Thinking sociologically about regenerative agriculture

Edgar A. Burns

Abstract

This article argues that sociological analysis is needed to assess regenerative agriculture, an emerging concept in New Zealand farming and overseas. 'Regen Ag' proposes a paradigm shift in farming, led by farmers, to respect and work with the environment rather than downgrading it. Most parts of modern society have until now also failed to practice the primacy of natural processes over human intentions. For sociologists, the human-nature interface identifies farming covering 40% of the earth's land surface and producing one-third of global emissions—more than any other single activity. This human-caused pollution and rapid degradation of land and waterways is escalating atmospheric carbon levels and will eventually undermine society's food production. Regenerative farmers aspire to sequester enormous amounts of carbon with environmentally-focused farm practices.

Keywords Regenerative Agriculture; Environmental sociology; Regen Ag; Settler identity; Social movement; Freshwater policy

Introduction

Social change is a recurring sociological theme, opening several reasons for sociologists to be interested in the phenomenon called Regenerative Agriculture. First, Regen Ag—as Regenerative Agriculture is often called—has the potential to make a major contribution to reducing the carbon in the atmosphere that is heating the planet, now at 410 parts per million (www.co2.earth). To achieve this requires not only biophysical changes but shifts in social discourses and socioeconomic structures. Second, Regen Ag is a farmer-led social movement. Sociological expertise about other social movements like labour, gender, sexuality and racial inequalities is applicable to these food production changes. The effects of activism, counter movements and state involvement will shape the outcome of what some see as the latest effort at agricultural renewal (Brulle, 2014; Gale, 1986).

Third, sociological community attention to climate change provides an openness to possibilities Regen Ag might bring to environmental change. This reinforces the sociological significance of the environment in the farmed landscape as core to society's future wellbeing. Fourth, like any social phenomenon, the attempt to achieve a clear focus on Regen Ag necessitates pushing deeper into the context and history of how it has come to be the way it is today (Merfield, 2019). In broad terms, then, this polemical article provides a sketch of Regen Ag and asks: how is Regen Ag important for society?

In rural communities and increasingly in policy circles, Regen Ag in New Zealand has created a 'buzz' of interest in 2019-2020. About fifty articles and media stories have appeared in print and radio news media in this short space of time. Multiple farmer seminars and field days devoted to Regen Ag practices have been held in many regions around the country (for example, Siegfried, 2020a). New farmer networks such as Quorum Sense (https://www.quorumsense.org.nz/) have come into existence to support farmers transitioning to Regen Ag, and websites such as PureAdvantage (https://pureadvantage.org/) articulate positive stories of the Regen Ag movement. In industry and government reports the term Regen Ag is increasingly mentioned (Primary Sector Council, 2019, pp. 12, 17, 18, 20). For example, Handley et al. (2020, p. 61) state in a banking report:

> Our economy relies on 15cm of topsoil. Without it we'd have to find NZD $46 billion. That's the revenue our primary sector earned in the year to June 2019. Soil takes hundreds to thousands of years to be produced, so it makes sense to take care of what's essentially a non-renewable resource. In response to this, interest is growing in regenerative agriculture, a conservation and rehabilitation approach to food and farming systems.

The adoption of the ideas and language of Regen Ag from overseas from United States (US) and Australian experiences is reflective of a much wider interest globally, illustrated in the International Regenerative Projects Map (2020). Internet communication via videos and podcasts has increased the speed of transferring ideas about Regen Ag between countries. Poorer farming

nations as well as modernised western societies' post-settler agriculture regimes are concerned about soil and organic matter loss and the consequences for food production and the economic viability of farming. The United Nations (UN) Food and Agricultural Organisation (FAO, 2020) recently issued a document about regenerative principles emphasising care of soil. Today's understanding of the anthropocene is not only about awareness of the social consequences of the headlined impacts of climate change. It increasingly includes mundane human land-use practices relating to water and food quality and availability upon which planetary society, urban and rural, relies.

Regen Ag globally

Globally, Regen Ag is sociologically significant because approximately 40% of earth's land surface has been changed by humans into pasture and cropping. Greenhouse gases from this farmed surface area are currently around 30% of global emissions (Waghorn & Woodward, 2006). This is the world's biggest single pipeline of carbon into the atmosphere, more than industry and transport combined. It is hard not to appreciate the stark simplicity and weight of this datum. In a data-hungry world increasingly focused on more precise and detailed biophysical information and digital technologies, these statistics speak loudly.

These numbers also mark our *collective* human unsustainability on the planet, not simply farming's unviability (Anderson, 2017; Cudworth & Hobden, 2013; Colebrook & Edelman, 2016; Klein, 2014). There is a fundamental discordance between the components of food production: farming's social and economic benefits, the previously valorised contribution of agriculture to society's wellbeing (Denoon, 1983; Springmann et al., 2016), and the deteriorating future we are making through current capitalist farming (Halteman, 2011). As much as "one-third of the world's topsoil is already acutely degraded, and the UN estimates a complete degradation within 60 years if current practices continue" (Payne, 2019, para. 3).

These issues have stymied policymakers for years when facing a powerful backlash from threatened farmers, farm communities, farming

interests and place-based electoral politics. Coupled with the corporate, financialised trade interests surrounding these politics, there has been ideologically-motivated lobbying—such as that by the Koch brothers—generating a denialism that has become associated with conservative politics (Leonard, 2019). In addition, consumers have been politically unwilling to shift their behaviours or pay significantly more for agricultural goods. Urban consumer denialism has thus run parallel to denialist impulses from rural producers (Dunlap & McCright, 2011).

Regen Ag, however, provides one possible solution to the massive carbon emissions and soil degradation associated with traditional agricultural practices. Changing from conventional/'industrial' farming tied to capitalism's continual growth logics could make farming prioritise the catchment landscapes where agriculture takes place. The cost to the environment, including our waterways, of agriculture has never been made fully explicit. Rising land degradation of organic matter, over-application of fertilisers, erosion and sediment run-off, puts chemicals and faeces into waterways and underground reserves where water tables are already depleted (Jenkins, 2018; Ministry of Environment, 2020; Mulligan, 2020).

