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Sustainable development: Social outcomes of structural adjustments in a South Australian fishery

Kate Brooks

Visiting Fellow; School of Social Sciences, Australian National University, Canberra, Australia

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ABSTRACT

The assessment of sustainable development is a relatively recent advent in policy and the evaluation of industry structural adjustments. Although the elements of economic and environmental assessment have been relatively well developed and accepted, the effective inclusion of 'social' aspects in assessments of sustainable development are still being grappled with.

This paper, which discusses a project that investigated the sustainable development of the Marine Scalefish Fishery in South Australia, was focused on providing a combined assessment of the interrelationships between the environmental, economic and social aspects of the industry and the effect of its restructure in 2005. The findings highlight the complexities of developing effective policies to address all three aspects of sustainable development, rather than trading off one outcome against another. In the case of the fishery at hand, while the environmental and economic objectives of the adjustment appear to have achieved, the social objectives may well have not. In this circumstance, the findings raise the possibility that the social impacts of the restructure may in fact, alone, compromise the long term future of the industry, despite the economic success of the restructure.

This paper addresses the results of the research and presents some salient social issues that policy makers and industry should be aware of, when considering industry structure and futures in a changing economic and climatic environment.

1. Introduction

There is a long history of industry economic assessment. However, it is only recently that the focus of assessment has broadened to incorporate other perspectives. Initially these were environmental, and in the last 10 years these are now more often attempting to incorporate the social implications as well.

In 2007, South Australia's fisheries management took the step of undertaking a comprehensive assessment (ecological, economic, and social) of the effects of an industry restructure which occurred in 2005. The review was in line with the current Ecologically Sustainable Development (ESD) thinking of the Australian Government [1]. Specifically, the Australian Government identifies ESD as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased' [1]. This paper discusses the background and the theoretical methodology of the social aspects of the review of the restructure; the findings from it, and the lessons learnt for both undertaking ESD assessments and for natural resource industry participants and managers.

2. ESD and triple bottom line assessments

In 1987 the Brundtland Report[1] was released and became the global benchmark for a growing awareness of the impact of environmental change and degradation. The Australian response to this was the EPBC Act,[2] from which the drive to undertake ESD (otherwise referred to as Triple Bottom Line or 'TBL') assessments has evolved. It was identified in the Allen Consulting Group report [2], and subsequently accepted by government that the social aspect of assessing businesses or industries incorporated, not only ethical behaviours, but also those 'other' factors which contributed to the economic development of the industry—social factors. These social factors were those behaviours that support the quality of life for employees, their families, and the communities

[1] 'Our Common Future' is the report that was made by the World Commission on Environment and Development, and it is most often referred to as the 'Bruntland Report' after Ms Gro Harlem Brundtland who was the Chairperson of the Commission.

[2] '*The Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the Act as matters of national environmental significance.' ⟨http://www.environment.gov.au/epbc/index.html⟩

E-mail address: Kate@kalanalysis.com.au

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in which industries operate. However, indicators of these that have variously been used to date largely encompassed demographic, economic income and employment data, only. Although the Allen Consulting report noted that TBL was not intended to provide specific quantitative measures but rather was a 'way of thinking about the integrated nature of business planning and performance across environmental, social and economic dimensions' [2], methods of TBL assessments in Australia have tended to pursue quantitative approaches, which the dominant indicators lent themselves to. While this is useful to compare a number (or in the case of Nelson et al. [3], a diagram) at different points in time, purely quantitative measures cannot capture the qualitative nature of many of the social dimensions and underpinnings of industry and community economic and environmental interactions. As underlined by Bass [4] 'we do not [as yet] have truly integrated research approaches'. This is commonly due to the fact that the social component of triple bottom line assessments is dynamic, not lending itself to the reductionist approaches devised to date. Different frameworks are needed to identify and assess the attitudes, experience, expectations and abilities of individuals to engage with the economic and environmental opportunities and challenges of industries and the communities in which they operate, as has been raised by Adger [5], Cocklin and Dibden [6] and Marshall et al. [7].

