 1, pp. 85-95.

Overfishing is deemed to be one of the greatest threats to the future of coral reefs. Two of the most common reef-fishing methods used in the Indo-Pacific region are linefishing, otherwise known as angling, and spearfishing.

Objectives

The aim of this study, therefore, was to compare the catch composition, CPUE and incidental impacts of recreational spearfishing and linefishing in the context of a coral reef fishery.

Method

Small teams of spearfishers and linefishers were engaged in a program of structured fishing on the Great Barrier Reef (GBR), Queensland, Australia. Importantly, both groups of fishers participated concurrently at the same reef site, thereby avoiding any spatial or temporal biases. Also, catch and effort data were recorded directly (i.e., "on site") to maximize accuracy. This study compared the catch composition, catch per unit effort, and incidental impacts of spearfishers and linefishers whereby fishing effort was standardized across time, space and skill level.

Findings

It was found that (1) the catch composition of both groups of fishers overlapped considerably, (2) the numbers of target fish caught by spearfishers (156) and linefishers (168) were not significantly different, (3) the mean size of target fish caught by spearfishers (1.95 ± 0.1 kg, \pm SE) was significantly larger than the mean size of target fish caught by linefishers (1.27 ± 0.06 kg), and (4) spearfishers retained 43% more biomass of target species than did linefishers (304 versus 213 kg, respectively). However, linefishers used 1 kg of bait for every 3 kg of target fish that were captured. Linefishers also caught far more undersized, undesirable, or protected fishes (i.e., bycatch) and caused far more pollution (i.e., lost gear) than did spearfishers.

Conclusion

It is concluded that the overall impacts of recreational spearfishing and linefishing on fishery resources of the Great Barrier Reef are broadly equivalent (per unit of fishing effort), and that management regulations should be applied equitably across both fishing sectors. A management strategy of this type will simplify enforcement of fisheries regulations and avoid discrimination of particular fishers in local communities where both fishing methods are socially or culturally important.

Theme 5

Fuay, M. 2009, *An evaluation of previous and current methods and models for researching Indigenous resource use and purposes, with recommendations for 'best practice' research solutions*, Report to the Marine and Tropical Sciences Research Facility. Reef and Rainforest Research Centre Limited, Cairns

Objective

To evaluate previous and current methods and models for researching Indigenous resource use and purposes, with recommendations for best practice research solutions

Methods

The research involved an extensive search, evaluation and critique of the published and unpublished literature on models of research in the international, national, regional and local domains. A special focus was trained on models of engagement between researcher and the research group, including participatory and collaborative models of research in the social and geographical/ environmental sciences.

Findings

The document articulates strategies and actions for addressing research into Indigenous resource use, and the associated issues of Indigenous Knowledge, Intellectual Property and models of research.

Gardner, S., Tonts, M. & Elrick, C. 2007, *A socio-economic assessment of industries in the South West Marine Region*, Prepared for the Australian Government Department of the Environment and Water Resources, Canberra.

This report provides a description and analysis of the main commercial marine users active in the South-west Marine Region (SWMR). The SWMR stretches from Kangaroo Island in South Australia, to Shark Bay in Western Australia - from the Territorial Sea Baseline out to 200 nautical miles.

Objectives

To describe the historical, current and emerging patterns of marine commercial use in the SWMR, and the socio-economic links with the adjacent coastal communities. This report is an important information source for the scoping stage of the marine plan. It also provides a resource that can be used to inform stakeholders of the commercial uses within the region.

Findings

Human use of the SWMR started with Aboriginal settlers who first moved into the region some 40 000 years ago. European exploitation of the resources of the region began with sealing and whaling in the early nineteenth century, but fishing, shipping and ports soon became important components of the region's economy. The range of uses expanded in the twentieth century, particularly in the post World War II period, with a substantial expansion in industrial and minerals activity in both South Australia and Western Australia. Today, the region has a complex socio-economic structure based on a wide range of industries. The focus of this report is on those industries which are most closely associated with the SWMR. These industries are: ports, shipping and ship and boat-building, oil and gas, marine tourism and marinas, submarine cables, defence, commercial fishing, recreational fishing, aquaculture, emerging industries (such as petroleum and biotechnology). These marine uses have been addressed in terms of current activity and distribution within the region, expected growth, key management and institutional arrangements, and main pressures affecting them. The report shows that the key industries of the region have grown rapidly over the past decade or so. The most notable growth has occurred in marine tourism and recreation, ship building, and aquaculture. At the same time, ports and commercial fishing have remained important commercial activities in the region. All of these industries underpin economic growth, employment, and social wellbeing in the cities, towns and small communities of the region. It is also clear that the industries of the region are far from static, and have experienced dynamic changes in their economic structure and geography. Recent years have also seen the emergence of new industries such as marine

biotechnology and desalination, and the prospect of oil, gas and minerals extraction. This report emphasises that existing and emerging industries also face a number of risks associated with factors such as international trade, global and domestic economic growth, interest and exchange rates, labour market constraints, policy reform and demographic change. Furthermore, there are potential risks to the marine environment; these risks are associated with virtually all of the industries operating in the region.

Conclusion

This report points out that from a marine planning perspective, it is important to recognise that many of these industries are also dependent on the ecological sustainability of the region's natural environment.

Theme 5

Gartside, D., Harrison, B. & Ryan, B. 1999, 'An evaluation of the use of fishing club records in the management of marine recreational fisheries', *Fisheries Research*, vol. 41, no. 1, pp. 47-61.

The size of the catch of recreational fishers has become a major issue in Australian fisheries management. Initially, it was thought by fisheries management agencies that recreational fishers caught relatively few fish compared to the commercial sector. More recently, however, there has been increasing awareness that for some species of fish, the recreational catch may equal or exceed the commercial catch.

Objectives

The present study examines two fishing clubs in northern New South Wales which have been established for a long time and attempts to evaluate the possible usefulness of their club records in providing data of use in the management of recreational fishing. The clubs are Lismore Angling Club, established in March 1937 and the Ballina Angling Club, established in July 1951.

Findings

Although there are limitations to the usefulness of data from fishing club records in management of marine recreational fisheries, the present study shows that, with careful analysis, trends relevant to resource management can be discerned. Club records analysed in the present study show that there are very large differences in catches and catch rates over time, including seasonally throughout the year. Increases in catch do not appear to be related to river floods, or to changes in angler effort or angler success rate. The changes in catch and catch rates have significant implications for measures for marine recreational fisheries management based on survey data. Results from this study relating to species caught and catch per unit effort are consistent with findings from other studies on recreational fishing, suggesting that data from fishing club records may be broadly representative of recreational fishing overall, at least for these aspects.

Conclusion

The value of fishing club records for fisheries management could be substantially increased if clubs collected data in a more standardised format.

Theme 4

Grafton, Q., Kompas, T., McLoughlin, R. & Rayns, N. 2007, 'Benchmarking for fisheries governance', *Marine Policy*, vol. 31, no. 4, pp. 470-479.

Objectives

The paper develops a benchmarking framework to improve fisheries governance and promote resilient ecosystems and profitable fisheries.

Findings

The benchmarking includes five key components: accountability, transparency, incentives, risk assessment and management; and adaptability. Collectively, these factors provide a framework to benchmark and improve fisheries governance. Initial findings from benchmarking in two of Australia's Commonwealth fisheries indicate that the framework provides an important tool to help overcome the underlying causes of unsustainability in capture fisheries--poor and/or ineffective fisheries governance.

Theme 3

Grantham, S. 2009, Insight into the fishers ecological knowledge system within the Lower Lakes and Coorong region of South Australia, Flinders University, Adelaide.

Though fishers are often thought to possess detailed knowledge regarding their respective fisheries, the systematic collection and documentation of fishers' ecological knowledge does not regularly occur. The knowledge system, commonly accumulated over many years, has the potential to aid in both scientific research and fishery management.

Objectives

This study therefore aimed to document the ecological knowledge held by the local fishers of the Lower lakes and Coorong commercial fishery in South Australia. Primary focus was placed on the collection of observations concerning commercial fisheries characteristics, physical environmental change and current fishery management.

Findings

The results obtained were then evaluated to ultimately provide examples of how the knowledge system can effectively be used to improve lakes and Coorong research and fishery management.

Theme 4

Greiner, R., Young, M., McDonald, A. & Brooks, M. 2007, *Australia's Ocean Policy: Management instruments for marine allocation and use*, Oceans Planning and Management Issues Paper 2, Department of Primary Industries and Energy, Commonwealth of Australia, Canberra.

The Australian Government is committed to developing a comprehensive and integrated Oceans Policy to manage effectively the resources and uses of the Exclusive Economic Zone.

Objective

This report seeks to explore and identify opportunities to use different incentive mechanisms to improve the health of Australia's oceans and the opportunities that they offer for the people who use and value them.

Findings

The report displays a wide range of incentive instruments and exemplifies their potential role for the management of marine resources and uses. The term incentive instrument is interpreted broadly, including financial and economic instruments as well as legal and regulatory instruments, education, co-management, voluntary approaches, community based mechanisms and research. A set of criteria is established for the evaluation of individual management instruments. The management instruments are further placed in the context of principles for policy design. The report discusses the potential and applicability of an appropriate selection of incentive instruments in the context of managing marine resources and uses. With respect to administrative arrangements, the report suggests alternatives to the current institutional framework which may be better suited to managing the ocean-land interface and the multiple uses of the oceans in a sustainable manner.

Theme 3

Ham, J. 2001, *Community communication guide strategies for positive action*, Fisheries Research and Development Corporation (FRDC), Canberra.

Objective

The purpose of the Community Communication Guide is to assist participants in the seafood industry in developing community communication plans. It encourages seafood communities to communicate the seafood industry's activities, social and economic contributions, and environmental commitment to community leaders and the broader community.

Findings

This guide provides direction and information for members of the seafood community to further their networks and enable them to make a significant contribution improving the image and raising the profile of the seafood industry.

Theme 2

Ham, J. 2003, *Developing a community communication guide and communications resource for the seafood industry, Final Report. Project 2001/310*, Fisheries Research and Development Corporation (FRDC), Canberra.

One of the seafood industry's ongoing challenges has been about public perception of the industry. These attitudes and perceptions have had undue influence over fisheries management decisions, which have adversely affected the industry over the years. Changing public perceptions about the seafood industry requires a broad and organised strategy aimed at all levels of the community.

Objective

The project provides strategies for all levels of the industry to effectively communicate with all levels of the community, including community leaders.

Findings

The *Guide* and *Resource Folder* provides a framework, practical advice and guidelines for industry participants. The communication resources provide practical, user-friendly information for individuals and groups to be active in consumer and community education about the seafood industry. It encourages community involvement in all aspects of the seafood industry. These communication tools have enduring qualities and can be used and referred to in many current and future situations. The whole-of-industry approach extended the ownership and commitment to the processes of community communication. ASIC and WINSC along with SSA, OceanWatch, state industry organisations and various sections of government have assisted in the broad implementation of the *Guide* and *Resources*. Through the collaborative processes in the development, distribution and implementation of the *Guide*, *Resources* and workshops, many individuals, groups and organisations have had the opportunity to work together on a proactive project.

Theme 3

Henry, G. & Lyle, J. 2003, *The national recreational and Indigenous fishing survey July 2003*, Australian Government, Department of Agriculture, Fisheries and Forestry (DAFF), Canberra.

A national survey of recreational and indigenous fishing was conducted in Australia during 2000-01. The survey was a joint initiative of Commonwealth and State governments. Grants from the Natural Heritage Trust, Fisheries Research and Development Corporation, State and Territory fisheries agencies supported the project.

Objectives

The national survey was a multifaceted project designed to provide a range of information about non-commercial fishing in Australia. The aims of the survey were to obtain:

- reliable, consistent and comparable data Australia-wide on angler participation and demographics, catch and effort, attitudes and awareness, and economic activity
- information on indigenous fishing in Australia to help achieve a wider understanding of a range of issues including the important role it plays in many indigenous communities, and
- information on international tourist fishing activities.

Method

The project comprised three independent surveys from private dwelling residents of Australia (5yrs +), the National Recreational Fishing Survey, the Indigenous Fishing Survey of Northern Australia and the Overseas Visitor Fishing Survey. A sample of approximately 44,000 Australian telephone numbers were selected for national screening surveys. Different methodologies and analytical approaches were required for each of these surveys, reflecting their varying characteristics. A telephone/ diary survey methodology was developed to collect information on recreational fishing in Australia with non-response and behavioural biases being assessed by a suite of innovative follow-up surveys. Modified on-site survey techniques were used to collect information from indigenous fishers in northern Australia while an existing survey instrument developed by the Bureau of Tourism Research was used to obtain information on overseas visiting fishers.

Findings

The project achieved its goals regarding the collection of fishery statistics for the non-commercial components of Australian fisheries. The report provides detailed information about recreation fishing effort, who and how many people fish for recreation, the number of animals harvested, the type of fishing undertaken, where fishing was undertaken, estimated expenditure on services and items that was attributed to recreational fishing, and reasons for fishing.

Conclusion

The project has established a substantial database on recreational and indigenous fishing in Australia, representing the first comprehensive description of these sectors. While the project has been a success by any measure, the real value of the data will become apparent in future years as further research projects are completed and long-term trends in recreational fisheries statistics become available.

Theme 5

Herrer, E., Woodhead, A. & Tottenham, R. 2004, *Social profile of people employed in the agriculture, forestry and fishing industries. Rural Industries Research and Development Corporation Project No. RIRDC BRR6A*, Rural Industries Research and Development Corporation, Canberra.

Objective

To provide a social profile of people employed in the Agriculture, Forestry and Fishing industries across Metropolitan and Non-metropolitan Australia. To enable the reader to make comparisons across Metropolitan and Non-metropolitan regions and the Australian population as a whole. To provide baseline and trend data that will inform discussion about the impact of changes in government policy or markets affecting the Agriculture, Forestry and Fishing industry

Findings

This report provides a snapshot of the key demographic and socio-economic characteristics of persons employed across Australia in the Agriculture, Forestry and Fishing (AFF) industry sector between 1996 and 2001. Based on secondary data sourced from the ABS Census of Population and Housing, the diversity of people employed in AFF are compared across regions and over time for Metropolitan and Non-metropolitan Australia. Twenty-three variables comprising a broad range of socio-economic topics were selected to social profile the AFF workforce. Key findings from the report include:

In 2001, approximately 330 500 persons were employed in the AFF industry. Between 1996 and 2001, a two per cent growth in the number of people employed in AFF was experienced across the industry. Youth aged 15-24 years comprised 10 per cent of the workforce in AFF in 2001 with a very strong representation of male workers. Indigenous Australians accounted for 1.3 per cent of all persons employed in AFF in 2001. Persons living alone accounted for approximately nine per cent of all people employed in AFF in 2001. -Strong increases in the number of people with university qualifications occurred between 1996 and 2001 however the absolute number of people employed in AFF with a university qualification is still quite small.

Conclusion

The profiles in this report provide a broad overview of people employed in AFF allowing for comparison of regions and trends over time across Metropolitan and Non-metropolitan Australia. Information in this report is intended to provide a firmer basis for industry policy development.

Theme 5

Huddleston, V. 2006, *A social assessment of coastal communities hosting the Western rock lobster fishing fleet. Volume 3*. Fisheries Research and Development Corporation (FRDC), and the Institute for Regional Development, Canberra.

This report is part three of a four volume series and is based on research and data collection undertaken in part 1-2 of the project.

Objective

This three-year project aimed to address the social dimensions of management arrangements governing the Western Rock Lobster (WRL) fishery, WA. The project aimed to inform managers/industry of the likely social consequences of changes to existing management rules and practices to the communities hosting the WRL fleet.

Method

In undertaking research for this report, an extensive literature review of government, academic, institutional and internet sources was completed. Primary data in the form of the results of a postal survey of WRL license holders, were also analysed. These survey results were complemented by semi-structured interviews conducted in nearly 17 communities that host the WRL fishing fleet. Community profiles for each of the 17 communities were also prepared.

Findings

Analysis of the socio-economic trends and patterns in 17 communities show the inter-relatedness of the economic, social, environmental and cultural facets of communities and regions. Some communities are better able to handle change than others. The decline in the proportion of rock lobster fishers in these communities is accompanied by a change in the mindset of younger fishers who are often becoming less concerned with community activities.

Theme 4

Huddleston, V. & Tonts, M. 2007, *A scenario analysis of the social impact of the Western rock lobster industry management options on fleet hosting communities: Final Report*, Project 2004/247, Fisheries Research and Development Corporation FRDC, Canberra.

Objectives

The aim of this project was to consider the social impact of management change in the Western Rock Lobster Fishery and those communities hosting the fishing fleet. This is consistent with one of the core Fisheries Research and Development Corporation's priorities, namely that "it is important to understand social impacts of implementing fisheries management regimes", and that "ESD (ecologically sustainable development) will be pursued most effectively when the industry is economically strong and when social benefits are clear".

Methods

Using a social impact assessment methodology, this research project has examined the socio-cultural characteristics of rock lobster communities, focusing on the experiences of those directly involved in the industry, as well as other residents in the communities that host the rock lobster fleet. It also considers the impact of management changes on the social sustainability of the fishery, and the fleet hosting communities. The study involved a number of methods, including: i) the compilation and analysis of secondary statistical data and documentary evidence; ii) a postal survey of managed fishery license holders; iii) semi-structured interviews with 216 stakeholders; iv) a telephone survey of 1,033 residents of fleet hosting communities; and v) multi-stakeholder workshops in 12 communities. This represents one of the most comprehensive social assessments ever undertaken of a fishery, both in Australia and globally.

Findings

The Western Rock Lobster Fishery is likely to continue to experience significant economic and social change into the future, regardless of management arrangements. Prior to this study, no baseline data existed on the social characteristics of the industry against which to assess the impact of change. The compilation of a detailed database of the social, cultural and economic attributes of rock lobster fishers and their communities offers an opportunity to monitor the

nature and impact of changes over a longer timescale. On a global scale, there are only a few longitudinal studies or monitoring programs that exist with regard to the social and socioeconomic characteristics of fishers and their communities. In line with the principles of ESD, this report sets the groundwork for a longer term monitoring program which has the potential to make a significant contribution to policy and management. In addition, the extensive nature of the consultation undertaken by the project was viewed by industry stakeholders as an extremely positive step towards a more open, holistic and transparent consultation process within the rock lobster industry.

Theme 4

Jones, A., Slade, S., Williams, A., Mapstone, B. & Kane, K. 2006, 'Pitfalls and benefits of involving industry in fisheries research: A case study of the live reef fish industry in Queensland, Australia', *Ocean and Coastal Management* vol. 50, no. 5-6, pp. 428-442.

Including collaboration with industry members as an integral part of research activities is a relatively new approach to fisheries research. Earlier approaches to involving fishers in research usually involved compulsory accommodations of research, such as through compulsory observer programs, in which fishers were seen as subjects of rather than participants in research. This new approach brings with it significant potential benefits but also some unique issues both for the researchers and the participating industry members.

Objective

Fisher practice was an important component in this research and so the project provides an illustrative example of how an industry-collaborative model can benefit traditional fisheries research, whilst also highlighting some of the risks and pitfalls with such an approach

Findings

In this paper we describe a research project involving the Queensland Coral Reef Finfish Fishery that originated from industry and community concerns about changes in marketing practices in an established commercial line fishery. A key aspect of this project was industry collaboration in all stages of the research, from formulation of objectives to assistance with interpretation of results. We discuss this research as a case study of some of the issues raised by collaboration between industry and research groups in fisheries research and the potential pitfalls and benefits of such collaborations for all parties. A dedicated liaison and extension strategy was a key element in the project to develop and maintain the relationships between fishers and researchers that were fundamental to the success of the collaboration. A major research benefit of the approach was the provision of information not available from other sources: 300 days of direct and unimpeded observation of commercial fishing by researchers; detailed catch and effort records from a further 126 fishing trips; and 53 interviews completed with fishers. Fishers also provided extensive operational information about the fishery as well as ongoing support for subsequent research projects. The time and resources required to complete the research in this consultative framework were greater than for more traditional, researcher-centric fisheries research, but the benefits gained far outweighed the costs.

Conclusion

Through their involvement, industry members gained an increased understanding of the research, and how research results would translate into management decisions or inform stakeholders about issues faced by the emerging live reef fish industry. A corollary was that industry members gained not only a sense of ownership of the research, and information provided to address research objectives, but also a sense of contribution towards future management of the resource on which their livelihoods depended. Active participation by industry members in research underpinning management policy is likely to mean that management decisions will be more widely understood and accepted by industry.

Theme 4

Kearney, R. 2001, 'Fisheries property rights and recreational/commercial conflict: implications of policy developments in Australia and New Zealand', *Marine Policy*, vol. 25, no. 1, pp. 49-59.

Objective

While the pros and cons of arrangements for governments and commercial fishers have been the subject of extensive and intensive debate, including voluminous scientific literature, including reviews, their impact, potential or otherwise, on recreational fisheries has been, surprisingly, largely ignored. The aim of this paper is to investigate the advantages and disadvantages of increased use of property rights in fisheries resource allocation.

Findings

Commercial fisheries management in Australia and New Zealand is increasingly based on better definition of the rights and responsibilities of resource users. At the same time recreational fishers are claiming a greater share of resources largely based on perceptions of superior economic returns to the community from their activities. The basis of the conflict between traditional, recreational and commercial resource users is moving from physical competition for fish to economic and legal arguments over social priorities. It is argued that the recreational sector needs better definition of its claim for priority access to resources.

Conclusion

Increased recognition of rights and devolution of responsibilities to resource user groups appears inevitable in future fisheries management. Allocation between competing user groups will be influenced by arguments over the nature of the right. This, in turn, will be affected by the rationale for the right.

Theme 3

Kearney, R. 2002, 'Co-management: The resolution of conflict between commercial and recreational fishers in Victoria, Australia', *Ocean & coastal management*, vol. 45, no. 4, pp. 201-214.

Conflict between recreational and commercial fishers over access to fisheries resources in inshore Victorian waters intensified through the 1980s and 1990s.

Objectives

In response to increasing pressure from angling representatives, and numerous individuals claiming to represent anglers, the Victorian Government in 1997 commissioned the Fisheries Co-management Council to review bay and inlet fishing and recommend "a preferred future fisheries management option to achieve balanced community use and sharing of Victorian fisheries resources in each bay.

Findings

The paper provides a thorough background to the issue and details angler concerns and perceptions followed by commercial fisher concerns about anglers. These concerns are then contrasted to the actual situation to illustrate the accuracy and relevance of concern over the exploitation of fish stock and the condition of the natural environment. The latter part of the paper provides a discussion of how Council arrived at its recommendations.

Conclusion

The Council concluded that environmental degradation posed a far more serious threat to long-term resource security for both recreational and commercial fishers than the effects of fishing by both sectors. It recommended that there be no short-term re-allocation of resources between the two sectors. Acceptance of the recommendations by both commercial and recreational sectors endorsed the Victorian co-management model for inshore fisheries conflict resolution and resource allocation.

Theme 4

Knuckley, I., Calogeras, C. & McShane, P. 2008, *Empowering stakeholders to initiate and advance R&D projects in the seafood industry*, Project 2007/304, Fisheries Research and Development Corporation (FRDC), Canberra.

Anecdotal reports from Industry indicated that their lack of capacity and/or resources to develop and submit R&D projects was hindering their involvement in, and commitment to R&D. Industry initiated R&D projects tended to be poorly represented, with the bulk developed by Government agencies and universities, which may not have been aligned to or focused on Industry priorities.

