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Abstract

In Australia significant resources are invested into Regional NRM arrangements where some authority and decision-making responsibilities are devolved to Regional NRM groups. However, little empirical evidence is available to guide policymakers in determining whether investments in such a governance regime will yield optimal outcomes. In this paper, we focus on exploring whether the Regional NRM model may result in a reduction in net transaction costs by generating social capital. By improving levels of trust and cooperation, and minimising levels of conflict between various stakeholders involved in NRM activities, costs such as those associated with monitoring and compliance can potentially be reduced. Evidence from a survey of landholders involved with NRM programs run by the Regional NRM group in the Central Queensland region suggests that social capital is generated under the Regional NRM governance model.

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Here I learn to do a service to another, without bearing him any real kindness; because I foresee, that he will return my service, in expectation of another of the same kind, and in order to maintain the same correspondence of good offices with me or others. And accordingly, after I have served him and he is in possession of the advantage arising from my action, he is induced to perform his part, as foreseeing the consequences of his refusal

David Hume
Treatise of Human Nature (1740/1978, p.521)

1. Introduction

Natural resource governance has been gradually moving away from traditional top-down, regulatory command and control type policies in the past to more participatory-type approaches characterised by local level encouragement facilitating the emergence of social capital (e.g. Pretty and Smith 2004; Paton *et al.* 2004; Pretty and Ward 2001; Blann *et al.* 2000; Marshall 1999). In Australia, natural resource governance has been gradually moving towards what has become known as Regional natural resource management (NRM) with some level of regional community responsibility and involvement.

The underlying problem of interest is the inefficient levels of supply of resource condition and ecosystem services caused by problems of externalities and public good aspects, coupled with information and government failure. In turn, such market failures mean individual producers face inappropriate incentives to supply environmental services, and significant institutional barriers exist to change the current situation. To improve environmental outcomes and address concerns about resource condition, governments have been trialling the Regional NRM arrangements as well as a range of information, suasion, regulatory and incentive approaches.

From an economic efficiency standpoint, Regional NRM arrangements could be viewed as a more strategic investment in regional priorities, representing a shift away from inefficient project-based approaches of earlier NRM investment programs such as Landcare, which failed to deliver the desired on-ground expectations despite the significant investment of funds in this decade-long landmark program (e.g. Marsh 2001; Woodhill and Nabben 2004). In Queensland, a number of NRM initiatives funded under the Natural Heritage Trust (NHT) extension and National Action Plan for Salinity and Water Quality (NAP) have been established involving the devolvement of some authority and decision-making responsibilities to Regional NRM groups.

One outcome has been the conscious decision to invest in the creation of a new institutional structure, the regional catchment management or NRM groups. This shift to a more participatory, community-based approach to NRM has been largely driven by government with little or no economic analysis undertaken to evaluate the regional NRM arrangements to date. Little empirical research exists to guide public managers in determining best value long term arrangements and strategic investments for natural resource governance to achieve environmental outcomes. There is an extensive literature that espouses the benefits of adopting bottom-up, participatory approaches and the development of social capital enhancing policies which are advanced as a means of alleviating transaction costs associated with monitoring and

enforcement and other NRM activities (e.g. Pretty 2003; Pretty and Ward 2001; Hayami 2001).

Social capital may be a key factor influencing economic welfare, and may be very relevant to understanding the level of market failure and provision of environmental services. The implementation of new governance arrangements, such as those associated with Regional NRM, may be based on elements of social capital. The following issues are explored in this paper: (i) How do Regional NRM institutions impact on social capital? (ii) How do changes in social capital affect the decisions of land managers in relation to conservation activities and the provision of environmental services?

In this paper, a theoretical framework for relating the Regional NRM process and linkages between potential changes in net transaction costs and social capital are presented. Section 2 reviews the current literature on social capital and outlines contributing elements of social capital with respect to Regional NRM. Section 3 discusses how social capital can be examined with respect to changes in economic welfare. Section 4 explores how social capital can influence Regional NRM, and Section 5 presents some findings from a survey of landholders involved in Regional NRM programs in Central Queensland. The paper is closed by some concluding remarks in Section 6.

2. Unravelling the Enigma

2.1 What is Social Capital?

There are many theories that explain cooperating behaviour in the social sciences. It has been observed that people cooperate more than they should according to standard assumptions of individual rationality (e.g. Paldham 2000; Schram 1998). This *excess* cooperation outcome has been confirmed in experiments even for players who do not know each other and play only once. This behavioural ‘glue’ generating excess cooperation has increasingly been described as ‘social capital’ (Paldham 2000, p.629).

