

Networks of agri-environmental action: temporality, spatiality and identity within agricultural environments

Associate Professor Stewart Lockie
Associate Dean (Research)
Faculty of Arts, Health and Sciences
Central Queensland University
Rockhampton QLD 4702
Australia
s.lockie@cqu.edu.au

Re-submitted to *Sociologia Ruralis*, October 2005.

Networks of agri-environmental action: temporality, spatiality and identity within agricultural environments

Abstract

Engineering new networks between state agencies, farmers and other actors is central to contemporary agri-environmental policy. This paper examines relationships between network membership, identity and changes in farming practice from the perspective of three different conceptualisations of social networks. These include social network analysis, the network society thesis and actor-network theory. Despite their common reliance on the metaphor of 'networks' to focus sociological analysis, these approaches are based on divergent ontological assumptions and suggest a number of different research foci. The paper finds that while social networks embedded in group membership and interactions among farmers appear to have had dramatic impacts on the expression of personal and group identities—particularly in relation to women—their impact on the adoption of more overtly environmentally sound farming practices has been limited in several important ways. By contrast, less visible relationships of knowledge and expertise that extend beyond the co-present interactions of producers appear to shape farming identities and practices, 'at a distance', in ways that contribute to the limited impact of agri-environment group membership.

Introduction

The empirical context for this paper lies in the increasingly prominent role attributed to networks in the Australian search for stable and resilient agricultural production systems. Catastrophic environmental damage has a history of stimulating major shifts in the ways governments and agriculturalists have approached natural resource management (Barr and Cary 1992). Mirroring the US, dustbowl conditions in Australia during the 1930s stimulated the formation of state soil conservation agencies. Explosive growth in the area of land affected by soil salinity during the 1980s (Madden et al. 2000) again raised agricultural land management to the national agenda and led, in turn, to the formation of novel coalitions between farm industry groups, conservation groups, and state and federal governments (Campbell 1994). The emergent approach to dealing with land and water degradation was couched in a language of partnerships, cooperation and community (Lockie 2000). In essence, the basis of the new approach was to encourage land managers to help themselves, and each other, by supporting the development of networks at local and regional levels to coordinate action and facilitate learning (Campbell 1994).

While a well established metaphor within sociological discourse, the idea of 'networks' has enjoyed, in recent years, a renaissance associated with at least three theoretical developments. The first is represented most overtly by the populist concept of social capital and the success it has achieved in promulgating the idea that participation in formal and informal groups is linked to the attainment of socially valued outcomes. The second is the notion that we are seeing, at a macro-scale, the development of a network society. Such a society, it is argued, is based on novel forms of decentralised organisation

that facilitate the development of equally novel identities and cultures. The third development traces back to sociological studies of science and technology (or actor-network theory) that treat networks not as a particularly contemporary form of social organisation but as metaphors for the fundamental nature of the social realm.

Within rural studies, these perspectives have been applied, often concurrently, to understand rural change and to inform it. The resultant mixing of network perspectives, as both theory and method, is exemplified by Murdoch's (2000) examination of the emergence of network promotion as a paradigm for rural development. Within this paradigm, networks are seen as alternative economic and institutional forms—examples of a 'third way'—sited somewhere between the state and the market. Thus, the role of state development agencies shifts from the provision of material resources to the provision of training, networking and support services in order to facilitate self-help, entrepreneurialism and capacity building (Murdoch 2000). In a similar manner, this paper will utilise network perspectives to reflect critically on a decade of explicit network engineering in Australian agricultural environments. Like Murdoch (2000: 408), the paper will not provide an exhaustive review of network theories and will concentrate instead on those that speak most 'immediately and evidently' to the empirical phenomena with which it is concerned. Additionally, while the paper will not develop a comprehensive analysis of international agri-environmental programs, it will identify some key points of differentiation between Australian and European measures in order to highlight more thoroughly the implications of a network paradigm for agri-environmental initiatives. For while key European programs within the network paradigm—such as LEADER—have attracted considerable scholarly attention, relatively little scrutiny has been applied to the relevance and potential consequences of the network paradigm for agricultural environments, and the explicit coupling of agri-environmental programs within this paradigm remains, among the advanced economies, an almost exclusively Australian phenomena (Wilson 2004).

Agri-environmental policy in Europe and Australia

European agri-environmental measures, largely, are based around the payment of subsidies to farmers in exchange for the production or preservation of valued countryside attributes. With the partial exception of pollution mitigation (Lowe et al. 1997), participation in agri-environmental schemes mostly is voluntary, and focuses on the preservation of wildlife habitats, archaeological sites, recreational opportunities, aesthetic values, and so on (Hodge 2001; Morris 2004). Underlying these schemes are two core premises. First, in contrast with earlier times when agricultural production was intrinsic to the maintenance of socially valued countryside attributes, agricultural modernisation has created a 'dualistic and often contradictory set of relations between agricultural production and environmental production' (Buller and Morris 2004: 1006). Second, since 'farmers hold the property rights to alter the environment [they] should be given incentives to change practices' in ways that favour environmental over agricultural production (Hodge 2001: 101). With farmers, in other words, compelled to intensify their operations in response to constantly declining terms of trade, it is appropriate that they be compensated for activities that limit their ability to optimise production. If the public

desire 'multifunctional' landscapes, the logic goes, they should pay for them. Despite widespread acceptance of this logic, environmental contracts on which the payment of subsidies is based have attracted criticism by Hodge (2001) for the lack of incentives they provide for entrepreneurship, innovation, long-term private commitment, and landscape-scale management. Further, Lang et al (2001; see also Barling et al 2002) argue, such contracts, and the assumptions on which they rest, reflect a fragmentation of agricultural, environmental, health and social policy that has both obscured the externalities of industrial agriculture and failed to avert continual crises of confidence in agriculture and regulatory agencies.

