IV. Carbon Farming on Māori land: Do governance structures matter?

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Abstract

Market-based climate policies have the potential to create important new opportunities for land management for indigenous and communal landowners, while providing environmental benefits. Yet these policies have been designed with an incomplete understanding of land-use decision-making among such landowners, possibly leading to problems with uptake and, therefore, under-delivery of public benefits. Understanding decision-making by these landowners, through the lens of organizational theory, helps make our understanding of potential policy impacts more complete, guiding policymakers toward more effective solutions, better targeted policies, and greater uptake among landowners.

To better understand the process of land-use decision-making, I developed and conducted four participatory case studies of carbon farming on Māori land blocks with different communal governance structures. I interpreted the outcomes using concepts from organizational theory.

The results suggest that structural attributes of the governance institutions shape their decision processes, influencing whether and to what extent they take up market-based policy opportunities. Some structures had difficulty responding effectively to the policy conditions as currently framed. Insights from organizational theory, supported by the case studies, point to policy interventions or modifications that will make it easier for each structure to participate. Such policy amendments could induce greater participation, ultimately leading to better livelihoods for indigenous landowners and greater delivery of public benefits.

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A. Introduction

Indigenous and communal landowners manage extensive areas in both developed and developing countries – up to 15% of forest land in developing countries (Agrawal 2007). Several factors, such as their large land holdings, economic constraints, and common cultural perspectives could make carbon farming more attractive for these groups than their neighbors, and the scale they can affect could make carbon farming a transformational force in their landscapes. Such change would bring improvements in their countries' greenhouse gas inventories, the sustainability of the landscape, and their own livelihoods.

Land-use decisions are complex phenomena, shaped by the choices of many individual actors responding to local, biophysical capacities and constraints; remote, macro-scale rewards and policies; and interactions between them. Indigenous decision processes, and the governance structures that undertake them, are important to the success of policies that reward landowners for reducing net greenhouse gas emissions. On indigenous lands, these incentives enter the decision process along with a variety of other factors, all of which must be weighed and evaluated before a decision is undertaken. As a result, policymakers face difficult challenges in designing markets for ecosystem services well-suited to indigenous participation (Murdiyarso and Herawati 2005). Beyond what is technically feasible or economically worthwhile, indigenous landowners must find the policy options acceptable within their institutional frameworks if they are going to participate.

New Zealand, one of first countries to have land-use based climate policy that will affect indigenous groups, provides a valuable model to find lessons about how similar policies proposed elsewhere could provide public benefits and improve indigenous livelihoods. Because of the scale of land resources they control, indigenous people in New Zealand could potentially deliver ecosystem services on a nationally significant scale while using markets for these services to improve their own livelihoods. Indeed, some hope that indigenous Māori groups in New Zealand could be among the first to demonstrate how markets for ecosystem services can serve as a tool for rural development, both in developing countries and in so-called 'fourth-

world' environments, where aboriginal cultures are embedded in industrialized countries.[2]

Among the many factors that will affect indigenous peoples' policy response, land governance structure has not been thoroughly examined, even though it is recognized that the governance structures of land blocks will ultimately decide whether to accept the policy incentives, and therefore determine the land-use response among these groups (Insley and Meade 2008). For communally owned lands, governance structures manage resources, serve as a gateway between markets and the group members, and make the decisions about the adoption of new opportunities. The governance structures that manage land resources vary in their capacity to perceive environmental markets as an opportunity, change their management practices to respond efficiently to the market, and maintain the level of internal monitoring required to meet the unique conditions of these markets (Dietz, Ostrom, and Stern 2003, Ostrom 2003). As a result, governance will play a role in determining whether market-based environmental policies succeed or fail.

To understand the way these structures could affect the success of carbon farming, I developed and analyzed four participatory cases studies of communal land blocks owned by indigenous Māori in New Zealand. I constructed a real financial opportunity for landowners to earn income from selling or leasing carbon credits for set-aside areas of regenerating forest, consistent with the conditions of New Zealand policy, and worked with the owners to understand their response to such an opportunity. The goal was to understand what characteristics of a market-based instrument like the PFSI make it more or less likely that a particular governance structure will adopt it, and what capacities landowners need in order to improve their ability to utilize this opportunity.

[2] In international climate policy, these two environments are currently affected by two distinct policy tracks in the Bali Action Plan, reflecting the commitments undertaken by different countries: the Ad-hoc Working Group for further commitments under the Kyoto Protocol (AWG-KP), which deals with commitments of most developed countries (included in Annex 1 of the Kyoto Protocol), and the Ad-hoc Working Group for Long-term Commitments and Actions (AWG-LCA), which deals with commitments by Parties to the United Nations Framework Convention on Climate Change that have not taken greenhouse gas reduction targets under the Kyoto Protocol, including most developing countries and, notably, the United States.

I have chosen to use organizational theory as the dominant framework for interpreting the results. Organizational theory is an appropriate lens to analyze the impacts of governance structures on indigenous land because it has developed causal explanations for why organizations – typically firms – adopt and pursue certain strategies to manage their resources. These explanations allow researchers to explore a greater range of motivations for agents' behavior than economic theory (which implicitly assumes individual, rational profit-maximizers), as well as providing a more diverse range of connections between group strategies and behaviors (Fredrickson 1986). In this study, I consider the importance of cultural values as motivation for adoption of the PFSI. I sought to add richness to policymakers' understanding about how to construct and deliver incentives for better land use and land-based climate mitigation.

B. Research questions

Many variables affect landholders' decisions to adopt a particular land management system. Governance structures serve as more than a proxy for these unobserved variables – they also strongly determine the outcomes of decisions on their own, perhaps overshadowing the importance of the other, unobserved variables. Differences in the process of decision-making across governance structures is one of several factors that will determine the uptake of carbon farming among Māori.

The overarching question is "what factors affect a particular governance structure's adoption of carbon farming, and how?" The case studies address sub-questions about the decision process for different governance structures:

1) How are strategic opportunities identified and the decision process initiated?

2) How, and to what extent, do non-market objectives enter into Māori decisions across structures?

3) How are objectives set in different governance structures?

4) How are options evaluated and decisions adopted?

5) Who implements decisions, once they are made?

Beyond these descriptive findings, my analysis and interpretation of the case studies targets the underpinnings of these differences, their impacts, and ways to overcome barriers.

C. Background

New Zealand's Permanent Forest Sink Initiative creates market opportunities

New Zealand is one of the first countries to establish a national-scale policy accounting for greenhouse gas emissions from land use. It includes land-use change as a way to generate emissions reductions, primarily through a mechanism to reward the creation of forest "sinks" – re-established forests that sequester carbon from the atmosphere (Ministry for the Environment 2007). The Permanent Forest Sink Initiative (PFSI) is a policy that creates a set of rules for implementation of this opportunity in New Zealand, allowing private landowners to access national and international carbon markets (Ministry of Agriculture and Forestry 2007). To participate in the PFSI, landowners are required to constrain certain land management activities and to perform others. In exchange, landowners can commodify a particular aspect of their property rights – the provision of climate benefits through carbon sequestration.

In framing the PFSI, lawmakers introduced a new mechanism for rewarding the permanent reforestation of land by opening an avenue to the market rewards for greenhouse gas emissions abatement. If the policy is successful, New Zealand will benefit from more efficient land use and simultaneously reduce its emissions from land-based sectors. However, not all landowners may be equally equipped to respond to new market opportunities.

Māori land tenure laws constrain decision-making

As with many other indigenous peoples, Māori landowners are constrained in the ways they can use their land resources by a distinct set of land tenure laws designed to protect Māori land ownership (New Zealand Parliament 1993). Restrictions on alienation are intentional: they help Māori landowners retain their ancestral lands and manage those lands according to customary family and tribal structures. Because of these restrictions, the separation and commodification of

property rights, as in the form of carbon credits, could prevent the participation of many Māori landowners.

Transferring property rights under Māori land law

Under *Te Ture Whenua Māori* Act of 1993, owners have collective authority to make decisions on Māori freehold land, through a system of dividing authority into individual "shares" for a particular block of land, with the shares allocated proportionally to owners who have greater claim to the land block. Shareholders have the authority to approve or deny any transference of shares, except in cases of inheritance of shares from a deceased person (Māori Land Court and Ministry of Māori Development 1997).

Because shares have been passed down through many generations and sometimes sold or otherwise transferred to relatives, and individuals may inherit shares from many different ancestors, hundreds of individuals may have shareholdings in a land block. As a result, only a few individuals find it worthwhile to take an active role in governance and decision-making of their shareholdings. To mitigate this problem, Māori have adopted several types of institutional structures, which serve to coordinate decision-making among the owners and reduce internal transaction costs of decision-making.

Restrictions on alienation

Alienations in the form of a lease, license, or forestry right that allows another party to use the land for more than 21 years must also be approved by the Māori Land Court, and those that fail to meet these criteria can be overturned. Owners must be notified about decisions regarding alienation and must have the opportunity to voice their opinions and register their votes through the governance structure. The rules for the process of alienation are differentiated according to 1) the governance structure adopted by the owners, and 2) the type of alienation. As a result, the degree of conflict between the obligations of carbon farming and Māori land law will vary along two dimensions: the governance structure of the land block and the duration of legal commitments. Since the PFSI is designed to generate permanent sequestration, landowners cannot choose to adjust the duration of their commitment. Therefore, any

conflicts must be worked out through the decision process supported by the particular governance structure.

Māori governance structures

Formal management structures include incorporations and various types of trusts (Mead 2003), although many land blocks have no structure recorded (Table 8). Each structure in the Act was designed for a particular function. Incorporations (Part 13, § 246-284) are designed to have greater freedom to utilize other assets; hence, they can put a greater share of assets at risk as collateral, can make investments in non-Māori land, and can lease other land. Trusts (Part 12, §210-245), on the other hand, are designed to administer the land resources only, either through lease arrangements or by hiring a farm manager. The Māori Land Court maintains a database, called the Māori Land Information Base (MLIB), which documents the structure landowners have formally registered with the Māori Land Court.

Table 1.Governance of Māori land blocks.

Governance of Maori Land

Governance Structure	Number of Land Blocks	% Total Area
Ahu Whenua Trusts	6303	50
Whanau Trusts	108	6
Kaitiaki Trusts	8	0.01
Whenua Topu Trusts	10	2
Putea Trusts	1	0
Incorporations	259	13
Trust Boards	106	4
No Clear Structure	16 405	13
Other	1 129	2
Not Described	1 307	4
Total	25 636	100

Legal conditions shape the land-use response of Māori blocks

Market-based environmental policies like the PFSI implicitly assume that landowners act like firms in the marketplace, processing opportunities, allocating

(land) resources to production, and delivering goods and services to markets. Māori landowners bear some similarities to firms, especially because of the collective nature of their decision-making processes. However, the complexities outlined above introduce several elements into decision-making on Māori land that make them different from normal firms in at least three important ways:

1) restrictions on alienation restrict the use of land assets from being used as collateral, limiting owners' access to credit;

2) non-economic benefits, such as collecting medicines, hunting, providing social welfare, and maintaining a cultural connection to the land, are sources of value, in addition to economic returns;

3) long-term, intergenerational impacts receive consideration in most decisions.

These differences all stem from cultural values applied to resource allocation decisions.

Restrictions on alienation insulate Māori landowners – and many other indigenous landowners – from market pressures that would otherwise drive land toward its highest and best use. These three factors have predictable effects on the way Māori respond to market signals. First, they change the way costs and benefits of each option are weighed in the decision by shaping the *objectives* of decision-making (i.e. unlike firms, they may express objectives other than profit maximization). Non-market objectives weaken the impact of market signals on decision-making, and when competitive pressures are reduced by barriers to land alienation and capitalization, a low level of efficiency in land-use decisions may persist (Roberts and Greenwood 1997).

Second, they change the responsiveness of Māori landowners to new strategic opportunities by affecting the *process* of decision-making. To understand how the process can affect the outcome of the decision-process, we need to look outside economic theory to other explanations of coordinated action. Collective action theory explicitly examines the implications of the conditions faced by communal decision-makers (see Rindfuss et al. 2007, Geoghegan et al. 1998). In particular, this work has explored how rational agents will act under limited information or cognitive ability,

long time horizons, and limited access to capital (Bell and Irwin 2002). A growing body of research explores how inhabitants of a landscape behave in predictable ways because of their group membership, allowing researchers to link the rules governing the behavior of the group to the outcomes observed in the landscape (Ostrom 1999, Ostrom 2003). Organizational theory extends the economic theory of the firm to better understand how firms create, gather, and process information, set objectives, make strategic decisions, respond to market stimuli, and achieve objectives (Nikonova, Rudaz, and Debarbieux 2007, Quinn et al. 2007, Kerr and Tindale 2004, Fredrickson 1986). Examples from Māori landowners illustrate the role of governance structures in shaping collective decision-making on communally owned land.

D. Conceptual Framework: Decision-making for Common Property

Unlike individually owned private land, multiple ownership requires a governance structure to collect information about owners' goals, form a consensus about goals, and implement choices that best fit those goals (Quinn et al. 2007). Through their choice of governance structure, landholders can change the characteristics of their decision process to respond better to changing reward opportunities or to compensate for deficiencies in land productivity. Recent attention to governance of common property resources has focused on the strategies landowners employ to maintain the productivity of such systems (Ostrom 2005; Ostrom 2003). For example, Dietz and others showed that users who wish to maintain the integrity of the open access resources are more likely to succeed when there is adequate provisioning of information, avenues for dealing with conflict, clear rules for compliance, access to infrastructure, and capacity for adaptation (Dietz et al. 2003). These factors are all elements of the decision process implemented by the governance structure.