The academic project of sociology has highlighted the shift to modern society and economy over several centuries, reprised in any introductory textbook (for example, McManus, Matthewman, Brickell, McLennan & Spoonley, 2019). The recent story, however, is lesser known; in the last several decades, we humans have greatly accelerated destruction of all the environmental parameters necessary for human society, as eloquently summarised in the graphs of Steffen, Deutech, Zalasiewiez, et al. (2011, p. 745). It might be argued that given the normative downgrade in recent decades of farmer worth and value of contribution to society, Regen Ag offers a point of renegotiating what Goffman (1986) called 'spoiled identity', the loss of settler-farmer approbation. In finding internal motivation beyond regulation and financial incentives, it is not only farmers who are looking for new ways forward.

New Zealand's focus on agricultural production is particularly harmful environmentally: "Farming creates methane and nitrous oxide gases. These

gases account for around half of New Zealand's total greenhouse gas emissions" (Ministry of Primary Industries, 2020, para. 1). Statistics New Zealand (2019, paras. 6 & 9) records that, "New Zealand's gross GHG [Green House Gas] emissions increased 19.6 percent from 1990 to 2016" and "net uptake of carbon dioxide from the atmosphere by land use, land-use change, and forestry (LULUCF) decreased 22.9%". That is, things got much worse. Thus, we need a shift in thinking not just to sustain the environment. Climate heating is also undermining human wellbeing and we are sliding into a not-so-slow train-wreck—the statistics just cited mean a fifth more greenhouse gases emitted and a fifth less absorption from farm practices continuing to degrade soils—not to mention all sorts of quality of life measures despoiled.

A genealogy of New Zealand Regen Ag

Regen Ag is a response to environmental trends that have been increasingly evident in New Zealand and global society. New Zealand is uncomfortably similar to other countries in adopting world-wide practices of exploitation of the environment rather than being proactive in maintaining soil, water and biodiversity. Pressures for farming to change have been increasingly felt by rural groups over recent decades. On-farm environmental damage by most measures has been sharply worsening across these decades, building on the longer run of modern economic environmental degradation (Monastersky, 2015). The same environmental downward spiral is reiterated in the media and is continually being updated by scientists anxious to communicate the evidence from their research. The obvious example of this is the Intergovernmental Panel on Climate Change (IPCC) series, including forthcoming reports, at www.ipcc.ch/reports/

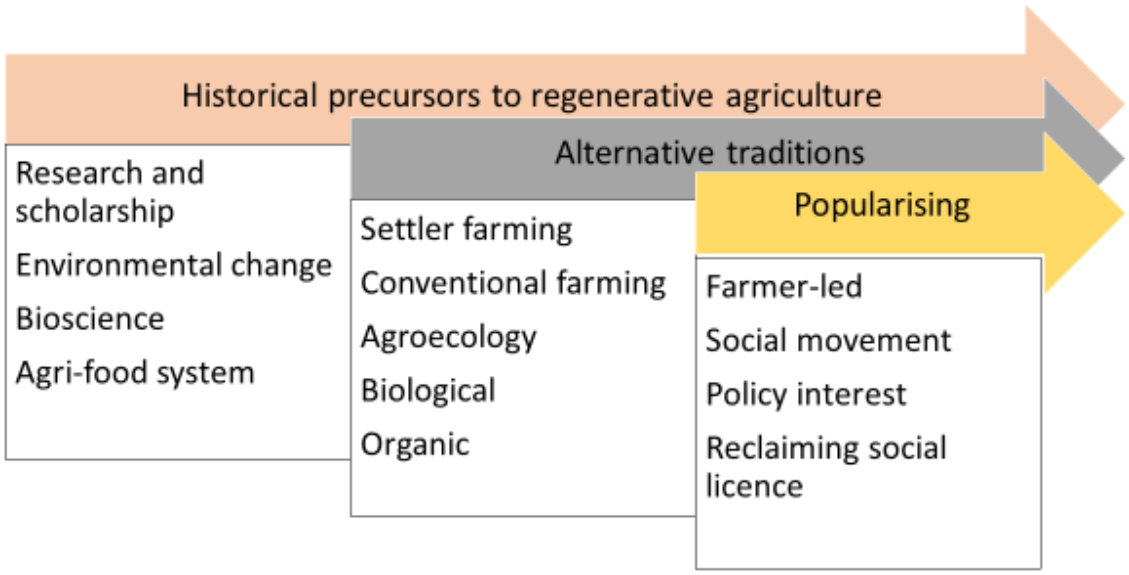
There is, however, another narrative to resistance and hostility of those landowners and others threatened by possible economic effects on their livelihoods. This narrative is a quieter but much more positive story. Along with the academic research out of which the biophysical correlates of sea-level rise, acidification, extinction, soil and biodiversity loss have been documented, social and human disciplines have continuously explored connections between agriculture and other sectors (Kolbert, 2014; Sodikoff,

2011). This includes consumers, instances of practice changes and the need for policy and regulatory resetting. Denialism is not a reason for inaction, it is a position, and it has not stopped this accumulation of vital countering information and what will eventually be perspective-shifting work. New Zealand theorising can be instanced in such fora as Regen Ag discussions at the Agri-food Research Network conference at the University of Canterbury in December 2019 (http://ecocanterbury.org.nz/) or the Western Australian Regen Ag network and conference in 2019 (www.regenwa.com).

Changing public discourses are often considered by sociologists in relation to disadvantaged groups but apply equally to socioeconomic activities. Relations of production and means of production are after all basic sociological framing, formative if not determinative in localised experiences of inequitable arrangements (Mitchell, 2009). This academic framing helps counter dominant narratives that privileged sections of society might assume about how society works. Climate change is a broad issue but in this article is narrowed to a particular question: what makes regenerative farming significant for society? Certain topics at certain times and locations attract broader interest by sociologists. The urgency of climate change makes Regen Ag a significant issue for global society, not only for farmers, the farming sector, the New Zealand economy or solely for New Zealand society.

Figure 1 sketches this understanding: political and sectoral opposition to meeting the inevitable environmental challenges has been countered by a set of scientific and academic discourses preparing to meet this threat to humanity. In New Zealand there have been multiple steps put in place in the last decade to bring these to fruition, even if this is almost always a dialectic process of steps forward and steps back. Thus Figure 1 regards Regen Ag as a key resultant possibility, already adopted by some.

Figure 1. Precursors to Regen Ag



Source: Author's own

I argue that the story of Regen Ag has an importance for New Zealand society that is yet to emerge. But, like other social phenomena, that future has a backstory with several threads. An important New Zealand development has been the Australasian Agri-Food Research Network involving Le Heron, Campbell, Smith and colleagues. Many years of conceptual and empirical work was perhaps most fully expressed in the concept of 'biological economies' in the title of their 2016 book. Contributions came from collaborators from around the world and built on success in a 2009 Marsden grant in New Zealand. This research had twin emphases: first, biological-agricultural processes; second, extending the discussion of the food supply chain through farm, manufacturing to consumption.

