Manaaki Whenua
Landcare Research

‘Think piece’ on Regenerative Agriculture in Aotearoa New Zealand: project overview and statement of purpose

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‘Think piece’ on Regenerative Agriculture in Aotearoa New Zealand: project overview and statement of purpose

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This report is one of a series of topic reports written as part of a 'think piece' project on Regenerative Agriculture (RA) in Aotearoa New Zealand.

This think piece aims to provide a framework that can be used to develop a scientific evidence base and research questions specific to RA, with relevance to a wide range of end users, including academic researchers and farmers. It was initiated in response to New Zealand's Ministry for Primary Industries seeking to assess the potential benefits (or drawbacks) of RA. It is the result of a large collaborative effort across the New Zealand agri-food system over the course of 6 months in 2020 that included representatives of the research community, farming industry bodies, farmers and RA practitioners, consultants, governmental organisations, and the social/environmental entrepreneurial sector.

1 Foreword from the project leads

Regenerative Agriculture (RA) is emerging as a grassroot-led movement that extends far beyond the farmgate. Underpinning the movement is a vision of agriculture that regenerates the natural world while producing 'nutrient-dense' food and providing farmers with good livelihoods. There are a growing number of farmers, NGOs, governmental institutions, and big corporations backing RA as a solution to many of the systemic challenges faced by humanity, including climate change, food system disfunction, biodiversity loss and human health (to name a few). It has now become a movement. Momentum is building at all levels of the food supply and value chain. Now is an exciting time for scientists and practitioners to work together towards a better understanding of RA, and what benefits may or not arise from the adoption of RA in NZ.

RA's definitions are fluid and numerous – and vary depending on places and cultures. The lack of a crystal-clear definition makes it a challenging study subject. RA is not a 'thing' that can be put in a clearly defined experimental box nor be dissected methodically. In a way, RA calls for a more prominent acknowledgement of the diversity and creativity that is characteristic of farming – a call for reclaiming farming not only as a skilled profession but also as an art, constantly evolving and adapting, based on a multitude of theoretical and practical expertise.

RA research can similarly enact itself as a braided river of interlinked disciplines and knowledge types, spanning all aspects of health (planet, people, and economy) – where curiosity and open-mindedness prevail. The intent for this think piece was to explore and demonstrate what this braided river could look like in the context of a short-term (6 month) research project. It is with this intent that Sam Lang and Gwen Grelet have initially approached the many collaborators that contributed to this series of topic reports – for all bring their unique knowledge, expertise, values and worldviews or perspectives on the topic of RA.

2 How was the think piece project funded?

The think piece was funded by Our Land and Water Toitū te Whenua, Toiora te Wai National Science Challenge (OLW), the NEXT Foundation (NEXT), and Manaaki Whenua – Landcare Research (MWLR), as well as by a substantial amount of in-kind support from research participants and project contributors as gifts of their time and talents, both individually and, in many cases, from their respective organisations.

3 What were the aims of the think piece?

The think piece had multiple aims:

- Identify questions that farmers and other stakeholders would like answered about RA (**RESEARCH NEEDS**)
- Identify the top principles and associated goals/objectives of RA farming systems for arable, beef and sheep, dairy and viticulture sectors in New Zealand – and when appropriate, highlight how these principles and goals/objectives differ (or not) from comparable systems overseas (**RA PRINCIPLES & OUTCOMES**)
- Acknowledge the context and alignment between Te Ao Māori (a Māori world view) and RA principles (**RA & TE AO MĀORI**)
- Compile an indicator framework and associated methodologies relevant to both scientists and farmers to quantify outcomes from RA activities – addressing profitability, productivity, food quality/safety, animal welfare, social well-being, land and water quality, and climate change adaptation/mitigation (**INDICATORS & METHODOLOGIES**)
- Identify key knowledge and/or methodological gaps hindering our understanding of RA and its impacts (**KNOWLEDGE GAPS**)
- Outline possible research strategies relevant to RA and highlight their advantages and limitations (**RESEARCH STRATEGIES**).