A land-use 'decision' in the context of communal ownership is defined as "a specific commitment to action (usually a commitment of resources)" (Mintzberg et al. 1976). A *decision process* includes the steps involved in reaching that decision, defined as "a set of actions and dynamic factors that begins with the identification of a stimulus for action and ends with the specific commitment to action" (Mintzberg et al.

1976). For land resource allocation, a decision is embedded in an "action situation" (Ostrom et al. 1994), which is

> composed of participants, positions, actions that respond to information and relate to potential outcomes, and the costs and benefits associated with actions and outcomes. Actors who participate in action situations have preferences, information-processing capabilities, selection criteria for making decisions, and individual resources that shape their range of feasible options (Tucker and Ostrom 2005).

In the cases described below, the stimulus for action is the newly available opportunity to earn revenue from carbon farming; the decision is whether to commit land resources to this activity. The action situation is composed of Māori landowners and their individual roles in shaping the decision process, through contributing their positions, preferences, and information-processing abilities, as well as the organization's role in synthesizing individual contributions into the strategic goals of the group, evaluating the available options, and committing resources to one option.

I evaluate the decision process itself – without regard to the outcome of the decision – as successful or unsuccessful, based on whether 1) the stimulus for the decision was detected, 2) the relationships between actions and outcomes were perceived correctly, 3) the costs and benefits of actions and outcomes were evaluated accurately, 4) the relevant actors were able to participate, 5) the information-processing capacity was sufficient for the decision at hand, 6) the selection criteria were appropriate, and 7) the complete range of options was evaluated. Many of these elements are linked; for example, if an actor with specific information-processing capacity is unable to participate, the capacity applied to the situation may be inadequate for the decision. Building upon these concepts, I structure the decision process as having five distinct sub-processes or phases (Fig. 14), linked to the factors Tucker and Ostrom (2005) identified:

1) Initiation of decision process. This step requires relevant actors to recognize the strategic stimulus and use lines of communication to transmit it to decision-makers.

2) Formation of strategic objectives for management. Stakeholders synthesize their preferences (selection criteria) and formulate them as potential benefits associated with certain actions.

3) Consideration of options and their potential to meet objectives. In this step, members of the group utilize their information-processing capabilities to evaluate the options available. This phase is where options are brought up for consideration and their costs evaluated relative to their potential benefits.

4) Selection and adoption of options. The group coordinates its selection criteria, applies them to the options under consideration, and reaches a decision.

5) Actualization of decision: implementation. The group uses its resources to enact the decision, committing them to their selected option.

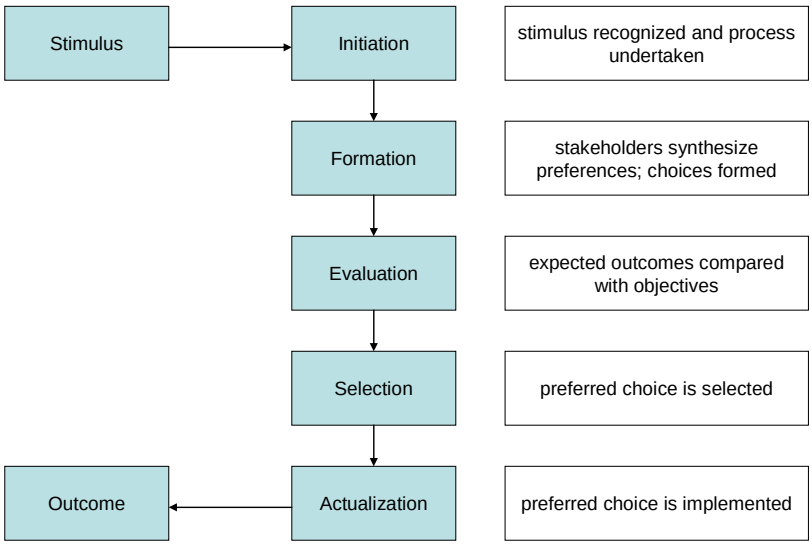

Figure 14. Stages of the decision process.

In the context of land use, I refer to an ownership unit with single group of landowners as a *land block* and to distinct areas within each land block as *management units*. Decisions about each management unit may have individualized objectives, but these must satisfy some subset of objectives for the overall land block

and, ideally, avoid violating the objectives of the land block as a whole. The phases of each decision about a management unit or a land block can be conducted independently in time (phases may overlap or be widely separated in time) and may be conducted by different individual actors, but the overall process for a given decision is sequential and iterative for a management unit.

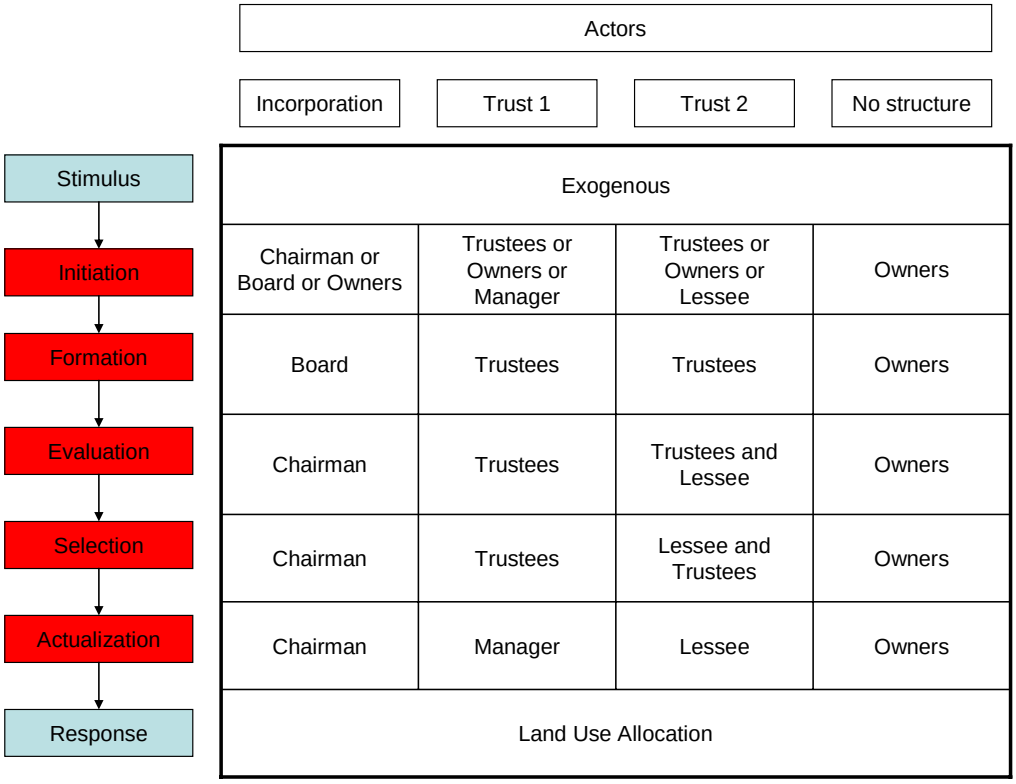

Figure 15. Actors in the decision process.

Changing conditions and new options are potential strategic stimuli, triggering stakeholders to reconsider their current management and decide whether adopting different options for a particular management would improve their chances of fulfilling their strategic objectives (Phase 1). Because owners, managers, and decision-makers engage at different points along the process (Fig. 15), there is the potential for breakdown in each of the phases, resulting in poor outcomes at the end of the process.

1) Phase 1 – landowners can fail to recognize the decision stimulus or strategic opportunity, or can fail to respond to it.

2) Phase 2 – landowners can fail to reach consensus in aligning their objectives for management.

3) Phase 3 – the process can fail to properly consider the potential for each option to meet strategic objectives, either because of information limitations, lack of information-processing capacity, or cognitive limitations of decision-makers.

4) Phase 4 – landowners can fail to make a choice, either because of lack of consensus or because a *de facto* choice is made.

5) Phase 5 – after reaching a decision, the landowners can fail to implement the chosen outcome.

Failure in any of these phases can result in sub-optimal outcomes for the landowners; that is, a missed opportunity to improve their overall welfare. To achieve the goals of market-based policies, policymakers need to know the sources of these failures, their consequences, and how to mitigate them.

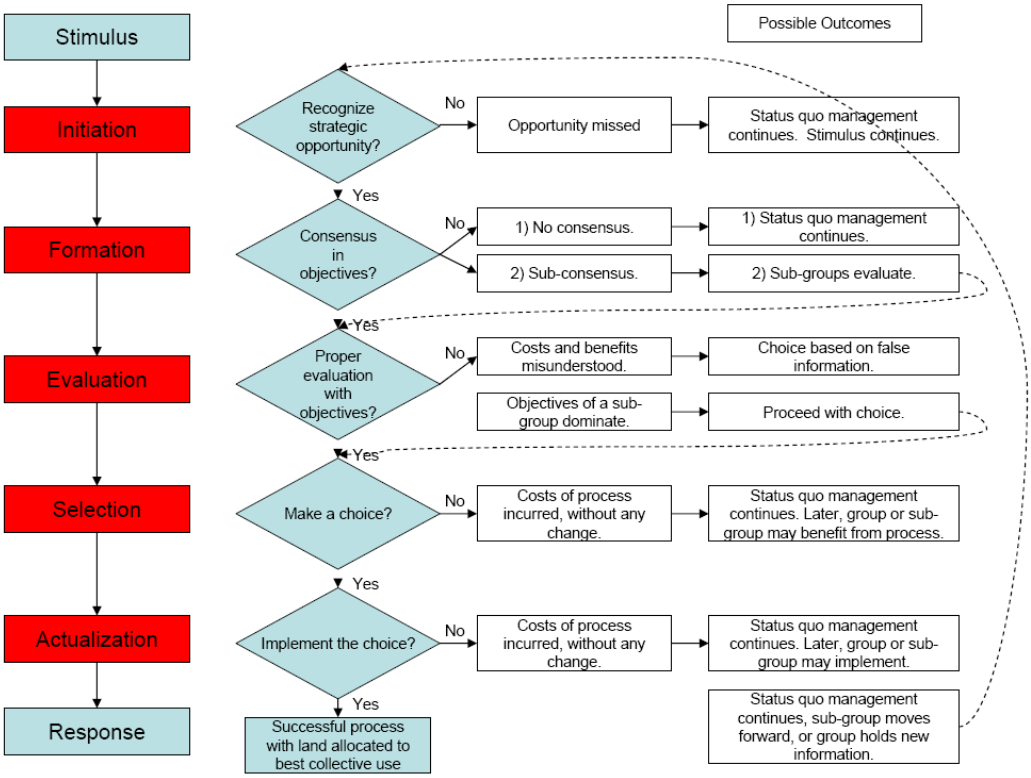

Figure 16. Possible outcomes of failure at different stages of the decision process.

E. Methods

I adopted a participatory approach in these pilot projects to see how landowner groups use different processes to reach a decision, and how landowners encountered, dealt with, and possibly overcame barriers in the adoption of carbon farming. Such an approach does not impose a set of values or processes on landowners, but allows researchers to facilitate the processes that landowners choose for themselves.

Engagement with the participants in the case study began in the context of collecting data on land-use decisions through interviews. The pilot project proceeded with guided facilitation by the author. Because this was a new land use with an unfamiliar process of implementation, I explained the steps of management and implementation to each participant. Once they clearly understood the management requirements, the rewards, and the implications of failing to meet the management conditions, they began the process of decision-making.

As the decision-making process proceeded, I supplied any available information and analysis tools that were requested. For each block, this information included digital maps of land cover, parcel boundaries, roads, soil types, and annual precipitation levels; digital and print reproductions of aerial photography showing land cover on the parcel in 1988; analysis of this information to estimate areas of land eligible for carbon farming; and a spatially explicit cash-flow model that calculated and displayed three available payment schedules for any selected land area. All participants were made aware that their choice was real: if they decided to set land aside, they would be offered a legal contract to sign and would receive the payments they had selected.

In the next section, I present the results of the participatory decision-making process for four groups of Māori landowners. These four groups represent governance types found on 76% of on Māori land (Table 8). The four groups own land blocks with similar biophysical characteristics. The results are organized along the five phases of the decision process: 1) initiation of the strategic decision process, 2) development of objectives, 3) evaluation of options, 4) selection and adoption of a decision, and 5) implementation of the decision.

Box2: Contract Conditions

The contract offered would pay for up to the first 7 years of sequestration credits on up to 50 ha of land. The contract required landowners to set aside land, protect it from grazing, maintain fences, and take no action that would interfere with the natural regeneration of the forest. In exchange, they would receive the equivalent of NZ$15 per ton CO_2-e sequestered, as predicted by the spatial model. The contract required landowners to agree to random inspections of compliance with 24 hours' notice, and it specified penalties if land was found to be in non-compliance. These penalties included the forfeiture of payments and a reduction in future payments. Landowners were given options to 1) accept permanent liability for the credits sold, or 2) receive lower payments for a temporary "rental" of forest credits, with no obligation of permanence. The option to accept payments for permanent credits also carried with it liabilities in the case of reversals. These liabilities were limited to the landowners' preferred option among the following choices: 1) the value of credits for all land found to be in non-compliance with the contract, 2) the replacement of credits for that land, or 3) the repayment of all payments for that land (with interest).