Objective

The 'Empowering Industry' project was intended as a one year trial to investigate this issue. The project sought to provide a process that allowed industry R&D ideas to be captured and developed into project proposals that could become part of the standard R&D funding process. Industry members were encouraged to be investigators on the developed projects and to become proactive in identifying and linking with an expanded range of appropriate R&D research providers. The project also sought to establish a broader network of funding sources.

Findings

The project was an overwhelming success and highlighted the real need of industry for assistance in developing R&D. The 'Empowering Industry' project identified that there were numerous opportunities for more extensive Industry involvement in R&D, but in many instances their input needed to be actively sought and assistance provided to work through the R&D process. Based on the success of this trial, a number of Industry representatives have called for the development of an ongoing mechanism to deliver a similar service to the broader seafood and fishing industry, ensuring that: it is cost-effective, inclusive and transparent, operates at a national or regional scale, and provides opportunities for the existing funding process to be improved.

Theme 3

Kwan, D., Marsh, H. & Delean, S. 2006, 'Factors influencing the sustainability of customary dugong hunting by a remote indigenous community', *Environmental Conservation*, vol. 33, no. 2, pp. 164-171.

The sustainability of indigenous customary hunting and fishing in remote areas can be influenced by human factors operating at global as well as regional and local scales because of the hybrid nature and sectoral interactions of the local economic environment. The internationally significant population of dugongs (*Dugong dugon* or seacow) in Torres Strait between Australia and Papua New Guinea supports an important indigenous fishery.

Objective

The economic, socio-cultural and environmental factors that influenced hunting activity in 1998 and 1999 by the members of the community of Mabuia Island were investigated to inform the sustainable management of the fishery.

Findings

The landed catch during the eight months March to October of 145 dugongs in 1998 and 170 dugongs in 1999 potentially provided the community with an average of 290 g of dugong meat per person per day. Fifty-seven per cent of adult males on the island participated in dugong hunting, but more than half the catch in each year was caught by only two hunters. The probability of at least one person from the community going dugong hunting in 1998 and 1999 was 0.59 ± 0.02 per day. This probability was influenced by local environmental factors, including the abundance of dugongs in the traditional hunting grounds (affected by wind speed, year, season and lunar day) and the size of the commercial crayfish catch (which is influenced by the global market price, as well as local conditions). Although dugong hunting remains a very important part of the islanders' contemporary culture and customary economy, the capacity to hunt dugongs is facilitated by the ease with which some hunters move between the state, commercial and customary sectors of their local economy.

Conclusion

The complexities of the economic, social and cultural environments need to be considered in planning for the sustainable harvesting of threatened species by remote indigenous communities.

Theme 1

Larcombe, J., Brooks, K., Charalambou, C., Fenton, M., Fisher, M., Kinloch, M. & Summerson, R. 2002, *Marine Matters: An atlas of marine activities and coastal communities in Australia's South-East Marine Region*, Bureau of Rural Sciences, Canberra.

This marine atlas in part meets an aim the Australia's Oceans Policy. The Policy's regional marine planning process is putting in place a management regime at the large marine ecosystem level. This South-East Marine Region plan is the first of the regional marine plans.

Objectives

This South-East Marine Region atlas aims to provide a focus for coordination between existing and developing ocean uses and the range of sectoral and administrative agencies with responsibilities for marine systems.

Findings

This Atlas provides a description of the demographic characteristics of coastal communities and reports on the wide range of human activities occurring in the South-East Marine Region. There is a particular focus on commercial fishing but data for other industries, activities and information including recreation, heritage, research and defence is also provided. This Atlas presents a synopsis of a wide range of information about human activities and interests in the marine environment. It is the first time such information is presented as a single publication and is a valuable resource for regional marine planning. The data sets provide the means to improve understanding of the complex patterns of human interaction with the marine environment.

Theme 3

Larcombe, J., Charalambou, C., Herrería, E., Casey, A.-M. & Hobsbawn, P. 2006, *National atlas of fishing activities and coastal communities*, Project 2002/223, Department of the Environment and Heritage, Bureau of Rural Sciences, and Fisheries Research and Development Corporation (FRDC), Canberra.

This national marine atlas in part meets an aim the Australia's Oceans Policy. The Policy's regional marine planning process is putting in place a management regime at the large marine ecosystem level. This report compiles a national collection of fisheries data.

Objective

To generate maps and analyses to form the first complete picture of where fishing occurs around Australia and the value of that fishing.

Findings

The Atlas focuses on mapping and analysis of Australian wild capture commercial, recreational and Indigenous fisheries and their adjacent coastal communities. It is the first Australia-wide, comprehensive and authoritative mapping of fishing activities and their related coastal communities and provides decision makers with a credible scientific resource for informing current and future marine and coastal planning initiatives. To date, the results have resulted in very tangible benefits to the fishing industry and to governments in marine planning, Marine Protected Area development and assessment as well as contributing to a number of other research areas. This report identifies detailed socio-economic and demographic profiles for eight marine regions around Australia and provides marine resource decision makers with a better and deeper understanding of the social climate in the adjacent coastal communities. Fishing related employment within coastal communities and "community resilience" are key concepts that have been used in MPA planning processes and in assessing the socioeconomic consequences of MPAs.

Theme 3

Lawrence, A. & Hewitt, C. 2004, *Adoption of an environmental management system by NSW commercial estuary fishers and oyster farmers*. Project2003/063, *Fisheries Research and Development (FRDC) Corporation*, Ocean Watch Australia, Canberra.

This project addressed the need to ensure best practice management and operations are adopted by the seafood industry to build community confidence and understanding in the way professional fisheries operate and are managed in NSW.

Objectives

1. Develop regionally specific, auditable Codes of Practice for the Estuary General Fishery and Estuary Prawn Trawl Fishery.
2. Provide advice and information in relation to the development of a Code of Conduct for the NSW Oyster Industry.
3. Assist fishers and oyster farmers to access government funding programs applicable to EMS implementation (e.g. the DAFF EMS Incentives Program and FarmBis).
4. Investigate options available to the professional fishing industry for achieving 3rd party certification and develop an action plan for doing so.
5. Provide training and development opportunities for fishers and oyster farmers to equip them the necessary skills for effective implementation of the Codes.

A perception by Industry that the initiative was ultimately controlled by DPI lead to considerable scepticism among participants and there very few fishers prepared to contribute to the development of the Codes. After some reconsideration and negotiation the research objectives were reframed:

1. To provide comprehensive industry consultation and representation on the development of Codes of Practice for the Estuary General Fishery and Estuary Prawn Trawl Fishery.
2. To provide NSW professional estuary fishers and oyster farmers information on the benefits of EMS and the process of EMS development.
3. To develop specific EMS's with up to four separate groups of estuary fishers and oyster farmers.
4. To assist estuary fishers and oyster farmers access government funding applicable to EMS implementation (e.g. the DAFF EMS Incentives Program and Farmbis)
5. To assist estuary fishers and oyster farmers access training and development opportunities to equip them with the necessary skills to develop and/or operate an EMS.

Method

Two simple, one-page introductions were developed that explained the benefits of EMS and how EMS's are developed. These were posted to relevant industry representatives and referred to at port meetings throughout NSW with fishers and oyster farmers. This led to the formation of five groups, who would oversee, promote and develop a range of EMS options for their fishery.

Findings

The author stated that the expectation of completing five EMS's in ten months was overly ambitious. Given the slow start to the project there have been few concrete outcomes. The project focussed on EMS development, whereas most benefits will flow from EMS implementation. Developments of positive and cooperative relationships with natural resource organisations, such as local councils or Catchment Management Authorities using EMS's as a base are a significant benefit expected.

Conclusion

Tensions between government and professional estuary fishers severely impeded the intentions of developing a cooperative project. Accordingly, the author forecast the Codes of Practice were likely to flounder. There are now however, broader moves from both industry and agency to build more a more positive relationship well beyond the capacity of this project. Development of the EMS's appeared to be a very positive experience for the groups. Although very few entirely new initiatives were developed, the process of considering environmental management in a structured manner was in itself, beneficial.

Theme 3

Lebel, L., Anderies, J., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T. & Wilson, J. 2006, 'Governance and the capacity to manage resilience in regional social-ecological systems', *Ecology and Society*, vol. 11, no. 1, pp. unpaginated.

Objective

This paper explores how institutions, actors, and social processes shape the politics of managing resilience and vulnerability. The central question addressed is: How do certain attributes of governance function in society to enhance the capacity to manage resilience?

Method

Three specific propositions were explored: (1) participation builds trust, and deliberation leads to the shared understanding needed to mobilize and self-organize; (2) polycentric and multilayered institutions improve the fit between knowledge, action, and social-ecological contexts in ways that allow societies to respond more adaptively at appropriate levels; and (3) accountable authorities that also pursue just distributions of benefits and involuntary risks enhance the adaptive capacity of vulnerable groups and society as a whole.

Findings

This paper draws on insights from a diverse set of case studies from around the world in which members of a Resilience Alliance observed or engaged with sustainability problems at regional scales. The case study relevant to this audit is of the Great Barrier Reef. In terms of proposition 1), the paper illustrates how the rezoning of the GBR was made possible through education (awareness raising) and shared decision making by different interested parties. As a result of improved awareness, fishers are increasingly willing to support no-take reserved areas for the sake of improved resilience and the long-term sustainability of fish stocks in the GBR. For proposition 3), the paper explains how the in GBR, progress toward protecting the rights of the indigenous people has also been made. GBRMPA held more than 50 workshops for Aboriginal and Torres Strait Islander people in 2002–2004 as part of its public consultation on rezoning the Barrier Reef. Today many indigenous groups actively seek involvement in the management of the park, although roles beyond employment as community rangers remain limited and uncertain, especially with the major expansion of no-take areas.

Theme 3

Lee, C. & Nel, S. 2001, *A national aquaculture development strategy for Indigenous communities in Australia: Final Report*, Commonwealth Government, Department of Agriculture, Fisheries and Forestry (DAFF), Canberra.

The Commonwealth Department of Agriculture Fisheries and Forestry - Australia ("AFFA") funded this national study into Indigenous involvement in aquaculture.

Objectives

The objectives for this study were developed jointly with the Aboriginal and Torres Strait Islander Commission ("ATSIC") and the principal objectives of this study were to:

- develop a national strategy and management framework for accelerating the involvement of Australia's Indigenous communities in aquaculture; and
- recommend a strategic plan to increase the economic independence and food-production capabilities of Indigenous communities in the country through involvement in aquaculture.

Findings

The Indigenous Aquaculture Strategy recognised that:

- many indigenous people possess a traditional affinity for fishing and aquaculture related activities, and
- many Indigenous communities have access to prime aquaculture sites and have access to land suitable for the development of aquaculture, and these communities have expressed interest in participating in aquaculture projects for commercial reasons, for food production or for creating employment.

The report presented 28 recommendations and an implementation strategy/framework to accelerate Indigenous involvement in the aquaculture industry, including the establishment of an IAU (Indigenous Aquaculture Unit).

Conclusion

The study elevated the profile of aquaculture as an industry that could provide significant benefits to Indigenous Australians, most notably by helping communities achieve economic independence, providing employment opportunities and food security for isolated communities.

Theme 3

Linder, R., Mcleod, P. & Nicholls, J. 2006, *Dynamic modelling of the socially optimal allocation of fish resources between commercial and recreational use*, Project 2003/039, Fisheries Research and Development Corporation (FRDC), Canberra.

Objective

This project sought to develop a general dynamic model that would allow an analysis of socially optimal resource allocation through time, based on changes in the marginal net benefits of commercial and recreational fishing. It sought to develop this framework so that the changes in marginal net benefits could be estimated by relating them to changes in significant socio-economic variables that drive the changes. The objective was to avoid the need for frequent direct estimation and re-estimation of marginal net benefits based on repeating contingent valuation surveys of recreational fishers and revenue and cost surveys for commercial fishers.

Method

The dynamic framework and the approach to measuring changes in marginal net benefits over time were tested using three case studies. The three case studies were a metropolitan crab fishery, a metropolitan abalone fishery and a demersal 'Wetline' fishery. The case studies were the same as those used in earlier FRDC supported research by McLeod and Nicholls.

Findings

The outcomes from this research proved to be consistent with allowing fisheries managers to take a planned strategic approach to resource allocation. The results indicate that adoption of the final project outputs will assist resource allocation decision making by identifying socially optimal resource allocations through time. The results also show that application of the model will enable fisheries management to make better informed allocation decisions today because they will be a position to consider the likely pattern of future socially optimal allocations based on a systematic analysis of trends in key socio economic variables that drive changes in underlying commercial and recreational use values.

Theme 3

Lugten, G. 2000, 'Cooperation and regional fisheries management', *Environmental Policy and Law*, vol. 30, no. 5, pp. 251-257.

If the notion of international cooperation (as used in the United Nations Charter, the 1982 Law of the Sea Convention, and all subsequent international instruments of fishery governance) is viewed as the fundamental philosophy underpinning the existence of regional fishery arrangements, then the South Tasman Rise Orange Roughy dispute of 1999 provides a good example of the notion in operation.

Objective

The purpose of this paper is to examine the notion of cooperation as a tool of effective management for remedying contemporary fishery problems in international law. The exercise is done by an examination of the South Tasman Rise dispute and its subsequent intergovernmental negotiations.

Findings

This paper provides an explanation of the cooperation and negotiation of the conflicting bilateral parties and how they established a fisheries management regime, how they achieved consensus on the most divisive of subjects: TAC and quota allocation, and how they constructed seemingly effective regulations (although controversial) for third party States. Furthermore, the author shows how this has been achieved by full compliance with international instruments for fisheries governance including the UN Fish Stocks Agreement, soon to come into effect. The author asserts that it is plausible to anticipate that the imminent coming into effect of the Fish Stocks Agreement will result in a worldwide proliferation of regional fishery bodies and arrangements. This is likely due to the fact that the FSA gives teeth to laws of fisheries conservation and management which have previously existed only as international principles. For this reason, Australia and New Zealand are keen to have their 2000 Agreement recognized by the UN as a regional fisheries arrangement under the terms of the Fish Stocks Agreement.

Conclusion

The STR incident demonstrates that there are difficulties with the emerging legal regime, particularly with its treatment of third States, but despite such weaknesses, regional fisheries cooperation provides the most realistic option for the future conservation and management of world marine capture fisheries.

Theme 3

Lynch, T., Wilkinson, E., Melling, L., Hamilton, R., Macready, A. & Feary, S. 2004, 'Conflict and impacts of divers and anglers in a marine park', *Environmental Management*, vol. 33, no. 2, pp. 196-211.

The New South Wales State Government (Australia) gazetted the Jervis Bay Marine Park (JBMP) in 1998.

Objective

To test the utility of societal data in developing MPA zoning options. The objective was to develop a zoning option for the heavily used Docks area, based both on biological information—in particular the protection of an endangered species—and also on the distribution and potential environmental impacts of the user groups.

Method

To provide a wider perspective, a comparison between the human dimension data collected a decade earlier and data collect in this study was also undertaken. Societal data on two conflicting park user groups-recreational scuba divers and fishers (anglers)-was collected.

Findings

While conflict resolution was a plan priority, other factors, such as cumulative environmental impacts of users and protection for the critically endangered grey nurse shark (*Carcharias taurus*), further complicated planning. Both scuba diving and angling are primary summer activities and are disproportionately concentrated around the headlands of the bay. Furthermore, shore based game-fishing was concentrated on the northern headland, where the conflict was centred. However, when the exact locations of divers and anglers were determined, there was a partial partitioning of the available space, with only a small contested overlap. To resolve conflict and maximize positive environmental outcomes, a sanctuary zone and no anchoring zone option in the draft zoning plan was sought to formalize this partition. The human dimension data proved valuable in guiding environmental management in this politically volatile situation. A baseline study conducted 11 years previously was also used to gain a limited perspective on change in user numbers. Comparison between study periods indicated dive numbers had remained similar, while the number of dive charter trips was significantly less. The numbers of anglers, for the four months compared, had doubled and tripled. The actual data used to inform management is presented and the limitations of this "best available data" approach are discussed.

Conclusion

The detailed information on the distribution and abundance of user groups was politically invaluable when zoning for marine conservation and conflict resolution.

Theme 3

Mapstone, B., Little, L., Punt, A., Davies, C., Smith, A., Pantus, F., McDonald, A., Williams, A. & Jones, A. 2008, 'Management strategy evaluation for line fishing in the Great Barrier Reef: Balancing conservation and multi-sector fishery objectives', *Fisheries Research*, vol. 94, no. 3, pp. 315-329.

Modern fisheries operate in circumstances of contested demands on resources from multiple stakeholders and management under different legislative jurisdictions. Formal management strategy evaluation (MSE) facilitates quantitative assessment of strengths and weaknesses of alternative management strategies designed to meet multiple agenda. The reef line fishery on the Great Barrier Reef (GBR, Australia) operates under multiple jurisdictions in a World Heritage Area with diverse stakeholder agenda for conservation and commercial and recreational harvest.

Objectives

We worked with stakeholders to identify: (i) specific objectives-, (ii) alternative management strategies; and (iii) performance indicators to compare likelihoods of meeting economic, recreational and stock objectives for the fishery and conservation objectives for the effects of line fishing on the GBR Stakeholders identified objectives and associated performance indicators in four categories, for: (1) conservation of unfished populations: (2) the harvestable stock: (3) economic performance of the fishery: (4) satisfaction of recreational fishers.

Method

We used a meta-population and fishing simulation model (ELFSim) to assess the effects of three effort regimes in combination with three area closure regimes on the primary target species, common coral trout (*Plectropomus leopardus*). The nine management strategies were also compared with a zero fishing scenario for reference.

Findings

Controlling fishing effort most improved prospects of meeting economic, stock and recreational satisfaction objectives for the fishery. Nine of ten performance indicators across all stakeholder objectives were maximised when fishing effort was at the lowest non-zero level tested. Maximising the area closed to fishing with reduced fishing effort was most likely to achieve the conservation objectives. This research provides a case study of productive engagement with stakeholders to address fisheries and conservation management needs in a multi-sectoral spatial management context. Together, we provided a common currency (the prospect of meeting quantified objectives) for impartial evaluation of performance of alternative management options against diverse and often competing stakeholder agenda.

Theme 1

Marshall, N. 2007a, 'Conceptualising and operationalizing social resilience within commercial fisheries in northern Australia', *Ecology and society*, vol. 12, no. 1, unpaginated.

How can we tell whether resource-dependent people are socially resilient to institutional change? This question is becoming increasingly important as demand for natural resources escalates, requiring resource managers to implement policies that are increasingly restrictive on resource users. Yet policy changes are frequently made without a good understanding of the likely social and economic consequences. Knowledge of the resilience of resource users to changes in resource-use policies can assist in the design and implementation of policies that minimize the impacts on people while maximizing the sustainability of ecosystem goods and services. Despite the appeal of resilience as a framework for sustaining human-environment relations, there has been a distinct lack of explicit application of the concept by natural-resource managers.

Objective

The authors build on general resilience theory to develop a conceptual model of social resilience for resource-dependent users.

Method

The researchers test and refine the operational virtues of the model using the commercial fishing industry in North Queensland. Detailed surveys of individual resource users provide data on historic response, expected well-being, and capacity as a basis for assessing resilience.

Findings

We find that the response of fishers to generic yet anticipated change events is determined by four key characteristics: (1) perception of risk associated with change; (2) perception of the ability to plan, learn, and reorganize; (3) perception of the ability to cope; and (4) level of interest in change. These responses represent relative measures of the likely response of resource users to prospective changes in resource policy that affect the way in which the resource is used or accessed.

Theme 3

Marshall, N. 2007b, 'Can policy perception influence social resilience to policy change?', *Fisheries Research*, vol. 86, no. pp. 216-227.

An understanding of the way that fishers perceive resource policies provides fisheries managers with the opportunity to refine policy design and delivery so as to better protect system resilience.

Objective

This paper questions whether policy perception can erode or enhance the ability of commercial fishers to be resilient to changes in fisheries policy.

Method

Social resilience to policy change is examined by assessing a fisher's (i) perception of risk associated with change, (ii) ability to plan, learn and reorganise, (iii) ability to cope, and (iv) level of interest in change. One hundred commercial fishers in five north Queensland coastal communities were quantitatively and qualitatively surveyed.

Findings

Policy perception is assessed by asking commercial fishers how they perceive their level of involvement in the policy decision-making process and interpret equity, the likely socio-economic impacts, conservation effectiveness and the rate of implementation (of generic policies). A negative perception of policy was found to significantly and adversely influence the behaviour and emotional response of commercial fishers, which, as described here, influences their resilience. For policy perception to be positive and resilience to be enhanced, fishers need to be meaningfully involved in the decision-making process, change needs to be implemented at an appropriate rate, and effort is required to ensure that equity, anticipated impacts and conservation effectiveness are positively interpreted. This knowledge can assist in the development of fisheries management strategies aimed at maintaining and enhancing socio-ecological resilience.

Theme 4

Marshall, N., Fenton, D., Marshall, P. & Sutton, S. 2007, 'How resource dependency can influence social resilience within a primary resource industry', *Rural Sociology*, vol. 72, no. 3, pp. 359-390.

Maintaining a healthy balance between human prosperity and environmental integrity is at the core of the principles of Ecological Sustainable Development. Resource-protection policies are frequently implemented so as to regulate the balance between resource access and use, however, they can inadvertently compromise the ability of resource users to adapt and be resilient. Resource users who are especially dependent on a resource are more seriously compromised. But how do we define and measure resource dependency? And how do we assess its ability to influence social resilience?

Objectives

In this study, a conceptual model of resource dependency is developed in terms of: (i) occupational attachment, (ii) attachment to place, (iii) employability, (iv) family attitude to change, (v) business size, (vi) business approach, (vii) financial situation, (viii) level of specialisation, (ix) time spent harvesting, and (x) interest in and knowledge of the environment. The model of resource dependency and its effect on social resilience are (quantitatively and qualitatively) tested and explored using the commercial fishing industry in North Queensland, Australia.

Methods

The final version of the survey was administered to 100 commercial fishers and their families in coastal communities in North Queensland, Australia: Cooktown, Port Douglas, Innisfail, Townsville, and Bowen. These communities represented a range of population sizes and fishing communities. These communities represented a span of population sizes, ranging from 1,800 for Cooktown to 91,000 for Townsville. Commercial fishers represented less than 2 percent of each community. Sampling occurred by visiting each community and contacting as many commercial fishers as possible until 100 commercial fishers had participated in the research. The surveys were voluntary and received a 100 percent response rate. Between 46–68 percent of the commercial fishing industry within each community was sampled.

Qualitative interviews were undertaken during the same period as the quantitative surveys and on the same 100 respondents.

Findings

Results show that occupational attachment and employability were important influences as were business size and approach. Results can be used to identify vulnerability to institutional change and guide policy development processes.

Theme 3

Mason, R. & Gullett, W. 2006, 'Cancellation provisions in Australia's Commonwealth-managed fisheries', *Marine Policy*, vol. 30, no. 3, pp. 270-280.

In its recently completed review of Commonwealth fisheries policy the Australian Government, following submissions from the commercial fishing industry, agreed to examine the implications of replacing the power in the *Fisheries Management Act 1991* (FM Act 1991) to cancel fishing concessions for non-compliance with management measures that increased financial penalties. Industry argued that the cancellation provisions undermine the security of access rights and the Australian Government had accepted that the current provisions may be an impediment to investment in Commonwealth-managed fisheries.