This research collaboration has been developed across many publications, for example Campbell et al. (2009). Both elements—on-farm practices and agri-food supply chains—are crucial in understanding the role that Regen Ag can play in reversing climate change. First, the research helps us to understand the biophysical planetary cycles by which carbon in the atmosphere means more of the sun's energy is retained, hence earth heats up. Associated environmental issues of monocultures, loss of biodiversity, forests and organic matter, and water vulnerability, are entry points into this discussion. Second, the scholarship of these authors and their involvement

in networks within wider international academic communities, connects on-farm practice, not just within multiple biological cycles but also within the unsustainable human-social ecosystem of supply chains, corporate activity, banking profits, forms of commodities and products—and their processing. Complexity theory is one obvious space where this documentation of cross-pressures that maintain the present commercial and economic regimes could be explored further, even as the need for new ways of growing food and fibre become more urgent.

Regen Ag, as Figure 1 suggests, emerges from this alternative academic narrative, building political consensus over time against politicised opposition. The broadness of the terms Regen Ag and debates about its meaning implicitly acknowledge multiple streams of academic and practitioner alternatives to settler-farming histories (Weaver, 2003; Denoon, 1983) and new settler logics (Pichón, 1996). These include holistic land management (Savory, 2013), agroecology (Altieri, 1995; Warner, 2007), organic farming (Slavova, Moschitz, & Georgieva, 2017; Siltaoja, et al., 2020) and natural sequence farming (Andrews & Williams, 2014), amongst many others. All challenge the human-only focus, affirming that farming and humans will only flourish if they function *in response to* nature rather than attempting to impose themselves on the environment.

Communicating the importance of Regen Ag is fundamental to formal scholarship in this area. Consciously shifting to a popular mode, as Masters' (2013) does in *For the Love of Soil,* benefits end-users by increasing understanding outside academic publishing. Masters' (2013) and similar work pushes information beyond scientists' uncertainty about adoption of Regen Ag which is, on one level, a reasonable caution:

> Regen Ag stands as the latest social movement attempting to break away from highly dominant modernist farming in NZ, and it is interesting partly because it is the latest movement in a longer lineage of attempted breakaways and alternative social movements that social scientists have been studying for decades. (personal communication)

Conversely, several biophysical scientists in New Zealand have spoken sternly of the need for evidence (for example, Anderson, 2020; Mackay, 2020). Granted their point about the need for Regen Ag evidence, there is a real danger that strong assertions, rather than undertaking immediate research, may undermine the current interest and willingness of farmers to practice in new ways much better aligned with the ecology of their farmed landscapes. It is yet unclear how successful Regen Ag will be environmentally. It is to be hoped that confirmatory scientific evidence will support work by local entities such as Regional Councils to achieve necessary behavioural shifts among farmers, consumers and government policies in shaping incentives and requirements to achieve what previous efforts to change have pointed towards but failed to achieve.

Understanding Regen Ag

This article has thus far indicated global arguments for Regen Ag and precursors to this concept in the New Zealand context. But what is Regen Ag? Farmers and agricultural scientists concur with environmental-climate change policy makers that Regen Ag is difficult to define. For many in these sectors, there is value in regarding it as a broad umbrella category. It is inclusive of agroecology, holistic land management, food provenance initiatives, carbon farming, biological economics, sequence farming and many other labels associated with other projects across the globe (Regenerative Projects Around the World, 2020). There are different emphases and aspirations, but all strands affirm the primacy of nature rather than the primacy of human agriculture which co-opts and dominates nature. For instance, Payne (2019, para. 5) suggests the following:

> The regenerative farming approach focuses on restoring soils that have been degraded by the industrial, agricultural system. Its methods promote healthier ecosystems by rebuilding soil organic matter through holistic farming and grazing techniques. In short, regenerative agriculture practitioners let nature do the work.

Thus Regen Ag sequesters carbon in enormous amounts, depending on place, and does the same for water retention (Toensmeier, 2016). Increased water-

holding capacity means crops are more resilient through times of drought or heavy rain. Maintaining roots, soil structure and beneath-surface biodiversity increases soil organic matter and this reduces nutrient runoff and erosion. Payne (2019, para. 3) argues that:

> [T]he healthier the soil, the healthier the crop. When plants have the nutrients and roots systems they need to thrive, they build compounds to help protect against insects and disease. There is also growing evidence that a healthy soil microbiome full of necessary bacteria, fungi, and nematodes is more likely to produce nutrient-dense food, promoting better human health.

There are many summaries of the main features of Regen Ag. For instance, Payne (2019, paras. 9-13) lists: integrative livestock management; cover crops; no-till; and crop diversity. Another list includes: minimise soil disturbance; maximise crop diversity; keep the soil covered; maintain living roots year-round; and integrate livestock (General Mills, 2020). The FAO (2020) identifies: minimum mechanical soil disturbance; permanent soil organic cover; and species diversification. Each of these summaries reinforce the necessity to prioritise nature over human attempts to dominate nature.

New Zealand definitions match international accounts of Regen Ag. Merfield's (2019, p. 4) review observes that:

> Regenerative agriculture is a set of farming practices and a social movement that has been increasing in visibility and uptake by farmers and growers in New Zealand over the last five to ten years.

Although Merfield (2019, p. 7) observes that the "relative novelty" of the field means, "there is very little literature directly studying regenerative agriculture," especially on "the social side of regenerative agriculture", he provides a substantial list of what he sees as "regenerative agriculture's key objectives and practices". Regen Ag:

> has a set of semi-informally defined objectives that it wishes to achieve, e.g., soil health, especially microbial health, building soil organic matter for soil heath and climate change mitigation and adaptation, etc. It then has a suite of on-farm practices, e.g., no-

> till, cover crops, minimising soluble fertiliser use, avoiding agrichemicals, integration of livestock, etc., that are used to try and achieve the various objectives (Merfield, 2019, p. 4).