This scenario was intended to present as realistic an opportunity as possible. A contract with a carbon buyer would likely be structured similarly, with rewards consistent with the price of forest carbon at the time. (In 2004, the NZ government had suggested a floor price of NZ$15 per ton; in 2005-2006, the New South Wales market was trading credits near that price.) By carrying through the process of decision-making, landowners were compelled to deal with uncertainties after the contract period, ensure permanence, provide for future contingencies, accept the presence of measurement and verification agents, weigh the acceptance of liability, and conduct the process in accordance with Māori land law.

F. Results

Landowner conditions and responses to carbon farming

In the examples presented below, I discuss the outcomes (at the time of submission) for four landowner groups. In each case, at least one person in a decision-making position expressed a desire to implement carbon farming. The examples are intended to illustrate different courses of action, resulting from different motivations, decision structures, and group dynamics, which led to different outcomes. They are not intended to make any judgments about whether carbon farming was the "right" decision for any of these groups – rather, I explore the ways different land blocks processed the stated desire to implement this land use. The focus is not on the success or failure of carbon farming as an outcome; rather, it is on the characteristics of the different decision processes that led to the outcomes for carbon farming. In an effort to protect the confidentiality of these groups, I have changed the names of the land blocks and eliminated most of their identifying characteristics from the narrative.

An Incorporation: Purotu Station

Land block description and current management

Purotu Station occupies several land blocks with a total area of nearly 2500 ha, of which 570 ha are used for grazing. The Station is largely composed of steep hill country and pastures affected by salt spray from the sea. Many of the steep slopes have been planted in pine forest, but some areas are too steep to plant or harvest, and are covered in native forest. Nearly 800 ha of this total are currently in native cover, about 480 ha of which is mature forest. Another 1050 ha are in plantation forestry. Over 400 ha of native land cover are protected under a Nga Whenua Rahui (NWR) *kawenata* (legal contract); it is within this area that the landowners decided to carry out their first carbon contract.

This management scheme demonstrated the efficiency of the operation. By utilizing plantation forestry, grazing, and government incentives for native forest reserves, the owners of Purotu were earning income from almost every hectare of land on the farm. By leasing neighboring land, the Incorporation had improved the efficiency of its stock management, allowing shepherds to move stock easily

throughout the grazed area. When they first set aside land in the NWR reserve, they received a substantial "consideration payment" of over $1 million from the program, which they had used to purchase a dairy farm and managed it productively for several years. At the time of our first meeting, the Chairman said they were considering selling the dairy farm at a profit and reinvesting elsewhere.

The only type of land that was not earning income was land that was in transition from pasture to forest: the kind of transition ideal for carbon farming. Because of its isolation or unproductiveness, the incorporation had identified such land and fought to include it in its NWR reserve, even though it had low habitat value at that time.

Initiation and progress of decision process on land block

The decision process for Purotu Incorporation was initiated by the executives: the Board Chairman and the Secretary. These two individuals made the first contact with the author and they maintained control of the entire decision process. They carried out the assessment of alternatives and made the decision to commit land to carbon farming. They selected land for the project, negotiated the contract, and ensured that implementation conditions were met.

Formation of strategic objectives and orientation of the decisions

Throughout the process, the Chairman and Secretary signaled through their comments that maximizing income generation was the dominant objective of the incorporation. They recognized that much of the land block was too unproductive to sustain pasture and too steep for timber and had already committed to take marginal pasture land out of production and either plant it in timber or put it into a biodiversity reserve. For the latter areas, carbon farming represented an additional income stream with hardly any additional costs. In one of our meetings, the Secretary indicated that the concept of carbon farming would be novel to Māori, but for Purotu, the most important factor to consider was profit:

> When you start talking to our people [Māori] in relation to these sort of things, they're going to get absolutely confused.... They don't know whether they're going to have sheep or cows or go back into bush. Alright? But if the money

> works out, and I can turn around and put 2000 acres back in bush tomorrow and it works out better than farming, well I will do [it].

This comment confirms that the primary strategic goal for land management was earning profit, but on its own, it does not indicate whether the executives were aware of other possible objectives, such as managing land for cultural benefits.

In fact, the executives did demonstrate their awareness of and respect for Māori cultural values. In their management of the incorporation, they donated a share of economic revenue to their communities and to maintain their cultural heritage and practices. For instance, the farm donated a significant number of livestock to local families and events such as *tangihanga*.[3] The executives were active in community organizations and gave financial support to a *kapa haka*[4] group and a military cadet training organization. Furthermore, their actions showed that these were not merely attempts to maintain public relations; the executives personally revered traditional Māori values. For example, at a discussion over a meal, the Chairman displayed a greenstone *mere*, or club. Such weapons are rare and hold high value among tribes. He explained that the *mana* of past warriors who had wielded the weapon, as well as its victims, imbued it with *tapu*.[5] At one time, it would have been suitable as a trade to ransom the lives of a family or village. The Secretary, meanwhile, became agitated because the Chairman was holding it near the food. The Chairman commented "He doesn't like me to bring this out here [because] these things shouldn't be around the table," referring to the *tapu* of the implement.[6] These individuals placed a value on elements of Māori culture, but their goal for land management was to provide profits as an indirect means of using land to support the Māori community. The management activities themselves did not create cultural value, but the wealth created through land management contributed to this goal. For them, the land was an economic asset, to be used for income generation. Like other firms, their priorities for land management

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[3] *Tangihanga* is a funeral ceremony held at a *marae*, a ceremonial meeting house. Often, visitors travel long distances and stay several days, during which time they are fed by the local people.
[4] *Kapa haka* is coordinated group ceremonial dance. Communities support groups that compete in regional or national competitions.
[5] *Tapu* is a level of sacredness or a measure of spiritual qualities in a person or object.
[6] Cooked food is regarded as *noa*, the opposite of *tapu*, and *tapu* objects should not be used near or brought into contact with cooked food. In fact, in Māori culture, the meal itself served the function of symbolically removing the personal *tapu* between us that could lead to conflict and bad outcomes.

were to maximize profits and manage risks. For them, carbon farming provided a low-risk, low-cost management scheme for land that otherwise could earn little profit.

Their firm-like objective was further evidenced in their choice of contract conditions. The executives indicated that they preferred a lump sum payment agreement, rather than an annual payment. Their reasons related to the scarcity of capital for investing in profitable activities: "We don't care about the 8% interest – we'll take that money and buy cattle that will earn us a 50% return next year." The farm executives recognized the relevance of the access to capital, its potential to earn higher returns through reinvestment, and the potential for a high return investment elsewhere on the farm to outweigh the risk of future liability for carbon credits. Their opportunity costs for the land selected for carbon farming were zero, and the land required no further investment to meet the conditions of carbon farming.

Consideration of options and evaluation relative to objectives

The focus of authority in the executives during the decision process allowed them to make decisions quickly. The executives were aware of the current management practices on each management unit, its profitability and sensitivity to market fluctuations, and its management history. In our first meeting about the project, they asked questions about the management conditions required for carbon farming, the eligibility criteria, and the amount of money available through the pilot project. They identified and proposed an area to use in the first meeting – a transition area of about 30 ha where grazing had stopped in the late 1990s and scrub was regenerating. At the second meeting, where they learned that the area met the eligibility criteria, they made the decision to commit the land. At the meeting between the three of us, they made clear how effectively they could use their authority to make management decisions. After hearing the proposal, the Chairman and the Secretary nodded to each other. "That [proposal] sounds good." When I asked them what the process would be for reaching a decision, the Secretary chuckled and said:

> You don't understand. That was it. We just *made* the decision. Oh, we'll get the Committee to approve it and all that, but they'll go along with what we want to do, because they know everything we've done has been good for the block. And if the whole thing falls over, well, that's on us.

The decision itself was made with an informal nod of the head, although it would have to proceed through formal channels of approval before it could be adopted.

The Chairman consulted with the Committee of Management at their next meeting and gained approval for the author to investigate the proposed area. When the investigation was complete and the *kawenata*[7] had been drafted, the Committee met again to give final approval of the project by signing the contract. The Chairman and Secretary facilitated meetings between the author and the Committee of Management, presenting the benefits and drawbacks of the opportunity themselves to the Committee and relying upon the author for technical details. The Chairman told me later that if the project failed, he would be held accountable by the Committee. But for him, it was an easy decision. No additional changes in land management were required for implementation, because the area selected for carbon farming was within an existing biodiversity reserve. Thus, the landowners could earn additional revenue from practices they were already carrying out. As the Chairman later described the project, "This is like money from heaven." The decision to commit resources to conservation had already been made; carbon credits were an extra bonus.

Selection and adoption of options

The formal adoption carbon farming had to occur through the Committee of Management. Each incorporation has a constitution document, in which the owners have allocated specific powers of the Committee and the Chairman, as long as these are in keeping with Māori land law. When the Committee met the author and the executives, they inquired about carbon dynamics, the source of the funding for the project, the author's affiliations and interests, the incorporation's potential liabilities, and the future of the credits sold. In addition to the author's responses, the managers interjected to help answer these questions. The executives then presented their own rationale for pursuing the agreement to the Committee, which focused on the additional economic revenue for land already committed to NWR. The requirement to maintain the forest in perpetuity and accept liability for the credits was an issue of concern for the Committee, but the executives made the case that the land had already

[7] *Kawenata* is a Māori word for legal contracts.

been committed to revert back to a forest, so they should earn whatever money they could from it.

The meeting closed without a decision, but most members of the Committee seemed to find the contract acceptable. In the following few weeks, the Chairman collected signatures from the Committee members and delivered the signed contract to the author. Several weeks after the Committee signed the agreement, I followed up with the Secretary by email. In his response, he indicated that Purotu Incorporation was prepared to sell more credits over a longer time horizon. He now understood the requirements and contract conditions of carbon farming, and was advocating for the incorporation to pursue more sales.

Actualization and integration of decision-making

In this case, there was no need to change management on the area selected for carbon farming, so implementation took no additional effort. The strategic action was in keeping with past decisions and did not require a deviation from the original objectives of management. Thus, it did not represent a major move from past decisions.

The Committee members and the executives framed the decision in terms of economic rationality and they justified their selection by its capacity to add revenue to the operation. Little, if any, mention was made about the benefits of the forest for environmental reasons. Because the land had already been retired, the Chairman did not cite any additional benefit to the rest of the farm, other than the increase in revenue. He intended to reinvest these revenues in the farm to increase the productivity of other management units. The single objective for management allowed easy integration of management decisions on individual management units, because the only criterion to evaluate was whether or not the practice would increase the overall profitability of the farm. In this case, carbon farming simply provided an extra benefit for a management decision already made.

2. A Trust without a Lease: Whakamahi Station

Land block description and current management

Whakamahi Station occupies the eastern part of a land block near the mouth of the Waiapu River, which in total holds 2240 ha. Of this, about 650 ha is used for grazing, over 500 ha is native bush, and 1050 ha is in scrub. There are no timber plantations on the station, though poplar trees have been planted for erosion control and the station maintains its own small poplar nursery.

Since the 1980s, Whakamahi Station has been managed as a trust. The farm manager implements the management decisions of the trust, in which he himself is a shareholder. The trustees are elected from among the owners and hold meetings every 2-3 months to review farm accounts, plan future directions, and select activities for the farm. The farm manager leases the house on the farm, but he earns his income as an employee of the station. Any profit earned by Whakamahi Trust is proportionally distributed to the owners, on the basis of their shareholdings, as a dividend.

The Trust is empowered by the owners to make decisions about reinvestment in the farm before distributing dividends. Thus, the trustees are able to consider investments over a longer time horizon than the duration of a lease, and the manager has an incentive to find activities that can generate higher returns over a long time horizon. In the past few years, the Trust had made several decisions to incrementally add new activities and change management of some parts of the farm, diversifying its sources of revenue. Besides grazing livestock, the manager had added a small tourism operation catering to young travellers and backpackers. Some revenues from this operation had been invested in converting farm buildings, such as an old woolshed, into facilities for tourists. Also, this enterprise allowed the addition of two part-time employees.

In 2002, the Trust had also decided to take advantage of the Nga Whenua Rahui (NWR) program by setting aside over 200 ha of steep land, which was now reverting to scrub and forest. NWR provided funding to fence this area of the farm, which had recently been completed. The funding for fence improvements was originally the primary objective of this agreement, because it made it easier for the manager to concentrate livestock and inputs on the most productive land – a shift in management meant to incrementally improve the profit margins of existing practices. However, the forest areas had created an unforeseen opportunity for synthesis with

other practices. One of the part-time employees of the tourism operation offered guided hiking and hunting in the forest areas, bringing in extra revenue from clients. The farm also rented space to beekeepers near newly regenerating manuka stands. Thus, by setting aside the reserve, the Trust had reduced the costs of operating the farm, improved its profit margins overall, and diversified the sources of revenue for the operation, reducing the risk of interannual variability in profits. These changes all suggested a progressive trust capable of making incremental changes in management that eventually led to larger strategic changes.

Initiation and progress of decision process on land block

Decisions on Whakamahi Station were made through coordination between the farm manager and the trustees. The farm manager was the initial point of contact with the author, and we had several private discussions before he brought up carbon farming in a formal meeting with the trustees. This action initiated a series of formal and informal meetings between the author and the manager or the trustees, either individually or as a group. In meetings, the manager gathered information about the management requirements for carbon farming and we shared information about the potential revenues from certain management units on the farm, drawing upon the financial and spatial models provided by the author. In informal meetings with individual trustees, they asked about the restrictions imposed by carbon farming, the implications of different contract options, and asked for explanations of information that had been relayed to them by the manager. Group meetings were more formal. The manager usually asked the author to speak during a specific part of the agenda, and the rest of the meeting was closed. While I presented information, the trustees freely interjected with questions and comments. Often, they would deliberate afterwards, sometimes referring to documents and aerial photos of the station.