Objectives

This paper considers the removal of cancellation provisions for domestic fisheries offences to determine if

- these provisions provide an effective deterrent to illegal fishing activity;
- these provisions are a cause for concern among the investment community; and
- increased financial penalties offer an alternative means of deterrence for domestic fisheries offences.

Findings

This paper reviews these concerns in light of property rights and compliance issues and concludes that there are no compelling reasons for removing cancellation provisions from the FM Act. On the contrary, these provisions provide a powerful deterrent to non-compliance, which is unlikely to be matched by financial penalties alone. Nevertheless, it is suggested that a review of the way fisheries offences are dealt with under the Act is undertaken and that the level of current financial penalties be reviewed.

Theme 3

Mazur, N. 2004, *Community perceptions of aquaculture: related social research*, Commonwealth Government, Social Sciences Program Bureau of Rural Sciences, Canberra.

Objectives

The community perceptions of aquaculture project was designed to help build a sustainable aquaculture industry by providing information about how to improve the social acceptability of aquaculture. The broad objective of the study was to underpin the long term viability of aquaculture by helping government, stakeholders and community to:

- Understand the different perspectives held about aquaculture
- Develop policies and programs that are responsive to a wide range of interests
- Improve participation, consultation and communication processes

Method

The authors undertook a literature review, which informed the overall project design, in particular the interview and survey instruments. It identified important social research in water use and allocation, forest, ecosystem and coastal management, and the mining, fishing and aquaculture industries.

Findings

This body of work showed diverse and conflicting community expectations about how to effectively allocate and manage natural resources and how to achieve favourable and equitable social, economic and environmental outcomes. Industries that depend on coastal and marine environments can benefit from recognising that the Australian public values these settings highly and there is growing support for integrated coastal management. Industries subject to controversy and conflict can share insights about improving their social acceptability. Public concerns about risks posed to the environment and human health can influence consumer purchasing of fishing and aquaculture products. The broader public values the environment, supports industries' use of environmentally friendly practices, however has low awareness of aquaculture issues. There is public support for improving governments' regulatory and resource management roles. Understanding how risk is perceived and what influences the public's trust can improve communications with a range of stakeholders. Need to ensure appropriate communication strategies and programs for stakeholders and the community. Ecological sustainable development (ESD) remains a challenge because the different values and belief systems operating in society means that ESD is subject to varying interpretations about what kinds of activities are sustainable and how best to balance the social, economic and environmental priorities of resource use.

Conclusion

Whilst this review did not claim to be exhaustive, it did identify key issues of relevance to policy makers and stakeholders interested in the aquaculture industry.

Theme 4

Mazur, N., Aslin, H. & Byron, I. 2005, *Community perceptions of aquaculture: Final Report*, Commonwealth Government, Bureau of Rural Sciences, Social Sciences Program, Canberra.

The Community Perceptions of Aquaculture Project was developed to support the ecologically sustainable development of the Australian aquaculture industry (taking into account social, economic and environmental elements). The project has produced several reports and this final report integrates the findings and crystallises study implications and recommendations for sustainable aquaculture development. Two regions were selected as case studies, Eyre Peninsula, SA and Port Phillip Bay, VIC.

Objectives

To collect primary data on perceptions of aquaculture.

Method

A literature review, interviews and mail out surveys were conducted.

Findings

Key findings of the investigation indicate population density, economic diversity, competing uses of marine/coastal environments and size of aquaculture industries influenced people's perceptions and responses to aquaculture. There are significant differences in how different sections of society perceive risk including support for aquaculture and recognition of socio-economic benefits; some industry aquaculture sectors attracted greater trust and lower perceived risks, and judgements were informed by industry sectors' motivations and environmental performance, presence of environmental or social problems and appropriateness of government regulations; there were mixed opinions about trustworthiness of government; there is minimal knowledge on governments' role and indigenous communities interest/involvement in aquaculture; some sources of information about aquaculture are perceived to be more important and credible than others; there was strong support for improved dialogue between government, the aquaculture industry and communities and the importance of having a communication plan that is tailored to meet the needs of industry and the community. The final report also depicts a range of potential indicators that could be used to meet future benchmarks and to ensure aquaculture's progress towards social sustainability. The description and detail of social assessments available in each State/Territory within an aquaculture context are also identified.

Theme 4

Mazur, N., Aslin, H., Byron, I., Curtis, A. & Magpantay, C. 2004a, *Community perceptions of aquaculture: report on the Port Phillip region*, Commonwealth Government, Bureau of Rural Sciences, Canberra.

This report provided a case study of community and stakeholder perceptions of aquaculture in the Port Phillip region, Victoria, Australia.

Objective

To identify:

- Social and regulatory contexts that inform perceptions on aquaculture and how aquaculture is planned, regulated and managed
- The different perspectives communities and stakeholders have about aquaculture
- How consultation, participation and communication processes about aquaculture by industry and government can be improved.

Method

Information was obtained through a literature review, in-depth interviews with key stakeholders and community members, and a mail survey.

Findings

Key results indicated strong support for aquaculture industry's benefits; strong environmental values among interview and mail survey respondents; varied views and uncertainty about aquaculture's current and future impacts and the quality of government's and aquaculture industry's decision making; low level of knowledge of aquaculture and the reliance on media as an information source; there is a need for government and industry to deliver more credible, effective and targeted information and consultation processes with the community; the need for key messages from government that engender a greater level of trust in the community; the data from this project supports other research, which indicates mixed opinions about knowledge of aquaculture issues. Statistical analysis showed certain perceptions were related to socio-demographic variables, with some respondents more likely to be critical of aquaculture than others.

Theme 4

Mazur, N., Aslin, H., Curtis, A., Byron, I. & Magpantay, C. 2004b, *Community perceptions of aquaculture: report on the Eyre Peninsula*, Commonwealth Government. Bureau of Rural Sciences, Canberra.

This document reports the findings from the case study of community perceptions of aquaculture on the Eyre Peninsula, S.A.

Objectives

To identify:

- Social and regulatory contexts that inform perceptions on aquaculture and how aquaculture is planned, regulated and managed
- The different perspectives communities and stakeholders have about aquaculture
- How consultation, participation and communication processes about aquaculture by industry and government can be improved.

Methods

Information was obtained through a literature review, in-depth interviews with 34 key stakeholders and community members, and a mail survey (to approx 500 households).

Findings

Key results indicated sustainability is a contested concept, viewed differently by people according to their values and worldviews. There was strong support and recognition of aquaculture's social and economic benefits and challenges and measures to overcome perceived challenges. There were variable degrees of trust in governments' and aquaculture industry's decisions. Some industry sectors attracted a greater trust and lower perceived risk. There was low overall knowledge about aquaculture, coastal management, government roles

and marine ecology. Local media was a significant source of information. Community participation into aquaculture planning and management is valued however there was some dissatisfaction with consultation/participation processes. There were significant differences among respondents' views towards aquaculture and environmental related impacts and level of trust within government. There was an appreciation of the difficulties in finding appropriate ways to balance economic, social and environmental imperatives. There is need for government and industry to tailor communication and engagement strategies for different audiences.

Conclusion

The Community Perceptions of Aquaculture Project provides research to support the National Aquaculture Policy Statement and initiatives from the Aquaculture Industry Action Agenda, in particular: growing the industry according to ecologically sustainable development principles, ensuring participation of the Australian industry and community in aquaculture planning and management and in promoting industry products domestically overseas. The data from this project can inform the development of communication and engagement strategies that ensure meaningful dialogue about aquaculture.

Theme 4

Mazur, N. & Curtis, A. 2006, 'Risk perceptions, aquaculture, and issues of trust: Lessons from Australia', *Society & Natural Resources*, vol. 19, no. 9, pp. 791-808.

Aquaculture is heralded as a way of helping to feed a growing global population by supplementing supplies of wild-sourced seafood. Australian aquaculture has the potential to become a \$1 billion per year industry and to provide employment needed in some rural areas. However, concerns about aquaculture have led to disputes about the industry's access to highly valued marine and coastal environments. The lack of research on this topic has confounded efforts to build a more socially acceptable and sustainable aquaculture industry.

Objectives

To reveal differences in perceptions of aquaculture risks

Method

This research used key stakeholder interviews and a household mail survey in Victoria.

Findings

Community groups (particularly conservation), ecotourism industries, researchers, some state and local government staff, and informed members of the general public were more likely to focus on aquaculture's risks, and seek improvements in aquaculture planning and management to substantially reduce those risks and make the industry more acceptable to diverse interests.

Theme 4

Mazur, N. & Curtis, A. 2008, 'Understanding community perceptions of aquaculture: lessons from Australia', *Aquaculture International*, vol. 16, no. 6, pp. 601-621.

Aquaculture is a growing and high-value industry that depends on access to and wise use of shared inland, coastal and marine resources. Varied stakeholders and communities are very interested in these public resources, and there has been conflict about how the aquaculture industry uses them.

Objective

To undertake a large-scale study of community perceptions of aquaculture.

Method

The research drew upon an extensive literature review, stakeholder interviews and a survey mailed to the public in two regional case studies in Australia: the Eyre Peninsula in the state of South Australia and Port Phillip Bay in the state of Victoria.

Findings

The data revealed some public support for aquaculture's socioeconomic benefits and strong interest in minimizing the risk of its environmental impacts. There were mixed opinions about the trustworthiness of governments' aquaculture decisions and actions. Some industry sectors attracted greater trust and lower perceived environmental risks. The importance and credibility of different information sources varied. There was strong support for improved dialogue among governments, the aquaculture industry and communities. Key differences between the regions included levels of awareness of and knowledge about aquaculture. Our research is consistent with literature on risk communication and perception that suggests that conflict and subsequent costs to industry and the community can be overcome or mitigated if government and industry understand, acknowledge and respond to community perceptions of the industry.

Theme 4

McGlennon, D. 1995, 'A review of recreational surveys in Australia', *Recreational fishing: What's the catch? Australian Society for Fish Biology Workshop Proceedings*, 30-31 August, Canberra.

Objective

To present a perspective of past Australian [recreational fishing] research, by describing the history and geography of past studies, summarising the type of data that have been collected and commenting on the general utility of these data.

Findings

Approximately 110 reports have been located on recreational fishing and it is these that provide the basis of this paper. The reports were located through computer and reference searches, bibliographic papers and assistance from workers in all States and the Northern Territory. The data presented for marine and general population surveys are considered to be quantitative, while data for studies concentrating exclusively on freshwater fisheries are qualitative only. Studies which have not been formally reported (e.g. unpublished data, studies in progress, etc.) have not been included.

Theme 5

McIlgorm, A., Hanna, S., Knapp, G., Le Floc'H, P., Millerd, F. & Pan, M. 2010, 'How will climate change alter fishery governance? Insights from seven international case studies', *Marine Policy*, vol. 34, no. 1, pp. 170-177.

Objective

To examine the implications of climate change for fishery governance using seven international fishery case studies in low, mid and high latitudes, including Eastern Australia, the western Pacific Ocean, Alaska, west coast United States, Hawaii, west coast Canada and France.

Findings

Climate change adds uncertainty about fish stock productivity, migratory patterns, trophic interactions and vulnerability of fish populations to fishing pressure. Fishery governance has to address additional uncertainty from climate change in both the system being governed and the governance systems. The case studies reveal governance issues that indicate adaptation will involve more flexible fishery management regimes, schemes for capacity adjustment, catch limitation and alternative fishing livelihoods for fishers. Where fishery governance systems have been less developed, fisheries are less able to adapt to climate change impacts. Adaptation involves addressing some of the most intractable allocation issues of fisheries management.

Theme 3

McManus, A., Burns, Howat, P., & Fielder 2007, 'Factors Influencing the consumption of seafood among young children in Perth: A qualitative study', *BioMed Central (BCM) Public Health*, vol. no. 7, pp. 119-125.

This formative study sought to explore the factors that influence the consumption of fish and seafood among 4–6 year old children in the Perth metropolitan area.

Objectives

To gain insights into the enablers and barriers to regular seafood consumption in children, and the knowledge, attitudes and perceptions of their mothers to including seafood as a regular part of their children's diet.

Methods: Focus groups were conducted with mothers of young children. Purposive sampling techniques were used to select and recruit mothers of children aged between four and six years from within the Perth metropolitan area. A total of seven focus groups were conducted. Thematic content analysis was employed to code data generated and to extract major themes.

Findings

Findings indicated that all children of study participants had tried fish and seafood products, with some being exposed to a wide variety from an early age. Across focus groups, several dominant factors were apparent in influencing the frequency and type of seafood purchased and consumed. Perceived cost, freshness, availability/accessibility, and the level of confidence to prepare a meal to suit all family members were significant determinants of whether seafood featured regularly on the household menu. The influence of others in the family (particularly the husband or partner) also tended to impact upon the likelihood of serving fish and seafood, and the types of products mothers were willing to serve.

Conclusion: Findings from this qualitative study indicate that interventions seeking to promote seafood (particularly fish) as an integral part of a healthy diet should address existing negative attitudes and beliefs around the storage and preparation of seafood. The influence of dominant male influences within the family unit should also be considered. Strategies directed at parents and children should include experimental 'hands-on' components to encourage experimentation, particularly focussing on ease of preparation and the variety of lower cost seafood available.

Theme 2

McPhee, D., Buxton, C., Knuckey, I., Hundloe, T., Stone, S. & Williams, K. 2007, *Part 2: Final Submission: A participatory and coordinated fishing industry response to the proposed rezoning of the Moreton Bay Marine Park*, Project 2007/053, Fisheries Research and Development Corporation (FRDC), Canberra.

This report is part two of the Fisheries Research and Development Corporation (FRDC) project 2007/053 *A Coordinated and Participatory Solution to the Rezoning of the Moreton Bay Marine Park*. Part one of this project provided information prior to the release of the draft zoning plan by the Queensland Environmental Protection Agency (EPA). Part two provides information after the release of the draft zoning plan to inform finalisation of the plan by the EPA.

Objectives

The objectives of the project were:

- To collect data on the fishing and associated industries (including social and economic values for commercial, recreational and indigenous/traditional fisheries).
- To collect data on Moreton Bay marine flora, fauna and ecosystems.
- To undertake a risk assessment of fishing and associated boating activity on environmental values.
- To develop options for managing the Moreton Bay Marine Park that achieve biodiversity and ecological sustainability objectives whilst having minimal impact on fishing industries (commercial, recreational fishing, boating and support industries).

Findings

While part one addresses all these objectives, part two focuses on providing additional information for the last two objectives in light of the details of the draft zoning plan released by the EPA. The report discusses global issues with respect to the draft zoning plan, and discusses systematically proposed no-take (green) zones, conservation park (yellow) zones and habitat protection (dark blue) zones and where applicable, the rationale for each zone is critically reviewed and alternatives proposed. A comparison is also made between estimated economic impacts of the draft zoning plan released by the EPA and the zoning plan included in this report. Structural adjustments and principles for the commercial fishing sector are noted and a range of potential impacts of implementing the marine park and marine park monitoring requirements are mentioned.

Key results from the study indicated:

- the proposed EPA draft Plan would have an impact on recreational fishing that is over five times that of the Moreton Bay Access Alliance (MBAA) Plan (the alternative plan)
- an estimated \$48 million of recreational fishing expenditure can be attributed to areas proposed as green zones (no take) by the EPA. Previous research shows reduced recreational fishing participation reduces turnovers for businesses that supports recreational fishing
- in order to minimise impacts of rezoning of MBMP on recreational fishing, and supporting businesses, green zone areas need changing
- draft EPA plan fails to match identified environmental threats the values in the MBMP
- conservation (yellow) zones do not provide demonstrable biodiversity outcomes and do not address any significant threats to biodiversity in the MBMP
- provisions in yellow zones in MPMP are not consistent with those applied elsewhere in state managed marine parks
- process for design and site selection for proposed artificial reefs and implementation timeframes are unclear.
- no structural adjustment package proposed

A range of proposals to permitted activities within each zone were also identified.

Theme 3

Memmott, P., Channells, G., Aboriginal Environments Research Centre, University of Queensland & Carpentaria Land Council Aboriginal Corporation 2004, *Southern Gulf of Carpentaria Sea Country needs and issues research*, National Oceans Office, Tasmania.

Objectives

The National Oceans Office agreed to facilitate the participation of the Indigenous Traditional Owners in the Northern regional marine planning process, so that the sharing of information could actively assist both Traditional Owners and the National Oceans Office in achieving a workable sustainable development strategy for the Northern Planning Area (NPA). The general aim of this scoping project was to ascertain the nature and extent of Indigenous interests and aspirations in relation to their traditional sea country between the Staaten River (Cape York Peninsula) and the Queensland/Northern Territory border in the NPA. This information will assist the Northern Regional Marine Plan ("NRMP") process in the identification of major planning themes to be further developed.

Findings

The report provides a comprehensive overview of a wide range of issues across four regions: Lardil & Yangkaal, Kaiadilt, Gangalidda and Garawa, Kurtijar, Gkuthaarn and Kukatj. The summary of all the regions explains how Aboriginal Law needs to be respected by both White people and Black people, Native Title to land and sea needs to be recognised across the Region, Aboriginal management of land and sea should be implemented across the Region; A Southern Gulf Ocean Plan needs to be initiated immediately; operational steps were listed.

Conclusion

It is expected that recognition of Indigenous interests and aspirations and inclusion of Traditional Owners in planning consultations, policy development and management processes will result in a holistic plan that can be readily embraced by the Indigenous population of the NPA.

Theme 4

Minnegal, M. & Dwyer, P. 2008a, 'Managing risk, resisting management: Stability and diversity in a southern Australian fishing fleet', *Human Organization*, vol. 67, no. 1, pp. 97-108.

Objectives

To explore the factors that have contributed to the relative stability of the locally-owned, ocean-going fishing fleet at Lakes Entrance in eastern Victoria through the recent past during a period when most other port-based fishing fleets in south-eastern Australia have experienced substantial decreases in the numbers of operating vessels.

Findings

At Lakes Entrance, in Victoria the locally-based commercial fishers utilise diversification (e.g. multiple targets, fishing areas, boats, or markets) as a means of managing the risks that characterise the biological and economic environments they experience. These strategies have contributed to numerical stability of the local fleet at a time when most south-eastern Australian fishing fleets are in decline. In effect, the Lakes Entrance fishing community has avoided, or at least delayed, outcomes that are explicitly intended by recent approaches to fisheries management. An implication of these observations is that the behaviour of fishers, including, importantly, how they manage risk offer lessons for fisheries managers with respect to both why their plans often fail and why different plans could be more successful.

Theme 3

Minnegal, M. & Dwyer, P. 2008b, 'Mixed messages: Buying back Australia's fishing industry', *Marine Policy*, vol. 32, no. 6, pp. 1063-1071.

This paper discusses the process and outcomes of a major buyback of commercial fishing concessions across all Australian Commonwealth-managed fisheries through 2006.

Objectives

To assess whether the objectives of the buy back of half the then existing Commonwealth fishing concessions— 800 of a total of approximately 1600—were met. These included allowing fishermen to leave the industry with “dignity; address existing concerns about “the sustainability and profitability of the industry” by substantially reducing the number of fishermen targeting available fish; put an end to over-fishing of domestic stocks; create an extensive network of off-shore Marine Protected Areas in the South-Eastern marine region.

Findings

The authors argue that the intent of the buyback program was ambiguous, the process was flawed, and the outcomes of doubtful benefit to fish or to fishermen. This case study directs attention to deeper issues that prevail in forms of managing people under the guise of a non-explicit ideology of "extol and control".

Theme 3

Minnegal, M., King, T., Just, R. & Dwyer, P. 2003, 'Deep identity, shallow time: sustaining a future in Victorian fishing communities', *The Australian Journal of Anthropology*, vol. 14, no. 1, pp. 53-71. Like commercial fishers everywhere, it seems, those living in coastal communities of Victoria perceive themselves to be under threat from recreational fishers, environmentalists, imposed management regimes, and modernisation and globalisation of the industry.

Objectives

To identify current threats to the life-style of small-scale commercial fishers in Victoria, and comment on ways in which they respond to those threats and assert their identity as fishers.

Findings

In responding to threats fishers appeal to conventional props of tradition-to continuity in genealogical time, affiliation with place and specialised knowledge and practice. This seems paradoxical, given that most established fishers in Victoria are first or second generation members of an industry that, through its 150-year history, has been characterised by innovation and mobility. That paradox, the authors argue, is more apparent than real. Fisher identity is grounded primarily in engagement with an environment that is not familiar to outsiders. The paradox arises because fishers, like others who seek to sustain a future in the face of threat from outsiders, reshape strongly felt identity as tradition

Conclusion

Victorian fishers seek to secure their future in the arenas of public and political discourse by emphasising entirely conventional props of tradition-those of connections with people, places and practices of the past.

Theme 4

Momtaz, S. & Gladstone, W. 2008, 'Ban on commercial fishing in the estuarine waters of New South Wales, Australia: Community consultation and social impacts', *Environmental Impact Assessment Review*, vol. 28, no. 2-3, pp. 214-225.

In its effort to resolve the conflict between commercial and recreational fishers the New South Wales (NSW) government (NSW Fisheries) banned commercial fishing in the estuarine waters. The NSW Fisheries conducted a number of studies and held meetings with the affected communities including commercial fishers prior to the implementation of the ban.

Objective

To investigate how community consultation played a role in the decision-making process especially as perceived by the commercial fishers and to determine actual social impacts of the ban on commercial fishers.

Method

In-depth interviews were conducted with the commercial fishers.

Findings

This research reveals that despite the NSW Fisheries' consultations with commercial fishers prior to the closure, the latter were confused about various vital aspects of the decision. It further reveals that, the commercial fishers faced a number of significant changes as a result of this decision. The authors argue that a better decision-making process and outcome would have been possible through a meaningful consultation with the commercial fishers and a social impact assessment.

Theme 3

Moore, A., Summerson, R., Sahlqvist, P., Kellett, S., McNee, A., Maller, C., Vieira, S., Stakelum, P., Larcombe, J., Woodhams, J. & Pickworth, J. 2007, *Regional Profile—East Marine Region*, Bureau of Rural Sciences, Australian Government, Canberra.

An underlying objective in marine bioregional planning (MBP) is to balance conservation, social and economic objectives. In undertaking MBP it is therefore important that the social and economic characteristics of commercial fisheries operating in the East Marine Region (EMR) are understood and inform the development of marine protected areas (MPA) and other conservation options. The three stages in marine bioregional planning are development of the Bioregional Profile, the draft Bioregional Marine Plan and the final Bioregional Marine Plan.

Objective

This paper's purpose is to provide the fisheries information for the development of the regional profile for the EMR. It will also be the starting point for identifying the potential implications for fisheries of various conservation options considered during the development of the draft plan.

Findings

Commercial fishing generates both direct and indirect employment opportunities in coastal regions and can be a substantial contributor to the economic and social wellbeing of communities. It is estimated that 3,600 persons are employed in commercial fishing in the EMR, representing 0.2% of the total employment for the region. It is recognised this is indicative only as it does not reflect unpaid family workers, prevalent in the sector, and high levels of seasonal casual employment. The socio-economic analysis of fishing in the EMR includes activity associated with Commonwealth and State fisheries that occurs in towns and ports spread along the coast, including where catch is landed and businesses are located, as well as the locations where people engaged in fishing activity live. In addition to an executive summary, the report includes an individual profile for each commercial fishery operating in the Region, broken down by Commonwealth, New South Wales and Queensland fisheries. A separate section of the report provides information and a socio-economic analysis of the recreational and charter fishing industries in New South Wales and Queensland.