Under the Regional NRM arrangements, community-based Regional NRM groups have been formed and granted some decision-making responsibilities relating to NRM. A key driver behind this process is founded on the premise that with possession of local knowledge on resources and the framework of social and economic conditions (O’Riordan and Stoll-Kleeman 2002), communities can work together collectively to sustainably manage the environment and natural resources for the long term (Uphoff 2002). Social capital encapsulates the idea that social bonds and norms are important for communities (Pretty 2003). Therefore, it is important to further examine this concept as it may be able to better characterise the dynamics of how individuals are able to work cooperatively together to achieve improvements in environmental outcomes and influencing economic welfare.

The idea of social capital has been applied a range of social and economic phenomena, from the growth tragedy of Africa (Easterly and Levine 1997), to the flourishing township village enterprises in the People’s Republic of China (Weitzman and Xu 1994). The concept underscores the importance of “non-market social interactions in socioeconomic outcomes and seeks to fill a lacuna in the traditional neoclassical economic framework” (Quibria 2003, p.20). Granovetter (1985) argues

that the neoclassical framework represents an inaccurate view of reality since it viewed man as anonymous and resistant to any social influence through social relations. In reality, individual behaviour is continuously shaped by non-market social influences in the form of culture, norms and social structure (Quibria 2003). Social interactions matter² since they form the basis for social networks, foster trust and values, sustain norms and culture, and are the very foundation of community (Quibria 2003).

A rapidly burgeoning literature explores various definitions and interpretations of the concept of social capital (e.g. Paldam 2000; Woolcock and Narayan 2000; Piazza-Georgi 2002). However, the concept of social capital remains shrouded by *vagueness*. This has led some to dismiss the construct altogether (Fine 2001), and other writers insist on more theoretical work to clarify the definition and role of the concept (Sobel 2002).

The literature on social capital has been characterised by a rapid growth in the definition and interpretation of the concept over the last two decades (Bourdieu 1986; Coleman 1988; Putnam *et al.* 1993; Ostrom 1994). However, Fukuyama (1995) and Putnam (2000) suggest the notion originates back to 1916 when Lyda Hanifan, a state supervisor of rural schools in West Virginia, used the concept to explain the importance of community participation in enhancing school performance. According to Hanifan (1916, p.130, cited in Sabatini 2006, p.4), social capital referred to:

...tangible substances [that] count for most in the daily lives of people: namely good will, fellowship, sympathy, and social intercourse among individuals and families who make up a social unit.

The value of the concept was later revived by Jacobs (1961), credited as one of the first scholars of modern social capital (Pelling 2003), following her study that highlighted mixed-use urban neighborhoods as representing a form of social capital which could promote public safety and trust within communities. Around the same period in the economics literature, Loury (1977) highlighted the concept in an analysis of racial income inequality to describe the social resources of ethnic communities, arguing that the neoclassical framework was inadequate because it did not incorporate the influences from social networks which can exert a significant influence on an individual's access to opportunities.

In much the same vein, Bourdieu's (1980) concept of social capital also focused on the individual, emphasising the importance of social network as an individual asset that affects one's economic locus in society. Social relations are used to increase the ability of an actor to advance economic and social interests from group membership and the driver for individual investment in such membership. Hence, Bourdieu defines social capital as:

² Therefore, it is perhaps not surprising that research into the concept of social capital has registered an explosive development across a multitude of subject areas in the last decade. Isham *et al.* (2002) note that a "keyword" search in all journals in the EconLit economics database shows that citations for "social capital" have grown rapidly over the last decade, doubling each year since the late 1990s. The study by Putnam *et al.* (1993) of Italy has been declared as the most cited contribution across the social sciences in the 1990s (Fine 2001, cited in Sabatini 2006, p.3).

...the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalised relationships of mutual acquaintance and recognition (Bourdieu and Wacquant 1996, p.119).