The decisions about carbon farming taken in the meeting were stepwise and incremental. After they were satisfied that they understood what carbon farming meant, in terms of management and benefits, the Trust agreed to allow the author to conduct a detailed analysis of the potential for income generation on their station. I discussed this in detail, first with the manager, then with the trustees, identifying specific areas that met the eligibility conditions and could potentially exceed the

profitability of grazing. The manager later brought up these areas in group meetings, discussed their current management, and made arguments for certain areas that he thought would be better in carbon farming. Often, his reasons related to improving the overall efficiency of managing the station. After considering the analysis, the trustees requested a draft of a *kawenata*, with options for several different payment schedules. The trust proceeded carefully at each step, but it never reversed a decision once they had made it.

Formation of strategic objectives and orientation of the decisions

The Whakamahi Trust had more complex objectives than Purotu Incorporation. Generating income from the farm was certainly a goal. Grazing alone was barely covering the costs of the farming operation, and the group had little access to outside capital. Nevertheless, their strategic objectives went beyond economic profit; they also considered the impact of decisions in terms of non-market, cultural benefits. These benefits included opportunities to practice customary uses and to pass along the right of self-determination to the next generation of owners. For example, on one occasion, the manager said that local people would benefit from the ability to gather traditional medicines (*rongoa*) from the new forest. In many meetings, trustees articulated the desire to improve the land for future generations. "Improvement" meant making the land more valuable, but not necessarily by economic measures. Several of them saw a benefit in "protecting" the land through forest regeneration, a view consistent with restoring the *mauri*[8] of the land. One Trustee summed up his views as follows:

> We're not looking for now, we're looking beyond, for our grandchildren. We can't even break in the country – I can't believe in the last three years how much has reverted! And steep country .... You know, I can see [carbon farming] working ... because we have a different generation coming through our farming committees now.

Many Māori informants told me that the reversion of pasture to forest, in a previous generation, would have been seen as "bad" farming or "lazy" management. But these trustees recognized that the coming generation might view it differently. Furthermore,

[8] In traditional Māori belief systems, *mauri* is the animating force that gives life and health to organisms and is the source of productivity for the land.

they acknowledged that the next generation might not have the skills and experience to maintain the land as pasture. In making their decisions about land use, the trustees were making an effort to consider not only their own near-term goals, but also the goals of their successors. They voiced an awareness that concerns about the environmental sustainability of management held a high importance for the next generation. They felt accountable to manage the land well for those generations, as well as to do what was necessary to satisfy the current needs of the owners, creating a range of potentially conflicting constraints.

These two goals – generating income and delivering benefits to the next generation – were in constant tension in the Trust, even within individual trustees. Sometimes, an individual struck an internal balance; at other times, they reached a balance through consensus within the group, even though each had different reasons:

> Trustee 1: I'm happy with [carbon farming], as long as it's bringing us money.
> Trustee 2: And it's not endangering our land at all.

At a minimum, the group wanted to avoid harming their asset. Debt or degradation could endanger the land, by making it less valuable and more vulnerable in the future.

Consideration of options and evaluation relative to objectives

The Whakamahi Trust had even fewer options for accessing capital than the Incorporation. As a result, they did not consider capital-intensive timber production as a viable option, though they did have a small tree nursery to supply their own saplings for erosion control plantings. The trustees appeared to have the information-processing capacity necessary to understand how the biophysical constraints of the farm also limited their options. Several of the trustees had farming experience, and together with the farm manager they had enough experience to make fine-scale assessments about how to manage the farm. For instance, at one meeting the trustees referred to a farm map as they deliberated about where to adopt carbon farming. One trustee commented:

> See, for example, this ridge along here ... that's going back to scrub. But for me, as a farmer, I would not develop that [for pasture]. I'd develop the ridge over there [to the north]. It's not exposed to your southerly winds. Over here [on the south side of the ridge], you're exposed to the southerly winds. It's

> cold grass -- it doesn't grow very quick. You've got a warmer area on the other side. So that's the kind of thing we're looking at.

Thus, the group demonstrated the capacity to match management with the appropriate conditions under their capital constraints.

They also expressed concerns about legal constraints on their decisions and carefully weighed the potential for overlapping benefits on a single area of land. For example, one trustee talked through the possible risks of a contract for carbon credits on the same land as the Nga Whenua Rahui reserve, ultimately deciding that they were compatible:

> Would the government think that we're double dipping by using the Nga Whenua Rahui area? .... With that one there, the Nga Whenua Rahui one, and this one [carbon farming], they're not going in to chop anything down, and that's one of the conditions, eh? They're just going in to count the carbon credits aren't they? So we can use [carbon farming].

The deliberations over multiple meetings showed that the group was able to evaluate each option in the context of their strategic objectives. The level of ease they demonstrated with each other and with the process of deliberation itself suggested that group politics were a minor factor. At each meeting, they worked through several agenda items, made motions and voted on decisions, and recorded minutes to circulate to owners after the meeting and to submit to the Māori Land Court. When dissension arose, the trustees were aware of the level of majority they needed in order to make a decision legal, and they ended deliberations when it was clear that the motion would not pass. They also took the time to discuss recent events, opportunities, threats, obligations, and evaluations of past decisions. Informational tools like maps and contracts were used by the trustees to support decisions or refresh their memories about past decisions. The trustees could openly debate their differences of opinion without apparent damage to their personal relationships. Even more significantly, they could evaluate past decisions and revise their positions based on new information. All of these characteristics indicated the group was comfortable operating under the formal decision-making rules and used the trust structure to reduce the risk of having decisions overtaken by a few dominant individuals or being bogged down by parochial interests or political infighting. The pace of their deliberative process stood in stark

contrast to the quick decisions of the Incorporation. Their desire to find a balance between economic returns and cultural benefits, as well as their economic constraints, led the group to make small changes in management and periodically re-evaluate the results. Their recent successes, especially the tourism operation, had rewarded these gradual changes and ultimately led to changes in the overall management strategy, evidenced by a shift to tourism and conservation enterprises.

Selection and adoption of options

As with the incorporation, carbon farming presented a new strategic opportunity already in keeping with previous decisions on the farm. However, the Trust accepted a greater degree of change than the Incorporation had. As with Purotu, they elected to sell the first tranche of credits from a few small areas within the boundary of the NWR reserve that were not forest in 1990. In addition, the manager selected some areas for consideration that were currently used for pasture. These areas included a steep south-facing hillside and a large area that would enclose an eroding gully. The manager pointed out that closing off the gully would reduce stock losses and labor costs on the whole station; so if the project was able to pay its own expenses, it would be worthwhile due to the benefits accruing elsewhere on the farm. The trustees saw the benefit of closing off areas of marginal land that yielded little return, improving the ease of management on the rest of the farm, but they were reluctant to set aside grazed land permanently. At the end of their deliberations, they agreed to rent these areas on a temporary basis. The rental option would give them the benefit of generating a small amount of revenue on very marginal land, and this revenue, in combination with the sale of credits from land already retired, would provide enough revenue to offset the costs of fencing the carbon farming areas.

Weighing the values in their land-use choice, the trustees stated that they felt they could adopt carbon farming with confidence that their successors would agree with the decision. For them, the change in management on the area was small, and they carefully selected contract options to ensure that they would not impose undue management restrictions on future generations. The contribution of carbon farming to revenue-earning activities was perhaps the highest priority for the trustees, but they were careful not to violate the constraint of keeping future options open. The choice

to permanently set aside land would remove much of the option value for future owners. (The decision by the trustees to forgo large near-term payments and instead accept much smaller payments for short-term obligations could be interpreted as applying a low discount rate to decisions, at least where they impact future options.)

Even after exhibiting caution throughout the deliberative process, the group still preferred to err on the side of caution. At our last meeting, one of the trustees (who had been absent from earlier meetings) raised concerns about setting aside one of the management units as a permanent forest. The farm manager responded "I can't ever see that block going back [into grazing], so we might as well get the money for the credits today." The other trustees assented, but the trustee who expressed concern voiced the opinion that he was uncomfortable with imposing the will of today's trustees on future generations.

> We've already committed the land under the Nga Whenua Rahui, but I'm just not ready to set aside more land and take away the decision from future generations.

Though they had a 7 to 1 majority and could overrule the dissenting trustee, all of the other trustees deferred to his view, even though they did not personally agree with the decision. By switching to rental credits instead of permanent credits, the group lost a total foregone income approaching $43,000 – the apparent option value of 47 ha of marginal land (~ $900 per ha). The landowners may still recover this lost value if they eventually claim permanent credits. In the end, the trustees only committed to permanent credits on about 7 ha of land, all of which had already been protected under a NWR kawenata. On those acres, the option value was already limited to what could be obtained from forest uses. The rental arrangement provided a small stream of income sufficient to offset the cost of fencing.

Whakamahi Trust had chosen to receive annual payments for the contract. Later, during an inspection of the farm with the farm manager, I asked why the trustees chose to take an annual payment, rather than a lump sum payment. The manager responded that he thought the Trust would actually prefer the lump sum payment, but they had not fully thought it through.

> You said that. We heard you say it. We understood that was an option, but I don't think they really thought about what it meant. We could have used the

> money on the fences. I think if they had another chance to think about it, they might take [the lump sum] instead.

Apparently, even with open-ended engagement and multiple rounds of participation, we failed to obtain the best option for the landowners.

Their decision was the result of a formalized deliberation process conducted in a transparent manner for the owners. The attention and time devoted by the trustees, as well as the convictions they expressed, all indicated that they took their responsibilities seriously and sought to discharge them in the best interest of all owners, current and future. The suitability of carbon farming relative to other options was the focus of the deliberation, and the costs and benefits were compared explicitly to the current practice.

Actualization and integration of decision-making

Whakamahi Trust displayed the capability to integrate decision-making across time and space. In their deliberations, they considered not only the most profitable use of a particular management unit, but also how changing the management of that unit would affect management of other areas of the farm. They also discussed the long-term impacts of restrictions and obligations, ultimately rationalizing restrictions on some areas while keeping options open on others. Finally, they understood the potential to layer multiple revenues on management units used for carbon farming. In a meeting with the Trustees, the manager commented:

> I think it's very good, because I can see [that] it's protection for the land, but at the same time [it is] still generating some income. And a multi-tiered income, at that. You just find your good areas; set aside your rugged stuff, your rough areas; let it regenerate to whatever, manuka preferably, and you've got carbon credits and income from bee keepers.

While the group was capable of reaching agreement on a decision, in the end, they did not actualize their decision. The Trust formally accepted the contract and 7 of the 8 Trustees signed it in the presence of the author – a majority large enough to make the contract legal. However, the Trust did not deliver the signed contract to the author. I made repeated inquiries and offered to begin delivering payments as soon as I received the contract, but the group held back, and eventually broke off contact. As a result, the contract was not delivered to the author and the project did not proceed. In my last

contact with the manager, he mentioned that one trustee was still resistant due to the obligations imposed on future generations. Although the Trust had a sufficient majority, the hold-out trustee held a great deal of *mana*. In this case, perhaps, respect for traditional authority overrode the decision-making authority the Trust was empowered to use under law.

3. A Trust with a Lease: Hau Rāwhiti Station

Land block description

Hau Rāwhiti was the smallest of the four stations considered in this study. Of the station's approximately 450 ha, about half was steep hill country covered in mature bush, some of which was open to livestock. None of this forest area was enrolled in the Nga Whenua Rahui (NWR) program or any other conservation program. The main source of revenue to the farm was about 200 ha of flat pasture. However, much of the good pasture was prone to waterlogging in winter and drought conditions in summer. Therefore, the lessees managed about 40 ha of steep land, which were kept clear of scrub as "run-off" pasture, an area that could be grazed for a few weeks of the year when the main pasture area was too wet. The carrying capacity for the run-off area was quite low (0-2 stock units per ha per year), and model results suggested that it would potentially be more profitable if converted to carbon farming at prices of NZ$15 per ton. However, this pasture served as an "insurance policy" for the lessees by ensuring that their stock would be able to graze year-round and allowing them to protect their high-value pasture during periods when it was vulnerable.

Initiation and progress of decision process on land block

When I initially contacted the couple operating Hau Rāwhiti Station, they were in the process of negotiating a lease agreement with the Hau Rāwhiti Trust. By pre-arrangement, a shareholder and his wife had agreed to take over the lease from his brother. He was responsible for writing the terms of the lease and submitting it to the Trust for their approval. Trusts sometimes receive several bids for a lease and choose one, but in this case, the lessees were already selected, and the terms of lease were to be negotiated between the trustees and the new lessees. Leases are not restricted to

family members or owners of a land block, but in this case the lessee was also an owner and had formerly served as a trustee himself.

The lease would include a management plan and the negotiated rent payments that the couple would pay annually. The lessees could keep any profits they earned, once they had paid rent and other costs, as income. The Trust was able to place restrictions on the management of some areas, but doing so would trigger a bid from the Lessee to lower the rent, because restrictions reduced his ability to earn income. Restricting the use of land through lease agreements allowed trustees to enter into long-term commitments of some management units, such as for timber forestry, while leasing other management units on a shorter basis. All leases on Māori land are reviewed by the Māori Land Court, and long-term leases require approval by a 75% supermajority of shareholders. Timber contracts are typically 30-35 years and require this level of approval. Leases in which the farm is managed for grazing are typically shorter (10-20 years) and only require a simple majority for approval. In the case of Hau Rāwhiti, the couple was pushing for a lease of 20 years, allowing them to work on the farm until they reached retirement age.