Theme 1

Morphy, F. & Morphy, H. 2009, 'The Blue Mud Bay case: refractions through saltwater country', *Dialogue, the Journal of the Academy of the Social Sciences in Australia*, vol. 28, no. 1, pp. 15-25.

Objectives

To contrast settler Australian and Yolngu ways of conceptualising and giving meaning to the bodies of salt water that settler Australians call 'seas' and 'oceans'. We explore elements of the Yolngu worldview in order to unsettle the foundations of the settler 'political geographic imaginary' surrounding concepts such as 'ocean' and 'border'.

Findings

Under the Aboriginal Lands Rights (Northern Territory) Act 1976 (ALRA) Aboriginal freehold land has always extended down to the low water mark. In a historic majority decision on 30 July 2008, the High Court of Australia ruled on appeal in the Blue Mud Bay case that, in effect, the ALRA also applies to the column of water above the intertidal zone. The subtitle of this paper, 'refractions through saltwater country', suggests that the Yolngu and settler Australian society view the material phenomenon of bodies of saltwater through very different cultural lenses. In Blue Mud Bay, settler Australians 'see the sea' - a political geographic zone, notionally bounded and distinct from land, whereas Yolngu see their saltwater country. It is argued, without such an unsettling, settler Australia cannot begin to comprehend what it is truly asking of Australia's Indigenous peoples when it demands that they pursue their land and sea rights within the framework of settler law. Nor can it begin to understand the resilience and persistence of Indigenous worldviews in the face of the encapsulating power of the settler state.

Theme 4

Murray-Jones, S. & Steffe, A. 2000, 'A comparison between the commercial and recreational fisheries of the surf clam, *Donax deltooides*', *Fisheries Research*, vol. 44, no. 3, pp. 219-233.

The catch of the pipi or surf clam, *Donax deltooides*, is shared in Australia by the commercial and recreational sectors, with recreational harvesters collecting them for bait and/or for food.

Objective

Assessment of how catch and effort are partitioned between these users is necessary for effective management of this resource, particularly because surf clam populations are prone to large temporal variations in distribution and abundance, and high recruitment variability, making stock assessment and hence management difficult.

Methods

We quantified catch, effort and catch rates for this fishery at an important site for pipi harvesting. A logbook study of commercial fishers, and an on-site bus-route survey of recreational fishers gave an estimate for the total harvest from Stockton Beach, NSW.

Findings

The total harvest was calculated at 237.7 metric tonnes per year, of which over 80% (191.2 t) was taken by commercial harvesters, 18% (43.1 t) by recreational food harvesters, and less than 2% (3.4 t) by anglers for bait. Recreational harvesting by food gatherers accounted for approximately 85% (102,228 collector-hrs) of the combined effort for all sectors of 120,650 collector-hrs, with 4% (4794 collector-hrs) spent by bait gatherers and only 11% (13,628 collector-hrs) by commercial fishers. Both commercial fishers and recreational anglers were selective, targeting larger pipis (>45 mm in length), while recreational food collectors took what they could get, sometimes taking animals as small as 10 mm. Effort and catch were highest for the commercial fishery in winter, declining sharply in October, but were higher in summer for the recreational fishery. Catch rates explained much of this difference, with commercial catch rates declining from 36.7 kg/collector-hrs in autumn to 16.1 kg/collector-hrs in Summer, while recreational catch rates were always far lower.

Conclusions

Such large differences were surprising in a hand-gathering fishery for which no gear is allowed, and we suggest that experience of collectors is an important factor in such large differences in catch rates. Pipis show large differences in spatial location on the shore and inexperienced collectors often cannot find them, leading to fluctuating catches.

Theme 5

National Aquaculture Development Committee 2002, *National Aquaculture Development Committee's Report to Government and Industry*, Commonwealth Government, Department of Agriculture, Fisheries and Forestry (DAFF), Canberra.

Objective

To provide a blueprint for the future growth of the Australian aquaculture industry.

Findings

The report contains practical and cost-effective recommendations from the National Aquaculture Development Committee (NADC) for increasing the sustainable growth and competitiveness of the Australian industry. NADC proposed eight key initiatives to drive future industry growth. The initiatives included:

- 1) Making a National Aquaculture Policy Statement
- 2) Implementing an industry driven action agenda
- 3) Growing the industry within an ecologically sustainable framework
- 4) Investing for growth
- 5) Promoting aquaculture products in Australia and globally
- 6) Tackling the research and innovation challenges
- 7) Making the most of education, training and workplace opportunities
- 8) Creating an industry for all Australians

Theme 1

National Oceans Office 2002a, *Communities - connecting with the ocean. The South-east Regional Marine Plan Assessment Reports*, National Oceans Office, Canberra.

Objectives

This report seeks to identify the values and aspirations of the community living within 50 km of the coast of the South-East Marine Region, and of national and regional conservation groups.

Findings

The coastal community of the Region is home to approximately 1.4 million people. Not surprisingly, their socio-economic characteristics are diverse. Overall, the Region's annual population growth is about half the national average. Coastal communities to the west of a line drawn from Melbourne and Hobart, tend to be doing better than those to the east, as is reflected in unemployment, which tends to be higher, and lower average weekly household incomes than in the west of the Region. Overall, the assessment shows that the community highly values environmental sustainability, biodiversity and the use of resources to secure future sustainable economic benefits. Community members express strong support for more policing of the resources of the Region, and improving knowledge of the Region and its resources through more funding for science. Participants also request more input into the decision-making processes and management, and an acknowledgment of local expertise by government. Generally, the community has little knowledge of the South-East Marine Region and the current planning processes. However, a desire for more education on these topics was regularly expressed.

Theme 4

National Oceans Office 2002b, *Sea Country – an Indigenous perspective: The South-east Regional Marine Plan assessment reports*, Commonwealth of Australia, Canberra.

Objective

This assessment report is one of six that are an initial step in better managing Australia's oceans. They provide a knowledge base for developing the South-East Regional Marine Plan – the first regional marine plan being implemented under Australia's Oceans Policy.

Findings

This summary of Sea Country outlines major issues and findings in two reports commissioned by the National Oceans Office to assist in developing the South-East Regional Marine Plan: 1. Indigenous Uses and Values in the South-East Marine Region – Consultation Report, prepared by Resource Policy and Management (RPM) 2. Indigenous Uses and Values in the South-East Marine Region – Desktop Report, prepared by Smyth and Bahrtdt Consultants. The consultation report summarises Indigenous uses, values, concerns and aspirations for the South-East Marine Region, based on consultations with coastal Aboriginal people and organisations throughout the Region.

Theme 4

National Oceans Office 2004a, *Living on Saltwater Country: Review of literature about Aboriginal rights, use, management and interests in northern Australian marine environments*, National Oceans Office, Tasmania.

Objective

This literature review is part of the Scoping Phase of the development of a regional marine plan for the Commonwealth, Northern Territory and Queensland waters of the eastern Arafura Sea and Gulf of Carpentaria, referred to as the Northern Planning Area. The plan is being undertaken by the National Oceans Office, an Australian Government agency established to implement Australia's National Oceans Policy.

This report draws together the key themes emerging from across the region and summarises documented accounts of Indigenous concerns about current marine environmental and resource management, and Indigenous needs and aspirations for the future use and management of sea country.

Methods

The report summarises the main sources of publicly available written information about Aboriginal associations with, rights to, responsibility for, use of, and management of marine environments in the Northern Planning Area. Most of the information has been sourced from books, journals, conference proceedings, workshop transcripts and land and sea claim hearings. Some use has also been made of unpublished material, with permission of the appropriate sources. No culturally sensitive or restricted information has been used or referred to in this report.

Findings

The report sets out some of the policy challenges and options resulting from the review. The authors conclude by suggesting there is a powerful argument for a fresh approach to engagement of Aboriginal people in the planning and management of saltwater country in the Northern Planning Region.

Conclusion

The literature review shows the necessity of taking a broad view of the maritime economies of the region. While commercial fishing and marine tourism may be the dominant marine industries, the real marine economy of the region includes direct consumption of marine resources, environmental and fisheries management, research and monitoring, and coastal surveillance. Regional marine planning provides an opportunity to set the framework for a shift in the operation of this broader economy towards the Indigenous people of the region who form a majority of the population, who are economically and socially disadvantaged, and who have a long-term commitment to the region based on customary rights and obligations.

Theme 4

National Oceans Office 2004b, Scoping Report for the Northern Planning Area, Australian Government National Oceans Office, Tasmania.

The Northern Planning Area is home to about 25 000 people who live mainly in small, isolated communities, many of whom rely on the sea for work, sustenance and culture. A majority of these people, around 70 per cent, are Indigenous Australians. Despite Indigenous peoples' strong and ancient associations with sea country, they are generally poorly represented in decision-making and management fora and derive inadequate economic and social benefits from the management of sea country. Regional marine planning has a role to play in addressing these inadequacies. This Scoping Report for the Northern Planning Area is a major step in developing a Regional Marine Plan for the Northern Planning Area.

Objectives

The intent of the report was to make sure the use and management of the marine resources is ecologically sustainable well into the future. This was to be accomplished by:

- Developing a better way to do oceans business between governments to provide increased certainty for all oceans users;
- Recognising and better coordinating current initiatives;
- Identifying current and emerging issues that require more attention; and
- Putting in place a way to measure whether oceans management is contributing to a sustainable future.

Findings

With advice from the science, industry, conservation and local communities – priorities for government in the marine environment have now been broadly identified. The work to support this report was developed jointly by the Australian, Queensland and Northern Territory Governments. The Queensland and Northern Territory Governments have an ongoing interest in the process and, as it continues, they will consider the nature of their relationship to the final Northern Regional Marine Plan.

Theme 1

New South Wales Fisheries 2002, *New South Wales Estuary Prawn Trawl Fishery environmental assessment under the EPBC Act*, New South Wales Fisheries, Cronulla, NSW.

In December 2000, the NSW Government made changes to the way fisheries are managed in NSW. These changes place increased emphasis on ensuring that fishing activities are environmentally sustainable. The changes require the development of fishery management strategies for each major commercial fishery, the recreational fishery, the recreational charter boat fishery, fish stocking programs and for the beach safety (shark) meshing program. They also require an assessment of the environmental impact of those fisheries. The draft fishery management strategy and environmental impact assessment for the Estuary Prawn Trawl Fishery are considered in this Environmental Impact Statement (EIS) for the fishery. Its structure is based on guidelines produced by planning NSW.

Objectives

To examine whether the proposed draft strategy adequately deals with the impacts of the Estuary Prawn Trawl Fishery on the shellfish and finfish resources, the biophysical environment and existing estuary trawl fishers (economic and social consequences).

Methods (social component)

ABS data and telephone survey of 171 fishers.

Findings

Social implications considered employment and community values, health and safety, European heritage, indigenous heritage and issues. Fishers hold dear their identity as fishers and were resistant to retraining. It is projected that between 38 to 45 fishers were to be displaced in the first five years of the strategy being implemented. Some communities more vulnerable than others (*Clarence and Hunter most vulnerable due to age and income and dependents). There was a noted lack of alternative employment in the region. Older fishers might be compensated through the sale of shares in fisheries.

Conclusion

Little work has been undertaken to understand the cumulative impacts on communities from successive management strategies.

Theme 1

New South Wales Government 2002, *Indigenous fisheries strategy and implementation plan - December 2002*, Primary Industries Fishing and Aquaculture, Retrieved 11/12/2009: <http://www.dpi.nsw.gov.au/fisheries/info/nsw-ifs/nsw-ifs>, NSE.

Objective

The NSW Indigenous Fisheries Strategy seeks to:

- Encourage a broad community understanding of Indigenous traditional cultural fishing issues in NSW.
- Ensure that the importance of traditional cultural fishing is acknowledged in fisheries policy and practices, and during discussions on fisheries resource management issues.
- Encourage and support the involvement of Indigenous communities in the management of the state's fisheries resources.
- Encourage and support the involvement of Indigenous communities in commercial fishing, fishing based ecotourism, and the emerging aquaculture industry.

Findings

Over several years, consultation by NSW Fisheries', has gathered the views of Aboriginal communities on the best approach to an Indigenous fisheries strategy. The consultation has clarified the views of other interest groups such as conservationists, commercial fishers, recreational fishers and the broader community. An underlying theme in consultations about this strategy was the desire to preserve fisheries for the future. This is the point at which the interests of the Aboriginal communities and the broader Australian community intersect. The strategy seeks to ensure Aboriginal access for both cultural and economic activities, while acknowledging the broader community will have ongoing access to fisheries resources.

Theme 3

Northern Land Council 2004, *Living on Saltwater Country: Goulburn Island to Queensland border sea country management, needs and issues sea country management*, National Oceans Office, Hobart.

Objectives

As part of the development of the Regional Marine Plan for the Northern Planning Area, comprising waters of the Gulf of Carpentaria and Arafura Sea, the National Oceans Office funded the Northern Land Council, the Carpentaria Land Council and Balkanu Cape York Development Corporation to undertake consultations with saltwater peoples living along the Arnhem Land coast, lower Gulf of Carpentaria and western Cape York Peninsula, respectively.

Method

Key knowledgeable Traditional Owners who could speak with suitable authority for sea country in the region were sought for consultation and every effort made to speak to them face-to-face. This was not possible in all cases due to a range of local circumstances. NLC staff and anthropologists conducted the identifications and supported the on-ground consultation process with some assistance from contracted regional specialists in some areas and local language experts where appropriate. The meetings involved the presentation of information about the regional marine planning process by the National Oceans Office (NOO) and Northern Territory Government (NTG) representatives. This was followed by an NLC facilitated discussion of issues, concerns and recommendations relating to the recognition of Aboriginal rights, responsibilities, and interests in marine management, including the protection and sustainable use of marine resources.

Findings

This report summarises the results of consultations undertaken by the Northern Land Council within the Northern Territory (NT) sector of the Northern Planning Area. This consultation report complements a literature review of saltwater Indigenous interests and issues prepared by the Northern Land Council, funded by the National Oceans Office. There are significant and long-standing discrepancies between the way Aboriginals wish to manage and use their saltwater country and the way it is currently being managed and used. Many of the issues raised in this report were brought to the attention of the Resource Assessment Commission's Coastal Zone Inquiry in 1992/93, but little has changed in the subsequent decade.

Theme 4

Nurse-Bray, M. 2005, "Having a Yarn": Engaging Indigenous communities in Natural Resource Management, International conference on engaging communities, Brisbane Convention & Exhibition Centre, Queensland Australia.

Objectives

Across Australia, Indigenous peoples have responsibility for managing country. There is a need to broker engagement processes and practices that will enable Indigenous peoples to protect their culture while maintaining high value biological resources. This paper considers this challenge in the context of two case studies along the Great Barrier Reef in North Queensland, Australia; (i) a sea country co-management initiative developed by Giringun, a traditional owner representative body; and (ii) a Land and Sea Management Framework developed by the Wuthathi people, traditional owners of Shelburne Bay, Cape York Peninsula.

Findings

Increasingly, partnerships between management agencies, mining companies, conservation groups and the pastoral industry are being brokered with traditional owners of land and sea. The successful outcome of these partnerships necessitates the implementation of participative and culturally appropriate and professional processes of engagement with Indigenous communities. This includes addressing local modes of governance and community relations. In 2002 in the Hinchinbrook section of the Great Barrier Reef Marine Park World Heritage area, Giringun, a traditional owner representative body for that area, developed a co-management agreement with the Great Barrier Reef Marine Park Authority (GBRMPA). In 2004 the Wuthathi people, traditional owners of Shelburne Bay, Cape York Peninsula, Australia, launched a Land and Sea Management Framework. The Giringun and Wuthathi initiatives illustrate the necessity of developing coherent practices of community engagement. They provide an interesting contrast as the Giringun initiative was a co-management enterprise whereas the Wuthathi Framework was constructed as a community based enterprise. This paper compares these two initiatives with a view to helping promote understanding of the concept of engagement and participative practices in Indigenous communities. It argues that engagement processes need to go beyond 'having a yarn' and address deeper issues of social justice and equity in order to achieve conservation outcomes.

Conclusion

The paper concludes with a framework for engagement based on the principles of social justice and biodiversity protection.

Theme 3

Nurse-Bray, M. 2006, Conflict to co-management, eating our words: towards socially just conservation of green turtles and dugongs in the Great Barrier Reef, Australia, James Cook University, Cairns.

Indigenous communities worldwide face multiple challenges to maintain their unique cultural identity and value systems. In the natural resource management arena, these challenges include the imposition of western solutions to environmental management and biodiversity protection. This imposition has caused the dispossession or relocation of Indigenous peoples from their lands, a loss of traditional ecological knowledge, social disempowerment and economic inequity. Indigenous peoples are responding to these challenges by asserting their cultural identity, developing cultural re-vitalisation programs, and actively participating in western political processes for ongoing involvement in the environmental and natural resource management domain. To date, many of these programs are faltering or have failed in their long-term implementation.

Objective

The thesis aimed to document indigenous understandings and perspectives about indigenous hunting, management and planning; document management agency understandings and perspectives of indigenous hunting, management and planning; and assess and understand the implications of difference and similarities between the two perspectives for future management.

Method

The thesis uses a case study approach to examine the issues identified above through an examination of Indigenous hunting of threatened species in a protected area. The research is based on the contention that language matters, as it is an enabling tool which reveals the knowledge and power relations in natural resource management. To this end, the author compares perspectives held by Indigenous people on the one hand and government Management Agencies on the other, about traditional hunting, planning and the management of Green turtles (*Chelonia mydas*) and Dugongs (*Dugon dugon*) in Australia's Great Barrier Reef World Heritage Area (GBRWHA). To compare these perspectives the author used a combination of discourse analysis, historical analysis and participant observation to analyse the development, implementation and subsequent failure of the Hope Vale Turtle and Dugong Hunting Management Plan.

Findings

The research yielded four key findings: (i) that significant differences exist between Management Agencies and Hope Vale Community about hunting, planning and management (Management Agency discourse for example prioritised biodiversity protection, while Indigenous discourse was primarily about ensuring cultural survival); (ii) that language in resource management does matter because different linguistic interpretations within such programs have a direct impact on their efficacy (iii) that social justice dimensions must be incorporated within management regimes in order to achieve both cultural survival and biodiversity protection objectives; and (iv) that resource management initiatives can never be divorced from the impact of external events, actors and power regimes.

Conclusion

The thesis concludes with the presentation of a socially just conservation methodology to guide future collaborations between Indigenous peoples and Management Agencies when addressing the ongoing cultural harvest of wildlife in protected areas.

Theme 4

Nursey-Bray, M. 2008, *Socially just conservation: towards collaborative hunting management of green turtles and dugongs in the Great Barrier Reef World Heritage Area, Australia*, VDM Verlag, Germany.

Indigenous communities worldwide face multiple challenges to maintain their unique cultural identity and value systems. In the natural resource management arena, these challenges include the imposition of western solutions to environmental management and biodiversity protection. Indigenous peoples are responding to these challenges by asserting their cultural identity, developing cultural re-vitalisation programs, and actively participating in western political processes to ensure their ongoing involvement in the environmental and natural resource management domain. This book considers this issue through an examination of Indigenous hunting of threatened species (turtle and dugong) in a protected area, specifically the Aboriginal community of Hope Vale which is located along the Great Barrier Reef World Heritage Area, Australia. Discourse analysis is used to examine the importance of developing common linguistic understandings in environmental management. Research findings show that the way language is used in environmental decision making does matter and that management agreements must be socially just in order to achieve conservation outcomes in Indigenous contexts.

Theme 4

Nursey-Bray, M. 2009, 'A Guugu Yimmathir Bam Wii: Ngawiya and Girrbithi: Hunting, planning and management along the Great Barrier Reef, Australia', *Geoforum*, vol. 40, no. 3, pp. 442-453.

The integration of Indigenous cultural rights with biodiversity protection can be explored in multiple dimensions and occupy contested grounds.

Objective

This paper outlines the results of a research project that applied discourse analysis as both a theoretical and methodological tool to examine the power and knowledge relations within a case study of the development of a turtle and dugong hunting management plan by the Hope Vale Aboriginal Community in northern Australia.

Findings

This paper reports on the results of this analysis and shows how multiple binaries exist within and between the different actors in a resource management problem. Findings show that contested constructions of the environment are hugely influential to the success or failure of natural resource management endeavours. The ontological frames that are adopted in supporting Indigenous peoples to manage their land and seas must be understood, otherwise there is a risk of reinforcing the very binaries that need to be avoided.

Theme 4

Nursey-Bray, M. & Palmer, R. 2008, *Walk the Talk: strengthening Indigenous participation in the management of Australia's Oceans*, VDM Verlag, Germany.

Objective

To report to the Australian Conservation Foundation (ACF) and National Environmental Law Association (NELA) providing advice on how to better incorporate Indigenous interests into the discussion document, *Out of the Blue*, an Act for Australia's Oceans.

Findings

The authors highlight how Indigenous peoples in Australia can become actively involved in managing and caring for their sea country, and showcase some examples of how Indigenous peoples internationally have been grappling with and finding solutions to a similar challenge.

Theme 4

Nursey-Bray, M. & Rist, P. 2009, 'Co-management and protected area management: Achieving effective management of a contested site, lessons from the Great Barrier Reef World Heritage Area (GBRWHA)', *Marine Policy*, vol. 33, no. 1, pp. 118-127.

Marine protected management has gained acceptance as a way forward to achieve enhanced biodiversity outcomes. Simultaneously, co-management has gathered momentum as a mechanism to incorporate indigenous cultural aspirations within environmental management domains.

Objectives

The article reflects on the usefulness of co-management regimes operating within a protected area context, to explore how different management paradigms intersect (that of indigenous peoples and the primary statutory management authority GBRMPA).

Findings

Each management process has its own methodologies; when the two models intersect, they present a number of challenges to overall management outcomes. The paper reviews the journey of an indigenous co-management initiative within a marine protected area (MPA), the Great Barrier Reef World Heritage Area (GBRWHA), Australia, to explore how different management paradigms intersect with both negative and positive results. The paper argues that lessons learned from this initiative will help participants to adapt and innovate, so as to implement effective on ground management despite the region being a contested site.

Theme 3

Palmer, L. 2004a, 'Fishing lifestyles: 'Territorians', traditional owners and the management of recreational fishing in Kakadu National Park', *Australian Geographical Studies*, vol. 42, no. 1, pp. 60-76.

Objectives

The paper moves beyond an understanding of natural resource management as a set of practices based around a concept of 'nature' as a priori, to an elucidation of the 'epistemological questions of authority, speaking positions, and the negotiation of reality and power' that permeate the disparate yet entwined systems of Bininj and non- Aboriginal land and resource management in Kakadu National Park.

Methods

The paper is based on fieldwork and interviews which the author carried out in Kakadu National Park between 1997 and 1999.