The key feature of TBL assessment that has been lost in recent years is the qualitative nature of social relationships and interactions affecting the ability of individuals (and therefore industries) to engage with and utilise, economic and environmental resources [8,9]. A useful framework to integrate the social aspects of industry with the economic and ecological components, is social capital. As discussed by Selman [10] 'Where stocks of social capital are buoyant and high levels of trust exist between individuals, favourable conditions exist for co-operation and participation in the pursuit of local sustainability.' The social aspect of sustainability, such as the community's capacity to engage with change to sustainable practices was however, one that has in the past, proven slippery due to the lack of consensus over definition and boundaries. Consequently, a means to usefully employ frameworks (such as social capital) in a holistic industry assessment which could be used as a benchmark would be useful to both industry and management.

2.1. Project background

It is generally accepted that, in the long run, a profitable fishery will only be sustained if the ecosystem is also healthy. Far less understood is the relationship between social, ecological and economic factors in the long term sustainability and profitability of a fishery. Consequently, a comprehensive ESD assessment of a fishery was proposed. The proposal primarily sought to establish the feasibility of bringing ecological, economic and social data together in a form useful to regulator and political decision making. Secondly, it was to provide a template of how such integrated assessments could be approached. At the prompting of the South Australian Government and the support of the Fisheries Research and Development Corporation, the project 'A comprehensive ESD analysis of a fishery: the incorporation of regulatory, ecological, economic and sociological aspects', was funded.

3. Theoretical integration of the 'Social' into ESD assessments

A variety of institutional arrangements need to be in place if an economy is to be responsive and healthy. However, that 'economy', or in this case 'industry' is, in addition to natural resources, also made up of people with expectations; weaknesses; aspirations and desires that will affect industry viability. Consequently, it is important to understand the 'social capital' that keeps a group of potentially quite diverse individuals on the same path and acting in concert to achieve similar or aligned goals, and which makes an industry, effective and profitable [6,11]. As a result, the concept of social capital is one useful way in which to qualitatively assess the social environment of a fishery (or any industry group), and was proposed for the research in this case. Social 'capital' consists of the relationship networks that provide feelings of belonging and access to information, knowledge and decision making, which provide a sense of control, security and purpose in people's lives. Without the social capital developed through networks with others, individuals are disconnected from not only social, but often their economic environment as well, unable to use their human capital (skills and knowledge) or apply any physical or financial capital they may have to improve their economic situation. Consequently, understanding the makeup of a community's social capital is fundamental to understanding their capacities to, not only absorb change but, potentially, also grow and prosper as a result of it [12].

The elements that comprise both social and human capital intimately interact to provide a 'package' of capacity that dictates a community's ability to adapt to changing circumstances. This can be demonstrated as follows (Fig. 1).

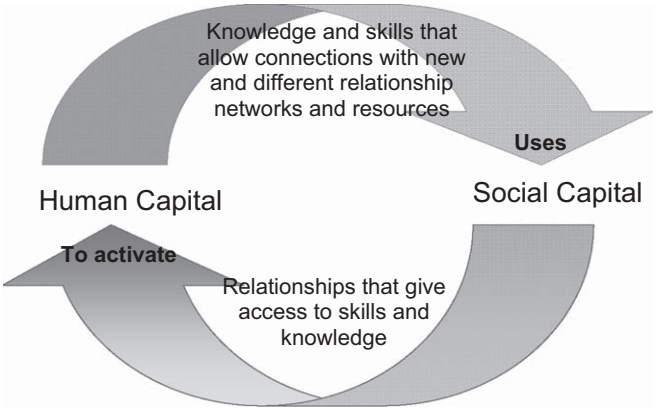

Fig. 1. The interaction of human and social capital.

A community's human capital is comprised of the depth and diversity of skills existing in a community. To be able to use those skills however, we need social networks to connect us with those who need our skills, or government representatives to lead us through the bureaucracy. As a result, both human and social capitals need to be considered in the process of assessing the social component of sustainability [13–15].