When I first met them, the couple had recently left their successful careers in Wellington and taken up residence on the farm, even though the lease was not yet finalized. They were eager to settle into life on the farm with their family and seemed invigorated by the prospect of improving the production of the farm and exploring new opportunities for revenue. Upon hearing about carbon farming, they began to carefully consider the management requirements and discussed potential areas on the farm that might be set aside. They asked the author to conduct a more detailed analysis of those proposed areas.

Formation of strategic objectives and orientation of the decisions

Like the trustees of Whakamahi Station, the lessees of Hau Rāwhiti embraced other objectives besides economic profit. One of them stated:

> There are a number of visions, really. One has to do with our personal identity. [Another] has to do with economics. [Another] has to do with

> caretaking, or *kaitiakitanga*.[9] The rest has to do with our immediate family, our own well-being. So there are a lot of reasons for us to be here.

Later, he clarified the point:

> Part of that has to do with being Māori on Māori land, on your homeland. I think if we just saw the land as a kind of economic asset, a lot of the decisions would become quite simple. We'd probably say "Well, this is not profitable – let's go!"

The family was intentionally making some economic sacrifices in order to maintain the cultural value of the farm.

Maintaining the character of the landscape was an important aspect of *kaitiakitanga* for the family, as a way to ensure historical continuity of its purpose. Certain land-use options would violate this character, and hence were unacceptable:

> A violation would be anything that would prevent this place from being recognized as home [by preventing] access to the places on the land. There are all these different hills, flats, corners, creeks – they're named and part of our own history.

They considered timber forestry a violation of those special places if it made them unrecognizable.

The purpose described by the lessees was consistent with asserting the role of *ahi kā*[10] as a Māori landowner. Māori lore and *tikanga* (customs) imply certain rights and responsibilities for this role, such as the right to occupation and the responsibility to maintain the land (Fox, C., personal communication, 2006). After living elsewhere for so long, then returning to take over the farm, the couple had the opportunity to show, by their actions, whether they had assumed the duties of *ahi kā*. Though they would have the right to earn incomes from the land, they also had the cultural responsibility of protecting it and maintaining its cultural value.

The male lessee had a rich knowledge of the farm's history and was deeply aware of the culturally important aspects of the farm. He had spent part of his career documenting Māori artifacts and important cultural sites, and was considered an

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[9] *Kaitiakitanga* means to fulfill the role of caretaking or stewardship for a thing of value. When applied to land, it is understood to include sustaining cultural and spiritual values as well as ecological function and economic productivity.

[10] *Ahi kā* means "home fires" or "keeping the fires lit," and is applied to people who live in on Māori land and maintain the culture, rituals, and resources of the families.

authority on *wahi tapu*[11] in the area. For example, on a tour of the farm, he took me to a *pa*[12] site that was formerly the site of houses, storage pits, and earthworks. I was surprised when the manager said it had been built for his own ancestor ten generations ago. He related the ancestor's name, the year of construction, and the event for which it was built, indicating a deep cultural and familial identification with the land.

Other details shared by the lessee revealed a commitment to maintaining the cultural elements of the land and sharing them broadly with the Māori community. He and other owners had spent several years working through the Māori Land Court to establish a *papakaianga*[13], or family reserve, on the farm. The *papakaianga* occupied a few hectares and could eventually be used for a family *marae*, *urupa* (cemetery), retiree housing, or other function.

He had managed the farm in the past and had maintained a level of engagement that enabled him to understand the current operation of the farm. When asked about their plans for the farm, the lessees presented several management goals meant to improve the economic returns of current land uses, such as increasing the number of livestock, taking steps to improve the pasture quality, and repairing fences. It appeared that the former leaseholder had reduced his efforts at farm upkeep in recent years, perhaps not anticipating that his own brother would take over the lease. The new lessees were confident that the farm could cover its expenses, but it would be difficult to generate enough extra profit to support the family.

Over a succession of meetings, the couple revealed a desire to invest in restoring the ecological function of the forested land at the same time they improved the quality of the grazed area. These goals were not in conflict because the areas suitable for grazing and forest were biophysically distinct on this farm: flat areas were used for grazing, and the steep areas were allowed to remain forests. There were only two exceptions on the farm, and these were steep ridges that were still used for grazing, which were the areas they ultimately considered for carbon farming.

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[11] *Wahi tapu* are sacred sites, such as burial grounds, battle sites, or former villages.
[12] A *pa* is a defensible fortified location used before European contact and after colonization.
[13] A *papakaianga* is a land reserve set aside to give the extended family a place to occupy, symbolically and legally ensuring that they cannot be alienated from it. It is a place for them to assert the right of *turangawaewae* – literally, a place to stand. The *papakaianga* is a commons and an area of collective ownership, kept distinct from the areas that are managed for economic purposes. Sometimes it is used for *urupa* or *marae*.

The objectives of the lessees, however, were not the only ones that needed to be satisfied. In the end, they would have to reach agreement about the management of the farm that would also meet the objectives of the Hau Rāwhiti Trust. Any management activities that conflicted with the Trust's goals would have to be negotiated. The Trust had the authority to reject the lease proposal completely, if they could not reach a satisfactory compromise. Therefore, the terms of the lease had to satisfy the constraint set of both the trustees and the lessees, creating the possibility for conflict if their objectives were not perfectly aligned. Unfortunately, the author did not get the opportunity to interact with the trustees as a group to gather information about their objectives and their relative priorities.

Consideration of options and evaluation relative to objectives

The lessees identified several potential benefits of carbon farming that they found important. For instance, they recognized that they could protect erodible land and increase the revenues from areas with little productive value. The husband saw value in the cultural and environmental benefits of restoring native forest on the land, but in a discussion with his wife, the couple admitted they faced practical constraints on what they could afford to do. "We'd have to go through the numbers, you know, and see if it makes sense," she said, referring to the relative profitability of carbon farming compared to grazing. Throughout the process, they demonstrated a knowledge of the history and capabilities of the farm, as well as the capacity to process information relevant to their decisions. For example, they easily identified the areas of the farm that would be eligible for carbon farming and knew how the per-acre returns from those areas compared to the estimated returns from carbon farming presented by the author.

Even if the numbers were favorable, however, their position in the decision process meant that they could not make this decision on their own. Instead, the proposal to set aside land for carbon farming would have to be part of the management plan they included in their lease agreement with the trust. Each part of the management plan could be negotiated and the Trust ultimately had the authority to reject some or all of the management plan. As a result, the elements of the management plan became points of negotiation that could be traded off to win other,

more favorable terms, such as lower rent. The lease could be renegotiated after it was accepted, but any accepted lease had the force of a legally binding contract, had to be negotiated in accordance with Māori land law, and had to be registered with the Māori Land Court. The formal nature of this process served as a safeguard for the owners.

Selection and adoption of options

Based on the analysis conducted by the author, the lessees agreed to propose using a small management unit for carbon farming. The area was a small ravine surrounded by forested ridges, difficult to access and not usually used for grazing. It was already enclosed by fences, so the couple would incur little additional cost in setting it aside. They included a map of the area in their proposal and agreed to bring it up in the next trustee meeting. In the meantime, they discussed the idea with several of the trustees and with other owners. One of the trustees met with the author and the lessees, raised several questions about carbon farming, considered the answers given by the author and the lessees, and indicated his strong support of the proposal. The lessees prepared their proposal and submitted it to the Trust for review. Importantly, it included a request to reduce the rent payments to account for the reduced use of the land caused by setting aside the carbon farming blocks.

The meeting between the trustees and the lessees did not proceed as favorably as they hoped. The author was not asked to attend, so the description here reflects the events as reported by the lessees, from their point of view. The meeting was called specifically to review the lease proposal and negotiate the agreement. Though some of the six trustees were local and had a good understanding of the local conditions, at least one was from an urban area far from the location of the farm. This trustee challenged the proposal for carbon farming. She questioned the need to put long-term restrictions on the land, and reportedly asked, "What if we could earn more money doing something else?" The lessee responded that this particular area was not likely to be profitable for any other land use in the foreseeable future, and the opportunity to earn income from carbon credits was a way to generate income from this otherwise idle land. However, the trustee persisted in her dissent, and her dissenting opinion was enough to prevent the contract from going forward. The length of the lease was also a

contentious point among some of the Trustees, who felt is should be for 10 years instead of 20.

As a result of these issues, the lessees negotiated a different agreement. They later reported that they felt the overall lease was in jeopardy and that other elements of proposal were more important to them than the carbon farming proposal. They withdrew the carbon farming section from the lease proposal and ended up reaching agreement on a 15-year lease. The lessee later expressed his frustration at not having a longer-term agreement, which would have allowed him to reap the benefits of some changes he intended to make in the long-term management of the farm. Instead, he felt these changes were now off the table. He was still open to the idea of carbon farming and hoped to pursue it in a future renegotiation of the lease. In the meantime, he remarked that he intended to pursue a strategy of lobbying the owners to replace the dissenting trustee in the next election. His hope was that a reconstituted trust board would view his original proposal more favorably in a renegotiation. The lessees also believed that the Trust would be more comfortable with allowing carbon farming if it became more common among other landowners; they were reluctant to be early adopters.

Actualization and integration of decision-making

As a result of these negotiations, carbon farming was not adopted in this example. However, the lessees who would actually manage the land felt strongly that it could play a valuable role on some parts of the farm. They anticipated both economic and cultural benefits of carbon farming: the economic benefits would come in the form of higher revenues from unproductive land and reduced management costs, while the cultural benefits would come from protection of the land and compatibility with the preservation of *wahi tapu*. The integration of carbon farming in their management plan demonstrated that carbon farming could play a role in their a holistic vision of management; however, their vision was not consistent with the objectives that the trustees were able to agree to. Therefore, it was rejected as a land use.

4. A Land Block with No Structure: Raukatauri Station

Land block description

The Raukatauri Station consists of approximately 2000 ha of mostly steep hill country, almost entirely covered in scrub and mature forest. Fewer than 20 ha were still open as pasture, though livestock were kept on the farm and grazed in the regenerating forest. These few hectares appeared, at first, to be the only land eligible for carbon farming, but inspection of aerial photography from 1988 revealed that over 250 ha had been pasture or scattered scrub at that time and would likely be eligible to receive carbon credits, if set aside.

Through conversations with owners, neighbors, and the Office of the Māori Trustee, I confirmed that the station had been consolidated from several different adjacent land blocks in the 1960s. Many of the shares in these blocks had become fragmented and their owners could not be located, so the Office of the Māori Trustee took over management of the shares. As a major shareholder in the consolidated block tasked with improving management in the interest of the absentee owners, the Māori Trustee began making substantial investments in the farm in the early 1980s. These investments including clearing pastures, building fencing, applying fertilizer, and purchasing stock. In this process, the station incurred a substantial debt.

Unfortunately, the remoteness of the station, the tendency for the pastures to rapidly revert to manuka forest, and the economic changes triggered by national policy reforms in 1984 ultimately forced the Māori Trustee to abandon these efforts. Eventually, they declared the station "uneconomic." According to the owners, they were left with an unworkable farm and a large debt, which they attempted to service by liquidating their livestock assets. At some point, the debt was eliminated or forgiven, but by that time the farm had largely reverted back to dense manuka forest, reducing the usable area of pasture. Furthermore, the owners were unable to secure credit to invest in the farm, at least in part because of its debt history.

The lack of revenue from the block and its current state of management suggested that carbon farming might be a good opportunity for the landowners. One owner, who maintained contact throughout the pilot study, personally felt that most of the land could eventually be retired and provide a small but continuous stream of revenue from the sale of carbon credits. The area available had a low carrying capacity for livestock and, according to later analysis, much of it was projected to earn

more from carbon farming than from grazing. Given the lack of investment capital from the landowners, carbon farming appeared to be their best management option.

Initiation and progress of decision process on land block

Decision-making on Raukatauri Station was made by individuals or small groups, each of whom had to submit their plans to the other owners before implementing them. Shareholders were not subject to any coordinating or centralized structure; they appeared to have no formal rules for deliberation. To convene a meeting, an owner would contact a few other owners and begin a telephone chain. They also posted radio announcements through a local radio station, which had a broadcast range limited to local communities. Some shareholders were the heads of families, and they were able to represent the interests of a whole family. This arrangement meant that most of the shareholders could be represented in a meeting of just a few *kaumatua*.[14]

One owner convened a series of meetings, in which he asked the author to present information and indicate what steps would be necessary to begin managing the land for carbon farming. In some of these meetings, elders challenged the author to prove that I was not attempting to take advantage of them and use carbon farming to take away their land rights. After I clarified my intentions, at the end of the first few meetings, most of the participants expressed cautious approval of the idea. They stated that they would contact other owners to get their input. They soon followed up and set another meeting, where I explained the concept again, responded to questions and challenges, and left with the impression that the group was generally in favor of carbon farming. At least six of these meetings occurred, with new attendees at each meeting.

Formation of strategic objectives and orientation of the decisions

Some individuals at these meetings had a comprehensive vision for management and knowledge about what steps would be necessary to achieve that vision. For instance, one owner built his vision upon the practices of the past: "Once,

[14] *Kaumatua* refers to respected elders.

there were many stations, beautiful stations, well stocked." However, he modified his goals to reflect the values of the times:

> To me, the future is to recover them, but in such a way that we answer the environment, you know, by leaving it ... in perpetuity .... Natural native [forest] should be left.

As a group, however, the owners seemed to lack both collective agreement about the objectives for the station and a consistent understanding of their capabilities and limitations for management. Some expressed a mistrust of government policies intended to help Māori. Others were enthusiastic about the cultural benefits. They all agreed on one point: the station was currently earning almost nothing, so any change would likely be an improvement. Several owners spoke forcefully about the irresponsible state of current management and the need to do something to improve the farm. Several owners posed ideas for other types of management besides carbon farming and even proposed activities that could overlap with carbon farming.