Findings

The relationships between traditional Aboriginal land owners and other Park users in Kakadu National Park in the Northern Territory are characterised by competing agendas and competing ideas about appropriate ways of relating to the environment. Similarly, the management of recreational fishing in the Park is permeated by the tensions and opposition of contested ideas and perspectives from non-Aboriginal fishers and Aboriginal traditional owners. The local knowledge and rights of 'Territorians' [non-Aboriginal Northern Territory residents] are continually pitted against the local knowledge and rights of Aboriginal traditional owners. Under these circumstances, debates between non-Aboriginal fishers and Aboriginal traditional owners are overwhelmingly dominated by the unequal power relationships created through an alliance between science and the State. The complex and multi-dimensional nature of Aboriginal traditional owners' concerns for *country* renders these concerns invisible or incomprehensible to government, science and non-Aboriginal fishers who are each guided by very different epistemic commitments. It is a state of affairs that leaves the situated knowledge of Aboriginal traditional owners with a limited authority in the non- Aboriginal domain and detracts from their ability to manage and care for their homelands.

Conclusion

The paper concludes by stating that finding ways of resolving these tensions will involve a preparedness on the part of non-Aborigines to listen to, reflect on and respect the culturally specific rights of Aboriginal traditional owners whose jurisdiction encompasses the use and management of the resources contained within their estates. Post-script: "The paper is based on fieldwork and interviews which the author carried out in Kakadu National Park between 1997 and 1999. Since this time a series of constructive meetings and discussions aimed at gaining a better understanding of each other's perspectives have taken and continue to take place between representatives from the Kakadu Board of Management, Parks Australia and recreational fishing groups".

Theme 4

Palmer, M. (2004). Report on Illegal Fishing for Commercial Gain or Profit in NSW. Independent Report, NSW.

The illegal capture and sale of fish for commercial gain or profit is accepted as a significant issue in NSW.

Objective

To scope and assess the nature and extent of illegal harvesting and black marketing of fish for commercial purposes and to recommend areas for potential improvement in legislation, regulation, education, and enforcement including identifying the resources and priorities necessary to achieve optimal compliance and effective deterrents.

Findings

The clear finding of this review is that the illegal harvesting and black marketing of fish is a serious, widespread, entrenched and growing problem in NSW. The activities and practices involved threaten resource sustainability and have serious potential consequences for public health and safety, Government policy and Governance, the continuation of Indigenous cultural practices and the ability of the legitimate fishing industry to properly plan and manage its business affairs, and maintain confidence and profitability in the industry. It is more difficult to quantify the direct economic cost of non-compliance in lost revenue terms, the cost to Government of existing threats to the viability of a number of sections of the commercial fishing industry have been estimated at \$45 million per annum. There was a strongly held, and consistently expressed, view that there is a need to fundamentally change the prevailing "Australian" fishing culture, not only of the fishing community, but also of the judiciary, the government and the general public. At present, neither the risk of being apprehended, nor the fear of significant penalty or sanction, are sufficient to deter illegal activity.

Theme 3

Pascoe, S., Proctor, W., Wilcox, C., Innes, J., Rochester, W. & Dowling, N. 2009, 'Stakeholder objective preferences in Australian Commonwealth managed fisheries', *Marine Policy*, vol. 33, no. 5, pp. 750-758.

Fisheries management is increasingly involving a wide range of stakeholders in the decision making process. However, in most fisheries, the set of management objectives are poorly defined, and the implicit importance placed on these objectives may vary considerably both between and within different stakeholder groups. This may lead to conflicts within management advisory groups where members from different stakeholder groups view potential management outcomes substantially differently, and inconsistencies in decision making when changes in stakeholder representation take place.

Objective

The purpose in this paper is to examine the objective preference structure of stakeholder groups involved in the development of fisheries management in Australian Commonwealth managed fisheries.

Method

A large survey of stakeholders involved in Australian Commonwealth fisheries management was undertaken to determine stakeholder preferences relating to these objectives. Preferences are derived using the analytic hierarchy process (AHP).

Findings

In this paper, the institutional structure of fisheries management in Australia and the roles the different organisations play in shaping fisheries management plans are detailed. An explicit hierarchy of management objectives is developed in collaboration with key managers and policy makers. The results highlight the differences in perspectives regarding the relative importance of the multiple objectives of fisheries management. While on average stakeholder preferences generally correspond with their expected preference set, the results also indicate that there is generally low coherence within stakeholder groups.

Theme 4

Phillips, G., Kriwoken, L. & Hay, P. 2002, 'Private property and public interest in fisheries management: the Tasmanian rock lobster fishery', *Marine Policy*, vol. 26, no. 6, pp. 459-469.

In 1998 a management system based on individual transferable quota (ITQ) was introduced in the Tasmanian rock lobster fishery. This marked the continuation of a management trend that has favoured economic efficiency at the cost of reduced employment and greater restrictions on access to the fishery.

Objectives

To consider how interest groups have influenced the development of policy in Tasmania's rock lobster fishery and to discuss the implications.

Findings

The paper commences with a brief background to Tasmania's history, social and political character, which is linked to the resource management culture that has evolved over time. The authors then consider how regulation of the rock lobster fishery has developed through various steps to the current management system based on ITQ that serves rent-seeking, vested interests at the expense of the interests of a wider Tasmanian community. The authors discuss management trends in the fishery in the context of Tasmania's history, and social and political characteristics, which they argue, have shaped development of Tasmania's resource management culture. Implications for social equality, economic well-being and environmental sustainability are discussed.

Conclusion

In conclusion the difficulty of reforming policy that has been shaped by vested interests and which establishes rent-seeking activity is considered.

Theme 4

Pickworth, J., Schirmer, J. & Casey, A. M. 2006, *Social fabric of Australian fishing: A case study in South Australia*, Commonwealth Government, Bureau of Rural Sciences, Canberra.

The case study outlined in this booklet illustrates the breadth and scope of information that social assessments can provide. Information obtained can assist the fishing industry and other stakeholders in decisions designed to improve industry's sustainability.

Objectives

The case study, which focused on the Marine Scalefish Fishery (MSF) in South Australia planned to identify:

- a profile of those participating in the fishery
- aspects of their quality of life and well-being
- a profile of the fishing businesses operating in the fishery
- impacts of the fishery at a regional level
- the various sub-groups within the fishery and their characteristics
- implications for management and future of the MSF

Methods

Information on the fishery was gathered from licence and non licence holders who were employed on fishing boats and responses were received from a mail out survey and from workshops held across South Australia. The results of this social assessment have key implications for the management and future directions of the MSF.

Findings

Key findings indicated:

- most licence holders were older males
- low levels of formal education
- high dependence on fishing income
- high quality of life
- health problems reduce wellbeing
- working hours affect social networking and fragmentation of networking
- social wellbeing related to financial wellbeing
- concerns over the future of fishing in MSF and the lack of skills transfer
- concerns over the changing nature of participants into the fishery
- belief that commercial fishers are perceived negatively by the general community

Theme 5

Pierce, J. 2008, 'On community capitals as we see them through photovoice: Cowell oyster industry in South Australia', *Australasian Journal of Environmental Management*, vol. 15, no. 3, pp. 159-168.

In this article, the authors discuss a photovoice study of the oyster industry in Cowell on the Eyre Peninsula in South Australia. For the last 15 years the Cowell community has been adding water-based farming - the environmentally sensitive industry of oyster aquaculture - to its land-based farming.

Objectives

To illustrate how the Cowell community is adapting to external forces involved in its change to oyster aquaculture, and how this has affected the internal dynamics among the existing and new community members.

Method

The community capitals approach for assessing community sustainability was undertaken. Capitals framework enables capital stocks (natural, human, social, institutional, produced) and flows to be compared within a community, and cause and effect relationships to be identified. The method relied on photovoice (Photovoice enables community members to record their views on a given theme using cameras, and diaries) and a photo stimulated workshop.

Findings

Whilst this study provides data on natural, produced, and institutional capitals, the method enabled subtle reflections to be made on social and human capitals. Hence it provides some data on these hard to capture aspects of the capitals approach. The method allowed the Cowell community to tell their insider-looking-out story of the impact of oyster aquaculture on their community. The capitals approach linked well with photovoice methodology, and would have wider applicability in assessing the impact of other environmentally sensitive industries and developments in other communities. Findings from the study indicated that oyster aquaculture is viewed by Cowell community members as adding positive social and human capital, and that any negative aspects of the industry on the other capitals are seen as minor.

Theme 3

Pitts, D. 2007, *Australia's Oceans Policy: Best practice mechanisms for marine use planning*, Oceans Planning and Management Issues Paper 3, A Report Commissioned by the Department of Primary Industries and Energy, Commonwealth of Australia, Canberra.

Objectives

To examine best practice planning models applicable to the marine environment and to assess their applicability to a national planning framework with regard to Australia's ocean resources and the conservation of the marine environment and sustainable resource use.

To what extent do existing decision-making processes reflect best practice in the allocation and multiple use of marine resources?

What is an appropriate role for the Commonwealth to play in a highly decentralised and largely sector-driven decision-making framework?

How can planning approaches based on sectors be utilised to deliver outcomes which are based on ecosystems, ecological processes and the optimum use of ocean resources across all sectors?

Findings

The project comprised four main outputs: a context analysis; an initial review of models; a more detailed assessment of models; and a recommended planning approach. The consultation, data collection and analysis were undertaken over a period of slightly less than 2 months under the direction of officers from the Petroleum and Fisheries Division within the Legislation and Environment Section of the Department of Primary Industries and Energy.

Theme 3

Poloczanska, E., Hobday, A. & Richardson, A. 2009, *Report card of marine climate change for Australia*, NCCARF, Canberra.

This Report Card summarises present knowledge on marine climate change impacts and identifies knowledge gaps and adaptation responses in Australia. It was produced by an author team representing 35 universities and organisations, a project team from the CSIRO Climate Adaptation National Research Flagship, and a steering group comprising representatives from the sponsor organisations [National Climate Change and Adaptation Research Facility (NCCARF); CSIRO Climate Adaptation National Research Flagship; and the Australian Climate Change Science Program (ACCSP)]. The report card notes that "adaptation options for marine climate change need to focus on conservation responses to increase resilience of our marine biodiversity as well as adapting our businesses and practices". Key adaptation options identified that have social ramifications include: "Reduce overfishing and maintain, restore and protect essential fish habitats; Include climate change projections in fishery management plans to conserve stocks and assist fishers in adapting to changes in species' abundances and distributions; Reduce non-climate threats"

Theme 3

Priskin, J. 2003, 'Tourist perceptions of degradation caused by coastal nature-based recreation', *Environmental Management*, vol. 32, no. 2, pp. 189-204.

Tourist perceptions of environmental degradation caused by nature-based tourism activities in a coastal environment were determined in the Central Coast Region of Western Australia.

Objectives

To assess tourist perceptions of environmental harm caused by individual nature-based tourist activities in a coastal area.

Method

Structured surveys were administered to 702 visitors over two peak seasons. Visitors were required to indicate their perceptions on a Likert-type scale. Activities assessed were swimming, boating, fishing, diving and snorkelling, (wind)surfing, sand boarding, four-wheel driving, (bush)walking, camping, horse riding and sightseeing.

Findings

Tourists had significantly variable demographic characteristics over two seasons and participated in different activities. However, perception of environmental degradation of individual activities did not vary significantly between seasons, except for fishing, four-wheel driving and sand boarding. The age, origin and level of education of visitors had more effect on perceptions than gender or income group. Participation in an activity affected perceptions only for those who went fishing, sand boarding, four-wheel driving and sightseeing. Visitor perceptions were comparable to 'real' impacts documented in the recreation ecology literature. Visitors had significantly different perceptions of whether fishing was harmful. The average (combined seasons) perception of fishing was that it is "slightly harmful". Those who fished during their trip rated it less harmful than visitors who did not fish. Visitors younger than 35 years, those with university education and visitors from overseas perceived fishing more harmful than other groups.

Conclusion

The results of this research indicate a need for improved visitor education and interpretation facilities.

Theme 4

Putt, J. & Anderson, K. 2007, *A national study of crime in the Australian fishing industry*, Australian Institute of Criminology, Canberra.

Anecdotal evidence and some research suggest that the following changes occurred during the past decade in the Australian fishing sector: growth in organised crime group activity in the systematic harvesting, processing and distribution of abalone and rock lobster organised crime groups using the fishing sector to launder money, and drugs being manufactured at aquaculture facilities.

Objective

To undertake a two-stage project to determine the extent and nature of criminal activity in the Australian fishing industry

Findings

Australia-wide consultations with industry stakeholders, fisheries and law enforcement agencies highlighted that illegal activity occurs within all fishing sectors (commercial, recreational and Indigenous) in all Australian jurisdictions, and that the recreational sector can provide good cover for organised criminal activity. It was further found that organised crime involvement was more likely within a high value, low volume fishery such as abalone. Fisheries officers in the national survey identified interagency cooperation, legislative reform and powers afforded fisheries officers as equally important factors to enhance compliance and police methods/powers deal with organised criminal activity. Consultations revealed that stakeholders were concerned about the potential vulnerability of key species to organised criminal activity – abalone, mud crab, coral, reef, and fin fish, rock lobster and shark fin.

It seems that the legislative framework in Australia is overly complicated; the distinction between minor infringements and the illegal catching or possessing of species is not straightforward.

Conclusion

Ameliorating widespread concerns about the vulnerability of Australia's fishing to organised criminal activity involves adopting measures and implementing reforms that may take some time and resources to achieve.

Theme 5

Putt, J. & Nelson, D. 2008, 'Crime in the Australian fishing industry', *Trends and Issues in Crime and Criminal Justice*, vol. 366, no. pp. 1-6.

Increasing demand for Australian seafood overseas and at home is driving both legal and illegal markets, heightening the need for sustainable harvesting and management. Though illegal activity in the Australian domestic fishing industry has long been thought to be small-scale and opportunistic, significant numbers are regularly flouting the regulations. Some organised criminal activity too is evident, in high-value, low-volume fish stocks, such as abalone and rock lobster. Although fisheries management arrangements currently in place may be effective in minimising the risk of low-level illegal activity, there is widespread concern among fisheries officers that the current regulatory environment is not adequate to deal with and prevent organised criminal activity.

Objectives

To report on criminal activity in the Australian fishing industry, and to examine ways of protecting the sector against more and more-organised criminal activity.

Method

The research involved a national survey of fisheries officers; a review of relevant literature and Australian legislation; consultations with key stakeholders; and analysis of prosecution and court-outcome data from four jurisdictions.

Findings

Illegal activities take a variety of forms from under reporting catch to money laundering activities and have been found to be carried out by both recreational and commercial fishers. In contrast to some recreational, commercial, and subsistence fishers who practise occasional, less serious non-compliance with fisheries regulations there are also more serious criminals who, for example, systematically flout fisheries regulations to profit from the illegal sale of high-value 'fish' such as abalone and international traffic in illegally obtained fish products. Abalone, rock lobster and shark perceived as the most vulnerable species. The prosecution data from four jurisdictions indicated considerable seasonal variations in when illegal fishing activity is detected; the location of hot spots, where much of the illegal activity is detected; and that a proportion of offenders are repeat offenders. Seriousness of offences may be underestimated in courts where fisheries-offence prosecutions are infrequent events.

Objectives

Increasing the capacity of fisheries regulatory agencies to investigate serious fisheries crime through greater sharing of intelligence with police and introducing uniform sanctions nationally might reduce and prevent serious crime in all Australian fishing sectors.

Theme 5

Queensland Seafood Marketers Association 2008, *Establish the acceptability of the Queensland Endeavour prawn as a product of choice in the Queensland domestic market - Final Report*, Project 2007/247, Fisheries Research and Development Corporation (FRDC), Canberra.

Endeavour prawns are caught off the North Australian coast and have traditionally been exported to Europe...However a few years ago new European laws and competition from Argentina curtailed this trade, meaning a new market was needed... With major seafood buyers unable to on-sell Endeavour prawns the price crashed making trawling unsustainable for many operators. 2007 was the worst year with many vessels not bothering to move. The QSMA decided action needed to be taken to resolve the situation and a test marketing campaign was developed. Although the immediate goal was to sell existing stocks and increase prices paid for them, the QSMA was also keen to establish Endeavour prawns as brand and not a commodity product.

Objective

To develop a successful marketing campaign to help promote Endeavour prawns and increase their market appeal. The principal Investigator from the Queensland Seafood Marketers Association (QSMA) with FRDC support (Project 2007/247) initiated the marketing R&D project.

Findings

The campaign created extraordinary interest within the local Cairns area and also the wider Queensland community. Numerous press stories, television and radio interviews were generated as the campaign commenced. Seven retail outlets were canvassed on a regular basis during and after the campaign was concluded. All parties confirmed sales increases of more than 30% over previous figures with customers for the first time specifically asking for Endeavour prawns...[The campaign contributed to the sale of between 400-500 tonnes of previously unsaleable stock and prices moved from \$4 to \$8 per kilogram]. The journey from "species" to "gourmet brand" required a multi-layered carefully timed program that would identify, explain, educate, persuade and reinforce.

Theme 2

Sainsbury, K., Haward, M., Kriwoken, L., Tsamenyi, M. & Ward, T. 1997, *Australia's Oceans Policy: multiple use management in the Australian marine environment: principles, definitions and elements*, Oceans Planning & Management Issues Paper 1: Environment Australia, Canberra.

The present fragmented approach to management of the marine environment and its resources lacks a single framework that integrates social, environmental and economic goals, and has resulted in a 'tyranny of small decisions' in which a range of governments and agencies hold often overlapping and sometimes conflicting responsibilities and jurisdiction.

Objective

In developing an integrated and cooperative approach to multiple use management it is essential that there be consistent and mutual understanding of its principles, definitions and elements. This report summarises the background of multiple use management and related concepts in international and national agreements, then provides the principles and definitions of multiple use management based on that background.

Findings

Existing marine sector legislation needs to be reviewed and rationalised to identify gaps and overlaps, and steps should be taken towards establishing a consultative framework to facilitate communication and harmonise management arrangements between governments and interest groups. Multiple use management offers the most satisfactory approach to achieving an ecologically sustainable balance of outcomes across the broad range of uses and users of Australia's marine environment. Seven key issues for the Commonwealth in development and implementation of multiple use management have been identified: the development of a whole of Government position and understanding of multiple use management.; a legislative framework capable of effectively and efficiently delivering the integration, consultation and

implementation requirements of multiple use management; multiple use management consultative forums; apply processes, consistent with the principles of multiple use management and the Biodiversity Strategy, for identification and management of a National Representative System of Marine Protected Areas; an inventory to provide the information for identification of ecologically sensible regional boundaries, and ecological and user interactions within and between regions; operational definitions for multiple use management from the underlying principles; mechanisms that will enhance informed and effective participation by all sectoral and other interest groups in multiple use management planning and decision making.

Theme 1

Scandol, J., Holloway, M., Gibbs, P. & Astles, K. 2005, 'Ecosystem-based fisheries management: An Australian perspective', *Aquatic Living Resources*, vol. 18, no. 3, pp. 261-273.

The terms 'ecosystem-based fisheries management', 'ecosystem-based management' and 'ecosystem approach to fisheries' have recently entered the vernacular of fisheries management.

Objectives

To demonstrate that ecosystem-based management is simply a re-expression of the processes and operational mechanisms already developed for the paradigm of (ecologically) sustainable development and to show that ESD is already embedded within the policies, statutes and regulations of all Australian jurisdictions.

Findings

Since the early 1990's, all levels of government in Australia have committed themselves to the concept of ecologically sustainable development, and a complex network of policies and laws exist to support this, particularly in natural resource management. One significant outcome of these instruments is the application of environmental impact assessment to the management of fisheries. This has forced extensive deliberation of the ecological impact of fisheries and stimulated the development and application of new research tools. Application of environmental impact assessment to the management of fisheries has been a crucial step for the implementation of ecosystem-based fisheries management in Australia. These assessments are embedded within a range of legal and policy instruments that capture the ecological, economic and social dimensions of fisheries. The scientific challenges associated with many aspects of ecosystem-based fisheries management are very significant, but it is likely that the value-based nature of the underlying environmental issues will continue to dominate the managerial agenda.

Theme 1

Schirmer, J. & Casey, A. 2005, *Social Assessment Handbook - A guide to methods and approaches for assessing the social sustainability of fisheries in Australia*, Commonwealth Government Bureau of Rural Sciences, Canberra.

Objective

To provide the first comprehensive guide to methods for assessing the social well being of those who are engaged in or dependent on fishing activities in Australia.

Findings

The Handbook is a guide to planning and assessing the current social and economic impacts of fishing and fishing industries on the wider community and people who depend on fishing for their livelihood. The Handbook contains an overview of social assessments, guidance on how to plan social assessments, and descriptions of the different types of social data that can be collected (e.g. target groups for assessment, types of social information, data collection methods and using and evaluating the assessment findings; given the capabilities for conducting such assessments). The methods presented have been specifically adapted to be applicable in the Australian fisheries context, and tested through case studies in South Australia and Victoria. The handbook is targeted at individuals and groups who are dependent on fishing activities, e.g. suppliers of fishing equipment and gear, fish processors or the population of coastal towns with a high dependence on fishing.

Theme 3

Schirmer, J., Casey, A. & Mazur, N. 2004, *Socioeconomic impact assessment of the proposed Cod Grounds Marine Protected Area*, Commonwealth Government. Bureau of Rural Sciences Canberra.

The Cod Grounds are located in Commonwealth waters, approximately four nautical miles off the coast of Laurieton, New South Wales.

Objective

To provide an assessment of the potential social and economic impacts of the proposed Cod Grounds Marine Protected Area (MPA).

Methods

Data for the report was collected via a number of methods. This included structured qualitative surveys of potentially impacted fishers and their families and fish co-operatives, access to catch and effort data and the Sydney Fish Market and the use of secondary data to profile socio-economic characteristics of the region.

Findings

This assessment examined potential social and economic impacts of the proposed Cod Grounds MPA on commercial fishers and their families, and on fish co-operatives whose members currently land catch from the Cod Grounds. Key groups were identified by socio-economic impact assessment (SEIA) as being potentially the most affected by changes to commercial fishing under the proposed MPA. A range of impacts associated with the proposed MPA were identified and included loss of income, increased capital costs of fishing businesses, co-operative commission losses, reduced numbers of locally caught fish at retail outlets and potential reduction in regional employment.

Theme 3

Schirmer, J. & Pickworth, J. 2005a, *Social assessment of commercial fishing in the East Gippsland region*, Commonwealth Government, Bureau of Rural Sciences, Canberra.

This study was conducted as part of the '*Social Assessment Handbook for the Australian fishing sector*' project and was funded by Fisheries Research and Development Corporation. The East Gippsland region was selected as a case study for testing methods of social assessment because a diverse range of fishers land catch in the area.

Objective

To examine the social well-being of people working in commercial fishing in the East Gippsland region and their impacts on the East Gippsland region.

Method

Data for the study was gathered via a mail questionnaire (235 surveys) sent in late 2004 to all fishers landing catch in the Lakes Entrance Fisherman's Cooperative, Eastern Zone Abalone Industry Association and the Abalone Fishing Cooperative regions. The survey asked questions about : work/life satisfaction, health, spending, services and networks in fishing, tasks undertaken, future plans and demographic information.

Findings

Findings of the report indicated fishers in the region had a high quality of life, but this was under pressure due to external pressures affecting fishing businesses. Well being was related to job security, work/life balance, and fair fisheries management. Stimulation and challenge of fishing work was also important for fishers. There was also evidence of intergenerational change occurring in regard to who enters the fishing industry and how they learn their fishing skills. This study found the commercial fishing sector was a significant contributor to the East Gippsland community; providing a large number of employees who work in fishing, fish processing and provisions of goods and services to fishing businesses.

Theme 5

Schirmer, J. & Pickworth, J. 2005b, *Social impacts of the South Australian Marine Scalefish Fishery*, Commonwealth Government, Bureau of Rural Sciences and Fisheries Research and Development Corporation (FRDC), Canberra.