3.1. Social capital—more than just 'ties that bind'

In Australia, 'social capital' was brought to the fore by Cox, in her call for the consideration of the social dimension in the policy domain (the Boyer lectures [16–20]). Since that time the definition of social capital has evolved to move beyond the one dimension of 'ties that bind', or 'bonding' social capital as it was termed by Putnam at that time [21,22], to include 'bridging' and more recently 'linking' social capital. A focus on 'ties that bind' or bonding social capital, was criticised as too narrow [23–26], as it refers only to homogenous relationships. Levi [25], Portes and Landholt [27], and Woolcock [28], amongst others, have since identified that 'bridging' social capital in the form of relationship networks between heterogeneous groups are required to mitigate

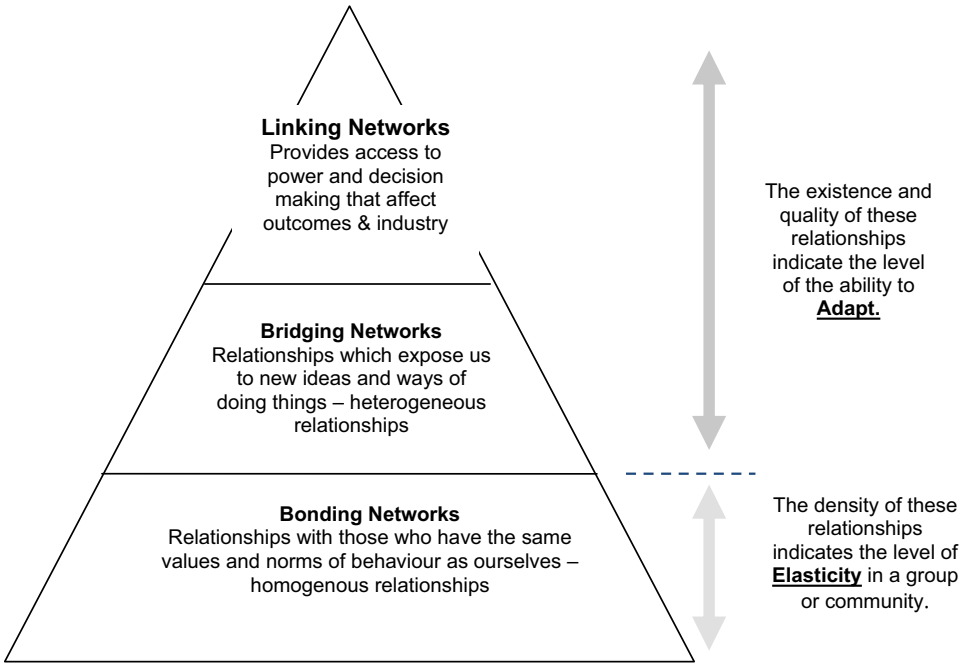

Fig. 2. Social capital.

the potentially negative effect of strong bonding social capital. Bridging social capital provides sources of new ideas, diversity and increased acceptance of the benefit that diversity can bring to society. Additionally, it has been argued that individually, communities, corporate entities or government bodies alone do not possess the resources needed to promote broad based sustainable development [23,29]. Complementarities and partnerships forged within and across these groups of differing power are necessary to achieve long term sustainable development. Consequently, 'linking' ties—or those that cross boundaries of power, being vertical relationships to sources of influence or authority—are now understood to be a further necessary network type in the mix of social capital needed to effectively engage communities and industries in developing their own sustainability. As a result, effective social capital for the purposes of sustainable development can be illustrated as above (Fig. 2).

It is necessary for bonding networks to make up the majority of the networks in a community in order to instil identity, a common vision, a sense of belonging and trust and a willingness to work together. It is noteworthy however, that the elasticity of ideas and openness to opportunity in communities is inversely proportional to the amount of bonding in a group: the greater the bonding the less elasticity. The levels of bridging and linking networks are necessarily lesser, in order to avoid fragmentation of the group through too many diverse ideas, perspectives or decision making directions; that is, the elasticity created by too *few* bonding networks.

Adaptability, in the social sense, refers to the degree to which groups are able to actively draw upon resources to adapt to a changing environment. A resilient community is one that is able to maintain the same or an improved functionality in the face of changed circumstances. Therefore, to be both adaptable and resilient, communities need to have integrated levels of all three types of social capital in order to draw upon its human capital through the networks which generate a common vision, and the elasticity of differing viewpoints to adapt to a changing environment and the linking networks to influence decision making; creating the ability to be resilient. Policy objectives in structural adjustments are aimed at increasing the resilience and sustainability of industries (and therefore necessarily the communities in which they exist) through decreasing their vulnerability to external economic pressures. Consequently, a comprehensive interpretation of social capital is essential to any holistic and effective Ecologically Sustainable Development (ESD) assessment or review.