In time, I attempted to discover if there was sufficient consensus about the concept to proceed with a more detailed examination of what areas they might consider setting aside. However, each attempt failed to achieve progress on this front. Each time, a new attendee would ask for a complete explanation before any areas were considered in more detail, and then another participant would say that an absent person would need to hear the proposal before any decisions could be made. Those convening the meeting would always ask me to bring a presentation, maps, and printed materials for the group to consider, but these materials did not appear to facilitate group decisions. They stimulated discussions about management options, but the owners running the meetings were not successful in getting the group to move forward.

Consideration of options and evaluation relative to objectives

Gradually, it became clear that the group would not be able to reach consensus on its objectives nor conduct an evaluation of carbon farming or any other management option. In this respect, carbon farming met the same response as most other options the owners had come across in the past 15 years, despite its unique

characteristics. Ironically, most of the farm was sequestering large amounts of carbon rapidly, due to the fast invasion and growth of manuka forests in former pastures.

My observations, over repeated engagement with the group and its members, suggest that the owners lacked the information-processing capacity to make an effective evaluation of their management options. I did not witness or participate in any discussion in which owners attempted to evaluate the benefits of one land use relative to another. Some owners asked for quantification of the potential revenues from carbon farming and may have made their own private evaluations. I did not observe any detailed exchange of information about the financial conditions of the block. Many of the landowners seemed to be only partially aware of the current management status of the block.

I also observed the presence of factions among the owners, each with its own interests. In some cases, an owner or a small group had taken over management of some part of the station and paid a share of the property taxes. These individuals were reluctant to share any financial information with the other owners, probably because they would be asked to allocate more of their profits to paying the taxes. Primarily, these individuals invested in grazing livestock, an asset that could easily be moved elsewhere or liquidated. There was little or no investment in farm upkeep or pasture improvement. To these sub-groups, the permanent nature of carbon farming would have been a disadvantage. A contract for carbon credits would need to be made with the whole group of owners, and the profits distributed according to shareholdings. This meant that, if carbon farming was not distributed equitably across sub-groups within the farm, some sub-groups could lose access to the land they managed and receive a disproportionately small share of the returns. Meanwhile, other owners might continue to utilize the units they managed, while receiving a full share of the profits from carbon farming.

This inequitable scenario was never openly considered in any of the group meetings I attended, but several owners raised concerns along these lines in private conversations. Through cooperation and negotiation, the group may have been able to reach an equitable solution to this problem. However, to my knowledge, they did not attempt to do so during the many months that I was in contact with them. Finally,

after a long gap in our interactions, an owner revealed another strategy that the group was pursuing: dissolving the block into smaller ownership units and establishing a trust to manage each one.

Selection and adoption of options

While individual owners were able to form their own objectives and evaluate different management options, the collective group did not achieve either of these steps. The current status of the farm and statements by the owners suggested that they had been unable to achieve these steps, as a group, for many years. They were left with three options: continue with the status quo, adopt a more effective management structure, or reconstitute themselves into new groups. At the time of my last communication with them, they had begun taking action to achieve a combination of the latter two options. They were taking steps to dissolve the current structure and reassemble the land and the shares into new land blocks. As a precursor to this step, the group had decided to reduce the assets of the station as much as possible, and then declare the station bankrupt. Without assets to distribute, the group could reorganize the shares and establish new governance over smaller blocks. Several indicated that they favored a trust structure to manage their anticipated landholdings.

Actualization and integration of decision-making

The group managed to actualize one decision: to reduce the value of the farm to nothing and then reconstitute it in smaller units along family lines. They took several years to reach this decision, and it will likely take a few more years before they achieve their goal. (Many Māori landowners informed me that procedures to change governance often take at least 18 months to complete.) Only then would they be in a position to reconsider carbon farming.

The decision illustrates fragmentation of the group, rather than integration of management decisions. The group chose this option as a solution to overcome their inability to reach a shared goal for managing the farm or to conduct an evaluation of the various means to reach a collective goal. Owners demonstrated their ability to articulate objectives and carry out management activities as individuals or small groups, but I never observed information-sharing or evidence of coordinated

management activities across groups. In fact, at times some owners seemed to withhold information about their activities and their intentions. These observations suggest that the lack of structure in the group prevented them from enacting a collective decision process.

G. Discussion

Interpreting the impact of governance structures on the carbon farming decision process

Incorporation

The case studies revealed the decision-making structure of land-use decisions for each land block. The owners of shares in Purotu Incorporation were relatively removed from the management decisions (Fig. 17). Instead, they affected decisions through the constitution of the Incorporation, which framed their objectives and designated authority for governance to the Committee of Management and the Chairman. The constitution gave the Chairman authority to make management decisions and the committee the right to oversee those decisions, ensuring that they met the owners' objectives. The Chairman evaluated management options for each management unit and coordinated activities for the land block. He made decisions and implemented management, with approval from the committee. The committee monitored performance of these decisions and reported back to the owners. The role of the committee in reviewing the decisions of the Chairman relative to the goals of the constitution provided a self-regulating mechanism over the decisions of the incorporation. Elections of committee members by the owners provided a second regulatory mechanism.

The powers designated to incorporations under Māori land law were designed to allow Māori land to be managed as a business, and the selection of the incorporation structure was itself an indication of the firm-like orientation of the owners. Māori land law designates incorporations as legal entities allowed to combine Māori land assets with other assets, although alienation of their Māori land holdings is prohibited. By adopting the incorporation structure, landowners provided a signal that their objective is to generate wealth from their shares. In the case examined here,

increasing profit was the principal objective of the decision process. Thus, we would expect a tendency for incorporations to be more market-oriented than other governance structures, because of both their legal capabilities and their objectives. The Purotu Incorporation illustrated an example of this alignment between structure and objectives. By evaluating their success in earning profits, the executives had built up confidence, skills, and experience in decision-making. These qualities gave them the capacity to recognize, judge, and act upon new strategic opportunities, like carbon farming.

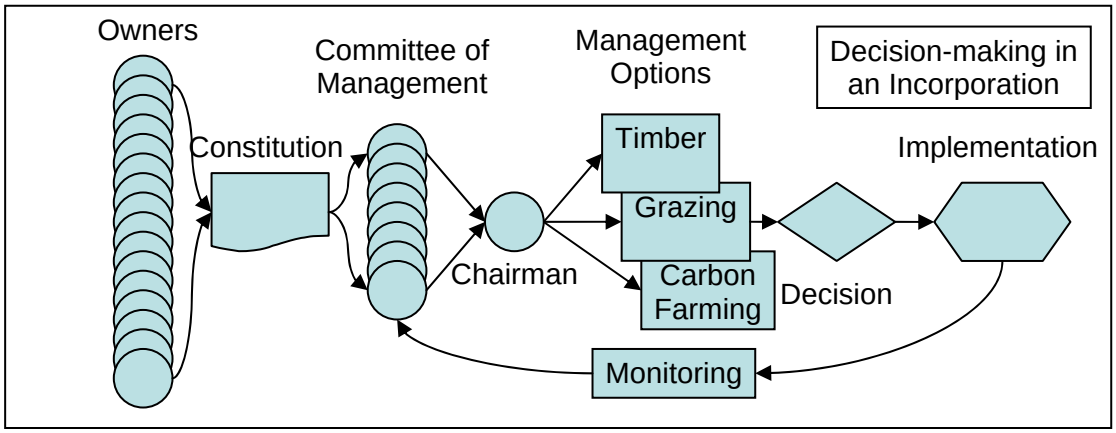

Figure 17. Decision-making in a Māori incorporation.

Trust without a lease

A trust with no lease has a similar structure to an incorporation (Fig. 18), but the powers of the trust are more limited. Like the incorporation, the owners articulate their objectives and designated decision-making authority through a legal document, in this case, a Trust Order. A key difference, however, is that the trustees make management decisions about the land block – there is no executive. Once trustees reach a decision, they delegate responsibility for implementing the decision to the manager. In practice, the manager could suggest options and recommend decisions, but trustees conduct the decision process and have final authority to make decisions. Trustees monitor the performance of implementation and report back to the owners periodically.

Unlike incorporations, trusts are only empowered to manage the land assets of the owners – their authority does not generally allow them to buy, sell, or utilize

external assets. The authority of the Whakamahi Trust was more constrained than the Purotu Incorporation, for example, which was able to use its assets to purchase another farm on non-Māori land, invest in developing that farm, and sell it off at a profit. The Trust was able to invest in a tourism enterprise on the farm and operate it through the Trust, but it did not acquire assets outside the farm.

The limited legal authority of a trust had two effects. First, it made it more difficult to obtain credit, because all of the assets of the Trust were inalienable under Māori land law. As a result, the Trust was capital-constrained and made conservative decisions, building up new enterprises incrementally. The second effect was that the Trust was not obligated to earn a high return on its management practices. The absence of loans with market interest rates gave the Trust more freedom to place emphasis on non-market objectives. At a minimum, the Trust had to pursue a satisficing strategy to ensure that it would earn enough revenue to pay property taxes; if it failed to meet that obligation, the accumulation of tax debt could jeopardize the retention of the land.

In this case, beyond land retention, the objectives included the enhancement of cultural value derived from the farm. For instance, one important objective was to improve the farm for future generations without passing along restrictions and obligations. A second objective was to provide culturally valuable services like access to traditional medicines and hunting. In effect, their limited access to market opportunities gave this Trust the flexibility to place greater emphasis on the non-market objectives of the owners.

The trustees were responsible for evaluating the relative likelihood of each management option to meet their set of objectives. This created greater complexity in the evaluation phase compared to the incorporation. Whakamahi Trust managed this complexity through a formalized deliberation process, with specific levels of consensus required for decisions to commit resources for different lengths of time, as set out in Māori land law. The Trust relied upon the knowledge of the farm manager and the collective knowledge of the trustees in evaluating its options. As with the incorporation, two levels of oversight regulated decisions: the trustees monitored the performance of the manager, and the owners held trustees accountable for their

decisions through the election process. Although the Trust was successful in identifying, judging, and adopting the new strategic opportunity represented by carbon farming, it exercised a level of caution that prevented actualization of their decision.

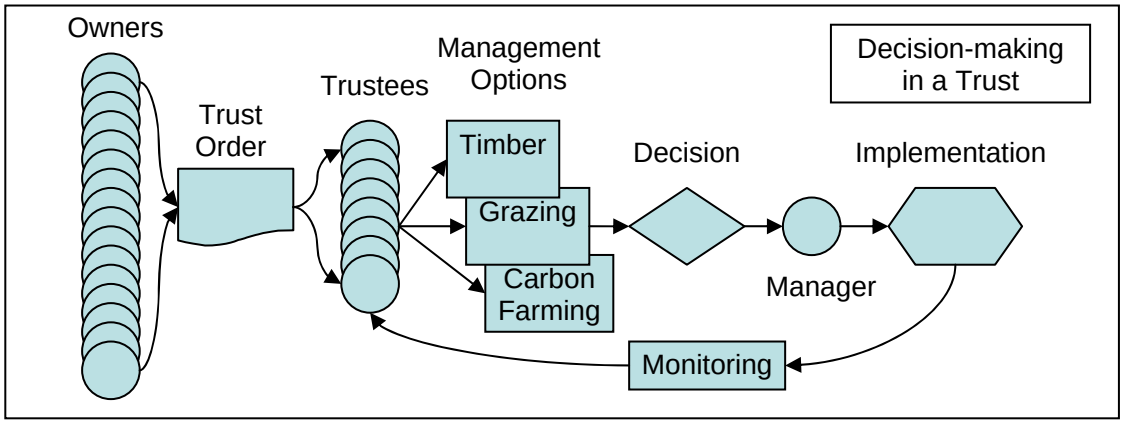

Figure 18. Decision-making in a Trust with no lease.

Trust with a lease

The authority of a trust is the same, regardless of whether it has a lease, but the decision process is structured differently when the land is leased (Fig. 19). Decisions about management are made by the lessee and specified in the conditions of the lease. Trustees monitor the performance of the lessee in meeting the conditions. The lessee is responsible for abiding by any restrictions or obligations of the lease and for paying rent, but otherwise he is free to earn whatever profits he can. Because of the limited duration of the lease, the lessee has a short-term time horizon in converting the productive capacity of the land and his labor into capital assets. The trustees are responsible for obtaining lease conditions that ensure the lessee will maintain the long-term productivity of the land, but these restrictions reduce the short-term opportunities for the lessee (by restricting his management options and requiring a share of his labor).

As a result of the decision structure, any management decision must satisfy the objectives of both the trustees and the lessee. Any differences in objectives must be mitigated through the lease negotiation process. The case of Hau Rāwhiti Trust presented here provides an example: the lessees were amenable to carbon farming as a management option for economic, cultural, and environmental reasons. They sought a

long-term lease, and on that time horizon, carbon farming could provide higher profits by increasing revenues, reducing management costs, and allowing a reduction in rent. However, the Trust could only achieve a supermajority on a set of objectives that placed more emphasis on economic profitability. The conflict in objectives caused them to reject the initial lease proposal. As a result, the lessee dropped carbon farming from the lease proposal.