To Bourdieu, social capital comprises two components: First, it is a resource that is tied to group membership and social networks, and second, a quality produced by the totality of the relationships between actors, rather than merely a common attribute of the group (Bourdieu 1980). In the 1980s Coleman (1988, 1990) provided a clearer, more relevant theoretical framework expressing social capital as the composition of relationships between and among individuals that promotes productive activities. These aspects of social structure comprise a resource base from which individuals are able to tap to realise personal interests. Coleman (1988, p.98) explains:

Social capital is defined by its function. It is not a single entity, but a variety of different entities, with two elements in common: they all consist in some aspect of social structures, and they facilitate certain actions of actors within the structure.

Similar to other forms of capital, social capital is productive, making possible the achievement of certain ends, which in its absence, would not be possible (Sabatini 2006). However, unlike other types of capital, Coleman (1988, p.98) asserts that the idea “inheres in the structure of relations between and among actors, and not lodged either in the actors themselves or in physical implements of production”. Incidentally, this is the point of contention raised by economists who are divided about how the concept should be treated.

Pelling (2003) notes that although many economists were in agreement that concepts such as social capital should form part of economics literature, there was not agreement on exactly how it should be considered. Light (2001) remarks that economists do not agree on the relationships between (and existence of) different types of “capitals”. Becker (1996) declares that the notion of social capital should be placed in the same classification as that of human capital. Bates (1998) on the other hand, would prefer to acknowledge human capital, but exclude social capital; while Hayami (2001) and Bowles and Gintis (2002, p.422) make the argument that social capital may not be a form of capital in the truest economic sense and suggest the term “community” as more appropriate as it focuses on “what groups do rather than what people own”. Following on from this point, Arrow (2000) argues that “capital” infers something transferable from one individual to another and it is difficult to transfer ownership of social capital.

In summary, social capital is an umbrella term that encompasses the “norms and networks facilitating collective actions for mutual benefits” (Woolcock 1998, p 155). Although a broad range of views exist in the literature on the notion of social capital, ranging from different origins and fields of application, it is apparent that most agree on the ability of certain aspects of the social structure to generate positive externalities from group membership. This can help individuals to derive a competitive advantage in pursuing their ends and can reduce the transaction costs involved in searching, negotiating and enforcing exchange between people (Sabatini 2006).

2.2 The Effect on Transaction Costs

Transaction costs arise from a range of day-to-day activities, including: (i) coordination activities among the community members, and (ii) interaction (lobbying, bargaining, etc.) between local communities and state agencies (Mburu *et al.* 2003). Transaction costs may differ between households due to household characteristics and differences in the willingness of households (or the incentives created for them) to bear the transaction costs involved in collective actions of natural resource management (Arifin 2006). Earlier studies suggest that transaction costs arising from coordination activities are influenced by the social cohesion or the social capital of the community members (Ostrom 1994, 2000).

Fukuyama (1995) also highlights the role of social capital in reducing transactions costs and increasing economic efficiency. These transactions costs are important in daily economic activities such as locating appropriate buyers and sellers, negotiating contracts, complying with government regulations, and enforcing contracts in the event of dispute or fraud.

In communities with higher stocks of social capital, cooperation requires less explicit enforcement and the resources spent on regulation and monitoring are less than in those with low stocks of social capital (Greiling 2006). Furobotn and Richter (1999) also stress the contribution of trust concerning the aspect of decreasing transaction costs. A decrease of transaction costs and mutual gains in cooperative behaviour is the central message in Institutional Economics, particularly stressing the extrinsic value of trust leading to cost reductions (Kubon-Gilke *et al.* 2005, cited in Greiling 2006).

Therefore, just as trustworthiness builds trust, so too is social capital credited with increasing economic efficiency. Putnam *et al.* (1993) asserts that a society that relies on generalised reciprocity is more efficient than a distrustful society. As social capital develops trust, reciprocity, and a common understanding of social norms, it reduces the need for preparing formal contracts. It frees resources as individuals are not compelled to invest in monitoring others and can trust them to act as expected (Pretty and Ward 2001). It can reduce transaction costs by generating expectations that allow people to conduct interactions with a degree of certainty. Societies characterised by high levels of trust are also less dependent on formal institutions to enforce agreements (Arifin 2006). By reducing transaction costs, trust also promotes productive efficiency (Maskell 2000; Offe and Fuchs 2002).

A social environment providing individuals with many opportunities for involvement and participation, and allowing people to meet frequently, is a fertile ground for nurturing shared values and social norms of trust and reciprocity (Sabatini 2006). The improved diffusion of information and the higher opportunity cost of free-riding in turn, make peoples' behaviour more predictable and cause an uncertainty reduction. Therefore, an increase in social capital and trust-based relations reduces the average cost of transactions, much in the same way an increase in physical capital can reduce the average cost of production (Paldam and Svendsen 2000; Routledge and von Amsberg 2003).