Australian agri-environmental measures have been based on quite a different set of premises. The centrepiece of these measures, the National Landcare Program (NLP) was initiated in 1989 with a primary focus on encouraging landowners to address rural environmental degradation through participation in community Landcare groups which were supported through the provision of funds to assist in group coordination and the establishment of experimental and demonstration sites (Campbell 1994). Accompanying the program was a rhetoric of government, industry and community partnerships, empowerment and participation that was contrasted with the top-down regulatory approach of earlier programs (Lockie 1997a). Although state approaches to rural land degradation prior to implementation of the NLP were, in fact, characterised more by voluntarism than compulsion (Lockie 1997a), the notion that the state's role in natural resource management primarily should be one of facilitating negotiation and learning among all stakeholders with an interest in resource management outcomes pervades almost all facets of relevant state policy.¹ In contrast with European measures, the assumption here is not that agricultural and environmental production stand in necessary opposition but that, quite the opposite, environmental degradation occurs because of the failure of markets to recognise the fundamental dependence of agriculture on environmental protection. The emphasis of policy, consequently, shifts from the payment of subsidies for the preservation of environmental and social values to the provision of information, planning assistance, capacity building opportunities, and market-based incentives to assist in the internalisation of environmental and social costs (see Lockie and Goodman, forthcoming). Such emphases speak clearly enough to at least some of the criticisms raised above concerning European agri-environmental measures. However, the implementation of this alternative logic in Australia has raised its own criticisms and it would be naive to assume that its implementation in Europe or anywhere else would necessarily resolve the contradictions of modern agriculture. More modestly, this paper will suggest that critical reflection on the Australian experiment in network-based agri-environmental measures raises some interesting possibilities for the improvement of agri-environmental measures elsewhere. It will turn, therefore, to an explication of the three broad network perspectives identified in the introduction above and examine the empirical evidence in support, or otherwise, of the social and environmental possibilities suggested by these perspectives.

Network analysis, group membership and agri-environmental change

Emerging in opposition to both structuralist and individualist theories of economic action,

network analysis represents a meso-level attempt to theoretically and methodologically operationalise Polanyi's argument that markets are not an autonomous sphere within modern capitalism but are embedded within social relationships (Biggart and Beamish 2003; Podolny and Page 1998). Networks are defined by Podolny and Page (1998) as assemblages of nodes and ties that are distinguished from hierarchical forms of organisation and from pure markets by the existence of exchange relations among participants that are repeated and enduring despite the lack of any centralised authority to allocate resources and/or resolve disputes. Empirically, network analysis has concentrated analysis on the extent and nature of relationships within population samples using measures such as the mean density of relationships, their strength, and their impact on individuals and organisations (Granovetter 1973, 1976). Network forms of organisation subsequently have been found to promote, among other things, adaptability, the sharing of status and resources, reduced uncertainty, and learning (Podolny and Page 1998). Somewhat missing, however, from the network analysis account of organisation is the intersubjective basis for meaningful interaction and coordination (Emirbayer and Goodwin 1994). Convention theory may usefully be drawn in here to focus attention on the role of habits, customs and routines in facilitating mutually comprehensible action and accountability among network participants (Biggart and Beamish 2003).

The idea that membership and participation in formal and informal groups may lead to positive outcomes for individuals and communities is, as Portes (1998) points out, something of a sociological staple dating back to Durkheim and Marx's analyses of anomie and alienation. It is not surprising, therefore, that the basic assumptions of network analysis and convention theory are reflected in a range of other contemporary theoretical perspectives, the most popular of which would undoubtedly be the burgeoning literature on 'social capital' (Lin 1999). Also relevant here is the concept of 'farming styles'. Farming styles are described by van der Ploeg (1993) as cultural repertoires negotiated and communicated among farmers through exchange and comparison of ideas which are, in turn, applied, tested and modified in the context of the spatially and temporally situated practice of agriculture. Faced with similar structural imperatives, it is argued, farmers do not congeal into a single homogenous mass but develop a range of strategically differentiated responses corresponding with either, or both, inter-regional agro-ecologies and intra-regional communities of interest (van der Ploeg 1993).

In attempting to assess the extent to which inter-personal networks among Australian farmers influence environmental management practices this section draws on a number of studies that have examined the particular impact of group membership as an indicator of network density.² The first, a survey of 766 landholders from coastal catchments feeding into the Great Barrier Reef Lagoon in 2004 found a small, but positive relationship, between participation in community Landcare or catchment management groups and implementation of a package of environmental practices—comprising soil conservation measures, property management planning, fencing to protect land and environmental management systems—believed widely relevant to the preservation of coastal wetlands and reduction of sediment loads to the Reef ($r=.081$, $p=.026$) (Lockie and Rockloff 2004). Similarly, a survey of 412 landholders from the Fitzroy catchment of Central Queensland undertaken in 1999 found minor relationships between group membership and the

implementation, or intention to implement, several environmental management practices (Lockie et al. 2002). However, there remained rather more practices for which no relationship with group membership was evident. Conversely, a study involving over 1000 Australian sugarcane growers in 1998 also found a number of weak correlations between adoption of environmental management practices and a range of individual and farm characteristics including participation in industry and community groups (Grasby 2004). However, when a spatial dimension was added to the analysis by stratifying the sample according to five major regions corresponding with the allocation of sugarcane to particular mills, it became possible to account for up to half the variance in adoption behaviour under the combined influence of these variables. The influence of interaction among growers on adoption was most clearly evident in relation to the impact of environmental group membership on implementation of nature conservation practices, with environmental group membership emerging as the most important variable in the regression model for three of the five mill areas.³

These findings are consistent with evaluations of the NLP with which many of the groups to which farmers belonged were associated (Cary and Webb 2000). Some 4500 community Landcare groups are estimated to have involved some 37 percent of farm businesses in the broadacre and dairy sectors as members and have been used by 50 percent of all Australian farmers as sources of information on farm management (ABARE 2003). There are significant positive relationships between the amount of on-ground environmental works in agricultural districts and the proportion of landholders participating in Landcare group activities and, similarly, between the adoption of sustainable farming practices on individual properties and the level of land manager participation in Landcare group activities (Curtis 2003; Curtis and De Lacy 1996; ABARE 2003; Mues et al. 1998). This raises the obvious question of whether Landcare group membership has led to increased adoption of environmental management practices or whether those more likely to implement such practices anyway comprise the majority of group members. National survey data indicates that 91 percent of farmers with some involvement in Landcare believe that they have made changes to land management practices as a result of participation in Landcare. Some 95 percent of Landcare group members and 71 percent of non-members report that their properties have benefited from their participation in Landcare activities (ABARE 2003). Farmers give different accounts of how Landcare membership or participation has influenced them to change (Lockie 1998a). For some, Landcare has helped to change the way they look at their properties and the way they interpret what may be described as warning signs of land and water degradation. For others, sharing experience and peer scrutiny of management practices has provided encouragement and/or pressure to implement new practices sooner rather than later.