Trusts that lease their land have the same flexibility to pursue non-market objectives as trusts without leases, but in practice they have to satisfy additional constraints: the objectives of the lessees. Māori land law places bounds on the commitments trustees can make. Within these bounds, the formal negotiation process places further restrictions on how the joint objectives of the trust and the lessees will be met. With leases, decisions to manage the land for non-market or long-term benefits must be made jointly by both parties. As a result, carbon farming may be disadvantaged within this governance structure. Hau Rāwhiti illustrated a case where carbon farming was not adopted, not because of lack of understanding or risk-aversion, but because the two parties could not make it fit into their combined objectives.

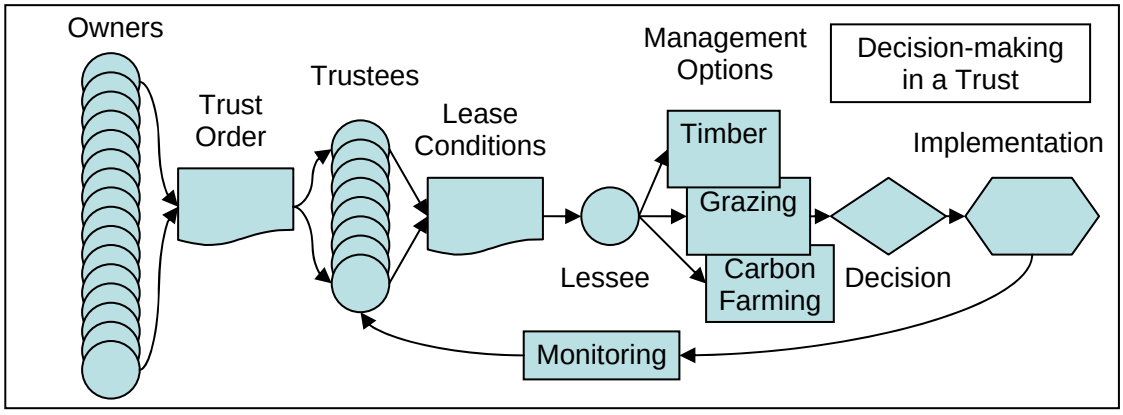

Figure 19. Decision-making in a Trust with a lease.

No structure

Land blocks with no structure are quite distinct from the others (Fig. 20). Rather than synthesizing the objectives and efforts of the owners, on these land blocks, owners may undertake their own decisions on a particular management unit. They

monitor the success of their implementation efforts and the efforts of others. Decisions affecting the land block as a whole must be approved by an appropriate consensus under Māori land law, but in practice, the case illustrated here had great difficulty assembling the necessary quorum of owners, much less enacting a decision. As a result, decisions seemed uncoordinated: some owners grazed a few cattle, others planted trees, still others took no interest in management. A few family groups staked out their own areas to manage and invested little in other areas. They took steps to ensure they alone would secure the benefits of their management activities.

Under some circumstances, we could envision successful decision processes in the absence of a formal governance structure. Indeed, many examples have been documented where communal owners of a property organized themselves to achieve sustainable land management (Ostrom 2005, Ostrom 1999). However, because Māori landowners already have several other governance structures available under law, the fact that a land block persists in having no structure is likely a sign of difficulty in decision-making. In the case illustrated here, the owners never developed a cooperative structure after the creation of the land block from the imposed consolidation of farms decades earlier. Perhaps the families continued to think of the old boundaries as their rightful management units. Perhaps there had not been enough turnover in the families to bring in new decision-makers with new approaches. Perhaps the active owners were hindered by the inertia of the large block of absentee shares managed by the Māori Trustee. Perhaps the historical role of the Māori Trustee had engendered a deep mistrust of government initiatives among the owners. We can speculate many reasons why this land block did not achieve effective decision processes, but in the end, our chief concern is the impact of this ineffective process on the uptake of carbon farming.

The unfortunate irony of this example is that, in much of the Gisborne District, unmanaged land quickly becomes dense manuka forest – the same land cover that is created under carbon farming. Landowners who do not manage their land provide the same environmental service as carbon farmers, but they do not receive the market rewards for the service. From a societal and market perspective, the provision of this service is not ensured, because the landowners have not made a commitment to

provide it. Should conditions change in the future, landowners can shift practices and eliminate the public benefits they had accumulated.

As a result, the behavior of unstructured land blocks toward carbon farming is unpredictable, but uptake is likely to be low unless decision processes can be improved. Sub-groups may be able to undertake carbon farming through rental agreements, but any permanent commitment of land must be approved by the other owners. While the low-input practice of carbon farming seems to be an ideal solution to their difficulty in coordinating management, these blocks may have unusual difficulty in overcoming the complexity of the decision process. Even if the majority of the owners are in favor of carbon farming, they will have trouble finding buyers willing to engage in the long process of negotiation necessary to develop a contract for the sale of credits. Raukatauri Station was not able to utilize the information-processing capacity present among the owners in a coordinated fashion, nor was it able to overcome the insular interests of different sub-groups. Based on this example, one would expect low participation among blocks with no governance structure.

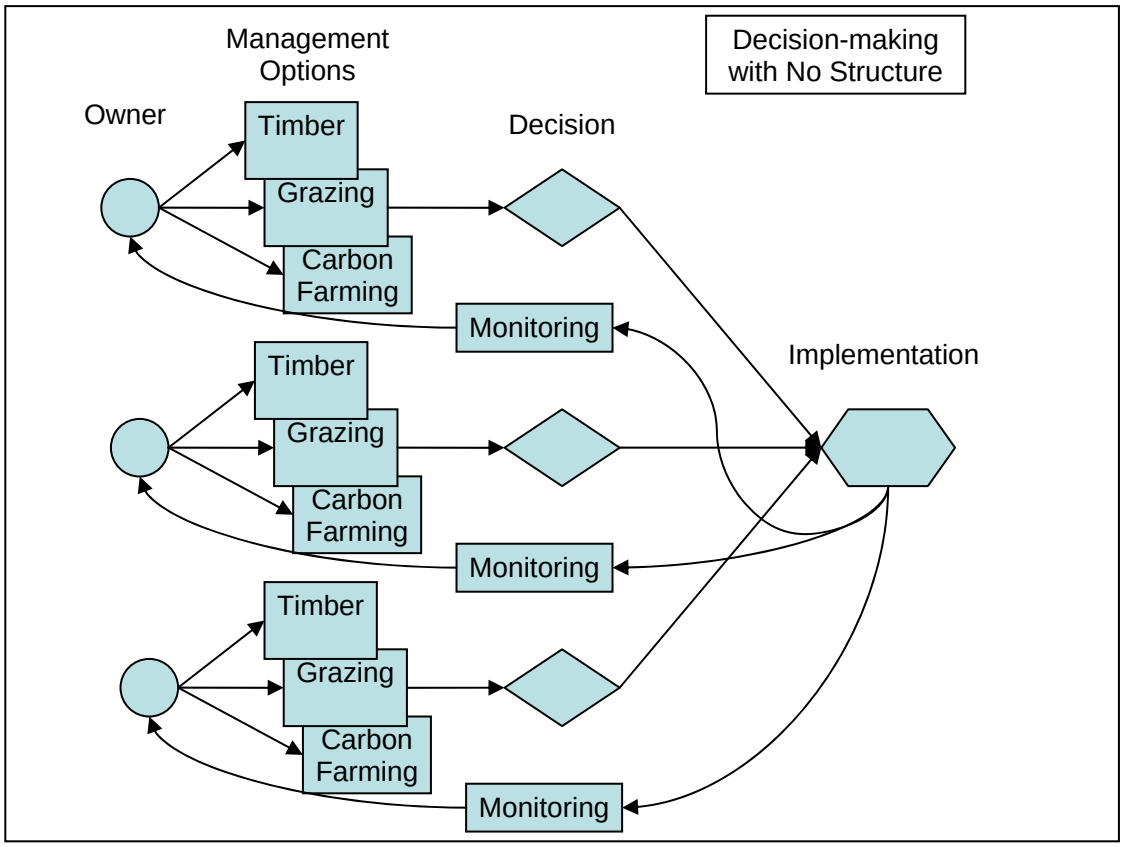

Figure 20. Decision-making in a block with no governance structure.

Toward generalization

Decision-making and governance structure

These case studies illustrate a wide range of outcomes and demonstrate how difficult it will be for some groups to achieve implementation of carbon farming (Table 9). Organizational theory sheds light on how these structures affect commitments to particular land uses like carbon farming. This approach is convenient, because the framing of carbon credits as a commodity allows us to compare the Māori decision process to the perspective of a firm making decisions about production.

The organizational theory developed by Fredrickson (1986) is a useful framework for guiding the analysis. Fredrickson builds upon accepted organizational concepts and seeks to explain the relationships between organizational structure, strategic decision-making, and strategic actions in firms, by characterizing the

dominant structural feature of organizations along three dimensions: centralization, formalization, and complexity (Fredrickson 1986). Each of these dimensions represents an organizational strategy for reducing internal transaction costs, thus improving the efficiency of decision-making within the organization.

Building upon first principles, Fredrickson predicts that each characteristic, when it dominates the structure of an organization, will have specific effects on the decision process (Table 9). For instance, centralization tends to yield goal-oriented decisions, rather than means-oriented, and decisions are initiated by a few individuals. Formalization, in contrast, yields more reactionary, incremental decisions that occur through standardized organizational processes. Finally, complexity in the organization tends to reduce the firm's ability to recognize and act upon a decision stimulus in a coordinated way, due to a large constraint set and low level of integration across the goals of individual members.

Subsequent research has added empirical support to these concepts, showing that organizational structures influence the effectiveness of decisions by shaping the process of decision-making (Dean and Sharfman 1996) and affect firm performance by moderating the speed of information flows (Baum and Wally 2003). Elbanna and Child (2007) have found that characteristics of the decision, the organization, and the environment all affect the ability of firms to make strategic decision according to rational expectations. Environmental and cultural factors also interact with organizational structures to shape the outcomes of a decision (Yasai-Ardekani and Haug 1997).

Table 2. Predicted outcomes of strategic decision processes for organizations with different dominant attributes. Adapted from Frederickson (1986).

Outcome category	Phase of process	Dominant attribute of Organization: Centralization	Dominant attribute of Organization: Formalization	Dominant attribute of Organization: Complexity
Initiation of process	Initiation	Strategic decision process initiated by a dominant few, and will be the result of proactive, opportunity-seeking behavior.	Strategic decision process initiated only in response to problems or crises in variables that are monitored by the formal system.	Members initially exposed to decision stimulus will not recognize it as being strategic, or will ignore it because of parochial preferences.
Goals of process	Formation	Decision process will be oriented toward achieving "positive" goals (i.e. intended future domains) that will persist in spite of significant changes in means.	Decisions will be made to achieve precise, yet remedial goals, and that means will displace ends (goals).	A decision must satisfy a large constraint set, which decreases the likelihood that decisions will be made to achieve organization-level goals.
Comprehensiveness and integration	Evaluation	Top management's cognitive limitations will be the primary constraint on the comprehensiveness of the strategic process. The integration of decisions will be relatively high.	The level of detail that is achieved in the standardized organizational processes will be the primary constraint on the comprehensiveness of the strategic decision process. The integration of decisions will be intermediate.	Biases introduced by members' parochial perceptions will be the primary constraint on the comprehensiveness of the strategic process. In general, the integration of decisions will be low.
Relationship of chosen strategic action to goals	Selection	Strategic action will be the result of intendedly rational, "strategic choice," and that moves will be major departures from the existing strategy.	Strategic action will be the result of standardized organizational processes, and that moves will be incremental.	Strategic action will be the result of an internal process of political bargaining, and that moves will be incremental.

Implications for policy

In the context of market-based environmental policies, as in other market environments, successful decision processes are the precursor to effective performance – but in this case, policy uptake and delivery of public benefits are the metrics of performance. Fredrickson's framework provides a connection between strategic decision-making behavior and market performance. The Māori case studies exhibited decision-making behaviors that closely match patterns found in Fredrickson's predictions, suggesting the dominance of certain organizational dimensions among the different structures. If these patterns can be generalized across organizational structures, we can predict the implications for policy uptake according to the outcomes of the different structures.

For instance, the concentrated authority in the executives of the incorporation suggests that centralization is the dominant dimension. The executives initiated the decision process to explore the new opportunity. With the constant, simple goal of profit maximization, the executives rationally evaluated whether carbon farming was a new means to achieve that goal. They easily integrated this decision into the other activities of the farm.

In contrast, the trust structure exhibited characteristics associated with formalization, though interpretation is made more difficult by the entrepreneurial behavior of actors within both trusts. These actors initiated the decision process proactively, rather than as a response to a problem. The trust with no lease maintained its orientation toward an intended future domain – one in which future owners would inherit a profitable, unencumbered land block – and its history indicated that it was able to maintain this goal despite changes in means. These characteristics are more aligned with centralization. However, the strategic process itself was highly formalized, and the group made incremental moves, as evidenced by its preference for a temporary, short-term contract. The group spent a great deal of time deliberating the proper fit for carbon farming within its overall management plan, so in the end, its adopted decision was well-integrated. However, the group did not achieve integration as easily as the incorporation.

The trust with a lease also showed behaviors associated with both centralization and formalization. This case is more complicated to interpret. For instance, the lessees were clearly engaged in opportunity-seeking behavior in their proposal to use carbon farming (centralization), but the trustees only took the opportunity to initiate the process in response to the periodic "problem" of the expiration of the previous lease. While one lessee was able to describe the future state he envisioned and adapt means to achieve it, the instrument of the lease between the trustees and the lessee forced both parties to negotiate precise means in order to achieve their goals (formalization). The annual rent embodied the means for the trustees to meet their economic goals and the management plan embodied the means to achieve the lessees' goals. Disagreement about the suitability carbon farming as a means ultimately led to its rejection. Integration was achieved through the detailed

management plan associated with the lease agreement. Taken together, the two trusts suggest the dominance of formalization in this governance structure, although the case is not clear-cut.