2.3 Social Capital and NRM

There is widespread acceptance that environmental and natural resource assets need protection from the destructive actions of people (Pretty 2003). This notion lies at the core of environmental conservation and NRM.

A possible solution to such dilemmas of NRM is to depend on a third party Government Leviathan to compel individuals to act collectively (Olson 1965). A second solution is to privatise the problem by assigning property rights to the resource, for example, by building fences in common grazing lands as a set of private grazing areas. A “third way” (Pretty 2003, p.1913) alternative is to rely on social capital, through social norms and sanctioning mechanisms that a group can self-enforce without the strict regulation of an outside Leviathan (Ostrom 1990). Theoretical developments in the governance of the commons and work on the notion of social capital has come to shape a great deal on this thinking (Ostrom *et al.* 2002; Singleton 1992), manifesting itself in the Regional NRM arrangements in the Australian context and the focus of this paper.

As social capital lowers the transaction costs of working together, it facilitates voluntary cooperation. Individuals have the confidence to invest in collective NRM activities, knowing that others will also do the same. They are also less likely to engage in private actions with negative outcomes, such as resource degradation activities (Pretty and Ward 2001; Agrawal 2002).

It was outlined earlier that writers such as Coleman (1988) had defined social capital as people’s ability to work voluntarily together. Other writers such as Fukuyama (1995) and Dasgupta (1999) credit this ability to cooperate to trust. Trust is often a concept intrinsically linked with social capital (e.g. Coleman 1984; Putnam *et al.* 1993. Paldham and Svendsen (2000) define social capital as the density of trust, and on the micro level, is the mutual expectation that arises within a community of regular, cooperative behavior, based on commonly shared norms. Dasgupta (1988) adds that associations reduce opportunistic behaviour by creating repeated interaction among individuals, which enhances trust. Fukuyama (1995, p.26) defines the concept of trust as:

...the expectation that arises within a community of regular, honest and cooperative behaviour, based on commonly shared norms, on the part of that member of the community. Those norms can be about deep value questions like the nature of God or justice, but they also encompassed secular norms like professional standards and codes of behaviour.

If the people in one’s environment are trustworthy, trust is productive because it enables risk-taking in resource exchange and in overcoming dilemmas of collective action (Resnick 2000).

3. Implications for Economic Welfare

To use the concept of social capital in an economic framework, it is important to identify how it is consistent with the concepts of economic welfare.

Welfare economics is concerned with the effect of economic policies on the level of welfare of individuals or groups of people. The framework can be used to compare the relative merits for two or more situations by assessing the level of welfare in each. The welfare of an individual or community can be defined as its well-being. Utility is

often used as a synonym, though Price (1977) argued that this has the disadvantage of implying (misleadingly) that it arises only from the consumption of 'useful' goods. Contributing to welfare are a range of conditions which may be defined as constituting well-being, such as security, protection from fear, electoral freedom, as well as the more obvious economic factors including income and price levels. For the issue of natural resource governance, improvements in well-being may be regarded as the change in income or satisfaction levels stemming from the desired environmental or natural resource condition as a result of a suite of policies or programs.

An important aim of welfare economics is the systematic ordering of alternative social states in terms of social welfare, where social welfare is dependent on the welfare of individuals in society. A social welfare function (SWF) maps individual utilities into an overall social utility function. It is an algebraic formulation that assigns numerical social utility to each possible social state, and assumes that individual utility can be aggregated to determine overall social welfare with all individuals characterised by the same utility function (i.e. equal marginal utility of income for all individuals). Ideally, a SWF should be derived from the revealed preferences of the individuals concerned, but as Arrow (1951) demonstrated in his Impossibility Theorem, there exists no unique method for aggregating individual preferences into social preferences. The concept of the SWF originates from Bergson (1938). The original Bergson welfare function was designed to rank not the combination of individual welfare but more directly, the combinations of all those variables on which the individual welfare depends. In particular, it includes the goods consumed and the services rendered by each of the individuals in the society.