Siegfried (2020a, para. 6) takes this further, with a description of an ideal, rather than a definition, in the New Zealand context:

> Regen ag … is not just about reducing harm, but seeks to actually improve the health of the land, waterways, the animals that live on it, and people that benefit from it. Taking a whole-system approach, it encourages farmers to pay close attention to what individual pastures, fields, gardens, and plots of land need in order to function more like natural ecosystems, while simultaneously seeking to improve farmer wellbeing and animal welfare. In practice, that might look like zero tillage, continual cover, increased pasture and crop diversity, the use of nitrogen-fixing cover crops, the avoidance of synthetic fertilisers and pesticides, and longer rotational periods for stock to give plants a longer time to recover.

Who is most interested in promoting Regen Ag? There is a lot of North American interest and activity, as well as in Australia, where Southern Cross University offers a world-first degree major. Regen Ag advocates tend to comprise a mixture of farmers and other industry participants, such as General Mills cited earlier. For them, transparent food chain narratives and product sourcing are central drivers of their financial support and commitment to Regen Ag. New Zealand farmers are keen to reduce expensive synthetic fertiliser use as well as agrichemicals. However, broader environmental discourses such as those based in Indigenous knowledge systems (Mercier, 2018; Ministry of Research, Science and Technology, 2005; Pascoe, 2018) provide a philosophical worldview beyond solely farm-driven reasons for action. This might suggest that Regen Ag is “New words for age-old practice[s]” (Whetham, 2020, section 3).

Overall, this section has indicated that Regen Ag is a long way from more prescriptive rules about farm inputs associated with some forms of organic farming and horticulture. Regen Ag advocates are usually experimental in their farming practice and generally interested in applying science in making better on-farm decisions and understanding the

hydrological, nutrient and soil cycles within watershed/catchment wholes. For sociologists it is possible to discern a broad, identifiable phenomena in agricultural with beneficial implications for New Zealand and the planet in economic and environmental future developments. Thus Regen Ag should be a key focus of sociological analysis.

Sociology and Regen Ag

Sociologists tend to be politically left of centre, where environmentalist arguments are often strongest, and with other social scientists are often interested in anti-consumerist arguments emerging from critical theories such as Marxism. At a personal level, academic or public sociologists might be concerned about their own fuel consumption and carbon footprint in travel to conferences and research fieldwork. Like other consumers they might also be concerned about vehicles they drive, things they eat (Fiala, 2008), even pets' food consumption (Okin, 2017).

But few sociologists are likely to consider Regen Ag as part of their research agenda or possibly even as a fruitful topic for sociological analysis. However, one way for sociologists to become part of the global response to the climate crisis now approaching is to think about regenerative farming as a social movement. The labour movements of the nineteenth and twentieth centuries have long been a focus for social analysis and activism. They have long been concerned with the impacts of capitalist exploitation on humans as workers, although to a lesser degree on those in rural areas than those in urban areas. However, scholars such as Wallace (2014) have highlighted how during the period of neoliberal reform in the 1980s referred to as 'Rogernomics' in New Zealand, a farmer a week was dying at their own hand, as capitalism failed to keep them afloat in difficult economic times. Both men and women in rural jobs were affected.

Sociologists are also interested in decolonising social movements that challenge settler politics, which are intimately linked to the way in which New Zealand was carved up into farms for colonial settlers with little regard to Māori sovereignty. Not only were settler-farmers framed as representative of an iconic Kiwi 'number 8 wire' ingenuity but New Zealand's position as the

food basket of Britain and the centrality of agricultural products to New Zealand's economy positioned farmers as morally superior in the country's mythology (Bell, 1996, 1997; Holland, 2013). As farmers have become entangled with commercial interests through the acceleration of fertiliser-and-petro-chemical capitalism, their historical moral ledger credit as 'good' food producers has been substantially disavowed, instead being framed as polluters of waterways and creators of erosion and land degradation.

Sociologists' attentiveness to the agentic and discursive power of other contemporary social movements, such as #MeToo and Black Lives Matter, builds on their interest in racial, gendered and class contestations (Byrd & Matthewman, 2012; Dunlap & Brulle, 2015). Increasingly environmental and ecological activism appears in the likes of Greta Thunberg, Bill McKibben or Naomi Klein raising global attention to issues such as Amazon deforestation, plastic in oceans, sea-level rising (Lockie, 2015; Urry, 2010; Yearley, 2009).

This article argues that sociologists should pay attention to Regen Ag as a social movement that focuses the contribution of farming to CO2 emissions and environmental degradation and, importantly, involves farmers themselves advocating for change through field days, seminars and virtual meetings. There are many examples that demonstrate farmers' growing interest in Regen Ag. Siegfried (2020a, para. 1) reports that recently:

> In November, 2019 a group of 85 farmers gathered in a mixed cropping farm and a dairy farm near Leeston, Canterbury, to find out what they could learn about regenerative agriculture. They marvelled at healthy pasture, dug in the rich black foot-deep top soil, heard stories from their peers, and visited some happy, healthy cows. The field day organisers were blown away by the attendance and enthusiasm of the crowd.

There is little documentation of how individual New Zealand farmers embrace Regen Ag, but examples are appearing: Eb (2019) on dairying in Northland, Hart (2020) on sheep and beef farming in Hawke's Bay and Siegfried (2020b) writing about a dairying farmer in Southland. Massy (2017) and Andrews & Williams (2014) offer similar accounts in Australia, Brown (2018) and Byck

(2015) provide examples from the US and Savory discusses Regen Ag in the African context (Savory, 2103; Savory & Butterfield, 2016).

Awareness of the need for change in modern farming practices, combined with enthusiasm about transitioning to Regen Ag, makes it stand out as potentially a broader-based farmer-led social movement than previous efforts to disengage from the system of conventional farming, such as organic or biodynamic farming. Significantly, Regen Ag is not academic-led; on the one hand some scientists applaud the focus on soil-building and water flows, while others criticise the current lack of tight empirical measures of effectiveness (Anderson, 2020; Fulton, 2019; Mackay, 2020; Rowarth, 2019). Maintaining farmer desire for autonomy and ownership of environmental solutions could be a strategic motivational lever worth working with, alongside options of incentives and regulations, to achieve real change.

As Eb's (2019, para. 1) comments: "A quiet revolution is growing on New Zealand farms. As debates on water and emissions grind on, a new group of farmers are showing us the way forward". Massy (2018, n.p.), a farmer with a science doctorate, stresses that that such farmers are not discussing seasonal or annual business:

> Regenerative agriculture is an ecological approach to agriculture that enables natural systems and functions to not just be renewed, but also to do the renewing: to self-organise back to healthy function, a radical idea of empowering and not controlling nature.