4. The South Australian marine scale fishery and its key social characteristics

The South Australian Marine Scalefish Fishery (MSF) net sector was identified as the ideal case study. The fishery had comprehensive economic and ecological data collected over the previous eight years, which indicated the necessity for a 'restructure', which occurred in 2005. The aim was to reduce the effort in the fishery by 40%, to protect its ecology and the economic position of remaining fishers. Prior to this occurring, but in light of the emerging need to address the status of the fishery and the gaps in social data of the industry, an assessment of the fishery, including social aspects, was funded by the Fisheries Research and Development Corporation (FRDC). This was undertaken in 2004 by the Bureau of Rural Sciences [30]. Given this baseline data, all three aspects of this fishery could be examined in 2007 to provide a holistic assessment of the effects of the restructure on the industry since 2005. Although the restructure had been aimed at shoring up the industry economically and protecting it ecologically, it did not have any particular social goals.

4.1. The nature of the Marine Scale Fishery[3]

The South Australian Marine Scalefish Fishery (MSF) operates in all coastal waters of South Australia, including all gulfs, bays and estuaries (excluding the Coorong estuary), from the Western

[3] Technical information for this section was provided in the final report by Andrew Sullivan, co investigator in the research from the Department of Primary Industries and Resources South Australia, for the fisheries science component of the work.

Australian State border (129 °E longitude) to the Victorian border (141 °E longitude). It is a multi-species, multi-gear fishery with numerous stakeholders, and while the study detailed here concentrated on the commercial fishery, its success or otherwise is intertwined with all those who seek to fish and operate in the region: commercial, recreational, charter & tourism operators and indigenous community members and those able to exert political policy pressure. More than fifty species are harvested by licensed commercial MSF fishers, including molluscs, crustaceans, annelids, sharks and numerous species of fish. The MSF excludes, however, rock lobster, prawns, abalone, blue crabs and freshwater fish species, all of which are managed separately.

Recreationally caught fish form a significant proportion of the total harvest of marine Scalefish species [31]. Australia's most recent—and most extensive—study of recreational fishing, the National Recreational and Indigenous Fishing Survey (NRIFS), undertaken during 2000/01, estimated that in South Australia 328,000 people over the age of 15 (24% of the population) participated in some form of recreational fishing during the previous 12 month period [32]. This made recreational fishers a significant stakeholder in the management of South Australia's coastal fisheries.

The 2005 MSF restructure had primarily been prompted by concerns for the sustainability of Southern garfish stocks. Garfish are one of the most important species in terms of total production and value in the fishery [33]. The garfish component of the fishery is located principally within two gulfs (Gulf St Vincent and Spencer Gulf) which dictated the focus of study detailed here. The majority of the commercial catch (85–95%) is taken by the net sector, using haul nets over the shallow (<5 m) seagrass beds in the upper reaches of both gulfs; in the same regions as many recreational fishers. A sharp and sustained decline in the biomass of the fishery had been identified during the eight years leading up to 2005 which demanded action. Although the recreational component of the total SA garfish catch equated to only 20% of the total catch, previous restrictions on recreational gear pointed to a focus on the reduction of commercial catch rates as being the most reasonable starting point, for fisheries managers to address sustainability concerns for the species and fishery. As a result, the restructure of the commercial Marine Scalefish Fishery in 2005 was undertaken, entailing a buyback of commercial MSF licences with net endorsements, with the result of effectively halving the commercial fishing effort through a reduction of licences from 113 to 52, and of effort by 44.7%; thereby also reducing the number of commercial fishers operating in the fishery.[4] In addition to the removal of net endorsements, six priority areas were identified for closure to future net fishing by the Government.[5] As a result of the closures, a number of fishers who did not participate in the buyback were displaced and had to move their operations to adjacent areas.

4.2. Social characteristics of the MSF with implications for a restructure

The key aspects of this fishery, as they relate to the previous discussion of social capital and the restructure, are several. In understanding the social implications of the industry's restructure, it is important to bear in mind the following factors: the commercial sector was outweighed per capita by the number of recreational fishers prior to the restructure; and commercial Marine Scalefish fishers were spread over a very large geographical area.