4 Why adopt a highly collaborative approach?

4.1 Multiple knowledge systems

This think piece sought to provide a framework from which an evidence base on RA can be developed. However, as with many complex systems, there are multiple types and sources of knowledge that are critical for achieving an understanding of the system (Bammer 2013; Brandt et al. 2013), and for considering what types of evidence are needed. In order for the knowledge produced to be effective, and the evidence to be taken as reliable (i.e. not easily dismissed), the proposed framework must be seen as credible, relevant, and legitimate by all parties (Cash 2003; Cash et al. 2003; Hansson & Polk 2018). The think piece therefore sought to braid together the multiple knowledge systems that influence RA.

4.2 Embedded pathways to adoption

RA is an Agricultural Innovation System (Hall et al. 2006) seeking the 'climate-smart' transformation of food systems (Gosnell et al. 2019; Giller et al. 2021). Agricultural Innovation Systems involve networks of actors from farming, science, business, brand and marketing, civil society, and government – all contributing certain aspects of technological, social, and institutional innovations (Turner et al. 2016; Klerkx & Begemann 2020). Agricultural Innovation Systems are complex adaptive systems in which interventions (such as the provision of evidence for or against claimed benefits) cannot be expected to create predictable, linear impacts (Douthwaite & Hoffecker 2017). Hence agricultural research on

RA must account for its complexity dynamics and acknowledge that predictable linear adoption pathway of the research outputs is unlikely (see Table 1). The work structure for this think piece was designed to explicitly adopt an empirical complexity-aware theory of change (Douthwaite & Hoffecker 2017, see Table 1), so as to maximise the likelihood of impact and adoption of research outputs. A collaborative approach that includes multiple types of actors and innovators was therefore seen as essential for this think piece and crucial for subsequent enquiries on RA.

Table 1. Comparison of the linear approach to agricultural research with a complexity-aware one (adapted and reproduced with permission from Douthwaite & Hoffecker 2017)

Characteristics	Linear approach to agricultural research	Complexity-aware approach to agricultural research
Name	'Transfer of technology' or 'knowledge transfer' or 'pipeline'	'Agricultural innovation systems'
Era	Central since 1960s to present	From 2000s to present
Mental model and activities	Supply knowledge and technology to next user	Co-develop innovation involving multi-actor processes and partnerships
Knowledge and disciplines	Driven by single disciplines (e.g. plant / animal breeding)	Transdisciplinary, holistic systems perspective
Drivers	Supply-push from research	Responsiveness to changing contexts, patterns of interaction
Source of innovation	Scientists	Multiple actors, innovation platforms
Role of farmers	Adopters or laggards	Partners, entrepreneurs, innovators exerting demands
Role of scientists	Innovators	Partners, one of many responding to demands
Key changes sought	Benefits accruing from technology and knowledge adoption	Institutional change, increase in system capacity to innovate
Dynamic	Research begins quickly according to a pre-defined agenda	Intervention begins by building relationships and trust through an open research agenda (e.g. this think piece)

5 How was the work stream of this think piece organised?

The project's structure was jointly designed by a project steering committee comprised of the two project leads (Dr Gwen Grelet[1] and Sam Lang[2]); a representative of the New Zealand Ministry for Primary Industries (Sustainable Food and Fibre Futures lead Jeremy Pos); OLW's Director (Dr Ken Taylor and then Dr Jenny Webster-Brown), chief scientist (Prof Rich McDowell) and Kaihāpai Māori (Naomi Aporo); NEXT's environmental director (Jan Hania)

[1] Senior scientist at MWLR with a background in soil ecology and plant ecophysiology - appointed as an un-paid member of Quorum Sense board of governors and part-time seconded to Toha Foundry while the think piece was being completed

[2] Sheep & beef farmer, independent social researcher, and project extension manager for Quorum Sense

and MWLR's General Manager Science and knowledge translation (Graham Sevicke-Jones). OLW's science theme leader for the programme 'Incentives for change' (Dr Bill Kaye-Blake) oversaw the project from start to completion.

The work stream was modular and essentially inspired from theories underpinning agent-based modelling (Gilbert 2008), which have been developed to study coupled human and nature systems, by which the actions and interactions of multiple actors within a complex system are implicitly recognised as being autonomous, characterised by unique traits (e.g. methodological approaches, world views, values, goals, etc.) while interacting with each other through prescribed rules (An 2012).