But do Landcare groups provide a basis for new networks and relationships? Or do they more-or-less replicate existing community groups? One case study in south west New South Wales found that membership of Landcare groups was dominated by commercial farmers and strongly correlated with membership of other local organisations (Lockie 1997b). By itself, this would suggest Landcare groups simply provided an additional forum for the same groups of people to interact. However, participation in Landcare

groups was higher than other specifically farm-related organisations and predicated less on membership of other farming groups. Landcare groups were significantly less gender biased than other farming groups and appeared to play an important role in encouraging women to increase their participation in these traditionally male-dominated organisations. At the same time, therefore, that existing networks of formal and informal ties increased the likelihood that Landcare groups would form, Landcare groups subsequently extended the networks from which they had developed and challenged, to at least some extent, some of the bases on which boundaries were defined and some potential members (women and non-farming rural landholders) excluded. The formation and extension of networks associated with Landcare groups were thus associated with at least two dimensions of change in the construction of landholder identities. First, Landcare networks were associated with an increase in the willingness of farmers to acknowledge that environmental degradation existed on their properties, to encourage peer review of their management practices, and to cooperate with others to address cross-boundary problems (Lockie 1998a). At the same time, mutual understanding of who has a legitimate interest in farming and land management widened, with Landcare activities constructed as activities that should involve 'the whole family' and 'the whole community', thus valuing more highly the contribution of farm women and non-farming rural landholders. This has been associated with more far-reaching change in the identities of farm women who have increasingly rejected their construction as 'helpers', 'housewives' and 'offsiders' in favour of understanding and presenting themselves as farmers in their own right (Lockie 1997c).

The above studies suggest that interaction among farmers within temporally and spatially-based agroecologies plays a major role in shaping the relationships between individual characteristics and environmental management outcomes. On the one hand, the confirmation this offers Portes' (1998) argument that group participation promotes positive social outcomes may be seen as banal. On the other, we might question why more agri-environmental programs do not seek, as Australia's have done, to capitalise on the opportunities for positive outcomes offered by network building? The following sections will consider the extension of agri-environmental networks beyond the locale and the role of other agents within these networks.

Alternative governance in the network society

The network society thesis is based on the argument that the organisational form of the network provides the basis of a new social structure in which flows of information, materials and people displace organisational hierarchies as centres of power and foci for the organisation of production and consumption (Castells 2000; Urry 2000). According to Castells (2000), the network society is characterised by a number of features, many of which stem, at least in part, from the development of a new technological paradigm based on microelectronics, information/communication technologies and genetic engineering. Some of the outcomes of this technological paradigm are relatively obvious. Electronic media increasingly provide the space of culture and politics while flexible patterns of work and employment promote polarisation within and between production spaces. Such media also facilitate the development of a new economy in which centralised firms are

displaced by network enterprises that act as intermediaries of supply and demand; linking together multiple firms, or segments of firms, through global flows of information and finance in distinct business projects. Together, these technological and social innovations, according to Castells, act to redefine patterns of space and time. In contrast with the rhythm of biological time, and the clock time of the industrial age, new information/communication technologies attempt to annihilate time: first, by compressing it into split-second transactions; and second, by randomising past, present and future time in electronic hypertext and blurred life-cycle patterns. Space, similarly, ceases to exist as places in which meaning, function and locality are closely inter-related and becomes a series of nodes through which social practice is organised without geographical contiguity. The state, meanwhile, is reconfigured as a focus not for the concentration of power (as was the case with the nation state) but for power-sharing and negotiated decision-making among networks of international, multinational, national, regional, local and non-governmental political institutions. Undermined by global flows of wealth and information, states adapt by building partnerships and sharing sovereignty to retain influence.

In response to criticisms that the network society thesis overstates the extent and novelty of these processes (Podolny and Page 1998), Castells (2000) argues that the 'network society' is characterised by a particular type of network (ie. the information network) in which the 'power of flows' is more important than the 'flow of power'. However, it remains the case that many networks are not information networks and are not causally related to the emergence of the network society. Similarly, it remains the case that networks may be located within hierarchical organisations (Castells 2000). Thus, it is entirely reasonable to expect the network society thesis to speak clearly to some aspects of agri-environmental action and not to others. It makes intuitive sense, for example, that networks of agri-environmental action might resist subversion by information/communication and bio-technologies of the temporal and spatial rhythms of ecological processes. But this is not necessarily the case (as evidenced by the ecological claims of biotechnology proponents), and the network society thesis does raise a number of interesting questions for our consideration of agri-environmental action. How are networks transforming the relationships between state agencies, farmers and other actors in the governance of agri-environments? To what extent have genetic engineering and other biotechnologies been able to reorganise the time and space of agriculture? And what role might we expect to see networks take in the re-organisation of commodity chains and what might be the place of environmental considerations within any such reorganisation?