According to the 2005 report [30] on the study undertaken to assess the status of the fishery immediately prior to the restructure, the following was identified:

> *The large majority of respondents reported being very satisfied with their life overall, while having lower overall satisfaction with their fishing work. Most reported feeling a strong or very strong attachment to their local community, and rated their local community as a good or excellent place to live. Most also reported having relatively good access to services such as schools, health, banks and police, and good levels of communication with family and friends.*
>
> *All of these measures indicate a high quality of life. However, only 49.5% reported being members of a community group and, in workshops, many discussed being limited in their ability to spend time with family, friends, and to be involved in community groups, due to the irregularity of their fishing hours.*
>
> *Most fishers believed they were perceived negatively in the general community in their role as commercial fishers. The presence of these negative perceptions reduced their quality of life, as they felt less accepted as a part of the broader community.*

The above illustrates that it is reasonable to conclude that prior to the restructure, MSF fishers were an identifiable group who, while enjoying a 'very satisfactory' quality of life, felt the pressure of effort required to make a decent living had the effect of socially marginalising them from their residential community (and to a lesser extent family and fisher friends). This may have contributed to their belief that they were negatively perceived in the broader community. In addition to this, it important to note that they were not a politically cohesive group, outweighed in numbers by a well mobilised and cohesive recreational fishing sector. Given the strong connections to geographical place it was not likely that any fishers leaving the industry would relocate geographically, or those staying in it would willingly relocate, with the numbers of them being too few (even before the restructure) to effect any significant focus or presence of the commercial industry in any one location. Overall, the industry was not well positioned, from the perspective of its social capital, to withstand the further fragmentation likely to be effected by a restructure.

5. Methodology and findings

The objective of the study, undertaken in 2007, was to identify the effectiveness and any other implications of the 2005 restructure, using the 2004 research as the benchmark. The following discussion encompasses the methods and findings of the 2004 work as well as the 2007 research.

5.1. 2004 Methods

The 2004 study gathered data via a mail questionnaire distributed to all licence holders in the MSF, and a series of 12 workshops held along the South Australian coast in October and November 2004.

One of the objectives of this study was to assess the effectiveness of different approaches that could be used to assess the social aspects of a commercial fishery. Overall, the mail survey, with weekly reminders and a toll free phone number available for respondents to address queries, was considered very effective, achieving a 59% response rate from licence holders. The

[4] The financial package was put together utilizing existing information from economic assessments of the fishery [33] and information regarding market value of recently transferred licences. To provide further incentive to participate in the buyback, a 30% premium on estimated licence value was added. Licence holders were also offered $3,000 up front to obtain professional financial advice.

[5] The number of priority areas that would be closed was dependent upon the success of the buyback [34].

analysis of non-response bias showed that there was no significant non-response bias by region, age, or licence type. By contrast, the workshops, while gathering useful qualitative data for the study, did not achieve the attendance hoped for, with markedly variable attendance occurring at different locations. Despite it being posed that greater flexibility in the workshop format may have achieved improved participation, it was noted that overall fisher cynicism and disillusionment with consultation processes and meeting outcomes was an extremely difficult barrier to overcome in regard to participation.

The 2004 survey questions were, in the main, answered relatively easily by fishers, with workshop discussion revealing that respondents had interpreted most questions in the way intended. This was credited to the design of the questionnaire being specifically applicable to those working in the MSF, making it meaningful to those fishers. Several questions were identified as problematic. These were generally in regard to response categories being too broad; a lack of comparability of OHS risk perceptions between industries; no delineation between fisher friends and non fisher friends in response options; disparate interpretations of generational questions in regard to what constituted the first generation involved in the industry; a lack of clarity in the definition of a 'dependant', as some respondents who provided 100% of the household income did not list their wife/husband/de facto partners as dependants; where the answer sought was a year, it was clearer to start the response with 19—, rather than leave a blank line; and clarification was required over what constituted local purchase of goods and services in the case of online or postal purchases. The suggested questions identified for future surveys covered the subjects of plans and intentions for future fishing activities and the debt levels of the fishing businesses, to assist in analysing how vulnerable fishers are to changes affecting their income. These issues were taken on board with the development of the 2007 survey.