The utilitarian social welfare function can be expressed below as:

$$W(U) = \sum_i U_i$$

Welfare (W) is given as a function of the sum of all individual utilities (U) in society. Individual utilities can be expressed as a function of various factors, commonly including level of income, and other factors such as environmental condition, and assets. In this case, maximising the social welfare function means maximising the total income of the members of the society, without regard to how incomes are distributed. In practice the concept of the SWF emerges in the consideration of distributional implications of alternative policy scenarios.

In the context of natural resource governance, a key task is to evaluate whether changes in environmental conditions are worthwhile to society. In economics, we assess this by estimating the net welfare changes associated with a particular proposal (this provides the theoretical base for cost-benefit analysis). In assessing the net welfare change, we have to consider both the benefits and the costs involved. Differing levels of social capital can be important in several ways to influence these positive and negative impacts – including those on income or willingness to pay.

Social capital is postulated as a key factor influencing economic welfare. Table 1 outlines the different relationships between social capital and various economic processes.

Table 1

Approach	Relationship
1. Production function	Social capital is a factor of production
2. Transaction costs	Transactions are easier in the presence of trust
3. Monitoring costs	Social capital allows cheap self-monitoring

(Source: Paldam 2000, p.636)

Each of these relationships outlined in Table 1 may be important in producing NRM outcomes. The development of networks of trust and shared vision for environmental outcomes through the institution of Regional NRM could potentially facilitate the emergence of self-monitoring processes. Increasing levels of social capital can reduce net transaction costs and therefore contribute to economic welfare. It can be viewed as a factor that can reduce the costs of monitoring and compliance associated with the promotion of improved land management activities, such as through the Regional NRM process.

The Regional NRM arrangements of interest in this paper can therefore be viewed as a vehicle to foster the development of social capital, which in turn, can produce benefits in two main ways: (i) by reducing transaction costs and (ii) generating improved environmental and NRM outcomes.

4. How is the institution of Regional NRM affected by the existence of social capital?

As outlined earlier, Regional NRM arrangements are acknowledged as a more strategic investment in NRM priorities than the project-based programs such as Landcare. Regional NRM is characterised by a shift to more participatory, community-based approaches that tap in to local knowledge in preparing and implementing NRM programs, thereby reducing conflict between the community and government and fostering the development of social capital.

Regional NRM promotes the development of local institutions. These may be effective because they permit individuals to undertake daily exchanges and activities with a minimum of repetition and costly negotiation (Bromley 1993). Pretty and Ward (2001) assert that social capital lowers these costs of working together and facilitates cooperation. Hence, this results in individuals within a society possessing the necessary confidence to invest in collective activities, assured that others will also do the same. They are also less likely to engage in rent-seeking actions that result in negative impacts such as resource degradation.

There is little evidence available to suggest that the Regional NRM model has generated increased efficiencies in NRM due to the difficulty in identifying and measuring all the transaction costs and related benefits. While regional NRM groups such as the Fitzroy Basin Association (FBA) in Central Queensland, the subject of study in this research, will deliver a number of outcomes, these are largely driven by the allocation of government funding, and it is unclear if the allocation of the same funds through different processes would deliver inferior outcomes. The key analytical issue is whether the Regional NRM model can generate more benefits compared to other models. In this research, six key elements of the Regional NRM process that

may generate social capital and improved NRM outcomes was identified. These include:

1. Tailoring NRM plans to local and regional knowledge
2. Capacity building
3. Improving cooperative behaviour
4. Changing behaviour through improved knowledge
5. Improved take-up and compliance
6. Reduced conflict over resource management

In this research, the assessment of the Regional NRM model will focus on examining the level of transaction costs of involvement in Regional NRM programs and examining the elements contributing to social capital development.

The role and choice of institutions will have different cost implications and transaction cost profiles. The question is whether it is worth investing in a regional model to create social capital as opposed to managing service delivery centrally through established government infrastructure which is likely to involve lower opportunity costs, but with potentially lower levels of social capital creation.

5. Assessment of a Regional NRM model – The FBA case study

A key focus of this research is to determine if elements of social capital seem to be important in a Regional NRM model. As part of the assessment of a Regional NRM model in light of the six elements identified in Section 4, a survey of landholders involved in NRM programs of the FBA Regional NRM group in Central Queensland focused on identifying whether these benefits were likely to exist under this institutional framework.

The survey sought to test whether institutional mechanisms such regional governance arrangements for NRM, may be influenced by a number of elements contributing to social capital. In addition, the survey also sought to identify the level of transaction costs associated with landholder involvement in Regional NRM programs.