Agri-environmental measures in Australia provide what appears, at face value, clear evidence of the 'network state' with a clear preference for diffuse, over concentrated, expressions of power. At all levels, Australian governments have positioned themselves as the deliberate architects of agri-environmental networks through which they have sought to increase their influence indirectly through: first, the provision of funding, technical and administrative assistance for some kinds of activities and not for others; and second, the use of participatory programs and discourse to encourage practices of self-calculation and self-regulation among rural landholders (Lockie 1999). The most

important of these practices, arguably, have been those that revolve around highly rationalised approaches to farm and catchment planning that, by linking environmental and economic objectives, re-define farmers as self-reliant and entrepreneurial business-people; thus legitimating a re-direction of resources away from welfare and other assistance measures and towards farm rationalisation (these planning technologies are examined in more detail in the following section)(Higgins and Lockie 2001, 2002). Sponsorship of self-regulating networks has been criticised, not surprisingly, for devolving responsibility to deal with problems without an accompanying devolution of resources. Such sponsorship has, however, enabled Australian governments, more-or-less successfully, to claim that they have increased their commitment to the agricultural environment while minimising conflict with landholders over regulatory limitations on private property rights and appearing sensitive to the tremendous spatial and temporal variability that characterises agricultural ecologies, resource management issues and stakeholders (Lockie 1997a).

The technological reorganisation of agricultural space and time raises the increasing influence of off-farm agents in the agricultural labour process and the possibility that agri-environmental programs based on self-regulation might be of limited efficacy. While the seasonal nature of agricultural production and labour demand has traditionally offered small and flexible household-based production units some comparative advantage over larger corporate entities (Friedmann 1986), the competitive pressures of capitalist agriculture encourage those same household units to engage in a constant cycle of technological innovation and productivity improvement that progressively increases their reliance on off-farm capital for inputs of energy, technology and expertise. This imperative is amplified by the increasing ability of processing firms to substitute one agricultural commodity (and thus space) for another as the clock time and uniformity of industrial production is imposed on more and more aspects of agricultural labour (Goodman et al. 1987) in a process that may well be interpreted as an intermediate step toward the annihilation of biological time. Although this may seem at odds with the finding of the previous section that agri-environmental networks have encouraged greater attention to the rhythms and cycles of nature, the following section will discuss the ways in which rationalised planning and other technologies have enabled the accommodation of agri-environmental concern within industrialised production systems.⁴ The question (or at least one of them) will be the extent to which such accommodation remains possible as the focus of technological innovation shifts from mechanisation, breeding and synthetic inputs to the new biotechnologies.

More recently, agri-environmental governance has become implicated in the re-organisation of food production-consumption networks under the influence of a highly concentrated retail sector that increasingly is by-passing markets for agricultural commodities in favour of developing direct relationships with farmers and other suppliers (Bain et al. 2005; Busch and Bain 2004; Marsden et al. 2000). Central to these new retailer-producer relationships are the imposition of auditable systems of product traceability and quality assurance. While, in most cases, these systems are focussed on the reduction of food borne risk there are notable examples also of the introduction of additional social and environmental criteria. This paper will not deal with this issue in

detail. However, it is worth noting that trends towards the reorganisation of commodity chains around quality assurance systems are seen by most commentators as examples of new hierarchical relations through which retailers usurp some of the influence previously held by commodity traders rather than more opportunistic and potentially egalitarian networks (Dixon 2002; Lockie 1998b; Marsden et al. 2000). Traceability and audit systems have enabled retailers to promote themselves as representatives of consumer interest while avoiding potential liability for the transmission of food-borne hazards (Busch and Bain 2004; Lockie 2002). In many cases, such systems have forced down prices and promoted concentration of agricultural production among fewer, larger farms capable of complying with retailer demands. Certainly, this has stimulated resistance and opened opportunities to exploit smaller niche markets (Coombes and Campbell 1998), but it remains the case that the bulk of food trade takes place under extremely hierarchical circumstances and that the spatial and temporal dimensions of agriculture continue to take increasingly industrial forms (Guthman 2004).

The network society thesis raises more questions for the future of agricultural environments than it provides answers. Nevertheless, to the extent that this thesis is seen as an insightful summary of key social trends, the possibility must be countenanced that explicitly network-based agri-environmental measures are more consistent with wider trends in the governance of food and agriculture, and better able to deal simultaneously with the social, ecological and economic basis of food and agriculture, than subsidy regimes. But is the network society thesis plausible? And is it the only way to conceptualise a more thoroughgoing account of the role of networks in the social and agri-environmental domains? This paper will turn now to actor-network theory (ANT) and the challenges it raises, both for the network society thesis and for our understanding of agri-environmental action.

Actor-network theory and the network model of innovation

Actor-network theory has been outlined in some detail in the agrifood literature (see Busch and Juska 1997; Goodman 1999; Murdoch 1995, 1997, 2001; Lockie 2002; Lockie and Kitto 2000; Morris 2004; Sousa and Busch 1998). This paper will draw, therefore, on a small number of particularly relevant arguments concerning: the extent to which the network society thesis is based on an over-stretched account of the hierarchical society that preceded it; the ontological status of networks; and the centrality of technological and ecological processes and artefacts to network construction.

ANT is concerned with the mobilisation of people, texts, technologies, non-human organisms and so on in hybrid assemblies (Callon and Law 1995) that are 'simultaneously real, discursive and social' (Latour 1993: 64). The network metaphor is thus used in ANT to denote an alternative conception of the social in which concepts of structure and agency cease to make sense (Law 1999) and in which intentionality, subjectivity, identity, morality and other aspects of human action are seen to derive from relations between entities rather than from either individuals or totalities (Latour 1999). This conceptualisation of power, identity and so on as network effects calls into question not only the traditional sociological dualism between structure and agency, but a host of

others including those between society and nature, global and local, and so on. According to Latour (1993), the sociological studies of science and technology from which these propositions are drawn question orthodox sociological theories of modernity from which new forms of organisation based on information networks are thought to depart. While this does not, in itself, undermine Castell's notion of the network society, it does question the focus of the network society thesis on technological developments (in information and communication technologies) that obliterate time and space as the primary basis for contemporary forms of organisation. In contrast, Latour (1993: 2) argues that disputes over food safety, energy policy, waste management and so on illustrate the manner in which contemporary issues mix together 'chemical reactions and political reactions', the 'right to development' and its ecological consequences, in seamless narratives of politics, biology, history, technology and ethics. With evidence that hybrid eco-social issues are proliferating, it seems that novelty in contemporary social relationships may be found as much in changing relations between humans and nature as in their obliteration. Regarding the application of network analysis to agri-environmental networks, ANT suggests a need to identify and evaluate: first, the centres of calculation that attempt to speak on behalf of farmers and non-human nature in the construction of agri-environmental networks; second, the strategies and intermediaries (or technologies) used to enrol farmers and other entities within these networks; third, the means through which farmers and other entities either resist or pursue enrolment; and fourth, the ability of networks to establish stability and durability (see also Morris 2004).