5.2. 2004 findings

Further to the findings related in section four, the 2004 study found MSF participants were predominantly male, although a high number of unpaid women helped manage fishing businesses. Most fishers had only achieved low levels of formal education, with the majority of their fishing skills and knowledge having been gained through working in fishing rather than formal training. Respondents had worked in fishing for, on average, over 20 years and up to 65 years. Contrary to common perception, only around half reported a family history of involvement in commercial fishing. Dependence on fishing for income was high, with most household income derived from fishing activities. The effort required to achieve income levels was held responsible for the lack of, or minimal, community participation or interaction. It was reported that opportunities for interaction with other fishers tended to be fragmented with fishers often only interacting via informal local networks of fishing acquaintances. Membership of fishing groups was low as was attendance at meetings, resulting in limited opportunities for knowledge and skills transfer within the industry or to take action on issues of concern as a united group. The 2004 research did not explore the existence or level of bridging or linking social capital networks in the MSF community.

5.3. 2007 methods

Given the results of the 2004 research, a survey method was again chosen utilising the previous question set (where identified as appropriate), to be able to compare the results from the two periods. Occupational health and safety (OHS) questions were dropped from the 2007 survey due to an inability to assess difference in risk perception. However, questions were added in the following areas to investigate levels of bridging and linking social capital, as these were now perceived as inextricably intertwined with sustainability and development, and the ability to adapt to changing circumstances [28,36] (Tables 1 and 2).

Table 1
Bridging social capital questions.

Questions for the proxy of the ability to engage with broader networks
What is the highest formal education level you have achieved?
Would you encourage young people to enter the Marine Scalefish Fishery?
Is the business you work in your own business?
Since the buyback has it become easier or harder to enter the Marine Scalefish Fishery?
Where do you go for information about the Marine Scalefish Fishery and the fishing industry in general?
So you ever find the people you know or ideas you are exposed to from these activities [fishing industry/organisations] are useful in your day to day business?
How did you learn the skills you use in your work in the MSF? (Formal, informal, self taught, family)
During the 2006/07 season how often did you attend meetings or briefing about the future of the Marine Scalefish Fishery?
How do you believe most people in your local community perceive commercial fishing?
How do you believe most people in South Australia perceive commercial fishing?
Has the public perception of fishing changed since the restricting of the Marine Scalefish Fishery?
Please indicate which, if any, of the following you and/or your spouse are a member of—a list of organisations is presented.
How often do you meet or communicate on a one on one basis with the other members of these organisations?
In your opinion has the operation of the Marine Scalefish Fishery contributed to the maintenance and/or expansion of any local or regional services or businesses? If so, which ones?
How often do you speak to or meet with relatives not living with you?
How often do you speak to or meet with friends not living with you?

Table 2
Linking social capital questions.

Questions for the proxy for access to decision making networks
During the 2006/07 fishing season were you in contact with a state industry body or representative about issues in the fishery?
During the 2006/07 fishing season were you in contact with a government representative about issues in the fishery?
Do you feel you have a level of power to contribute to change in the management of the Marine Scalefish fishery?
During the 2006/07 fishing season were the industry bodies proactive in addressing any issues that you or others might have raised about the fishery?

Due to a shorter time frame being available to implement the survey in 2007 compared with 2004, combined with the need to ensure consistent interpretation (highlighted in the 2004 survey), the decision was made to administer the survey by personal interview, either face to face or by telephone. All 52 licence holders remaining in the fishery were contacted and, of these, 37 agreed to be interviewed in the month of September, 2007, resulting in a 71% participation rate. Participants represented the geographical coverage of the fishery, with 64.8% of participants residing between Adelaide (Gulf of St Vincent) and Port Lincoln (Spencer Gulf), which encompasses the majority of fishers remaining in the commercial MSF fishery.

5.4. Findings

The Marine Scalefish Fishery in South Australia is an industry, ecologically and economically, stronger than it was in 2004, whose

members have become more connected through smaller employment networks. This is reflected in the length that they have been involved in both the industry and the particular fishery (a comparison of 2004 and 2007 results indicated established fishers remained in the fishery); the increase in business ownership by industry operators, and the increased involvement of family and friends. Of the respondents, 97.3% were owners of their own fishing businesses and in addition to this, 59.4% of respondents had family who had been in the fishing industry for more than three generations, themselves having worked in the MSF industry for 20 years or more. Not surprisingly, the majority had memberships with one or more fishing associations. This strong attachment to and investment in, the industry is further supported by the high level of those who have acquired their skills in the industry either through being self taught (62.2%) or from a family member (73%). Contrary to these durable connections with the industry, industry members believe themselves to be strongly self reliant, illustrated by the majority of respondents (56.7%) who deemed ideas or contacts from the industry itself only 'occasionally' or less often, useful. Consequently, although the fishing community has become smaller and more tightly aligned, whose members are strongly bonded to their geographical locations, it is a group of individuals likely to act independently of each other, which limits their abilities to pull together for a common purpose.