Data was collected by a telephone survey conducted by the Population Research Laboratory at Central Queensland University. The final sample included 67 landholders who participated in the FBA's Neighbourhood Catchments Devolved Grants Program³. Landholders were asked to assess various aspects of their involvement with the program with the objective of collecting information from participants which could be used to improve future funding rounds of the program. Reviewing a particular program run by the FBA provides a microcosm of this governance arrangement and is able to provide a useful analysis of this model in the context of delivering NRM services.

The following key tests are reported in this section:

- Level of transaction costs associated with participation in a regional body incentives program.

³ The FBA Devolved Grants program provided seed funding incentives to encourage landholders to adopt improved land management practices in the region.

- Elements associated with the generation of social capital, which will be assessed under the following categories:
 - Change in levels of conflict between landholders and the government;
 - Change in levels of adoption and take-up for environmental programs;
 - Level of flexibility compared with centrally run government programs;
 - Ability of NRM actions to be tailored to local knowledge;
 - Potential for achieving NRM and environmental outcomes; and
 - Change in level of production.

In assessing the transaction costs, respondents were asked to provide an estimation of both the total time and costs involved with participating in the FBA program. Landholders were also asked to estimate what area of their property was taken out of production, and whether they experienced a change to their net farm income as a result of their involvement in the program.

5.1 Survey Results

The total cost of individual landholder involvement in the program amounted to approximately \$34,392. This was calculated by summing the total direct costs of purchasing materials and labour for the program, together with the total number of hours invested by landholders in various aspects of the NRM program (e.g. construction, maintenance, and application process). The number of hours invested was converted to a dollar figure by multiplying this with the average wage rate. Table 2 summarises the total costs associated with landholder involvement in the NRM program.

Table 2: Cost of Participation in FBA Program

Question	Units	No. of responses	Mean	
Was time involved in construction?	Hours	58	412	\$6,308*
Was time involved in subsequent management and/or maintenance?	Hours	58	40	\$612*
Was time involved in applying for, or organising the incentive grant with the FBA?	Hours	58	15	\$234*
In dollars only, approximately how much money was used to purchase materials/labour?	\$	58	26,443	\$26,443
What was the area of land taken out of production?	Hectares	58	98	\$792**
In dollars only, what was the change in net farm income?	\$	56	2,643	
Total				\$34,391.00

* Calculation based on Queensland average annual wage of \$31,844 for 2000-01 (ABS 2001)

** Calculation based on mean per hectare farm income

While the costs presented are classified as direct costs to landholders, they can also be viewed as the value of additional contributions that have been generated as a result of increased engagement and social-capital-enhancing processes under this regional governance arrangement. This compares to an average grant payment of approximately \$10,000 to landholders involved in the program (FBA 2006). In effect, this shows that on average, this grant was able to leverage landholders to undertake NRM cost-sharing activities to the factor of approximately 3.4 times the grant amount.

The survey also revealed that participation in NRM activities associated with the grants program resulted in, on average, 98 hectares of land taken out of production per farm. This was equivalent to an average value of lost production of \$793 per farm. However, the majority of landholders involved in the program reported a net increase in farm income of \$2,643 per farm. Hence, the findings from this case study add support to the notion that Regional NRM processes can make a net contribution to economic welfare.

The assessment of the indirect benefits generated under the Regional NRM model was also undertaken by examining landholder involvement in the program. To achieve this, the survey asked respondents how they viewed the administration of the program under the Regional Body model. The findings revealed that the majority of involved landholders thought that the FBA program had:

- led to *reduced* conflict between landholders and the government;
- led to *improved* levels of adoption and take-up for environmental programs;
- was *more flexible* than government programs;
- *allowed* NRM actions to be tailored to local knowledge;
- *improved* the likelihood of achieving NRM and environmental outcomes; and
- helped farmers to *improve* their production.

Table 3 and Figure 1 below provide a summary of these findings.