Actor-network theory has stimulated spirited debate in the sociology of food and agriculture; its novelty and analytical acuity questioned by Fine (2004) in a recent edition of this journal (see also Friedland 2001). While Fine (2004) lays many charges, two are of particular relevance to this paper. First, is the contention that ANT proponents have been unduly dismissive of rival theoretical approaches; in part, due to their narrow concern with the integration of consumption within food commodity chain studies. This criticism rests on a highly selective, if not misrepresentative, reading. The interest in ANT among agrifood scholars lies not in the incorporation of consumption into commodity studies as an end in itself but in the opportunities offered by ANT to link the political economy of food, the social, ecological and spatial dimensions of agriculture, and recent growth of alternative food networks, third party food quality certification schemes, and so on (see Goodman 2003). Second, is the claim that ANT is generally recognised for its lack both of causal theory and of analytical reflexivity in the networks it chooses to describe. The theoretical issues implicated in this claim are discussed at some length in Lockie (2002) which argues that understanding the causal nature of power within agri-food networks is dependent on shifting the focus of analysis from the question of 'why' power is exercised to the question of 'how'. A far more relevant criticism of ANT proponents is the relative lack of attention that has been paid to agri-environmental governance measures and the attempts made, through these, to enrol farmers, agro-ecologies, state agencies and so on in alternative networks of production. Further, where studies of agri-environmental measures have been placed under the ANT microscope (eg. Morris 2004), they have focussed on detailed investigation of the implementation of those measures (ie. on their success in mobilising and stabilising networks) but have avoided more thoroughgoing analysis of the dualistic policy

assumptions on which those measures are based. This is evidence less of a shortcoming of individual studies than of the potential to consider the implications of ANT to agri-environmental measures more extensively. The remainder of this section will make a small step in this direction by examining the particular relationship between network-based measures and changes in farming practice.

As stated above, the vast majority of farmers involved in Landcare group activities believe their participation to have led to positive changes in farming practices. The practices most frequently implemented by group members nationally have been revegetation and other nature conservation works (68%), pest control (66%), 'conservation farming' practices such as reduced tillage (65%), erosion control (63%) and farm planning (56%)(ABARE 2003). More limited case studies suggest that while these practices have led to considerable improvements in resource condition at a paddock and property scale, there is little evidence of improvements at a catchment or regional scale where indicators of resource condition such as water quality continue to decline (CSIRO 2003). According to Australia's lead government research agency, this lack of evidence of regional impact stems from a variety of factors including: the predominant focus of the preceding practices on maintaining productivity at the farm level; the significant number of farmers who have not implemented them; difficulty in translating actions that have been undertaken in an ad hoc and disconnected fashion into cumulative regional outcomes; and the lack of appropriate monitoring and analysis of the relationships between farm-based practices and regional hydrological and ecological processes (CSIRO 2003). To a certain extent, it may be argued that to expect more of farm-based networks would be unfair, and would ignore a range of programs and initiatives oriented more specifically at broader scale natural resource management. However, it is also reasonable to look more closely at the ways in which ecological processes and farming practices are enrolled in Landcare networks at the paddock and property scale and, subsequently, at the sorts of agro-ecologies they generate.

To assist in the almost impossible task of defining the sustainability of farming practices, Pretty (1998) suggests a typology of sustainability which begins with practices that increase the efficiency of existing agricultural systems (thereby minimising pollution and waste), moves on to practices that build up the stock of natural capital within farming systems (eg. soil biota, biodiversity etc), and thence to practices that build the stock of social capital within the system (eg. vibrant local economies etc). The goal suggested by Pretty is not the steady-state environmental utopia implied by the concept of sustainability but to enhance the ability of agro-ecologies to regenerate themselves in the face of inevitable disturbance. While the practices promoted through Landcare (and the Landcare Program itself) may be seen to embody elements of each stage of Pretty's typology, the implementation of these practices is oriented predominantly towards increasing the efficiency of existing farming systems, and addressing their most immediate environmental externalities, in order to maintain or enhance productivity (Lockie 1999, 2001). This is not to suggest that farmers and other participants in Landcare are not genuine in their approach to agri-environmental action. Indeed, few would question the rationality of implementing practices that enhance farm productivity and profitability more readily than those with uncertain, long-term, or off-site

environmental benefits. The issue is, rather, that Landcare networks do not appear to have offered a basis for a more fundamental reassessment of the goals and farming practices dominating Australian agriculture. The difficulties, in fact, faced by agri-environmental networks in initiating such reassessment is exemplified by the practice of whole farm or property planning.

At face value, property planning offers an opportunity and rational basis on which to reorient farm management in ways that better meet unique personal goals while incorporating a range of property level, local and regional concerns such as resource condition, marketing opportunities, farm financial characteristics, biodiversity, hydrology, human resources and so on. On the surface, such attempts to identify and prioritise land use issues and strategies appear unambiguously positive. However, in reality, property planning exercises generate outcomes that are remarkably similar from one farm to the next and suggest a range of management actions that are never or only partially implemented. As argued in Lockie (2001), the development of property plans is dependent on data collection and interpretation techniques established by agri-science agencies committed to a high input model of sustainability based on existing farming practices. To give meaning to the data on which planning is based (eg. soil test results) farmers draw on agency research that is often little more than 'input-requirement' trials. One study thus found that farmers who had undertaken property planning spent two to three times as much per hectare on inputs such as pest control chemicals as farmers who had not (Lockie 1999, 2001). Yet in relation to practices which had less direct production benefits there were no significant differences between those farmers who had participated in property planning and those who had not.