The land block with no structure, however, closely matches the predictions for organizations dominated by complexity. Despite repeated attempts to initiate a decision process, family groups ignored the global opportunity in favor of their parochial preferences. The presence of many owners and family groups created a large constraint set for management, and the owners did not seem able to achieve – or even articulate – organization-wide goals. I did not observe political bargaining within the group, but its decision to disintegrate into smaller units is certainly symptomatic of a low level of integration. In the absence of centralized or formalized decision processes, complexity appeared to dominate the decision process of this group.

This last point is especially important for Māori landowners, because their rules of ownership can easily lead to complex organizational conditions. Multiplication and fragmentation of shareholdings increase the number of actors, while familial connections and the role of the Māori Trustee create parochial interests. Conditions for complexity are pre-existing, and they will dominate unless landowners take action to implement strategies for formalization or centralization. Nevertheless, complexity does not guarantee failure; in fact, Fredrickson (1986) and others suggest conditions where complexity is an advantage (Vickery, Droge, and Germain 1999). For example, hospitals are organizations that function with high levels of complexity, where actors with highly specialized skills successfully carry out formalized procedures on a timely and routine basis. Specialization is the key advantage that complex structures allow over others. This line of thinking suggests that specialization in land management activities within sub-groups could offer a strategy for Māori to overcome the challenges of this structure.

Limits to generalization and potential sources of error

Before drawing conclusions about these results, I should note the limitations to generalizing from these findings. Besides differences in governance structure, these land blocks also had different biophysical capabilities and slightly different access to

markets. The participatory nature of the research allowed groups to take different paths toward their decision – an intentional kind of flexibility necessary for this type of research, but one that introduces the potential for differences in "treatment" that could drive the outcomes of the research. Readers should bear in mind that the focus of the study was the *decision process*, and that the process described here for different governance structures can be generalized with more confidence than the particular *outcomes* reached by different groups.

Besides possible errors of commission, I should also note factors omitted in my analysis that may have influenced the outcomes. For example, during the study, several entrepreneurs began visiting the region to discuss carbon farming with landowners. The presence of these individuals may have led to some confusion on the part of the participants about my role in the Gisborne District, despite all reasonable efforts to make my role clear.

Unobserved dynamics within some blocks may have also affected the outcomes. Factors unknown to me may have been percolating for years through the various structures and came to light during my observations, which I attributed to the governance structure. Or the structure itself may have been undergoing change. Furthermore, power structures I was not able to observe may have had an effect on the decision process and its outcomes.

Finally, the time span of the study may not have been sufficient for the land blocks to overcome the challenges inherent in carbon farming. Though the governance structures exhibited clear differences in their responses to these barriers, it is possible that over time, these differences would have become less pronounced.

While urging caution, I reiterate that my goal was to identify the structural characteristics of different land blocks that *do* impact decision-making and link them to more generalized theory of organizational decision-making. Every Māori land block has its own unique characteristics, but decisions about those blocks are funneled through a few basic structures. In anticipating the likely extent of carbon farming, policymakers should expect the organizational characteristics of Māori land blocks to play a significant role in determining whether blocks implement carbon farming.

The interaction of property rights protections and organizational structures is not unique among Māori – similar situations can be found among indigenous groups in many parts of the world. As a result, the insights shared here about the interplay of these characteristics and the decision to implement carbon farming are important for further research examining the impact of incentives for carbon sequestration on land use.

H. Conclusions

Market-based incentives to promote environmentally beneficial behaviors are designed to provide an economic motivation for providing services like carbon sequestration. Yet the decision processes that landholders have adopted are not necessarily well-suited to respond to these market incentives. Indeed, marginalized people on marginally productive land are likely to be disproportionally affected by the increased risks, conversion costs, information processing burdens, and transaction costs associated with new management activities. The characteristics of multiple ownership exacerbate rather than diminish these challenges. Empirical research is needed to explore the rich and largely untapped potential source of new theories in the area of rural development, where the selection pressure of competitive markets is sometimes lacking (Feder and Fehr 1991).

The primary lesson from the cases presented here is that organizational structure helps determine land-use outcomes, but only indirectly. Organizational structure is a means for organizing objectives and overcoming constraints of individuals. However, structures can impose their own constraints. Some are better suited to the decision-making and implementation required for carbon farming.

These case studies of Māori land governance structures suggest important insights for policies intended to influence land uses, particularly where land rights are not completely individualized. For New Zealand and for Māori, these insights are important because Māori landowners control a significant percentage of land, especially in the North Island, and this land is often well-suited to reforestation. Policymakers need to understand how decision-making and participation in these markets are affected by conditions in Māori land law, cultural values, and internal

decision-making (Insley and Meade 2008). The choices landholders make about their land governance structures may lead to qualitatively different responses, ultimately shaping decisions, policy outcomes, and landscapes. Globally, such lessons are important because they raise prospects for how to deal with internal and external barriers to participation that are critical for the success of policies to address climate change. With a deeper understanding of land-use decision-making, we can hope to design policies that will successfully motivate climate mitigation activities swiftly enough and at a large enough scale to prevent dangerous climate change.

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Processes and Actors	***Purotu* *Incorporation***	***Whakamahi* *Trust – No Lease***	***Hau Rāwhiti* *Trust – Lease***	***Raukatauri* *No Structure***
Initiation of process	Chairman and Secretary	Manager	Lessee	A Landowner or group of Landowners
Formation of strategic objectives	Landowners, through Charter, monitored by Committee of Management. Objective is limited to maximizing profit.	Landowners, through Trust Order, interpreted by Trustees, and passed on through decisions to manager.	Landowners, through Trust Order, interpreted by Trustees, and enforced through Lease conditions.	Landowners, through collective discussion and consensus.
Consideration of options and their potential to meet objectives	Chairman	Trustees	Lessee, under constraints of Lease conditions	Landowners, individually and then through collective discussion and consensus.
Selection and adoption of a decision	Chairman, approved by Committee of Management	Trustees	Lessee	Landowners, at first collectively and if no action, individually
Implementation of decision	Chairman	Manager	Lessee	Landowners, collectively if possible; if not, individually, with potential sanction by larger group

Table 3. Processes and actors in the case studies.

Potential sources of breakdown in decision process	***Purotu*** ***Incorporation***	***Whakamahi*** ***Trust – No Lease***	***Hau Rāwhiti*** ***Trust – Lease***	***Raukatauri*** ***No Structure***
Failing process initiation	• Dominant few fail to recognize strategic opportunity • Failure in information delivery, • Failure in adequate experience or training	• No perception of crisis or problem • Lack of monitoring • Low criteria for successful management	• No perception of crisis or problem; lack of monitoring • Low criteria for successful management	• Failure to recognize strategic opportunity • Failure in information delivery or inadequate experience and training • Ignoring opportunity due to parochial preferences
Failure to form comprehensive strategic objectives	• Failure of decision process to form positive goals • Failure to recognize carbon farming as a means to goals	• Failure to form precise goals; • failure to recognize carbon farming as means. Management becomes the goal in itself, not any especially beneficial form of management.	• No precise goals • Failure to recognize carbon farming as means.	• Formation of large constraint set in objectives, creating conflicts with each possible set of means • Creation of factions, focused on choice of means
Failure to Achieve Comprehensiveness in evaluation of Options	• Failure of executives to understand all options due to limitations in experience and information • Limited consideration of options they do not perceive to fit with strategy	• Failure to achieve level of detail to meet standards of process • Failure of process to effectively evaluate options, due to lack of information and experience	• Failure to achieve level of detail in Lease to meet standards of process • Failure of Lessee to effectively evaluate options, due to lack of information and experience	• Failure due to parochial perceptions and biases, rather than rational consideration • Competition for authority and resource use between members (including denial of resource use to others)
Failure in Selection	• Failure of rational decision-making • Failure to gain approval for deviations in strategy	• Failure of decision process to act in timely manner to use opportunity • Failure to overcome incremental process where implementation represents major change	• Failure of Lessee to act in timely manner • Risk to lessee of failing to achieve strategic goals, entailing risk to future income • Failure to meet standards of formalized process, resulting in rejection of options on procedural basis	• Failure through internal political bargaining • Failure because participants see change as too radical • Failure due to lack of alignment of strategic objectives and high constraints.
Failure in Implementation	• Failure of administrators to effect the choice through channels of authority • Implementation rejected when it fails to meet conditions of standardized process.	• Failure due to ineffective manager or poor direction by Trustees • Implementation rejected when it fails to meet conditions of standardized process.	• Failure due to ineffectiveness of Lessee • Failure of Trustees to direct Lessee properly • Implementation rejected when it fails to meet conditions of standardized process.	• Failure due to lack of coordination between decision and implementation • Failure due to lack of authority by implementers when their decision goes against others • Implementation rejected when it fails to meet conditions of standardized process.

Table 4. Potential points of failure in the decision process, leading to failure to uptake carbon farming.

Success factors for landowners	***Purotu* Incorporation**	***Whakamahi* Trust – No Lease**	***Hau Rāwhiti* Trust – Lease**	***Raukatauri* No Structure**
Process initiation	Chairman and Secretary were highly engaged within community and had built up experience as successful businessmen. However, they lacked access to scientific and policy information.	Manager had built up experience managing diverse projects and building them holistically into the management of the land block. Manager and Trustees had an established process for maintaining trust and oversight while engaging in new opportunities. However, both lacked access to scientific and policy information.	Lessees had good access to science and policy information, had a desire to try new opportunities, and knew how to fit these opportunities into land management. However, as new lessees, they had not built up a trusting relationship with Trustees, potentially limiting their ability to engage in new strategic opportunities.	Landowners had a desire to try new opportunities, but lacked technical or experiential knowledge to incorporate these into holistic land mangement. Particular characteristics of carbon farming made implementation desirable because of low management requirements, but policy, information, capital, and legal hurdles were daunting in initiation phase.
Strategic objectives	Strategic objectives were well-articulated, simple, and enforceable.	Strategic objectives were articulated in Trust Order and were enforceable.	Strategic objectives were articulated in Trust Order, but allowed enough room for Trustees to disagree about this issue.	No alignment of strategic objectives for management, except for a common desire to make land somewhat profitable.
Evaluation of Options	Evaluation was conducted by two individuals, reducing the duration of the process. Nearly exclusive focus on economic profit limited opportunities for carbon farming.	Process for evaluation of options was established by formal rules: law and by the Trust Order.	Process for evaluation of options was established by formal rules: law and the Trust Order.	No formal rules for the evaluation of options.
Selection	Selection process was centralized in two individuals, allowing it to proceed quickly. However, selection had to be ratified by Commitee of Management.	Selection process centralized in Trustees, with criteria for adoption.	Selection process was subject to Trustees and their criteria for adoption.	No formal selection process -- ad hoc decision-making subject to limited information-processing capacity, parochial biases, and political bargaining.
Implementation	Implementation by the same actors as those who evaluated and selected the process meant they already had an understanding of the management requirements.	Manager initiated the process and also implemented it, meaning it could be tailored to meet his needs and capabilities.	Implementation would have been carried out by lessee who initiated the process.	Unclear who would carry out implementation.

Table 5. Potential factors for success in decision process, favoring uptake of carbon farming.

Outcomes	***Purotu*** ***Incorporation***	***Whakamahi*** ***Trust – No Lease***	***Hau Rāwhiti*** ***Trust – Lease***	***Raukatauri*** ***No Structure***
Process initiation	Process was intitiated and carried to completion by the Chairman and the Secretary.	Process was initiated by the farm Manager and put forward to the Trustees.	Process was initiated by the farm Lessee and put forward to the Trustees.	Process was initiated by a single landowner, who convened a series of meetings and advised other landowners to conduct their own meetings.
Strategic objectives	Strategic objectives were focused on economic profit, with a balance between generating short-term capital gains for reinvestment, and the accumulation of a productive asset base for the future.	Strategic objectives included a balance between economic profit and cultural goals -- these included environmental goals (no degradation, improvement where possible) and cultural goals (no erosion of rights, creation of greater assets if possible)	Strategic objectives were in conflict within the Trust: some trustees wanted to emphasize economic profit; others wanted to ensure sustainability and asset base.	No agreement about strategic objectives among groups, except at the most basic level: agreement that some economic activity was preferable to the status quo (virtually none).
Evaluation of Options	Carbon farming was seen as additional source of revenue on land with no other option value.	Carbon farming was seen as additional source of revenue that could add to the economic benefits for other activities. Contribution to cultural goals was important, but its potential to reduce rights was equally important.	Carbon farming was perceived as risky, in terms of achieving economic profits and in terms of its requirement to retire land permanently. Include role of information in this section.	Conflicts observed between those with authority and those in favor of carbon farming. Some landowners appeared to have difficulty understanding and processing information available to them, or even recognizing its strategic importance.
Selection	Carbon farming selected for all eligible areas already retired. No consideration of lands outside existing reserves.	Carbon farming with liability selected for all eligible areas already retired. Carbon farming without liability selected for some very marginal areas.	As debate among trustees appeared unfavorable and increased risk to the lessee of losing the lease, he removed the option from consideration, at least until he could achieve a more secure position.	The process of decision-making proceeded on a scale too slow for the project. Fear of future liabilities played a role, but landowners did not appear to recognize the benefits of the no-liability option.
Implementation	Implementation required no further change in management.	Failed to implement, for unknown reasons.	No implementation.	No implementation.

Table 6. Outcomes of decision process for each land block.