Multiple working groups were formed, each deliberately including a single type of actor (e.g. researchers and technical experts only or regenerative practitioners only) or as wide a variety of actors as possible (e.g. representatives of multiple professions within an agricultural sector). The groups were tasked with making specific contributions to the think piece (see Fig. 1). While the tasks performed by each group were prescribed by the project lead researchers, each group had a high level of autonomy in the manner it chose to assemble, operate, and deliver its contribution to the think piece. Typically, the groups deployed methods such as literature and website reviews, online focus groups, online workshops, thematic analyses, and iterative feedback between groups as time permitted (given the short duration of the project).

The think piece outputs included this series of topic reports and a white paper providing a high-level summary of the context and main outcomes from each topic report. All topic reports have been peer-reviewed by at least one named topic expert and the relevant research portfolio leader within MWLR. The standard report review procedure at MWLR most commonly draws on in-house experts. Because of the breath of topic addressed in this think piece, however, many of the topic reports were reviewed by experts drawn from the wider New Zealand and international research & development community. The white paper was initially drafted by a committee of 19 people representing all working groups, and then edited and reviewed in its entirety or in parts by all other co-authors (total of 71). Some authors, reviewers, and research participants contributed to one or several topic reports that informed the writing of the white paper, but did not contribute directly to the writing / reviewing / editing of the white paper. They were nonetheless acknowledged accordingly on the front page of the white paper. The white paper can be found at https://ourlandandwater.nz/regenag
https://www.landcareresearch.co.nz/publications/regenag.

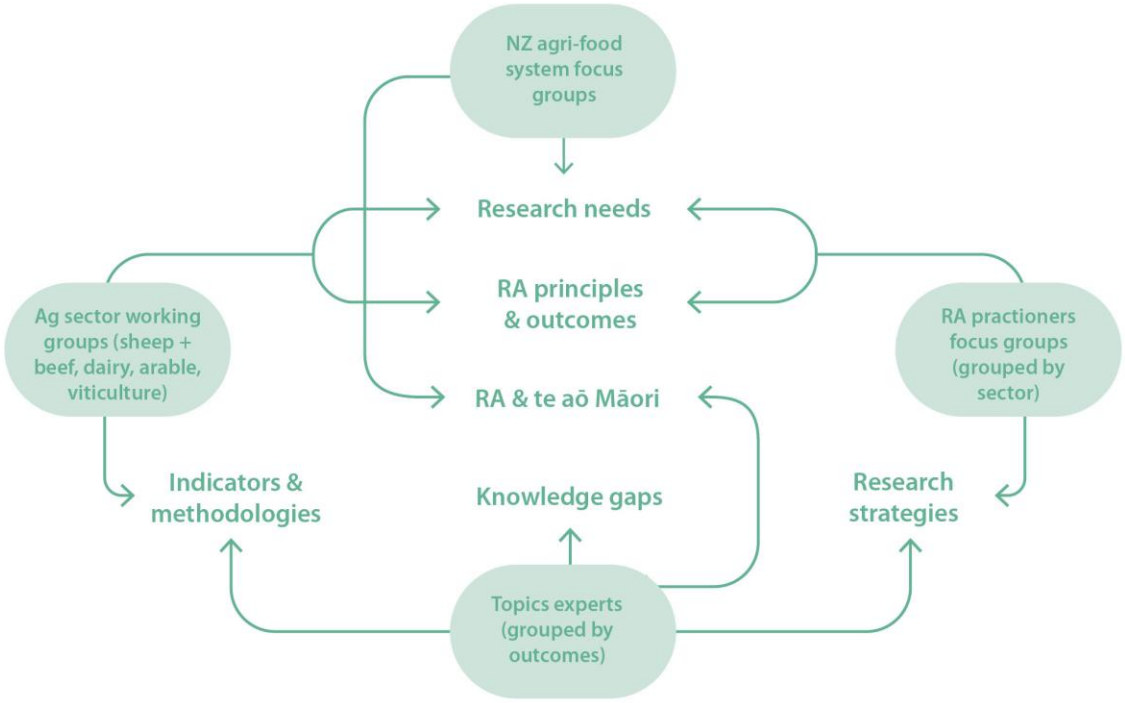

Figure 1. Project work stream structure showing how the multiple working groups contributed to the six aims of the think piece on Regenerative Agriculture.

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