The empirical operationalisation of property planning illustrates the importance of not taking farming practices at face value and of examining, instead, the recursive relationships between farming practices as technological artefacts and the diversity of other network participants implicated in the construction of agroecologies. As Coughenour's (2003) study of the development of no-till cropping in the US shows, such practices are usually the outcome neither of technological imperatives simply imposed on farmers by external agencies seeking to appropriate elements of the farm labour process, nor the result of solely endogenous technological development. The development and adoption of no-till cropping methods was, by contrast, a lengthy and potentially fragile process of coalition-building based on the fortuitous congruence of actors in the farming and agri-science sectors with relatively common goals, technological developments elsewhere (embedded in their own innovation networks), and the perceived commercial interests of supply companies (Coughenour 2003). Thus, even though the innovation network described by Coughenour (2003) appeared relatively local in the sense that it was characterised by frequent co-present interaction between key actors, successful mobilisation of the network depended also on the enrolment of actors and networks that extended well beyond co-present interaction. Also critical to the success of this network was the ability both to capitalise on self-identities of farmers as innovators and the ability, subsequently, to modify the self-identities of network participants. No-till network participants were required to embrace a different understanding of the relationships between farming and soils that rejected many of the beliefs on which

previously participants had based their professional roles and reputations (Coughenour 2003). In the case of Landcare and similar networks of agri-environmental action in Australia, we similarly see the adoption of identities that challenge pre-existing ideas about good farming practice and yet which reinforce identities of farmers as innovative, progressive business people (Lockie 1997a).

Conclusions

Conceptually, at least, the network paradigm for agri-environmental governance addresses several of the criticisms of European measures raised by Hodge (2001) and Lang et al. (2001); namely, that environmental contracts fail to promote entrepreneurship, innovation, long-term private commitment, landscape-scale management and the integration of agricultural, environmental and social policy. The experience of agri-environmental networks in Australia, therefore, is useful in pointing towards some tentative conclusions regarding the wider utility of a network paradigm for agri-environmental governance.

The studies discussed here certainly support sociological orthodoxy that membership and participation in formal and informal groups may lead to positive outcomes with clear, if at times small, associations between indicators of participation in formal agri-environmental networks and the implementation of more sustainable farming practices. Networks formed through the National Landcare Program, in particular, may be described as examples of profound cultural change in the way rural Australians understand their own identities, interact among themselves and invest their time and resources (Lockie 1998a). Networks do matter. Further, it is interesting to note that participation in agri-environmental networks appears to have played a greater role in encouraging social inclusiveness within some rural communities than has participation in a range of other farm-based organisations. But what does this tell us about the emergence of an information-based network society or the centrality of technological and ecological processes to the networks of the social? And has it made a fundamental enough difference to the way agriculture is practiced to have substantial environmental and social impacts at a landscape scale?

Although the new biotechnologies and appropriation of the agricultural labour process raise new possibilities for the 'annihilation' of space and time, Australian agri-environmental networks appear to have refocussed the attention of participants on the rhythms and cycles of nature and supported the construction of novel, and arguably closer, relationships with the agro-ecologies of rural space. Nevertheless, network forms of organisation have become central to agri-environmental governance and led to substantial change in the relationships between rural landholders and state agencies as new, and often indirect, forms of influence are deployed to reconstruct farmers as self-regulating and self-reliant entrepreneurs for whom the pursuit of economic and environmental objectives are essentially one and the same thing. However, at the same time that landholders' active and voluntary participation in agri-environmental governance increases in importance to state agencies, the globalised reach of production-consumption networks institutes a new set of hierarchical power relations between

farmers and off-farm capital. That agri-environmental networks established through Landcare have not led to a fundamental problematising and recasting of agriculture should not be considered inevitable. However, with Australian farmers actively pursuing strategies of globalisation and scientification and, at the same time, embracing identities as innovative and progressive businesspeople, it is also no great surprise that the primary emphasis of practices implemented as a result of Landcare participation is on increasing the efficiency, and addressing their most immediate environmental externalities, of existing farming practices.

Notes

¹ The most notable exception to this trend has been the implementation of controls in some States over vegetation clearing on rural lands. While the imposition of tighter controls in response to unacceptably high rates of clearing has been accompanied by attempts to establish participatory regional planning processes for vegetation management, they have been interpreted nevertheless by the majority of landholders as unnecessary infringements on private property rights (Reeve 2001).

² Examining networks in this manner raises at least two methodological concerns; the first regarding the use of group membership as a proxy measure of inter-personal network density and the second regarding the acceptance of particular models of environmental best-practice as relevant to all farms and farm operators. Reliance on group membership as an indicator of network density stems, at least in part, from the limitations of data availability. However, consideration is given here to the extension of groups' influence beyond the boundaries of formal membership. In relation to the adoption of pre-specified environmental management practices, in most of these studies the practices have been broadly defined (eg. 'soil conservation measures such as reduced tillage, earthworks etc) so as to reduce non-applicability. Further, where possible, statistical techniques such as factor analysis have been used to group individual practices into 'packages' that acknowledge farmers may pursue a variety of paths to sustainability (see also Saltiel et al. 1994). While adoption of innovation and technology transfer studies have lost favour among rural sociologists for a variety of reasons, it remains the case that social participation often was identified in early adoption studies as a correlate of innovation (Buttel et al. 1990).

³ It is relevant to note that the sugar industry may be considered organisationally dense, with a plethora of spatially-based group structures responsible for the coordination of activity within the industry and ensuring frequent co-present interaction. We might reasonably expect, therefore, this particular industry to demonstrate more regional homogeneity than others.

⁴ None of this is to deny that industrial appropriation of agriculture has stimulated considerable opposition and explosive growth in markets for 'natural' foodstuffs. While this paper will not deal in detail with the growth of networks around organic food and farming, it is recognised that the influence of resistance to genetically-engineered foods extends well beyond the small percentage of farmers in Australia who have taken the path of full organic certification.