Payne (2019, para. 4) further suggests that enthusiasm for change is not simply a matter of efficiency and rational decision-making:

> Dubbed 'beyond sustainable,' regenerative agricultural methodologies seek to add to the soil through a self-nourishing ecological system that benefits the environment in the process. A closed-loop system that doesn't halt humans' impact on the environment, but reverses it. Is it too good to be true?

Merfield (2019, p. 1) begins his report on Regen Ag with the epigram, "Live, like you'll die tomorrow; farm, like you'll live for ever" and this serves as a succinct mantra for Regen Ag movement. Regenerative farmers bring both

scientific information and a recognition, sometimes obliquely, of climate and environmental issues together in this movement to think about the long-term future, not just about yields one or two years hence.

Among the few academics to interview farmers about their involvement in this new Regen Ag movement, Gosnell et al. (2019, p. 1) emphasise joining human-to-human with human-to-nature relationality:

> We draw on theories and insights associated with relational thinking to analyse the experiences of farmers in Australia who have undertaken and sustained transitions from conventional to regenerative agriculture. We present a conceptual framework of 'zones of friction and traction' occurring in personal, practical, and political spheres of transformation that both challenge and facilitate the transition process. Our findings illustrate the ways in which deeply held values and emotions influence and interact with mental models, worldviews, and cultural norms as a result of regular monitoring; and how behavioral change is sustained through the establishment of self-amplifying positive feedbacks involving biophilic emotions, a sense of well-being, and an ever-expanding worldview.

Thus Regen Ag is much more than simply about money but it is also about money since 'following the money' is always a central, though never exclusive, strategy for explicating a social phenomenon. This might be one area of fruitful investigation for sociologists. For instance, we could analyse where government funding is spent in farming and how this incentivises or discourages Regen Ag practices amongst farmers.

Another potential area of analysis is to examine the types of 'evidence' and scientific knowledge that is promoted, both by proponents of the Regen Ag social movement and those who disagree with it. How does such evidence gets used and what are the stakeholder interactions around it? Neither climate nor environmental science knowledge by themselves constitute the measure of Regen Ag. We need to make links between different types of knowledge such as Jellyman et al.'s (2016) text on New Zealand freshwater science, Anderson et al.'s (2020) careful water science, Brent et al.'s (2020) mapping of New Zealand's solar energy and a former Environment Canterbury CEO's reflections on the limits of dairy farming water extractions (Jenkins, 2018).

There is also room to sociologically investigate how regenerative farming compares to conventional late western capitalist approaches described by Gosnell et al. (2019, p. 1):

> Regenerative agriculture, an alternative form of food and fiber production, concerns itself with enhancing and restoring resilient systems supported by functional ecosystem processes and healthy, organic soils capable of producing a full suite of ecosystem services, among them soil carbon sequestration and improved soil water retention. As such, climate change mitigation and adaptation are incidental to a larger enterprise that employs a systems approach to managing landscapes and communities. The transformative potential of regenerative agriculture has seen growing attention in the popular press, but few empirical studies have explored the processes by which farmers enter into, navigate, and, importantly, sustain the required paradigm shift in their approach to managing their properties, farm businesses, and personal lives.

Given New Zealand sociology's emphasis on qualitative research, we should be well-prepared to undertake studies that explore these personal lives and decisions, as well as community reactions to them, and how these might support or inhibit a shift to a new regenerative approach.

Other sociologists might be interested in how shifting economic models shape farming. As noted, settler farmers pursued nineteenth and twentieth-century expectations that the task of farming was to clear land and control waterways, leading to decades of intensification of farming that largely ignored longer-term deficient environmental care. The more recent cocktail of 'zombie' neoliberalism economic principles encouraging free-markets through deregulation ideas of trickle-down benefit and individualised entrepreneurship (Quiggin, 2012; Kelsey, 2015) continue to miss the fundamental economic discussion of shifting from exploiting and damaging the environment. For sociologists it is not a simple matter of appropriately costing this damage—that would be to stay inside the economistic framework. Economic arguments ultimately only exist as subsidiary to environmental sustainability. At present society is still attempting to falsely balance environment and economy. As ecologist Mike Joy affirms, measures of the environmental impact seen in proposals that talk about costing nature

ecosystem services, are fundamentally misconceived (Mulligan, 2020). They do not break the capitalist paradigm and we continue towards environmental disaster (Morton, 2018).

How transition to Regen Ag affects or might affect other stakeholders and sectors raises many political, economic and wellbeing questions. Sociological evaluation of unintended consequences, and capacities to contest and negotiate the rhetoric of claims and potential economic effects, will draw on or critique the following starting points in analysis of Regen Ag. Given the absence of research on Regen Ag in New Zealand, five issues are identified here from current debates by academics and others in the media about what threatens or creates opportunities for Regen Ag research in New Zealand. Each issue would benefit from multiple sociology inquiries beyond the biophysical science:

1. *Current state of New Zealand agriculture vs what Regen Ag offers*
   There are sharply contested views about the current state of mainstream New Zealand agricultural versus significant farmer interest in moving towards environmental farming practices. Anderson (2020, para. 1) headlines this issue as follows, 'The 'mythology' of regenerative agriculture and lack of scientific evidence has prompted two renowned plant scientists to write to Ag Minister Damien O'Connor.' He reports that some scientists challenge the implication that current farming is "degenerative" (Anderson, 2020, para. 9) saying that Regen Ag gets uncritical favourable press.

2. *Farmer leadership in Regen Ag environmental improvement vs delay in scientific research*
   Fulton's (2019, para. 1) headline describes this as 'Evidence needed to support regenerative ag' citing: "Landcare Research chief executive Richard Gordon says there's debate about the strength of the evidence to support regenerative agriculture." This source reports efforts to get funding for national research across hundreds of farms.

3. *How scalable is Regen Ag?*
   Earlier adopters or high-performing famers may be positioned differently than a broader adoption of Regen Ag. It is a basic social question, not just a science, technology, engineering and medicine one, how niche or broadly applicable Regen Ag could be. Payne's (2019) article title asks, 'Regenerative agriculture is getting more mainstream but how scalable is it?' She addresses the carbon debates and 'the net carbon sink potential', citing authorities who state that small increases in organic matter sequester huge increases in carbon and water.