Table 3: Views on the Benefits and Impacts of the FBA Program

Question	These types of programs ...	No. of responses	Mean	Std. Dev.
29a	...will lead to reduced levels of conflict between landholders and the government.	64	3.53*	1.266
29b	...will lead to improved levels of adoption and take-up for environmental programs.	64	4.08*	1.029
29c	...will lead to more flexibility than government programs in dealing with environmental conservation issues.	64	4.02*	1.165
29d	...will allow Natural Resource Management actions and programs to be tailored to local knowledge.	64	4.19*	1.080
29e	...will improve the likelihood of achieving environmental outcomes.	64	4.25*	1.031
29f	...will help landholders improve production.	64	4.09*	1.052

* (Scale: 1 = Strongly disagree to 5 = strongly agree)

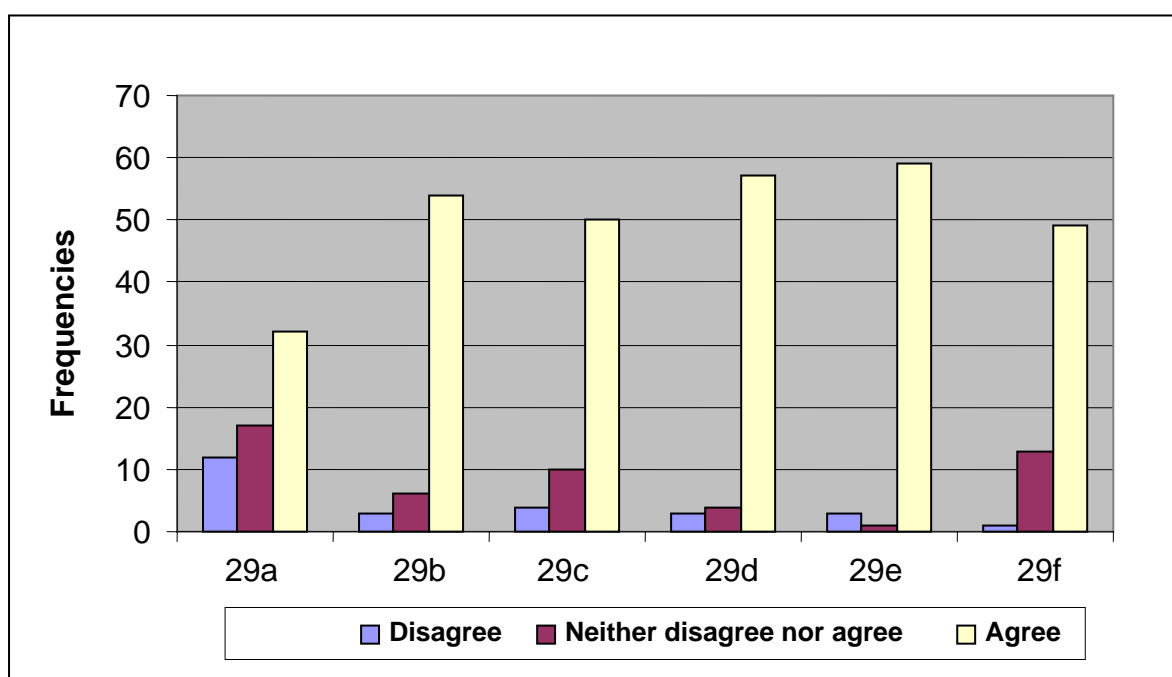


Figure 1: Views on the Benefits and Impacts of the FBA program

6. Conclusion

From a neoclassical economic framework there appears to be little reason why Regional NRM groups such as the FBA should exist. They appear to be an additional layer of institutional bureaucracy, perform similar functions to government, and may just duplicate a lot of NRM service delivery functions. There would appear to be a strong case for just using government to engage with landholders and use a mix of suasion, regulatory and incentive mechanisms to improve NRM outcomes.

The research reported in this paper explored three main issues:

- Concepts of social capital which explain why Regional NRM models generate benefits;
- How the benefits arising from social capital can be incorporated into a social welfare function; and
- How social capital can generate net economic benefits in a case study setting.

In this paper a number of contributing elements have been identified. A survey of landholders involved with the FBA Regional NRM group in Central Queensland suggests these elements are important, and could contribute to economic welfare through lowering net transaction costs.

Social capital may be a key factor in influencing economic welfare, and may be very relevant to understanding the level of market failure and provision of environmental services. The use of institutional mechanisms such as the Regional NRM arrangements for improved environmental outcomes may be based on elements of social capital.

The overall case for using a Regional NRM model has not yet been evaluated, but there is a strong conclusion that a social capital framework should be used. Hence, an evaluation of Regional NRM arrangements should explicitly account for elements of and impact on, social capital.

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