References

- ABARE (2003) *Natural Resources Management on Australian farms* (Canberra: Australian Bureau of Agricultural and Resource Economics)
- Bain, C., Deaton, B. and Busch, L. (2005) Reshaping the agri-food system: the role of standards, standards makers and third-party certifiers. Pp. 71-83 in Higgins V. and Lawrence, G. eds., *Agricultural Governance: Globalization and the New Politics of Regulation* (London: Routledge)
- Barling, D., Lang, T. and Caraher, M. (2002) Joined up food policy? The trials of governance, public policy and the food system *Social Policy and Administration* 36(6) pp. 556-574
- Barr, N. and Cary, J. (1992) *Greening a Brown Land: The Australian Search for Sustainable Land Use* (Melbourne: Macmillan)
- Biggart, N. and Beamish, T. (2003) The economic sociology of conventions: habit, custom, practice, and routine in market order. *Annual Review of Sociology* 29 pp.443-464.
- Buller, H. and Morris, C. (2004) Growing goods: the market, the state, and sustainable food production. *Environment and Planning A* 36 pp. 1065-1084.
- Busch, L. and Bain, C. (2004) New! Improved! The transformation of the global agrifood system. *Rural Sociology* 69(3) pp. 321-346
- Busch, L. and Juska, A. (1997) Beyond political economy: actor-networks and the globalization of agriculture. *Review of International Political Economy* 4 (4) pp. 668-708
- Buttel, F., Larson, O. and Gillespie, G. (1990) *The Sociology of Agriculture* (New York: Greenwood Press)
- Callon, M. and Law, J. (1995) Agency and the hybrid *collectif*. *South Atlantic Quarterly* 94 (2) pp. 481-507
- Campbell, A. (1994) *Landcare: Communities Shaping the Land and the Future—With Case Studies by Greg Siepen* (Sydney: Allen and Unwin)
- Cary, J. and Webb, T. (2000) *Community Landcare, the National Landcare Program and the Landcare Movement: The Social Dimensions of Landcare* (Canberra: Bureau of Rural Sciences)
- Castells, M. (2000) Materials for an exploratory theory of the network society. *British Journal of Sociology* 51(1) pp. 5-24
- Coombes, B. and Campbell, H. (1998) Dependent reproduction of alternative modes of agriculture: organic farming in New Zealand. *Sociologia Ruralis* 38(2) pp. 127-145
- Coughenour, C. (2003) Innovating conservation agriculture: the case of no-till cropping. *Rural Sociology* 68(2) pp. 278
- CSIRO (Commonwealth Scientific and Industrial Research Organisation)(2003) *Assessing the Impact of Landcare Activities on Natural Resource Condition. Attachment 4. Review of the National Landcare Program* (Canberra: Department of Agriculture, Fisheries and Forestry)
- Curtis, A. (2003) *Reflecting on the Landcare Experience: A Report Based on Information Held Within ABARE and BRS. Attachment 1. Review of the National Landcare Program* (Canberra: Department of Agriculture, Fisheries and Forestry)
- Curtis, A. and De Lacy, T. (1996) Landcare in Australia: does it make a difference? *Australian Journal of Environmental Management* 46 pp. 119-137

- Dixon, J. (2002) *The Changing Chicken: Chooks, Cooks and Culinary Culture* (Sydney: University of New South Wales Press)
- Emirbayer, M. and Goodwin, J. (1994) Network analysis, culture, and the problem of agency. *American Journal of Sociology* 99 pp. 1411-54
- Fine, B. (2004) Debating production-consumption linkages in food studies. *Sociologia Ruralis* 44(3) pp. 332-342
- Friedland, W. (2001) Reprise on Commodity Systems Analysis. *International Journal of Sociology of Agriculture and Food* 9 (1) pp. 82-103.
- Friedmann, H. (1986) Patriarchal commodity production. *Social Analysis* 20 pp. 47-55
- Goodman, D. (1999) Agro-food studies in the 'age of ecology': nature, corporeality, biopolitics. *Sociologia Ruralis* 39 (1) pp. 17-38
- Goodman, D. (2003) The 'quality' turn and alternative food practices: reflections and agenda. *Journal of Rural Studies* 19 pp.1-7
- Goodman, D., Sorj, B. and Wilkinson, I. (1987). *From Farming to Biotechnology: A Theory of Agro-Industrial Development* (Oxford: Basil Blackwell)
- Granovetter, M. (1973) The strength of weak ties. *American Journal of Sociology* 78(6) pp. 1360-80
- Granovetter, M. (1976) Network sampling: some first steps. *American Journal of Sociology* 81(6): 1287-303.
- Grasby, D. (2004) *Adoption of Environmental Innovations in the Australian Sugar Cane Industry*. Unpublished PhD Thesis (Rockhampton, QLD: Central Queensland University)
- Guthman, J. (2004) The trouble with 'organic lite' in California: a rejoinder to the 'conventionalisation' debate. *Sociologia Ruralis* 44(3) pp. 301-316
- Higgins, V. and Lockie, S. (2001) 'Getting Big and Getting Out: Government Policy, Self-Reliance and Farm Adjustment'. Pp. 178-190 in Lockie, S. and Bourke, L. eds., *Rurality Bites: The Social and Environmental Transformation of Rural Australia* (Sydney: Pluto Press)
- Higgins, V. and Lockie, S. (2002) Re-discovering the social: neo-liberalism and hybrid practices of governing in natural resource management. *Journal of Rural Studies* 18(4) pp. 419-428
- Hodge, I. (2001) Beyond agri-environmental policy: towards an alternative model of rural environmental governance. *Land Use Policy* 18 pp. 99-111.
- Lang, T., Barling and Caraher, M. (2001) Food, social policy and the environment: towards a new model. *Social Policy and Administration* 35(5) pp. 538-558
- Latour, B. (1993) *We Have Never Been Modern* (Cambridge, MA: Harvard University Press)
- Latour, B. (1999) On recalling ANT. Pp. 15-25 in J. Law and J. Hassard eds., *Actor Network Theory and After* (Oxford: Blackwell).
- Law, J. (1999) After Ant: complexity, naming and topology. Pp. 1-14 in J. Law and J. Hassard eds., *Actor Network Theory and After* (Oxford: Blackwell).
- Lin, N. (1999) Networks and status attainment. *Annual Review of Sociology* 25 pp. 467-487
- Lockie, S. (1997a) Beyond a 'good thing': political interests and the meaning of Landcare. Pp. 29-43 in Lockie, S. and Vanclay, F. eds., *Critical Landcare* (Wagga Wagga, NSW: Centre for Rural Social Research, Charles Sturt University)