The report presents results of one of the two case studies undertaken as part of the *Social Assessment Handbook for Australian Fisheries* project. The Marine Scalefish Fishery (MSF) is a large and diverse fishery stretching across most of South Australia's coastline. Several hundred fishers work in the MSF, contributing significantly to the communities and economies of many coastal regions.

Objective

To provide best practice advice on approaches to designing and undertaking social assessments and to provide information on the social well-being of people working in the South Australian Marine Scalefish Fishery (MSF) and their impacts on the South Australian community.

Method

The study gathered data via a mail questionnaire (which was distributed to all licence holders in the MSF) and a series of 12 workshops across South Australia.

Findings

The key findings of this report are:

- The mail survey approach used was very effective.
- The workshops, while gathering useful qualitative data for the study, did not achieve the attendance hoped for.
- The approach taken to designing the questionnaire, in which questions were designed to be specifically applicable to those working in the MSF was clearly successful.
- That, while most MSF participants have a high quality of life, various pressures - including many related to their fishing work - are reducing this quality of life for many.
- Quality of life was highly related to work and financial satisfaction, and to the level of involvement fishers had in their local communities
- Most fishers do not work in fishing with the goal of earning a high income, but for reasons including enjoyment of the types of tasks undertaken and environment worked in when fishing.

Conclusion

In summary, the MSF contributes significantly to many coastal regions of South Australia, but particularly to the West Coast, Port Lincoln, the Yorke Peninsula and Kangaroo Island.

Theme 4

Seafood Services Australia 2006, *Walking the talk - Seafood EMS pilot group case studies*, Seafood Services Australia Ltd.

Five years ago, the notion that the Australian seafood industry would become a world leader in environmental management systems would have been considered far-fetched. Today, the industry's EMS leadership is widely acknowledged throughout the world and our nation. In five years, stimulated by Australian Government initiatives such as the Natural Heritage Trust, there has been a sea-change in attitudes about what is possible in managing the environment. Challenges that seemed insurmountable then can now be met by systematic approaches. Importantly, seafood environmental management systems also allow the industry to *demonstrate* responsible, sustainable natural resource management. Knowledge of this environmental responsibility is starting to spread throughout the community, with many eventual economic, environmental and social benefits in prospect from increased community confidence in the industry. "*Walking the Talk — Seafood EMS Case Studies*" is one of ten paper-based and electronic "Seafood EMS Resources", including an interactive CD ROM and a website. It relates experiences of the pilot groups, supplementing *Seafood EMS Recipes for Success*.

Theme 3

Seafood Services Australia Ltd and Ocean Watch Australia (2005). Take your pick! — the Seafood EMS Chooser, 2nd edition, Seafood Services Australia Ltd.

[The seafood] "industry's future, and access to the natural resources used by fisheries and aquaculture, will depend increasingly on [the industry's] capacity to *demonstrate* that ...resources [are being utilized] in a sustainable, responsible way. More and more seafood industry businesses and organisations are setting up environmental management systems (EMSs) to improve — and demonstrate — good environmental performance. In the process, they are increasing their profits and improving their relations with the community. An EMS can help [seafood businesses] to gain access to the latest and best knowledge, to be innovative, and to reap the benefits of adopting the best and most efficient industry practices. Fisheries and aquaculture enterprises that want to achieve greater self-management can also use their EMS to demonstrate a standard of achievement that meets the needs of regulators within a self-managed system. The *Seafood EMS Chooser* is the first step in deciding on what should be in [an] EMS. It provides an overview of what's involved and leads into the Seafood EMS Resources — manuals, a CD-ROM and a website — which... take seafood businesses through the process step-by-step. The *Seafood EMS Chooser* outlines the various choices [to assist with setting] goals and tailoring EMS to unique, day-to-day business activities. People who have already implemented EMSs are keen to pass on their experience, and industry trainers can help seafood businesses to quickly acquire EMS skills and access government training assistance.

Theme 3

Sharp, N. 1998, 'Handing on the right to fish: The law of the land and cross-cultural co-operation in a gulf community in Australia', *Pacific Conservation Biology*, vol. 4, no. 2, pp. 95-104.

Drawing on oral and written sources, this paper discusses an Aboriginal community's experience in taking primary responsibility for land and waters on behalf of the generations. It explores the reasons why Aboriginal people's distinctive relationship to the environment and to future generations forms a framework for their management practices. Respect for the law of the land became the pre-condition for more than a decade of co-operation with neighbouring commercial fishermen and others. Given a recognition of important cultural differences in the way relationships to land and sea are constructed, it is suggested that these experiences may offer some guidelines on sharing lands and coasts in Australia.

Theme 4

Smith, A. 1999, 'Implementing effective fisheries-management systems - Management strategy evaluation and the Australian partnership approach', *ICES Journal of Marine Science*, vol. 56, no. 6, pp. 967-979.

Fisheries management is characterized by multiple and conflicting objectives, multiple stakeholders with divergent interests and high levels of uncertainty about the dynamics of the resources being managed. This conjunction of issues can result in high levels of contention and poor outcomes in the management process. Management strategy evaluation (MSE) can assist in the resolution of these issues. MSE involves assessing the consequences of a range of management options and laying bare the trade-offs in performance across a range of management objectives.

Objectives

To describe and evaluate the experience in developing the MSE approach within the Australian Fisheries Management Authority (AFMA) fisheries assessment process. The focus is on the implementation of MSE within the AFMA partnership model, on the role and responses of the various key players in the process, and on the lessons that have been learned along the way.

Findings

Managers were somewhat sceptical of the MSE approach at the commencement of the project but have since come to find it a useful model; it fits with the partnership model already adopted by AFMA. Industry reactions were reported to be more difficult to judge as they were exposed to MSE at the same time as the partnership approach. A key element of industry acceptance of the process was the involvement of an industry-funded scientist in the assessment group. The paper asserts that conservation agencies tend to be sceptical of fisheries management but in this case they were well accepted by industry representatives, provided constructive (although limited) input, took some of the heat off scientists (who otherwise tend to be seen by industry as "green"), and "played by the rules" of the process. The benefits and limitations of the AFMA partnership approach are reviewed, both for MSE, and, in a wider sense, in the development of an effective fisheries management system.

Conclusion

One of the priorities for MSE is to broaden its scope and application beyond the relatively narrow confines of target species harvest strategies.

Theme 3

Smith, A. & Pollard, D. 1996, 'The best available information - Some case studies from NSW, Australia, of conservation-related management responses which impact on recreational fishers', *Marine Policy*, vol. 20, no. 3, pp. 261-267.

In New South Wales fishing is one of the most popular recreational activities in coastal and freshwater environments, Although a wide variety of fish, crustaceans, molluscs, other invertebrates and algae are exploited by fishers for sport, food and bait, there is little quantitative information on the catches, efforts and effects of humans on populations of these organisms. Although there have been a number of surveys of the activities of recreational fishers in lakes, rivers, estuaries, and more recently the marine environment, there have been few such surveys of the catch, effort, effects and/or motivations of other human user groups such as spearfishers, SCUBA divers, aquarium fish collectors and conservationists. Ideally, fisheries managers use catch and effort data together with information on species biology and human usage to determine management strategies aimed at sharing the fisheries resources in order to maximise the benefits for both present and future generations.

Objective

The paper presents case studies on Aquatic Reserves and protected aquatic species to illustrate NSW Fisheries' management responses to protect fish habitats and species in NSW waters, and to consider some of the positive and negative impacts of management strategies on recreational fishers. The paper considers the usefulness of the concept of 'adaptive management' in such cases.

Findings

The paper provides an overview of both positive and negative effects of fisheries management. Positive impacts: (1) increased densities of fish (either directly by stocking or indirectly through catch restrictions, fishways, habitat protection, etc.); (2) larger individuals; (3) breeding population security; (4) conservation for the future; (5) sharing the resource; (6) introduction of species that are highly regarded as sport or food fish, (e.g. trout); (7) protection of fish habitats. Negative impacts: (1) restricted access; (2) restricted catches; (3) community doubts and criticisms of fisheries management policies; (4) perceived bias towards commercial users, and in some cases non-extractive recreational users (e.g. SCUBA divers in relation to Aquatic Reserves); (5) introduction of pest species (e.g. carp, mosquito fish). The author promotes the concept of adaptive management as a way forward, although there is a dearth of such management approaches in place.

Conclusion

Management practices can be improved, taking explicitly into account the uncertainty affecting fishery catch data and related scientific information, and the consequent risk in decision making. More cautious and broadly-based approaches to management are required.

Theme 5

Smith, D., Smith, A. & Punt, A. 2001, 'Approach and process for stock assessment in the South East Fishery, Australia: a perspective', *Marine and Freshwater Research*, vol. 52, no. 4, pp. 671-681.

The stock assessment process in the South East Fishery involves scientists, industry, fishery managers, economists and non-government organizations. A comparison with such processes in other countries, where stakeholder involvement ranges from government scientists only to involvement of scientists, industry and conservation non-government organizations, suggests that Australia is the only country in which fishery managers are active and integral stock-assessment participants.

Objectives

To describe the processes and approach currently adopted for stock assessment in the South East Fishery, compare it with stock-assessment processes in other countries, and discuss its strengths and weaknesses.

Findings

In Australia, as in several other countries, the form of advice is comparative (consequences of alternative decisions) rather than prescriptive. Although all approaches have advantages and disadvantages, the South East Fishery process has advantages that appear to clearly outweigh the disadvantages. The advantages include better communication among interest groups, improved ownership of and hence support for outcomes and better interactions among groups. The disadvantages include the cost of the process, lack of consistency among assessments, vulnerability of scientists and the frustrations of industry.

Theme 4

Smyth D & Smyth and Bahrdr Consultants in Cultural Ecology 1997, *Saltwater Country Aboriginal and Torres Strait Islander Interest in Ocean Policy Development and Implementation. Socio-cultural Considerations - Issues Paper 6*, Department of Tropical Environment Studies and Geography, James Cook, University, Commonwealth of Australia, Canberra.

This information paper examines the pre-colonial, post-contact and contemporary relationships of Aboriginal and Torres Strait Islander peoples' with Australia's oceans because the relationship between Indigenous cultures and Australia's ocean environments is not well understood.

Objectives

This information paper seeks to explore the relationship between Indigenous cultures and Australia's ocean environments, and to assist policymakers, managers, users and the wider community to incorporate Indigenous perspectives into the management of Australia's oceans and marine resources.

Findings

The concept of customary marine estates, traditionally owned and managed by Indigenous groups, is identified as a key difference from the general community's views on the ocean as an open common to be managed by governments. The paper documents current levels of Aboriginal and Torres Strait Islander involvement in ocean management, including initiatives by indigenous groups to regain self-management of their saltwater country. An introduction is also given to the role of Indigenous peoples in marine protected area management, the prospect of recognising native title in the sea, and international obligations for addressing indigenous peoples' rights and interests in Australia's oceans.

Conclusion

The paper concludes that the stewardship ethic, which remains an inherent feature of Aboriginal and Torres Strait Islander maritime cultures, can provide the basis for reconciling Indigenous and non-Indigenous perspectives on ocean management to the benefit of all Australians.

Theme 4

Social Sciences Program Bureau of Rural Sciences, Department of Agriculture Fisheries and Forestry, Bureau of Transport and Regional Economics & Australian Bureau of Agricultural and Resource Economics 2005, *Socio-economic Impact Assessment Toolkit: A guide to assessing the socio-economic impacts of Marine Protected Areas in Australia*, Commonwealth of Australia, Canberra.

The Australian Government released a policy statement on Marine Protected Areas (MPAs) and Displaced Fishing in January 2004. That policy recognises that the declaration of MPAs may have adverse social and economic impacts on sections of the community, and that in such circumstances there may be grounds for providing structural adjustment assistance. As stated in the policy, this is because the declaration of an MPA is a resource allocation process whereby marine resources are effectively reallocated from generating a private benefit such as fishing to a broader public good of biodiversity conservation. Therefore, in developing MPA proposals it is important to assess social and economic implications.

Objectives

This toolkit has been developed to provide policy makers and the fishing sector with a general background and introduction to methods for assessing the socio-economic impacts within a fisheries context of proposals to declare MPAs in Australia. In particular, the toolkit focuses on potential impacts on the fishing industry, including related businesses and communities associated with fishing activities.

Findings

The toolkit comprises a general guide to undertaking socio-economic impact assessment (SEIA), followed by specific guides to methods and sources of information which can be used in assessing the potential impacts of proposed MPAs on these selected sectors. It provides a range of options for assessing social and economic impacts, and advice on appropriate methods for particular situations. It covers methods for assessing direct and indirect impacts. Uses and limitations of each method are included, such as likely cost and time required to implement, and the type of information each method can provide. DEH will use the toolkit to identify the most appropriate approach for socio-economic assessment of the impacts of candidate MPAs, initially in the South-east marine region.

Theme 3

Stacey, N. 2001, Crossing borders: implications of the Memorandum of Understanding on Bajo fishing activity in northern Australian waters, understanding the cultural and natural heritage values and management challenges of the Ashmore Region, Darwin.

The 1974 Memorandum of Understanding (MoU) between Australia and Indonesia was a goodwill attempt to recognise the long-standing interests of Indonesian fishermen in the northern Australian region. Bajo originating from the villages of Mola and Mantigola in the Tukang Besi Islands, Southeast Sulawesi, are one group of fishermen who have a historic interest in the region and currently operate in and around the MOU area.

Objectives

This paper examines the effectiveness of the MoU in providing for recognition of indigenous Bajo fishing rights, sustainable marine resource conservation and management, and in curbing illegal Bajo fishing activity in the Australian Fishing Zone.

Findings

An analysis of the key concept of "traditional" fishing encapsulated in the 1974 MOU shows it to be problematic with direct and far reaching consequences for Bajo fishermen. It is argued that until the problems of the MoU are addressed, by way of new arrangements incorporating a more culturally informed inclusive approach with respect to traditional Indonesian fishermen, other Australian policy responses to address illegal activity and marine resource conservation in the AFZ will be undermined.

Theme 3

Stoeckl, N., Greiner, R. & Mayocchi, C. 2006, 'The community impacts of different types of visitors: An empirical investigation of tourism in North-west Queensland', *Tourism Management*, vol. 27, no. 1, pp. 97-112.

Objectives

To investigate some of the economic and environmental (predominantly fishing) impacts of different visitor segments to the Carpentaria Shire in Queensland, Australia

Findings

The results show that different types of visitor generate different economic and environmental impacts and that the current visitor mix contributes most (financially) to caravan parks and local stores while drawing heavily upon local fishing stocks. The paper argues that in the short to medium term it is paramount for the continued success of tourism to manage the recreational fisheries. In the medium to long term, a more diverse range of visitor types could generate larger regional economic benefits, a broader distribution of benefits, and less reliance on just one of the region's otherwise plentiful natural resources.

Theme 5

Stuart-Smith, R., Barrett, N., Crawford, C., Frusher, S., Stevenson, D. & Edgar, G. J. 2008, 'Spatial patterns in impacts of fishing on temperate rocky reefs: Are fish abundance and mean size related to proximity to fisher access points', *Journal of Experimental Marine Biology and Ecology*, vol. 356, no. 2, pp. 116-125.

Effects of fishing on marine communities are becoming increasingly evident, yet little is known of the spatial extent of impacts, particularly for multiple impacts distributed over broad scales.

Objectives

To test the common perception that commercial and recreational fishing on inshore temperate reefs generate spatial impacts that diminish with distance from fisher access points.

Methods

The authors collected data on harvested and non-harvested reef species using underwater visual censuses at 133 shallow rocky reef sites around Tasmania and tested for relationships between assemblage and species level indices of fishing impacts and distance to the nearest boat launching ramp.

Findings

Slopes of size spectra of fish communities tended to decrease with distance from the nearest boat ramp, with this relationship apparently resulting from low numbers of large fish and a greater number of smaller fish at sites closest to access points. At the species level, relationships were evident either in the abundance of legal individuals or the mean size of harvested species with distance to the nearest boat ramp, except for rock lobster. Patterns for rock lobster differed when areas in which commercial or recreational fisheries dominated were considered separately from the state-wide analysis. A pattern of increasing numbers of legal lobsters with increasing distance from boat ramps was observed, but only in the areas in which the recreational fishery dominated. Observed relationships in all species were consistent with greater fishing impacts at sites closest to boat ramps, with the exception of exploited wrasses. Banded morwong, which are subject to a live export fishery, appeared to be most affected by proximity to boat ramps. Conversely, no relationships were found between the abundance or size of the most frequently occurring non-harvested species and distance to boat ramps.

Conclusion

These results support the hypothesis that greater fishing impacts occur at more accessible sites over the entire Tasmanian coastline. The variability of results among individual species are likely, at least in part, to be related to differences in fisheries characteristics such as vessel size and range, as well as the suitability of our methods for detecting impacts. The potential of such a pattern in fishing impacts to be evident in other locations will thus likely depend on characteristics of the particular fishes and fisheries.

Theme 5

Stump, N. & Kriwoken, L. 2006, 'Tasmanian marine protected areas: Attitudes and perceptions of wild capture fishers', *Ocean & Coastal Management*, vol. 49, no. 5-6, pp. 298-307.

In 1999 the Marine and Marine Industries Council was established by the Tasmanian (Australia) State Government and in 2001 a Tasmanian Marine Protected Area Strategy was launched.

Objectives

To investigate the views, perceptions and attitudes of commercial fishers towards this MPA Strategy and to identify the key issues that influence fisher support or opposition to marine protected areas (MPAs).

Method

Fifty-one structured interviews with license supervisors of commercial abalone, rock lobster and scalefish fishers were conducted.

Findings

Fishers stated that they would conditionally support MPAs if they sustained or increased fish populations, supported research, allowed fishing in multiple use areas, and if multiple use areas contained small 'no-take' zones. Fishers were concerned about the ability of the government to provide adequate marine protected area monitoring and compliance and were critical of the public consultation process that accompanied the development of the Strategy. Concern was expressed regarding the potential negative impact of additional MPAs in terms of resource sustainability and the long-term economic viability of the fishery.

Theme 4

Sutherland, J. 1996, *Fisheries, aquaculture and Aboriginal and Torres Strait Islander peoples: studies, policy and legislation*, Environment Australia, Canberra.

Aboriginal and Torres Strait Islander peoples hold a range of interests in fisheries and aquaculture; there has been some effort to have such interests recognised and protected (e.g government inquiries and consultation processes over the last decade or so). The extent to which these interests have been accommodated in law and policies varies markedly around the country. In addition, although there are many common aspirations amongst Aboriginal and Torres Strait Islander peoples, there is also considerable diversity. This reflects in part the heterogeneity of indigenous cultures and their geographic locations.

Objectives

To identify and summarise those sections of available studies, legislation and policies which are relevant to Aboriginal and Torres Strait Islander peoples' interests in fisheries and aquaculture.

Findings

The report has found that since the RAC little progress has been made by government agencies in assessing indigenous Australians' rights and interests in fisheries issues, or the impact of current or proposed management regimes on indigenous Australians' rights and interests. The Torres Strait, and to a lesser extent the Northern Territory, seem to be the only areas where detailed economic analyses of fisheries development issues for indigenous fishers have been undertaken. This report identifies and summarises those sections of available studies, legislation and policies which are relevant to Aboriginal and Torres Strait Islander peoples' interests in fisheries and aquaculture. It is structured around the key components of the proposed Aboriginal and Torres Strait Islander Fisheries Strategy identified by the Resource Assessment Commission (RAC) in its Coastal Zone Inquiry Final Report. These may be summarised as:

- recognition of indigenous Australians' interests in the coastal zone;
- participation in fisheries management;
- economic development and employment opportunities; and
- improving relationships.

Theme 4

Sutton, S. 2007, 'Socio-economic aspects of artificial reefs: Considerations for the Great Barrier Reef Marine Park', *Ocean & Coastal Management*, vol. 50, no. 10, pp. 829-846.

Artificial reefs are used to enhance recreational fishing and diving opportunities in the marine environment. Until recently, demand for artificial reefs in the Great Barrier Reef Marine Park (GBRMP) has been low due to the high value placed on the natural ecosystem of the Great Barrier Reef (GBR) and the abundance of fishing and diving opportunities it provides. In the GBRMP, where there are multiple stakeholder groups with diverse and often conflicting values and opinions, the deployment of artificial reefs will be a complex and controversial social issue.

Objective

To review the available socio-economic literature regarding the deployment, use, and management of artificial reefs, and aim to identify and understand potential socio-economic issues and information gaps surrounding deployment of artificial reefs in the GBRMP.

Findings

The paper outlines a strategy to guide decision-making and maximize the socio-economic value of artificial reefs should they be deployed in the GBRMP.

Theme 4

Sutton, S. 2006, *An assessment of the social characteristics of Queensland's recreational fishers*, CRC Reef Research Centre, James Cook University, Townsville.

Objectives

To gain better information regarding the levels of use by identified user groups and their interactions, perceptions and motivations;

To assess the effectiveness of communication and consultation methods;

To monitor long-term trends in social, economic, and cultural parameters, and

To gain a better understanding of the social and economic impacts of alternative management strategies.

Methods

A combination of telephone and mail survey methods was used to collect information from Great Barrier Reef area (GBR) and non-GBR area recreational fishers in Queensland regarding demographic and fishing participation characteristics, the importance of fishing, motivations and consumptive orientation, beliefs, opinions and involvement in fisheries management, stocked impoundment fishing and social values. The telephone survey contacted 13,390 fishers between February 16, 2004 and March 18, 2004. In total, 9,754 interviews that provided basic household-level information were completed (73% response rate). Only active recreational fishers (those who had fished in the previous 12 months) were interviewed further. This resulted in 2,733 full interviews and a sample of 2,355 fishers who agreed to participate in the follow-up mail survey. Questionnaires were mailed to these fishers on May 5, 2004. In total, 1,385 usable surveys were returned. The effective response rate was 60%. A non-response bias check suggested that older more experienced and committed fishers may be somewhat overrepresented in the mail survey. This should be taken into consideration when viewing and using the results of this study.

Findings

A thorough overview is provided of the demographic characteristics of the fishers in the study. Statements about the importance of fishing to the fisher's lifestyle that received the highest level of agreement/strong agreement were "Most of my friends are in some way connected with fishing" (41% GBR; 26% non-GBR), "I would rather go fishing than do most anything else" (35% GBR; 26% non-GBR), and "Other leisure activities don't interest me as much as fishing" (33% GBR; 27% non-GBR). The reasons why people liked fishing included relaxation and being outdoors. Responses to questions about fisheries management suggest recreation fishers see management as necessary to protect fish stocks. Habitat protection was seen as a key requirement for sustainable fisheries.

Conclusion

This study provides an extensive database on the social aspects of recreational fishing in Queensland. As such, it should begin to give managers and other stakeholders a better understanding of the recreational fishing sector, and allow the needs, concerns, and values of recreational fishers to be incorporated into the management process.

Theme 5

Taylor-Moore, N. 2006, Great Barrier Grief: A case study of the socio-economic impacts of the representative areas program for the Great Barrier Reef marine park on the Queensland Seafood Industry, Paper presented at *Sharing the Fish* conference, Perth, WA.

The Great Barrier Reef Marine Park Authority (GBRMPA) introduced a controversial Representative Areas Program (RAP) for the Great Barrier Reef Marine Park (GBRMP) on 1 July 2004 closing one third of the GBRMP to commercial fishing. The RAP resulted in a significant reallocation of resources, industry angst, business failure and personal trauma and grief.