4. *Farmers and also corporate players*
   Financial and corporate networks globally will have a major impact on how Regen Ag is positioned. Fonterra is the largest New Zealand-based milk products giant but overseas corporate food manufacturers and organisations in the supply chains—supermarket chains as one example—are likely to exert major influence on the ongoing development of the Regen Ag movement. Rowarth (2019, para. 8), representing Fonterra, calls for further research into Regen Ag, noting that "New Zealand soils are generally around 8 percent organic matter", with variations. The Regen Ag proposals seem environmentally 'perfect' but "nobody appears to have asked where the nutrients in the dung and urine came from" (Rowarth, 2019, para. 7).

5. *Translating overseas Regen Ag to New Zealand*
   New Zealand landscape and farm practices stand in contrast to overseas countries such as the US and Australia that have active Regen Ag movements. Will they ideas and proposals apply to New Zealand in the same way, or with what differences? Whetham (2020) writes from an Australian context where water in that country's dry continental landscapes occupies a different place for Regen Ag that appears to require adaption to New Zealand. Whetham (2020, para. 25) reports mixed opinions and mixed attitudes: "While personal testimonies may be enough to inspire some producers … 'How do

> you know there's been a response if you don't measure it? … many [farmers are] in crisis looking for a way out'." Here, too, the social consequences for farmers, families and food production need sociological perspectives not just agronomy and ecological sciences.

Siegfried (2020a, para. 25) refers to Sam Lang's interviews with a hundred people which found that:

> a significant factor in determining whether farmers made a successful transition to Regen Ag was whether or not they had a supportive community alongside them. Sometimes that was their local community, but more often it was an online or geographically spread community of like-minded people.

This foregrounding of the social in the biophysical is unusual in climate and environment debates. Every proposal for addressing climate change inevitable involves increased understanding of people's motivations, available information and habitus (Bourdieu, 2004).

But an ongoing dilemma in climate change debates is scientists' focus on the environment before human motivations and behaviours derived from farmers' material and economic positions. A sociological approach reverses this common science-expert stance, starting with human decision-making, rather that expert information, and the structuring effects of rural dispositions. Even growing acceptance of the science about the environment still needs translating into potential threats, opportunities, and management of farm risks. Sociologically speaking, human attitudes, beliefs, roles and commitments are central sites of investigation. Few scientists make their focus the human actors, although Mike Joy's work include landusers' feelings of impact (Morton, 2018).

Finally, sociologists might be interested in how Regen Ag as a social movement as an effort to find a new purpose and legitimacy for farming. Bernstein's (2000, p. 59) observation is that identity:

> arises out of a particular social order, through relations which the identity enters into with other identities of reciprocal recognition, support, mutual legitimisation and finally through a negotiated collective purpose.

That farmers would not use such terminology around identity is not at issue. The importance of the social and relational is central for sociologists trying to establish a coherent interpretive lens for the mixture of resistance yet involvement that Regen Ag involves.

Conclusion

This proposal for taking Regen Ag seriously from a sociological viewpoint has been set out in several ways, inviting attention to its potential importance to meaningful climate change. Modern society continuously changes; why would agriculture *not* change in a new century? Given how much society has changed and technology changed, it would be surprising if farming stayed the same. The shift of political power to urban centres, the diffuse influence of consumerism, agri-corporates in food supply chains, public and youth acceptance of climate change, worsening degradation of water, nutrient leaching and soil erosion—all these mean farming is different today. Already in 2020, several New Zealand research initiatives are beginning to investigate the propositions of regenerative farming, seeking to place more science around practitioner accounts. It is not yet known how generalisable these early adopter accounts are that they are having at least as good or better farming outcomes economically, but they confirm the growing interest in Regen Ag in the New Zealand farming community.

The point this article makes is that there is not nearly as much effort going into the social and community ecologies as there is into biophysical ones when it comes to Regen Ag (Gosnell, 2020). Rice (2013, p. 236), however, claims that, “The biophysical environment is not tangential to the social; it is only tangential to conventional sociological thought.” The Covid-19 pandemic has focused public attention on a generalised crisis. We learned governments, in conjunction with their publics, could indeed act more swiftly than was previously imaginable. Change is, therefore, possible to reduce the impacts of climate change. But we need Regen Ag research that includes social science critique and evaluation, so we can better understand regenerative processes in agricultural change and help bring this better future into existence.

References

Altieri, M. (1995). *Agroecology: The science of sustainable agriculture*. Westview Press.

Anderson, D. (2020, 30 June). Regenerative ag's "mythology questioned". *Rural News.* https://www.ruralnewsgroup.co.nz/rural-news/rural-general-news/regenerative-ag-s-mythology-questioned

Anderson, N. (2017). Pre-and posthuman animals: The limits and possibilities of animal-human relations. In J. Weinstein & C. Colebrook (Eds.), *Posthumous life* (pp. 17-42). Columbia University Press.

Anderson, S., Closs, G., & Matthaei, C. (2020). Agricultural land-use legacy, the invasive alga didymosphenia geminata and invertebrate communities in upland streams with natural flow regimes. *Environmental Management, 65*(2020), 804-817.

Andrews, P., & Williams, J. (2014). *Back from the brink: How Australia's landscape can be saved*. HarperCollins.

Bell, C. (1996). *Inventing New Zealand: Everyday myths of pakeha identity*. Penguin.

Bell, C. (1997). The 'real' New Zealand: Rural mythologies perpetuated and commodified. *The Social Science Journal, 34*(2), 145-158.

Bernstein, B. (2000). *Pedagogy, symbolic control and identity*. Taylor & Francis.

Bourdieu, P. (2004[1977]). Structures and the habitus. In V. Buchli (Ed.), *Material culture: Critical concepts in the social sciences* (vol. 1, pp. 72-95). Routledge.

Brent, A., Hinkley, J., Burmester, D., & Rayudu, R. (2020). Solar atlas of New Zealand from satellite imagery. *Journal of the Royal Society of New Zealand, 50*(4), 572-583.

Brown, G. (2018). *Dirt to soil*. Chelsea Green.

Brulle, R. J. (2014). Institutionalizing delay: Foundation funding and the creation of U.S. climate change counter-movement organizations. *Climatic Change, 122*(4), 681-694.

Byck, P. (2015). *Soil carbon cowboys*. https://vimeo.com/119630011

Byrd, H., & Matthewman, S. (2012). Warm up New Zealand: Heat smart—A critical overview. *New Zealand Sociology, 27*(2), 54-75.