- Lockie, S. (1997b) *Sociocultural Dynamics and the Development of the Landcare Movement in Australia*. Unpublished PhD thesis. (Wagga Wagga, NSW: Charles Sturt University)
- Lockie, S. (1997c) Rural gender relations and Landcare. Pp. 71–82 in Lockie, S. and Vanclay, F. eds., *Critical Landcare* (Wagga Wagga, NSW: Centre for Rural Social Research, Charles Sturt University)
- Lockie, S. (1998a) 'Landcare in Australia: cultural transformation in the management of rural environments', *Culture and Agriculture* 20(1), 21–29.
- Lockie, S. (1998b) Environmental and social risks, and the construction of 'best-practice' in Australian agriculture. *Agriculture and Human Values*, 15(3) pp. 243–252
- Lockie, S. (1999) The state, rural environments and globalisation: 'action at a distance' via the Australian Landcare Program. *Environment and Planning A* 31(4) pp. 597–611
- Lockie, S. (2000) Environmental governance and legitimation: state-community interactions and agricultural land degradation in Australia. *Capitalism, Nature, Socialism* 11(2) pp. 41–58
- Lockie, S. (2001) Agriculture and environment. Pp. 229–242 in Lockie, S. and Bourke, L. eds., *Rurality Bites: The Social and Environmental Transformation of Rural Australia* (Sydney: Pluto Press)
- Lockie, S. (2002) 'The invisible mouth': mobilizing 'the consumer' in food production-consumption networks. *Sociologia Ruralis* 42(4) pp. 278–294
- Lockie, S., Dale, A., Taylor, B. and Lawrence, G. (2002) 'Capacity for change': testing a model for the inclusion of social indicators in Australia's National Land and Water Resources Audit. *Environmental Planning and Management*, 45(6) pp. 813–826
- Lockie, S. and Goodman, M. (forthcoming) Neoliberalism, standardisation and the problem of space: competing rationalities of governance in Fair Trade and mainstream agri-environmental networks. In Marsden, T. and Murdoch, J. eds., *Between the Local and the Global: An Institutional Perspective on Food* (London: Sage)
- Lockie, S. and Kitto, S. (2000) Beyond the farm gate: production-consumption networks and agri-food research. *Sociologia Ruralis* pp. 40(1), 3–19
- Lockie, S. and Rockloff, S. (2004) *Landowner Attitudes to Wetlands and Wetland Conservation Programs and Incentives* (Brisbane: Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management)
- Lowe, P., Clark, J., Seymour, S. and Ward, N. (1997) *Moralizing the Environment: Countryside Change, Farming and Pollution* (London: UCL Press)
- Madden B, Hayes G and Duggan K. (2000) *National Investment in Rural Landscapes: An Investment Scenario for National Farmers' Federation and Australian Conservation Foundation with the Assistance of Land and Water Resources Research and Development Corporation* (Melbourne: Australian Conservation Foundation and National Farmers' Federation)
- Marsden, T., Flynn, A. and Harrison, M. (2000) *Consuming Interests: The Social Provision Of Foods* (London: UCL Press)
- Morris, C. (2004) Networks of agri-environmental policy implementation: a case study of England's Countryside Stewardship Scheme. *Land Use Policy* 21 pp. 177–191
- Mues, C., Chapman, L. and Van Hilst, R. (1998) *Landcare: Promoting Improved Land*

Management Practices on Australian Farms: A Survey of Landcare and Land Management Related Programs (Canberra: Australian Bureau of Agricultural and Resource Economics)

- Murdoch, J. (1995) Actor-networks and the evolution of economic forms: combining description and explanation in theories of regulation, flexible specialization, and networks. *Environment and Planning A* 27 (5) pp. 731–758.
- Murdoch, J. (1997) Inhuman/nonhuman/human: actor-network theory and the prospects for a nondualistic and symmetrical perspective on nature and society. *Environment and Planning D: Society and Space* 15 pp. 731–756.
- Murdoch, J. (2000) Networks—a new paradigm of rural development? *Journal of Rural Studies* 16 pp. 407–419
- Murdoch, J. (2001) Environmental sociology and the ecological challenge: some insights from actor network theory. *Sociology* 35 (1) pp. 111–133.
- Ploeg, J.D. van der (1993) Rural sociology and the new agrarian question: a perspective from the Netherlands. *Sociologia Ruralis* 33(2) pp. 240–60
- Podolny, J. and Page, K. (1998) Network forms of organization. *Annual Review of Sociology* 24(1) pp. 57–77
- Portes, A. (1998) Social capital: its origins and applications in modern sociology. *Annual Review of Sociology* 24(1) pp. 1–24
- Pretty, J. (1998) *The Living Land: Agriculture, Food and Community Regeneration in Rural Europe* (London: Earthscan)
- Reeve, I. (2001) Property rights and natural resource management: tiptoeing round the slumbering dragon. Pp. 257–269 in Lockie, S. and Bourke, L. eds., *Rurality Bites: The Social and Environmental Transformation of Rural Australia* (Sydney: Pluto Press)
- Saltiel, J., Bauder, J. and Palakovich, S. (1994) Adoption of sustainable agricultural practices: diffusion, farm structure, and profitability. *Rural Sociology* 59 pp. 333–349
- Sousa, I. de and Busch, L. (1998) Networks and agricultural development: the case of soybean production and consumption in Brazil. *Rural Sociology* 63 (3) pp. 349–371
- Urry, J. (2000) Mobile sociology. *British Journal of Sociology* 51(1) pp. 185–203.
- Wilson, G. (2004) The Australian *Landcare* movement: towards ‘post-productivist’ rural governance? *Journal of Rural Studies* 20 pp. 461–484