Objectives

To negotiate an effective and fair adjustment policy, administrative procedures and funding for both the commercial fishing fleet and fishing related businesses. Without this input, it is questionable whether anything other than minimal assistance would have occurred.

Findings

This case study presents the socio-economic impacts resulting from the implementation of the RAP not the processes undertaken by the GBRMPA in determining appropriate closures for biodiversity purposes, even though the two are inter-related. The former was virtually ignored by GBRMPA in determining the latter. Moreover, the two main fisheries within the GBRMP, the otter trawl fishery and reef line fishery, had already been significantly restructured, and deemed sustainable, before the implementation of the RAP. The resource reallocation outcomes and their associated socio-economic impacts of the RAP on commercial fishing and fishing related businesses and how these are measured under an adjustment scheme are presented. The findings are based on personal interactions with hundreds of fishers and businesses directly affected by the RAP.

Conclusions

There are two important resource allocation lessons for any jurisdiction considering the implementation of marine protected areas (MPAs): 1) the socio-economic impacts of MPAs; and 2) the need for an integrated approach.

Theme 4

Tedesco, L. & Szakiel, S. 2006, *Indigenous people in aquaculture*, ABARE Research Report 06.9, Prepared for the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), Canberra.

Objective

The objective in this study is to provide a reference for indigenous people who are considering whether to enter the aquaculture industry.

Findings

The report provides a reliable source of information on the current state of the Australian aquaculture industry, current indigenous involvement, and the role of government. In addition, five different indigenous case studies from around Australia have been presented.

Conclusion

It is important to understand the risks associated with entering into this type of business and whether the business can in the long term sustain these risks and continue to remain viable.

Theme 5

Tobin, R., Pears, R., Marshall, N., Marriott, R., Busilacchi, S. & Bergenius, M. 2005, *Fishing for more: A student-stakeholder workshop on the biology, ecology and sociology and economics of fisheries*. CRC Reef Research Centre Technical Report No 59, CRC Reef Research Centre, Townsville.

Social hardship is frequently associated with setting limits on the use of our natural resources. Resources have been mostly managed using ecological and economic knowledge. Evidence is now accumulating showing that incorporating social factors into the decision making process may improve resource protection through decreasing conflicts and increasing compliance whilst enabling the social costs associated with protecting natural resources to be understood.

Objectives

This PhD study explored the resilience of the commercial fishing industry to changes in fisheries policy. Ways in which resilience can be defined and recognised are explored. Factors that influence resilience are also examined.

Method

One-hundred fishing families in 5 coastal communities in northern Queensland were interviewed. They were asked to complete a structured survey relating to their business, their background, their family, their relationship with decision makers, the fisheries resource, and their community. Results suggest that the level of dependency on the fisheries resource, the way in which policies are interpreted and certain personal and family characteristics are important in determining how resilient a fishing family might be to a change in policy.

Findings

Conflict between recreational and commercial fishers resulting from competition for shared fish stocks is a significant concern in the management of fisheries resources throughout Australia, with each sector calling for tighter restrictions on the activities of the other. In north Queensland, competition for a share of the barramundi resource is apparent through numerous media articles outlining opinions of both sectors. Opinions expressed in the media can influence decisions by managers and politicians who allocate and distribute access to fisheries resources, though usually it is not known whether such opinions are representative of the general fishing population. To address this uncertainty, a questionnaire program was implemented for recreational line fishers and commercial gillnet fishers. Questions focussed on fishers' perceptions about competition and conflict between the sectors, their view and knowledge of their own and the competing sectors' impacts, and their suggested solutions to competition. Results indicate that fishers from each sector holds negative opinions of the competing sector, and positive opinions of their own sector, perhaps indicating a likelihood for blame for negative outcomes, such as declines in catches. Negative opinions, however, appear to be based on perceptions that are not supported by scientific research, suggesting that correct information about fishing impacts of each sector is failing to reach the general fishing public. Solutions suggested by respondents include improving education and communication within and between sectors, or segregating the sectors via Recreational Only Fishing Areas (ROFAs). Overall, results suggest that current conflict between sectors may be eased through increased education and communication, highlighting the importance of social research into such situations.

Conclusion

It is hoped that this study can be used to stimulate discussion as to how social information can be better incorporated into the decision-making process so that policies can be designed that not only protect the resource, but minimise associated social impacts.

Theme 4

Waite, G. & Hartig, K. 2000, 'Ecologically sustainable fishing in theory and practice: individual transferable quotas in Australia's South East Fishery', *Australian Geographer*, vol. 31, no. 1, pp. 87-114.

In 1988, responding to international legislation that requires sustainable fishery management, the Australian Fishery Management Authority (AFMA) implemented an individual transferable quota (ITQ) management system to address the environmental crisis in the South East Fishery.

Objectives

To compare the theoretical socio-economic outcomes with the actual operation of ITQs

Findings

The paper defines sustainability in its broadest context to include social as well as economic and ecological dimensions. The paper sets the context for the study by describing the environmental crisis and the South East Fishery's ITQ management system. The brief South East Fishery experience suggests that the logic behind ITQs is correct. Production has become reorganised. Operators are not only fewer, but also embrace professionalism, quality, efficiency, and the operation of the free market within the industry. However, because of the local idiosyncrasies of this multi-species fishery, the legislation over territorial waters, and the absence of alternative employment, fishers have adopted non-quota fishing techniques and entered seas under New South Wales jurisdiction.

Conclusion

Without a social re-adjustment policy or buy-out scheme, the AFMA's objective of ecologically sustainable development cannot be attained.

Theme 1

Wilcox, C. & Donlan, C. J. 2007, 'Compensatory mitigation as a solution to fisheries bycatch-biodiversity conservation conflicts', *Frontiers in Ecology and the Environment*, vol. 5, no. 6, pp. 325-331.

Globally, fisheries catch of non-target species has major environmental impacts, resulting in social conflict, litigation, and fisheries closures.

Objectives

The authors use a bio-economic approach to demonstrate that compensatory mitigation - an innovative, market-influenced approach to fishery-conservation conflicts - can facilitate high-value uses of biological resources and cost-effective conservation gains for species of concern.

Findings

The paper illustrates the strategy using a seabird example from Tasmania: levying fishers for their by-catch and using the funds to remove invasive mammals from breeding islands. Removal of invasive predators is 23 times more effective from a return-on-investment perspective (i.e. percent increase in population growth per dollar invested) in comparison to fisheries closures, and is more socio-politically feasible. A by-catch levy, which would increase with endangerment, provides an individual incentive for avoiding by-catch, the most effective mechanism for sustainable management of fisheries.

Conclusion

Compensatory mitigation provides an opportunity to address a global concern, optimize conservation interventions, and forge an alliance between conservation and fisheries organizations.

Themes 3

Williams, A., Ballagh, A., Begg, G., Murchie, C. & Currey, L. 2008, 'Harvest patterns and effort dynamics of indigenous and non-indigenous commercial sectors of the eastern Torres Strait reef line fishery', *Continental Shelf Research*, vol. 28, no. 16, pp. 2117-2128.

The reef line fishery (RLF) in Eastern Torres Strait (ETS) is unique in that it has both a commercial indigenous sector and a commercial non-indigenous sector. Recently, concerns have been expressed by all stakeholders about the long-term sustainability of the fishery. These concerns have been exacerbated by the lack of detailed catch and effort information from both sectors, which has precluded any formal assessment of the fishery.

Objectives

To characterise the harvest patterns and effort dynamics of the indigenous and non-indigenous commercial sectors of the ETS RLF.

Methods

This study took place over a four year period (2003-2006). A range of data sources are used for this study including commercial logbooks, community freezer records, voluntary logbooks and observer surveys.

Findings

A total of 56 species were caught by indigenous and non-indigenous commercial fishers, with a substantial overlap in the species composition between sectors. The paper demonstrates that by-catch is a significant component of the catch for both sectors and identify substantial differences in harvest patterns and effort dynamics between the sectors. Differences between sectors were observed in species composition and spatial and temporal patterns in catch, effort and catch per unit effort.

Conclusion

These results highlight the inherent variation in catch and effort dynamics between the two commercial sectors of the ETS RLF and provide valuable information for the development of future assessments and appropriate management strategies for the fishery. The more reliable estimates of harvest patterns and effort dynamics for both sectors obtained from observer surveys will also assist in resolving issues relating to allocation of reef fish resources in Torres Strait.

Theme 5

Williams, K., McPhee, D., Hundloe, T., Buxton, C., Knuckey, I. & Stone, S. 2009, *Regional impact assessment for the Moreton Bay Marine Park*, Project 2007/053, Fisheries Research and Development Corporation (FRDC), Canberra.

The development and implementation of networks of no-take MPAs in Australia has seen an initial significant underestimation of the economic and social impacts on both the commercial and recreational fishing industries and businesses directly supporting those industries. Following Queensland's Environmental Protection Agency's (EPA) announcement that the Marine Parks (Moreton Bay) Zoning Plan 1997 would be reviewed in 2007, various industry groups that relied on Moreton Bay came together to discuss possible changes to the legislation. A group was formed, the Moreton Bay Access Alliance (MBAA) who worked together to develop a project, "Regional impact assessment for the Moreton Bay Marine Park".

Objectives

To ensure the revision to the zoning plan met conservation objectives (including consideration for environmental, community and economic factors), whilst not diminishing access to commercial, indigenous and recreational and boating activities. Specific project objectives were:

- To collect data on the fishing and associated industries (including social and economic values for commercial, recreational and indigenous/traditional fisheries).
- To collect data on Moreton Bay marine flora, fauna and ecosystems.
- To undertake a risk assessment of fishing and associated boating activity on environmental values.
- To develop options for managing the Moreton Bay Marine Park that achieve biodiversity and ecological sustainability objectives. The selection of these areas was guided by a set of scientific principles prepared by the EPA Scientific Panel

Findings

Despite the ambitious goals set in a limited timeframe, the objectives of the project were achieved and were well communicated through all sectors. The strong relationships built between traditionally rival stakeholders, set a bench mark for planning and development in the SEQ region. Unified agreements were reached between the sectors as to which locations should be no-take zones. A scientifically defensible case for placement of marine reserves was developed which formed a point of negotiation during the Government-led public consultation process.

Theme 1

Woodhead, A., Cornish, P. & Slavich, P. 2000, 'Multi-stakeholder benchmarking: Clarifying attitudes and behaviour from complexity and ambiguity', *Australian Journal of Experimental Agriculture*, vol. 40, no. 4, pp. 595-607.

Developing an understanding of a major environmental issue with multiple stakeholders is complex. Each stakeholder has a different perspective, level of knowledge and institutional focus. Acid sulfate soils on New South Wales coastal catchments are an emotive and polarising issue for the many stakeholders involved. Conflict over acid sulfate soils is therefore newsworthy, and the broader community is introduced to different stakeholders from these polarising viewpoints. Consequently, cane and cattle producers, who benefit from the draining of acid sulfate soils, are portrayed as perpetrators. Oyster farmers and fishers, who incur the cost of acidified water, are portrayed as victims, while local and state government agencies, who have responsibility for regulation, are variously portrayed as either heavy-handed bureaucrats or toothless tigers.

Objectives

Multi-stakeholder benchmarking has been developed to clarify complexity and ambiguities. By establishing indicators for documenting and understanding change in stakeholder attitude and behaviour it aims to decrease the divisiveness and degree of the polarised opinions. Benchmarking is a continuous process of measurement that identifies the best and compares against the best.

Methods

Multi-stakeholder benchmarking uses multiple methods to establish quantitative data which, along with qualitative data are used to develop a deeper understanding of the complex social issues. It aims to empower individuals and groups while supporting extension and processes of change. First, information about social and economic issues is established by identifying and surveying stakeholders, using both quantitative 'closed' or explicit questions and qualitative 'open' questions for non-structured responses. Second, qualitative research, conducted in focus groups of sub-sampled survey respondents, validates and explores the survey results. During this stage, unique characteristics of the groups are defined, compared and best practices are identified. Results from these 2 stages are communicated back to the stakeholders, taking care to use non-judgemental language. Finally, best practice goals are defined, investigated and transferred within the same or other stakeholder groups.

Findings

This paper proposes multi-stakeholder benchmarking as a new benchmarking process, and discusses the application of it to a complex environmental problem, acid sulfate soils. Multi-stakeholder benchmarking provides an important opportunity for stakeholders to voice their view on how environmental issues can be best managed and for determining which practices they wish to change. Further it provides information for education program development and evaluation, and facilitates the process of change. Acid sulfate soils stakeholders' positive responses to non-judgemental information, that clarifies their position, and helps identify the way forward, suggest that multi-stakeholder benchmarking is applicable to other multi-stakeholder environmental problems.

Theme 4

Young, M., Gunningham, N., Elix, J., Lambert, J., Howard, B., Grabosky, P. & McCrone, E. 1996, *Reimbursing the future: an evaluation of motivational, voluntary, price-based, property-right, and regulatory incentives for the conservation of biodiversity*, Biodiversity Series, Paper No. 9, CSIRO Division of Wildlife and Ecology, the Australian Centre for Environmental Law, and Community Solutions Biodiversity Unit, Department of the Environment, Sport and Territories, Canberra.

Objectives

This case study aims to identify the potential of incentive instruments and mechanisms to promote the conservation of biodiversity in the marine environment of New South Wales (NSW) and to encourage the sustainable use of these biodiverse resources.

Findings

Attention is drawn to the fact that, throughout the marine environment of most of Australia and NSW, knowledge about biodiversity is very poor and the threats to it are numerous. The report provides an overview of governance arrangements in NSW for recreation and commercial fisheries. Data on most of the State's fishery resources are patchy and, in most cases, inadequate for fine-scale management. In many cases, management decisions are underpinned by little scientific information. Stock estimates for most species are not available and have never been estimated. Whilst several fresh water fish are endangered, as yet, no marine species of fish have been listed as endangered. Many of the threats to marine biodiversity arise from land and fisheries managers not being sufficiently involved in the management of these onshore threats. Fishing, tends to be managed by reference to the form of gear used and the species harvested, rather than the fishery ecosystem being considered. The risk for this approach is that the maintenance of marine habitats and the ecological systems that feed them are never central to the agenda. If stronger ecosystem orientations can be built into the framework, then the overall prospects for biodiversity conservation will be greater.

Theme 3

Young, M. 1999, 'The design of fishing-right systems -- the NSW experience', *Ecological Economics*, vol. 31, no. 2, pp. 305-316.

In 1994, the Australian state of New South Wales (NSW) passed legislation to introduce a fishery share system. In some ways it is similar to the 'ITQ', or individual transferable quota, fishery management systems found in New Zealand, Iceland, Australia, Canada and other countries.

Objectives

To report on the concepts, experiences and observations derived whilst designing, from first principles, a share based fishery management system for those fisheries managed by the Australian State of New South Wales (NSW).

Findings

The focus of the system is on fisheries rather than species. In most of these fisheries, a combination of input and output controls are used. Special design features include allotment of shares in the 'fishery' rather than in quotas, and a structure that forces adaptive resource management. The system is designed to maximise the probability that fishery use will remain both sustainable and consistent with social objectives as they change through time. The system's conceptual framework is of relevance to other fisheries and, also, many other industries that use natural resources. Consistent with periodically revised management plans, rights to harvest specific amounts of fish or to use certain classes of boats and gear are issued in proportion to the number of shares held in each fishery, 'fishery' being flexibly defined by region and habitat, with or without further specification by gear-type, species group or single species. The management plan might, for example, specify a relationship between number of shares and size of boat or net. Any quotas are allocated in proportion to the number of shares held. Subject to compliance with periodically reviewed share conditions, rights are perpetual and give each fisher a direct financial interest in the future of the fishery. Shares are mortgageable and fully transferable. Driven by the management plan, structural adjustment is delegated to the market and individual fishers. A dual property-right structure is used to minimise transfer costs encourage self-enforcement and compliance.

Conclusion

The key elements of the NSW system proposed include a highly adaptive management structure, mechanisms with strong incentives for bottom-up forms of community management, a focus on ecosystem functions and strong incentives for astute administrative practice. The author believes that the system is generally applicable to most fisheries and most other forms of resource use.

Theme 1

Zann, L. 1995, *The social value of the coastal and marine environment to Australians - our sea, our future, major findings of the State of the Marine Environment Report for Australia* Great Barrier Reef Marine Park Authority & Department of the Environment Sport and Territories, Canberra.

Objectives

Through the State of the Marine Environment Report for Australia (SOMER) to provide the first comprehensive description of Australia's marine environment, its uses and values, the issues and threats affecting it, and its management.

Method

The topics to be covered in SOMER were initially identified by a workshop of experts from marine science, resource management and industry.

Findings

The 'social value of the coastal and marine environment to Australians' covers the following subjects: the importance to Australia's indigenous people (traditional practice and current challenges for indigenous communities), importance to Australia's general community (social, cultural and heritage values of the coast; community engagement) and marine education in Australia.

Theme 4

Appendix 4 References discarded from the literature review

- Boyd, C. 2003, 'Guidelines for aquaculture effluent management at the farm-level', *Aquaculture*, vol. 226, no. 1-4, pp. 101-112.
- Branden, K., Pollard, D. & Reimers, H. 1994, 'A review of recent artificial reef developments in Australia', *Bulletin of Marine Science*, vol. 55, no. 2-3, pp. 982-994.
- Campbell, R. A., Pepperell, J. & Davis, T. 2003, 'Use of charter boat data to infer the annual availability of black marlin, *Makaira indica*, to the recreational fishery off Cairns, Australia', *Marine and Freshwater Research*, vol. 54, no. 4, pp. 447-457.
- Cinner, J., McClanahan, T., Daw, T., Graham, N., Maina, J., Wilson, S. & Hughes, T. 2009, 'Linking social and ecological systems to sustain coral reef fisheries', *Current Biology*, vol. 19, no. 3, pp. 206-212.
- CSIRO 2006, *Great Barrier Reef Catchments Theme: Research Overview*, CSIRO, Department of Primary Industries (Victoria) 2005, *Flinders aquaculture fisheries reserve management plan*, Department of Primary Industries, Melbourne.
- Findlay, J., Cross, C. & Bodsworth, A. 2003, 'Marlin fisheries management in Australia', *Marine and Freshwater Research*, vol. 54, no. pp. 535-545.
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- Boyd, C. 2003, 'Guidelines for aquaculture effluent management at the farm-level', *Aquaculture*, vol. 226, no. 1-4, pp. 101-112.

Pressure from environmental groups will force most governments to impose effluent regulations on aquaculture. Shrimp and fish producers are concerned that these regulations will be unnecessarily restrictive and expensive. Most pond aquaculture cannot be conducted without discharge. Fish and shrimp farms tend to be concentrated in specific regions, but typically they are sprawling operations where large volumes of relatively dilute effluents are released at many points. Effluents from pond aquaculture resemble non-point sources of pollution more than point sources. Thus, application of traditional effluent treatment methods to meet effluent standards, as done for point source pollution, will be difficult or impossible. Many involved in aquaculture believe that application of best management practices (BMPs) could be a reasonable and affordable way to improve the quality and reduce the volume of pond effluents. During recent years, several organizations have suggested systems of BMPs for making pond aquaculture more environmentally responsible. These include international development organizations (Food and Agriculture Organization of the United Nations and International Finance Corporation), industry groups (Global Aquaculture Alliance, Australian Prawn Producers Association, Marine Shrimp Culture Industry of Thailand, and Alabama Catfish Producers), a research center (Coastal Resources Center, University of Rhode Island), and state agencies in the USA (Missouri Department of Natural Resources and Florida Department of Agriculture and Consumer Services). The contents of BMP documents presented by the different groups are remarkably similar. Although the BMP approach is largely a "paper list" at present, the topic is being discussed widely, and producers are becoming more aware of environmental issues. There is an obvious attempt by producers in Latin America, Asia, Australia, and the United States to improve production practices, and some producers are voluntarily adopting BMPs. Many shrimp producers in several nations have installed settling basins, and a few large shrimp farms monitor effluent quality. The Aquaculture Certification Council (ACC) plans to implement a certification program based primarily on compliance with BMPs during 2003. There also is considerable discussion among producers and governmental agencies in several nations regarding BMPs, and it is expected that regulatory programs based on BMPs will be forthcoming. (C) 2003 Elsevier B.V. All rights reserved.

Branden, K., Pollard, D. & Reimers, H. 1994, 'A review of recent artificial reef developments in Australia', *Bulletin of Marine Science*, vol. 55, no. 2-3, pp. 982-994.

This paper summarizes artificial reef developments in Australia since the mid 1980's. Seven artificial reefs, each consisting of about 900 tetrahedron module units constructed from discarded motor vehicle tires, have been placed in South Australian waters since 1984 to enhance primary production of colonizing organisms and to enhance catches of fish species of recreational importance. Similar reefs have also since been placed in other regions of Australia. Studies indicate that these reefs have increased both primary productivity and the number of fish available for recreational fishers. Most artificial reefs placed in Australian waters have been for recreational use by either divers or anglers. To avoid conflict between these two user groups some of these reefs have been specifically designated for diver use and include underwater trails to assist divers with navigation. The use of derelict vessels as artificial reefs in several Australian states is also discussed.

Campbell, R. A., Pepperell, J. & Davis, T. 2003, 'Use of charter boat data to infer the annual availability of black marlin, *Makaira indica*, to the recreational fishery off Cairns, Australia', *Marine and Freshwater Research*, vol. 54, no. 4, pp. 447-457.

Catch data, recorded in daily diaries kept by the captains of charter boats in the recreational fishery that targets black marlin (*Makaira indica*) in the Cairns/Lizard Island region off north-eastern Australia, were used to calculate annual indices of fishing success (catch per day). Generalized Linear Models were used to investigate factors likely to influence catch rates, such as captain, area fished, water temperature, moon phase and the strength and direction of prevailing currents. Despite a high degree of inter-annual variability in the catch, results indicate that there has been a long-term decline of between 20-30% in estimated availability between 1970 and 1997. Models fitted to the data for the period 1987-1996 indicate that several environmental factors can have a significant influence on availability in any given year, with higher catch rates occurring close to a half moon and associated with water temperatures around 26.0-26.5degreesC. Catch rates for the period 1980-1997 were also found to be negatively correlated with longline effort levels within the inshore region close to the recreational fishery, though this correlation was not found to be significant.

Cinner, J., McClanahan, T. , Daw, T. , Graham, N. , Maina, J., Wilson, S. & Hughes, T. 2009, 'Linking social and ecological systems to sustain coral reef fisheries', *Current Biology*, vol. 19, no. 3, pp. 206-212.

The ecosystem goods and services provided by coral reefs are critical to the social and economic welfare of hundreds of millions of people, overwhelmingly in developing countries [1]. Widespread reef degradation is severely eroding these goods and services, but the socioeconomic factors shaping the ways that societies use coral reefs are poorly understood [2]. We examine relationships between human population density, a multidimensional index of socioeconomic development, reef complexity, and the condition of coral reef fish populations in five countries across the Indian Ocean. In fished sites, fish biomass was negatively related to human population density, but it was best explained by reef complexity and a U-shaped relationship with socioeconomic development. The biomass of reef fishes was four times lower at locations with intermediate levels of economic development than at locations with both low and high development. In contrast, average biomass inside fishery closures was three times higher than in fished sites and was not associated with socioeconomic development. Sustaining coral reef fisheries requires an integrated approach that uses tools such as protected areas to quickly build reef resources while also building capacities and capital in societies over longer time frames to address the complex underlying causes of reef degradation.