In relation to questions investigating the establishment and use of bridging relationships, 37% of respondents did not cite any interaction with any other groups (sporting, religious, civic or other) which would expose them to different approaches, ideologies, business frameworks, or communication networks. A further 37%, although belonging to groups or clubs outside the fishing industry, did not participate at a committee level which would involve them in discussions of administration models, communications or relationship building opportunities with others dissimilar to themselves (fishers).

While 8% of respondents noted being a member of one or more industry associations,[6] 37% believed they did not receive any benefit and the majority only attended one meeting dealing with the future of the industry in the 2006/07 year. The comments in regard to the nature of meetings that respondents attended were focused on the meetings simply providing information, rather than any meaningful opportunity for a role in decision making. The most telling data in relation to linking networks related to the level of power fishers felt they had to contribute to change in the management of the fishery. Almost 60% of respondents felt they did not know what level of power they had or felt they had none at all.

Overall, however, MSF fishers were more satisfied with their quality of life (89.2% up from 75.8%), working environment (89.2%, up from 67.8%), and return on effort (78.4%, up from 41.1%) than they were in 2004. However, those who felt they had control over decisions affecting their future was reduced (24.3%, down from 41.1%), as were those who felt secure about their long term future (18.9%, down from 26.7%).

6. Discussion

The data indicate that the Marine Scalefish Fishery is lacking in a diversity of social networks to provide new or additional ideas, approaches or perspectives. Such perspectives are needed to challenge and expand views of how the fishery can operate, or to provide resources to manage current circumstances and obtain greater support from the broader community to secure the industry's future. Further, the identified low level of interaction and networks that individuals in the fishery have with the community's in which they live, fishing industry associations, and local and state government bodies, is likely to be inadequate to facilitate them engaging with factors affecting their future. The lack of heterogeneous (or bridging) networks denies MSF fishers the opportunity to gather new ideas, and alternative means of addressing industry challenges. Additionally, the geographically dispersed nature of the fishery was exacerbated with the restructure, halving the number of fishers across the region, further complicating means they may have to gather and use bonding social capital to improve cohesion in the industry. This is also complicated by an increasingly active and politically savvy recreational fishing lobby network which is perceived by fishers and fisheries management as effectively swinging political favour toward recreational fishers, resulting in the threat of increased exclusion of commercial fishers from the remaining MSF fishing grounds. The lack of industry bridging and linking social capital severely limits the ability of MSF commercial fishers to engage with exogenous factors and groups affecting their industry and futures.

The indicated inability of MSF fishers to contribute to, or control, the sustainable future of their industry is due in large part to the structure of the industry. The current structure precludes the training of non licence holders (through formal training courses), and has an exclusionary effect through the increased value (cost) of licences, which resulted from the restructure. These prevent, or at best limit, the introduction of new entrants to the industry. Additionally, licences cannot be transferred from parent to child, but must be purchased, which also limits the ability to shift ownership and operations between generations in the one family. Consequently, although operators in the industry are currently doing very well economically, and the ecological environment is healthy and improving, there is little opportunity to develop the next generation of fishers from either within existing networks or through introducing new entrants. Due to the limited nature of fisher's networks to either become aware of these implications (thought effective industry bonding or bridging social capital), or generate action at a policy level (via linking social capital), there is little opportunity to divert this course of events by the fishers. This may result in a 'die out' of the fishery over time due to a lack of trained and financially capable people. Overall, although becoming more economically successful and ecologically sustainable, the industry has become socially less sustainable and more vulnerable to changes in its operating environment.