Campbell, H., Burton, R., Cooper, M., Henry, M., Heron, E. L., Heron, R. L., ... White, T. (2009). From agricultural science to "biological economies"? *New Zealand Journal of Agricultural Research, 52*(1), 91-97.

Colebrook, C., & Edelman, L. (2016). The once and future humans: Between happiness and extinction. In A. Hunt & S. Youngblood (Eds.), *Against life* (pp. 63-85). Northwestern University Press.

Cudworth, E., & Hobden, S. (2013). Complexity, ecologism, and posthuman politics. *Review of International Studies, 39*(3), 643-664.

Denoon, D. (1983). *Settler capitalism.* Clarendon Press.

Dunlap, R., & McCright, A. (2011). Organized climate change denial. In J. S. Dryzek, R. B. Norgaard & D. Schlosberg (pp. 144-160), *Oxford handbook of climate change and society.* DOI: 10.1093/oxfordhb/9780199566600.003.0010

Dunlap, R. E., & Brulle, R. J. (Eds.). (2015). *Climate change and society: Sociological perspectives*. Oxford University Press

Eb, D. (2019, 4 November). With the walls closing in, regenerative farming is a way forward for agriculture. *The Spinoff.* https://thespinoff.co.nz/business/04-11-2019/with-the-walls-closing-in-regenerative-farming-is-a-way-forward-for-agriculture/

Food and Agriculture Organisation (2020). Conservation agriculture. *Food & Agriculture Organization, United Nations.* http://www.fao.org/conservation-agriculture/en/

Fiala, N. (2008). Meeting the demand: An estimation of potential future greenhouse gas emissions from meat production. *Ecological Economics, 67*(3), 412-419.

Fulton, T. (2019, 30 May). Evidence needed to support regenerative ag. *Farmers Weekly.* https://farmersweekly.co.nz/section/other-sectors/view/fieldays-evidence-needed-to-support-regenerative-ag

Gale, R. (1986). Social movements and the state. *Sociological Perspectives, 29*(2), 202-240.

General Mills. (2020). The six core principles of regenerative agriculture. *General Mills.* https://www.generalmills.com/en/Responsibility/Sustainability/Regenerative-agriculture

Goffman, E. (1986). *Stigma*. Touchstone.

Gosnell, H., Gill, N., & Voyer, M. (2019). Transformational adaptation on the farm: Processes of change and persistence in transitions to 'climate-smart' regenerative agriculture. *Global Environmental Change, 59*(November), 101965.

Gosnell, H., Grimm, K., & Goldstein, B. (2020). A half century of holistic management: What does the evidence reveal? *Agriculture & Human Values*. https://doi.org/10.1007/s10460-020-10016-w

Halteman, M. (2011). Varieties of harm to animals in industrial farming. *Journal of Animal Ethics, 1*(2), 122-131.

Handley, D., Nuir, D., & Greaves, J. (2020). Shift happens: Where is your agribusiness heading? (pp. 1-84). BNZ-Massey University. https://www.bnz.co.nz/assets/bnz/business-banking/Agribusiness/pdfs/shift-happens-future-of-agribusiness-report-2020.pdf?6fc5b217e402e017886f9dd1f7953e3221dc3afb

Hart, G. (2020). RegenAG: Regenerative Agriculture Aotearoa/New Zealand. *Mangarara Station,* Otane, Hawke's Bay. https://www.mangarara.co.nz/family-farm-produce/

Holland, P. (2013). *A home in the howling wilderness: Settlers and the environment in southern New Zealand*. Auckland University Press.

Hunt, L. M., Rosin, C., Campbell, H., & Fairweather, J. R. (2013). The impact of neoliberalism on New Zealand farmers: Changing what it means to be a "good farmer". *Extension Farming Systems Journal, 9*(1), 34-42.

Jellyman, P. G., Davie, T. J. A., Pearson, C. P., & Harding, J. S. (Eds.). (2016). *Advances in New Zealand Freshwater Science*. New Zealand Freshwater Science Society and New Zealand Hydrological Society.

Jenkins, B. R. (2018). *Water management in New Zealand's Canterbury region: a sustainability framework*. Springer.

Kelsey, J. (2015). *The fire economy: New Zealand's reckoning*. Bridget Williams.

Klein, N. (2014). *This changes everything: Capitalism vs. the climate*. Allen Lane.

Kolbert, E. (2014). *The sixth extinction*. Bloomsbury.

Le Heron, R., Campbell, H., Lewis, N., & Carolan, M. (Eds.). (2016). *Biological economies: Experimentation and the politics of agri-food frontiers*. Routledge Earthscan.

Leonard, C. (2019). *Kochland: The secret history of Koch industries and corporate power in America*. Simon & Schuster.

Lewis, N., Le Heron, R., Carolan, M., Campbell, H., & Marsden, T. (2016). Assembling generative approaches in agri-food research. In R. Le Heron, H. Campbell, N. Lewis, & M. Carolan (Eds.), *Biological economies: Experimentation and the politics of agri-food frontiers* (pp. 1-19). Routledge Earthscan.

Lockie, S. (2015). Why environmental sociology? *Environmental Sociology, 1*(1), 1-3.

Mackay, J. (2020, 11 August). Why this soil scientist thinks regenerative agriculture is 'nonsense.' *New Zealand Herald.* https://www.nzherald.co.nz/the-country/news/article.cfm?c_id=16&objectid=12355534

Massy, C. (2017). *Call of the Reed Warbler: A new agriculture—a new earth*. University of Queensland Press.

Massy, C. (2018). An underground insurgency: Regenerative agriculture and human transformation. *The RegenNarration,* Rescope Radio #032. https://www.regennarration.com/episodes/032-an-underground-insurgency

Masters, N. (2002). *For the love of soil.* Printable Reality.

McManus, R., Matthewman, S., Brickell, C., McLennan, G., & Spoonley, P. (2019). *Exploring society: Sociology for New Zealand students* (4th ed.). Auckland University Press.

Mercier, O. R. (2018). Mātauranga and science. *New Zealand Science Review, 74*(4), 83-90.