CSIRO 2006, *Great Barrier Reef Catchments Theme: Research Overview*, CSIRO

Department of Primary Industries (Victoria) 2005, *Flinders aquaculture fisheries reserve management plan*, Department of Primary Industries, Melbourne.

The purpose of the Flinders Aquaculture Fisheries Reserves Management Plan is to specify the policies and strategies for managing activity within the Flinders Aquaculture Fisheries Reserve Vic and has been prepared under the requirements of the Victorian Fisheries Act 1995. The vision of the Plan is the development of environmentally sustainable, economically viable and socially equitable marine aquaculture at the Reserve that produces a commercial supply of high quality seafood. The Plan prescribes a range of ecological, economic, social and governance objectives and strategies that reflect the goal of the plan as well as a suite of management actions (IFS).

Findlay, J., Cross, C. & Bodsworth, A. 2003, 'Marlin fisheries management in Australia', *Marine and Freshwater Research*, vol. 54, no. pp. 535-545.

Australia has a relatively long history with respect to management of fishery interactions with marlins. Sectoral conflict has been, and remains, the main driver of management action. Whilst constrained by verified catch and effort data from both recreational and commercial sectors, a range of management actions including limited entry, non-retention, non-targeting, closed areas and gear restrictions are reviewed. The review of management performance shows that the effectiveness of management actions varies considerably. Some measures such as voluntary non-retention policies have had little impact, whereas others such as closed areas have had a marked impact on fishery interactions and sectoral conflict. Relatively small area closures reduced the interactions of Japanese longliners with black marlin by 85%. On a per unit-of-effort basis marlins are currently afforded greater protection than ever from overfishing; however, effort from all sectors continues to increase and sectoral conflict with respect to marlins is expected to continue to result in calls for further management action.

Flegel, T. W. 2009, 'Review of disease transmission risks from prawn products exported for human consumption', *Aquaculture*, vol. 290, no. 3-4, pp. 179-189.

Recent publications have proposed that transmission of exotic viral pathogens to cultured and native shrimp stocks may be possible via frozen prawn products prepared and packaged for human consumption. To properly assess the probability of such disease transmission, epidemiological analysis would be required. This analysis might necessitate new investigations to quantify the risks associated with intended and non-intended product use. It would also require a review and analysis of published literature on transmission of shrimp pathogens from frozen shrimp products, of existing prawn fishery and aquaculture statistics, and of published literature on disease epidemics in wild and cultivated shrimp. This review revealed no published reports in the peer-reviewed, scientific literature of shrimp disease outbreaks in wild or cultivated shrimp that originated from shrimp packaged and processed for retail sale. Similar conclusions have been reached for chilled and frozen eviscerated fish and mollusk products prepared and packaged for human consumption. Reports were found describing successful laboratory transmission of shrimp viruses from packaged fresh frozen shrimp under specific laboratory conditions, but these did not include epidemiological analyses to determine the probable risk of transmission to wild or cultivated shrimp stocks under conditions of product marketing and use. Other more likely routes of possible shrimp viral transmission are also reviewed and risk reduction measures are recommended.

Grafton, R. & McIlgorm, A. 2009, 'Ex ante evaluation of the costs and benefits of individual transferable quotas: A case-study of seven Australian commonwealth fisheries', *Marine Policy*, vol. 33, no. 4, pp. 714-719.

Individual transferable quotas (ITQs) have been introduced in a number of different countries, including Australia. Using seven Australian commonwealth fisheries the paper undertakes an ex ante cost-benefit analysis whether to introduce ITQs into these fisheries. The analysis uses five cost-benefit criteria, and in particular the gross value of production (GVP), to evaluate whether ITQs should be introduced or not. For fisheries where the net benefits do not currently justify ITQs, a pathway is provided to improve management Outcomes With the use of individual transferable efforts units (ITEs). (C) 2009 Elsevier Ltd. All rights reserved.

Gray, C., Johnson, D., Young, D. & Broadhurst, M. 2004, 'Discards from the commercial gillnet fishery for dusky flathead, *Platycephalus fuscus*, in New South Wales, Australia: spatial variability and initial effects of change in minimum legal length of target species', *Fisheries Management and Ecology*, vol. 11, no. 5, pp. 323-333.

A scientific observer programme was used to quantify the composition and magnitude of discards in the gillnet fishery for dusky flathead, *Platycephalus fuscus* (Cuvier), in three barrier estuaries in New South Wales, Australia, during the 2001 fishing season. Regulations only permit the retention of legal-sized dusky flathead and legal-sized blue swimmer crab, *Portunus pelagicus* L., and mud crab, *Scylla serrata* (Forsk.) all other organisms were discarded. Sampling was stratified into two time periods; before and after 1 July 2001 which coincided with the increase in the minimum legal length (MLL) of dusky flathead from 33 to 36 cm total length (TL). Eighty one catches were sampled, yielding 38 finfish species and two portunid crab species. Legal-sized dusky flathead were the most abundant organism captured, accounting for 23-47% by number and 34-54% by weight of the mean observed catch depending on the estuary and survey period, with a mean catch of 25-59 flathead weighing 13-25 kg per fishing-night. Species composition and relative abundance of catches differed among estuaries, but not between sampling periods. Predominant bycatch species included legal and undersize blue swimmer crab, sea mullet, *Mugil cephalus* L., luderick, *Girella tricuspidata* (Quoy & Gaimard), bream, *Acanthopagrus australis* (Gunther) and yellowfin leatherjacket, *Meuschenia trachylepis* (Gunther). These five species accounted for 82% of total bycatch by number and 71% by weight, pooled across the three estuaries. More crabs were retained than discarded, with retained legal-size crabs (byproduct) accounting for 16% of total bycatch by number and 13% by weight, with an average of 5-22 crabs weighing 1-6 kg being caught per fishing-night, depending on the estuary. Overall, 7% of dusky flathead captured (number) were below the MLL of 36 cm and discarded, suggesting the nets as currently configured may be relatively selective in catching legal-size flathead. However, 41% of dusky flathead were <40 cm TL, indicating that if the MLL for this species is increased to this length as proposed, new nets must be introduced into the fishery. The findings are discussed in terms of making the flathead fishery more sustainable, including alternative management strategies for the fishery.

Harrison, J. 2009, *Assessing the technology transfer and people skills requirements for the introduction of mullet processing on the east coast similar to Shark Bay frozen sea mullet fillets*, FRDC, Canberra.

Lowry, M. & Murphy, J. 2003, 'Monitoring the recreational gamefish fishery off south-eastern Australia', *Marine and Freshwater Research*, vol. 54, no. 4, pp. 425-434.

The east coast Australian gamefish fishery is a diverse, multi-species fishery that targets billfish, sharks, tuna and other pelagic fish along the east Australian seaboard. A Gamefish Tournament Monitoring Program (GTMP) was undertaken, and 39 021 angler trips from 1996 to 2000 were analysed. The program reports on trends in fishing effort, catch rates, catch composition, proportions of captures tagged and released and spatial distribution of catches for the principal recreational billfish species: black marlin (*Makaira indica*), striped marlin (*Tetrapturus audax*)

and blue marlin (*Makaira nigricans*). The GTMP was principally designed as part of an integrated program to monitor the recreational gamefish fishery. The spatial and temporal design of the program restricted statistical analyses however, there were trends in fishing effort, directed effort, catch rates, catch composition, proportions of fish tagged and spatial distribution of catches for the principal recreational billfish species over seven successive years (1994-2000). Analysis of catch data, stratified by directed effort, indicated significant differences in catches of target species, demonstrating the importance of calculating catch rate estimates according to the main target preference. Analysis of tournament based tagging information indicated that while overall tournament tagging rates remained high (88%) there were significant differences in the number of fish tagged between species groups highlighting the impact that angler attitude and the competition point score structure has on the harvest of gamefish target species.

Lyle, J. & Morton, A. 2007, *Survey of the 2006 Tasmanian recreational scallop fishery*, Department of Primary Industries and Water, Hobart.

The 2006 recreational scallop season took place between March and June following a successful fishery in 2005. Management arrangements were basically unchanged in 2006; all Tasmanian waters (apart from marine reserves) open, dive collection the only permitted harvest method, and a daily bag limit of 40 and possession limit of 200 scallops. Management arrangements were basically unchanged in 2006. The status of scallop populations was assessed by dive survey prior to the opening of the fishery and immediately following the closure of the season. A post-season survey of licensed fishers was also conducted to collect information on fisher success, effort by region and to gauge opinions about the management of the fishery. The telephone survey involved over 350 recreational scallop licence-holders. Almost 35% of scallop licence holders did not fish during 2006, this compared with 17% in 2005, though increased licence sales in 2006 meant that, in absolute terms, there were more active fishers in 2006. Licence-holders dived an estimated 18,800 fisher days for scallops during the 2006 scallop season, representing an average of almost 6 days per fisher. By comparison with 2005, dive effort was higher but the difference was not statistically significant. Overall the 2006 recreational scallop season enjoyed a high level of fisher success and satisfaction as well as support for the management strategy. Of concern for the future, however, is the combination of a lack evidence to support the existence of substantial beds of scallops in inshore waters other than the D'Entrecasteaux Channel and the limited recent settlement of commercial scallops in that area. Based on the distribution of fishing effort and fishing success over the past two seasons it is likely that subsequent fisheries will be increasingly reliant on queen or doughboy scallops. In the absence of significant settlement in the next few years there is a risk that stocks may decline to very low levels through the combined effects of fishing and ageing. Together they will have major implications for the quality of the fishery.

Lyle, J. M., Morton, A. & Forward, J. 2005, 'Characterisation of the recreational fishery for southern rock lobster, *Jasus edwardsii*, in Tasmania, Australia: implications for management', *New Zealand Journal of Marine and Freshwater Research*, vol. 39, no. 3, pp. 703-713.

Southern rock lobster (*Jasus edwardsii*) support significant commercial and recreational Fisheries in Tasmania, Australia. Since the mid 1990s the number of persons holding recreational lobster licences increased by over 80%, with c. 15 500 persons licensed in 2002/03. Assessment of the recreational fishery has been undertaken periodically since 1996 using a telephone-diary survey method. The fishery was concentrated off the south-east and east coasts of Tasmania and characterised by strong seasonality in catch and effort, which peaked markedly early in the fishing year (November-January). Although pots were the most popular fishing method, daily catch rates by divers were more than double those for pots. Divers selectively harvested larger lobsters than those taken by pots and more frequently attained the daily bag limit of 5 lobsters. The estimated recreational harvest increased significantly since 1996/97 and in 2002/03 effectively reached a management trigger level of 10%, of the total allowable commercial catch, flagging a review of recreational management arrangements.

Marsh, H., Harris, A. & Lawler, I. 1997, 'The sustainability of the Indigenous dugong fishery in Torres Strait, Australia/Papua New Guinea', *Conservation Biology*, vol. 11, no. 6, pp. 1375-1386.

The sustainability of the indigenous dugong (*Dugong dugon*) fishery in Torres Strait is evaluated on the basis of aerial survey estimates of the size of the regional dugong population in 1987 and 1991 and a survey of catches of dugongs taken by local communities between 1991 and 1993. The estimate of the dugong population in the Torres Strait region in November-December 1991 was 24,225 (6SE 3,276) compared with the corresponding estimate of 13,319 (6SE 2,136) for November 1987. The difference between the two estimates cannot be explained by natural increase of the population or variations in the sighting conditions encountered during the two aerial surveys. We believe this difference is due to a major redistribution of dugongs within the survey region or migration into Torres Strait, probably from Irian Jaya (Indonesia). Dugongs are a major component of the traditional fishery in Torres Strait. The biomass of dugongs landed between June 1991 and May 1993 was higher than the weight of any other component of the traditional catch. The estimated annual dugong catch of 1226 (6SE 204) was higher than previous catch estimates. It is impossible to verify the sustainability of this harvest without an understanding of the movements of the dugong population, better absolute estimates of dugong population size, dugong catch statistics for Papua New Guinea and adjacent regions in Australia, and current estimates of life history parameters for dugongs in Torres Strait, all of which will be difficult to obtain. The mean estimate of the annual dugong catch in Torres Strait for 1991– 1993, however, is approximately 5% of the mean estimate of the dugong population size in 1991. This is too close to the estimated maximum rate of increase of the dugong population to be sustainable if the estimate of dugong numbers is close to an absolute estimate or if there is substantial emigration of dugongs from the area. Co-management arrangements must be developed between the government agencies responsible for the dugong fishery and the Torres Strait Islanders in order to develop management strategies that will provide for the Islander's traditional hunting expectations and maintain dugong numbers.

Pecl, G., Frusher, S., Gardner, C., Haward, M., Hobday, A., Jennings, S., Nursey-Bray, M., Punt, A., Reville, H. & van Putten, I. 2009, *The East coast Tasmanian rock lobster fishery - vulnerability to climate change impacts and adaptation response options, (Executive summary)*. Report to the Department of Climate Change, Australia.

This case study examines the potential impacts of climate change on the Tasmanian rock lobster fishery, and identifies several options and opportunities for adaptation. Climate change is expected to have a significant impact on the Tasmanian rock lobster industry with declines in rock lobster biomass occurring initially in northern and north-eastern regions before eventually also potentially declining in the south. As water temperatures increase it is also expected that the range of a damaging sea urchin will be extended. The study found that the rock lobster fishery is reasonably well placed to adapt to the challenges of climate change but identified several possible measures that will assist with this adaptation including improved catch modelling, long-term monitoring, better risk assessment, and effective education and communication with the industry. Understanding the impacts of climate change on the Tasmanian rock lobster industry is important because this fishery is ideally placed to be an 'early warning signal' for Australian fisheries genera.

Phillips, B. & Melville-Smith, R. 2005, 'Sustainability of the western rock lobster fishery: A review of past progress and future challenges', *Bulletin of Marine Science*, vol. 76, no. 2, pp. 485-500.

The western rock (spiny) lobster (*Panulirus cygnus* George, 1962) fishery has 594 boats operating about 57,000 pots. The average annual catch of 11,000 t is valued at around US\$150 million. In addition to the commercial catch, recreational fishers take about 600 t yr⁻¹. Sustainability in this fishery is maintained by analysis of a comprehensive fisheries database, some of which dates back to the 1960s (e.g., catch, effort, length-frequencies, fishery-independent breeding-stock surveys, puerulus settlement monitoring, recreational catch monitoring); an extensive set of management controls (including a limited fishing season and legal minimum and maximum sizes); and an effective compliance program. Effort in the fishery is controlled by input restrictions on the number of pots allowed and number of days fishing, which are implemented after considerable consultation with industry. The principal method of ensuring the sustainability of the fishery is monitoring of the size of the breeding stock, using data from both a commercial at-sea monitoring program and an annual fishery-independent breeding-stock survey. When the breeding stock fell to low levels in the early 1990s, management initiatives succeeded in returning it to what are considered to be safe levels. Catches are currently high, but fishers have acquired sufficient scientific knowledge to understand that catches will fluctuate for environmental reasons and to take this into account in their fishing operations. Environmental effects have been shown to drive the level of settlement in a particular season. These settlement levels are in turn highly correlated with catches 3-4 yrs later, which provides a means of predicting future catches and managing the fishery accordingly. There are issues to consider in assessing the sustainability of this fishery in the future. The fishery may be overly reliant on egg production from the Abrolhos Islands; catching power of the commercial fleet is increasing due to improvements in gear and technological equipment; growth in catches made by the recreational sector are currently unconstrained; pueruli may be harvested for aquaculture in the near future; and regulations protecting the female brood stock more than the male population could lead to reproductive issues. These potential threats are considered to be low, but will need to be monitored. The fishery was awarded Marine Stewardship Council certification in March 2000, the first in the world to receive this imprimatur.

Shepherd, S. & Rodda, K. 2001, 'Sustainability demands vigilance: Evidence for serial decline of the greenlip abalone fishery and a review of management', *Journal of Shellfish Research*, vol. 20, no. 2, pp. 829-841.

The greenlip (*Haliotis laevis*) abalone fishery in the Western and Central Zones of South Australia comprises about 74 distinct metapopulations. Although the total catch has been maintained since 1979, analysis of catch and effort data for the two zones at a fine scale in 49 map code areas shows that 39 areas are in decline; of these, 28 areas, with declines exceeding 50%, are considered serious. In the Western Zone, the proportional catch from 23 inshore reefs has declined from similar to 69 to similar to 34% of the total catch over 20 y of fishing whereas, that of 10 distant reefs has increased from similar to 26 to similar to 50% of the total over the same period. Fishing mortality is 0.4-0.6 on inshore reefs and 0.2-0.4 on distant ones, indicating serious maldistribution of effort. The frequency of declining populations reaching the 50% decline point peaked in the years 1989 to 1990 a subset of the same group of populations reaching the 80% decline point peaked in 1995 to 1996, indicating a continuing decline trajectory, despite quota imposition and reduction. Multiple regression analysis of the proportional rate of decline of 38 populations in the Western Zone showed that the rate of decline was inversely correlated with distance from port and with a closure index that measures the extent to which the population is bounded by land. The closure index is considered to estimate crudely the extent to which coastal topography retains larvae within the population. Comparison of the spatial extent of fishing areas in eight populations mapped in 1978 to 1979 and again in 1996 to 1999 showed strong spatial contraction matching the decline in catch. Spatial contraction occurred from deeper to shallow water leaving relict subpopulations around headlands and in bays, consistent with inferences on the effect of coastal topography on abalone larval retention. In the Central Zone, with six divers and 12 reefs fully fished over a shorter time period, the declines are less certain and less severe. The catches of five reefs have declined by >50% and increased substantially on one remaining productive reef. An overfishing hypothesis best explains the long-term decline in the catch of many reefs and the transfer of fishing to distant or remaining reefs. The history of management is reviewed and shows that, over the lifetime of the fishery, management has moved from control by government with little consultation with industry in 1967 toward self-management with endorsement by government from about 1995. Since 1995, management has been unresponsive to declines in the fishery, and possible reasons are explored. We advocate application of the precautionary approach by management at the scale of the metapopulation to arrest the declines and the establishment of recovery plans for areas in serious decline.

Simpfendorfer, C. & Donohue, K. 1998, 'Keeping the fish in 'fish and chips': research and management of the Western Australian shark fishery', *Marine and Freshwater Research*, vol. 49, no. 7, pp. 593-600.

The shark fishery in the southern half of Western Australia fishery began in 1941 and developed slowly until the mid 1970s when the fishery began to expand rapidly. A management plan incorporating limited entry, gear specifications and effort controls was introduced in 1988 in response to concerns about the status of the stocks. Research has focused on the assessment of stocks, and has involved the collection of catch-and-effort data since 1975, and tactical research projects to gather data on biology; this has allowed the implementation of stock assessment, modelling and forecasting techniques. The fishing industry is involved in the development of the research projects and in the decision-making process of management. This, together with regular reporting of research results, assists in maintaining industry support and acceptance of results. A potential disadvantage of the involvement of industry is the delay in implementation that may be caused by the complexity of the system of consultation or by the conflict between regulation of the fishery and the present livelihood of fishers. However, this is minimized by the creation of clear quantitative targets for management.

Tucker, A., Robins, J. & Mcphee, D. 1997, 'Adopting turtle excluder devices in Australia and the United States: What are the differences in technology transfer, promotion, and acceptance?', *Coastal Management*, vol. 25, no. 4, pp. 405-421.

Turtle excluder devices (TEDs) are being trialed on a voluntary basis in many Australian prawn (shrimp) trawl fisheries to reduce sea turtle captures. Analysis of TED introductions into shrimp trawl fisheries of the United States provided major insights into why conflicts occurred between shrimpers, conservationists, and government agencies. A conflict over the introduction and subsequent regulation of TEDs occurred because the "problem"; and the "solution"; were perceived differently by the various stakeholders. Attempts to negotiate and mediate the conflict broke down, resulting in litigation against the U.S. government by conservationists and shrimpers. Litigation -was not an efficient resolution to the sea turtle-TED-trawl conflict, but it appears that litigation was the only remaining path of resolution once the issue became polarized. We review two major Australian trawl fisheries to identify any significant differences in circumstances that may affect TED acceptance. Australian trawl fisheries are structured differently and good communication occurs between industry and researchers. TEDs are being introduced as mature technology. Furthermore, bycatch issues are of increasing concern to all stakeholders. These factors, combined with insights derived from previous conflicts concerning TEDs in the United States, increase the possibilities that TEDs will be introduced to Australian fishers with better acceptance.

Welch, D., Mapstone, B. & Begg, G. 2008, 'Spatial and temporal variation and effects of changes in management in discard rates from the commercial reef line fishery of the Great Barrier Reef, Australia', *Fisheries Research*, vol. 90, no. 1-3, pp. 247-260.

Discarding in commercially exploited fisheries has received considerable attention in the last decade, though only more recently in Australia. The Reef Line fishery (RLF) of the Great Barrier Reef (GBR) in Australia is a large-scale multi-sector, multi-species, highly regulated hook and line fishery with the potential for high levels of discarding. We used a range of data sources to estimate discard rates and discard quantities for the two main target groups of the RLF, the coral trout, *Plectropomus* spp, and the red throat emperor, *Lethrinus miniatus*, and investigated possible effects on discarding of recent changes in management of the fishery. Fleet-wide estimates of total annual quantities discarded from 1989 to 2003 were 292-622 t and 33-95 t for coral trout and red throat emperor, respectively. Hypothetical scenarios of high-grading after the introduction of a total allowable commercial catch for coral trout resulted in increases in discard quantities up to 3895 t, while no high-grading still meant 421 t were discarded. Increasing the minimum size limit of red throat emperor from 35 to 38 cm also increased discards to an estimated 103 t. We provide spatially and temporally explicit estimates of discarding for the two most important species in the GBR RLF of Australia to demonstrate the importance of accounting for regional variation in quantification of discarding. Effects of management changes on discarding are also highlighted. This study provides a template for exploring discarding levels for other species in the RLF and elsewhere. Crown Copyright (C) 2007 Published by Elsevier B.V. All rights reserved.

Wells, F. & Jernakoff, P. 2006, 'An assessment of the environmental impact of wild harvest pearl aquaculture (*Pinctada maxima*) in Western Australia', *Journal of Shellfish Research*, vol. 25, no. 1, pp. 141-150.

Typical operating procedures used in the wild harvest pearl aquaculture (*Pinctada maxima*) industry in Western Australia are described as a basis for examining the potential environmental impact of the industry. A risk analysis workshop was held, which included industry representatives, marine scientists, regulatory agencies and conservation interests. The goal of the workshop was to document the main potential environmental and ecological risks that arise from the various activities carried out by the *P. maxima* industry. Thirteen environmental and ecological issues were identified across the *P. maxima* fishery. None were considered to be high risks; all were ranked as either moderate (23%) or low (77%). Moderate risk rankings included: introduction of disease from seeding; attraction of other fauna and introduction of exotic organisms. Low risks were: spread of disease; introduction of disease from hatchery; introduction of disease from translocation; impact to protected and endangered species resulting from entanglement; impact of habitat impact to protected and endangered species resulting from farm lighting; nutrient impacts in sediment; perceived change in water quality; potential for litter and reduction of primary productivity. The low ratings given to disease risks took into account current strict regulatory controls for minimizing disease risks. The industry is considered to be environmentally benign. However, recommendations are made on how to further minimize risk.