7. Issues for industry, management and policy

The challenges and opportunities arising for both the fishers and managers of the Marine Scalefish Fishery from this holistic ESD assessment are that both parties have a role to play in ensuring the social 'health' of fishers is maintained. The opportunities to address the current social circumstances that are likely to restrict the long term future of the industry lie in modifications to the structure of the licensing system to allow for training of non licence holders and the transfer of licences. Further, both management and fishers alike need to turn their attention to the opportunities and barriers to greater participation in industry associations and government management committees to build the bridging and linking networks of the fishery both internally and with the broader community and political spheres. To do so would provide opportunities to both expand knowledge of different operating systems, and to provide greater links with

[6] These included the South Australian Fishing Industry Council (SAFIC); Marine Scale Net Fishers Association (MSNFA) and the Marine Scale Fisheries Association (MFA); Blue Crab Pot Fishery Association; Cowell Areas School Aquaculture Committee.

exogenous forces on the industry, therefore increasing the industry's ability to influence these spheres of thinking and action.

From the policy perspective several important aspects of undertaking social assessments in conjunction with the economic and ecological emerge from this research. Firstly, it is necessary to understand the social objectives or vulnerabilities of undertaking structural adjustment as much as the ecological and economic ones, as the three are inextricably linked. Previously adjustments have been undertaken largely to reduce ecological pressures without unjustifiable economic detriment. However, as the balance between economic outcomes, resource management, and the maintenance of our regional communities becomes finer, clarity in policy objective and responsibility is required in all three areas. A focus exclusively on one or two of the triad at the expense of the other(s) will cause unintended outcomes, possibly requiring mitigation measures and costs downstream.

Secondly, though related, is the requirement to acknowledge and understand that the symbiotic relationship between social circumstance, the health of the environment and the economic benefits to be derived from it, is fundamental to achieving positive outcomes from any management change. Often 'tradeoffs' are talked about in regard to the ecological, economic and social aspects of an industry's sustainability: inferring that one must necessarily be at the expense of another. This is a false assertion, as one aspect of this triad cannot exist without the other. Rather, an understanding of how they interact is necessary, so that each of the three can be kept 'healthy' in order to support the other two. It has been accepted in recent decades that overuse of the ecological resource may have short term economic benefits, but may also cause long term cause economic and ecological pain. This research highlights that there is also the potential for large short term economic and ecological benefits, at the expense of long term social, and equally economic, aspects of the industry. Likening the economic, ecological and social aspects of sustainability to one of keeping the levels of your stereo in balance is more beneficial than the view that, while considering all three, one needs to be chosen as the 'trade off' against another.

Lastly, the nature of an industry's economic structure and ownership may have implications for both the ecological and the social environment in which the industry is situated; such as the effect of corporatisation of industry versus private ownership. The operational structure of an organisation provides benefits from opportunities in different ways dependent on that structure. The structure, therefore also contributes variously to social networks that may increase and underpin (or otherwise) resilience and sustainability. For example, corporatisation may inject new ideas, networks and opportunities into a community; or alternatively, may strip a local community of essential infrastructure and social networks, by relocating essential components of the industry for efficiency purposes. Consequently, ensuring that both industry and relevant government agencies (responsible for managing the resources an industry uses) have an awareness of the context (ecological, economic *and* social) in which an industry operates, allows informed and proactive decisions to be made that are less likely to require mitigating measures downstream.

8. Conclusion

The information gleaned from comprehensive ESD assessments can be used to improve and create predictive and proactive approaches to policy development. In this case, as policy is about managing the resource an industry uses, an understanding is required of the interaction between it, and the economic and social environments in which it exists, to manage and effect changes in the ecological one. By wholly comprehending the symbiotic relationships of the resource, economic and social environment of an industry, policy development can occur in a proactive and balanced manner, rather than having to develop mitigation measures to address unforeseen outcomes resulting from limited assessments. Policy developed on the basis of comprehensive ESD assessments can, if broadly communicated, lead to the increased possibility of the broader community providing industry with a 'licence to operate'.[7] This decreases the potential for pressure on governments to change policy mid stream and costs that are associated with that for both government and industry. Additionally, by understanding the social as well as the economic and ecological context of an industry's circumstance, policy can be developed in a proactive environment of managing the development and diversity of both the resource and its associated industries, to maximise the social, economic and ecological outcomes.

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[7] The term 'licence to operate' is synonymous with an industry's duty to manage existing and potential external liabilities, usually reflecting compliance with the regulatory dimension of a set of rights and obligations, such as meeting health, safety, security and environmental obligations.

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