Merfield, C. N. (2019, August). An analysis and overview of regenerative agriculture. Report 2-2019. BHU Future Farming Centre. www.bhu.org.nz/future-farming-centre

Ministry for the Environment (2020). National Policy Statement for Freshwater Management. *Ministry for the Environment.* https://www.mfe.govt.nz/fresh-water/freshwater-acts-and-regulations/national-policy-statement-freshwater-management

Ministry of Primary Industries. (2020). Agriculture and greenhouse gases. *Ministry of Primary Industries.* https://www.mpi.govt.nz/protection-and-response/environment-and-natural-resources/emissions-trading-scheme/agriculture-and-greenhouse-gases/

Ministry of Research, Science and Technology). (2005). Vision Mātauranga: Unlocking the innovation potential of Māori knowledge, resources and people. https://www.mbie.govt.nz/assets/9916d28d7b/vision-matauranga-booklet.pdf

Mitchell, T. (2009). Carbon democracy. *Economy & Society, 38*(3), 399-432.

Monastersky, R. (2015). The human age. *Nature, 519*(7542), 144-147.

Morton, J. (2018, 3 May). Water crusader Mike Joy wading into NZs freshwater woes in new role. *New Zealand Herald,* https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12044541

Mulligan, J. (2020, 15 June). Mike Joy's vision for New Zealand in 2021. *Radio New Zealand.* https://www.rnz.co.nz/national/programmes/afternoons/audio/2018750730/mike-joy-s-vision-for-new-zealand-in-2021

Okin, G. (2017). Environmental impacts of food consumption by dogs and cats. *PLOS ONE*, 12(8). https://doi.org/10.1371/journal.pone.0181301.

Pascoe, B. (2018). *Dark emu.* Scribe.

Payne, E. (2019, 28 May). Regenerative agriculture is getting more mainstream but how scalable is it? *AgFunder Weekly Newsletter.* AgFunder Network Partners. https://agfundernews.com/regenerative-agriculture-is-getting-more-mainstream-but-how-scalable-is-it.html

Pichón, F. J. (1996). Settler agriculture and the dynamics of resource allocation in frontier environments. *Human Ecology, 24*(3), 341-371.

Primary Sector Council. (2019). Fit for a better future. New Zealand Government. https://www.mpi.govt.nz/dmsdocument/41031-fit-for-a-better-world-accelerating-our-economic-potential

Quiggin, J. (2012). *Zombie economics: How dead ideas still walk among us*. Black Ink.

Regenerative Projects Around the World (2020). *https://www.google.com/maps/d/viewer?mid=1LZ8IVoeMYCplO7FkaueXTNZrdwY&ll=-3.81666561775622e-14%2C24.359540249999 96&z=1*

Rice, J. (2013). Further beyond the Durkheimian problematic: Environmental sociology and the co-construction of the social and the natural. *Sociological Forum, 28*(2), 236-260.

Rowarth, J. (2019, 3 October). Regenerative agriculture—Context is everything. *New Zealand Herald.* https://www.nzherald.co.nz/the-country/news/article.cfm?c_id=16&objectid=12273396

Savory, A. (2013). *How to fight desertification and reverse climate change*. http://www.ted.com/talks/allan_savory_how_to_green_the_world_s_deserts_and_reverse_climate_change

Savory, A., & Butterfield, J. (2016). *Holistic management: A commonsense revolution to restore our environment* (3rd ed.). Island Press.

Siegfried, A. (2020a, 4 May). What is Regen Ag and why is it big for NZ? *RadioNewZealand.* https://www.newsroom.co.nz/2020/05/04/1155648/alina-siegfried-good-bad-opportunity

Siegfried, A. (2020b, 8 May). Regenerative agriculture: How a dairy farmer learned to trust his instincts. *RadioNewZealand.* https://www.rnz.co.nz/news/country/416143/regenerative-agriculture-how-a-dairy-farmer-learned-to-trust-his-instincts

Siltaoja, M., Lähdesmaki, M., Granqvist, N., Kurki, S., Puska, P., & Luomala, H. (2020). The dynamics of (de)stigmatization: Boundary construction in the nascent category of organic farming. *Organization Studies, 41*(7), 993-1018.

Slavova, P., Moschitz, H., & Georgieva, Z. (2017). Development of organic agriculture in Bulgaria (1990-2012): Actors, relations, and networks. *Sociologia Ruralis, 57*(4), 507-528.

Sodikoff, G. (2011). Introduction accumulating absence: Cultural productions of the sixth extinction. In *The anthropology of extinction: Essays on culture and species death* (pp. 1-16). Indiana University Press.

Springmann, M., Mason-D'Croz, D., Robinson, S., … Scarborough, P. (2016). Global and regional health effects of future food production under climate change: A modelling study. *Lancet, 387*(10031), 1937-1946.

Statistics New Zealand. (2019, 18 April). New Zealand's greenhouse gas emissions. https://www.stats.govt.nz/indicators/new-zealands-greenhouse-gas-emissions

Steffen, W., Persson, Å., Deutsch, L., Zalasiewicz, J., Williams, M., Richardson, K., . . . Svedin, U. (2011). The anthropocene: From global change to planetary stewardship. *AMBIO, 40*(7), 739-761.

Toensmeier, E. (2016). *The carbon farming solution: A global toolkit of perennial crops and regenerative agriculture practices for climate change mitigation and food security*. Chelsea Green.

Urry, J. (2010). Sociology facing climate change. *Sociological Research Online, 15*(3), 145-147.

Waghorn, G. C., & Woodward, S. L. (2006). Ruminant contributions to methane and global warming: A New Zealand perspective. In J. S. Bhatti, R. Lal, M. J. Apps, & M. A. Price (Eds.), *Climate change and managed ecosystems* (pp. 233-261). Taylor & Francis.

Wallace, N. (2014). *When the farm gates opened: The impact of Rogernomics on rural New Zealand*. Otago University Press.

Warner, K. (2007). Agroecology in action: Extending alternative agroecology through social networks. MIT Press.

Weaver, J. (2003). *The great land rush and the making of the modern world 1650-1900*. McGill-Queen's University Press.

Whetham, B. (2020, 31 January). Regenerative agriculture a contentious trend still stirring emotions in Australia's farming industry. *ABC South East.*

https://www.abc.net.au/news/2020-01-31/regenerative-agriculture-solution-or-sellout/11897176

Yearley, S. (2009). Sociology and climate change after Kyoto. *Current Sociology, 57*(3), 389-405.

Edgar Burns has worked in the tertiary sectors in Australia and New Zealand. His interdisciplinary approach starts from his sociological research and teaching. Current work responds to environmental issues focusing on communities, policy and motivations. He recently published *Theorising professions*: *A sociological introduction* and is currently writing about farmer professionalism. Email: edgar.burns@waikato.ac.nz