

## **The Royal Society of New Zealand response to the Discussion Document from the Ministry of Agriculture and Forestry on Sustainable Land Management and Climate Change**

The Royal Society of New Zealand (RSNZ) is New Zealand's academy of sciences, instituted under an Act of Parliament to advance and promote science and technology, including providing expert advice to government.

The following response has been prepared following in-depth discussion among relevant experts in the science community including the RSNZ's Climate and Primary Resources Committees, with input from the Chair of the Social Sciences Committee, a Professor of Agricultural Economics. It has been referred to the RSNZ and Academy Councils for review, with feedback from some members. As such this is the official response from the RSNZ to the MAF discussion document.

### PREFACE

The RSNZ agrees with the scientific conclusion that climate change is a real threat and challenge, and that we in society need to do something – the risks of not doing anything are too great. We agree that scientific research, including social and economic research, has much to offer in developing adaptation and mitigation measures relating to climate change. In addition, it is important to develop fair greenhouse gas (GHG) accounting systems that minimise compliance costs while enabling accurate measures.

However, we were concerned that the document focused on short-term actions that attend to our liabilities under international agreements – activities that are stop-gap measures – rather than stepping back to look at mitigating and adapting to climate change. There lacks an underlying philosophy in the document, and a lack of deep thinking on changing behaviour across the economy and society. The focus of the document is on some measures at the expense of other measures – i.e. there is a lack of equity between sectors and options. In addition, on a global scale, mitigation measures may have unforeseen consequences. Locally effective measures may backfire in larger ecosystems.

### SUMMARY

The overall conclusions relating to the land management options were that:

- 1) It is important that we apply the cost of emitting greenhouse gases (and other environmental costs for that matter), to enable a level playing field for businesses. Therefore we advocate for a gradual devolution of credits and liabilities that is fair and equitable for individual users rather than sector by sector.

- 2) The voluntary system (of reporting net emissions) is likely to be ineffective, as evidence in the industrial sector shows, and will therefore need regulation or incentives.
- 3) Notwithstanding the fact that a case is yet to be put before the UNFCCC for N-inhibitor technology to be credited against our emissions liability, there are several other problems with the focus on nitrogen (fertiliser and inhibitors). Technologies deemed fit for incentives should be thoroughly tested for efficacy and safety.
- 4) We advocate for an audit of current land use and in-depth consideration of optimal land use and management depending on local conditions looking out 50 years. Then we can set in place systems that will achieve optimal use, including removing barriers to change in land use and incentives and deterrents that eventually result in the most appropriate land use. The latter needs to consider both climate change mitigation and adaptation.

We applaud the fact that Pillar 2 is recommending actions on the ground that aim to engender change in land management immediately. However, some of the options will have limited impact, and are selected without consideration of other technologies that are also currently available (see below).

Nitrogen fertiliser application boosts productivity so much that a small increase in cost will have negligible reduction in use, even a large increase in cost may not significantly reduce use, but it might make primary products less competitive internationally. In addition, while the charge on N-fertiliser will be most applicable to some industries, e.g. dairy, it may be unfairly applied to other sectors, such as horticulture, which has very low nitrous oxide emissions.

However, such a charge would balance the externalities of N-fertiliser use by providing revenue for subsidies for other mitigation measures. These should not just include N-inhibitors, but other technologies that significantly reduce nitrous oxide (and, if possible methane emissions), such as high sugar grasses (see below).

In each case, the mitigation measure to be subsidised should be thoroughly tested for safety and efficacy. For example, due to the chemical breakdown of N-inhibitors, which is faster at higher soil temperatures, independent verification of its efficacy in relation to reducing nitrous oxide should be checked in many sites in many different business uses and conditions. In addition, other ecological impacts of technologies should be investigated, e.g. the impact of run-off of N-inhibitor into riparian strips and wetlands, where natural denitrification systems are important for reducing nitrogen in water flowing into lakes, and where N-inhibitors could damage this vital ecological service provided by the wetlands.

There are other options for reducing nitrogen that have not been mentioned in the discussion document. For example, High Sugar Grasses are currently available on the market that will maintain or increase productivity, while reducing nitrous oxide emissions and N leaching into waterways. These grasses have a lower protein proportion than current pasture forages and, in addition, the high sugar content makes N-utilisation by grazing animals more efficient. Less nitrogen is ingested and released in urine onto the ground thereby reducing nitrous oxide emissions and N-runoff. The amount of grass seed required at the time of pasture establishment has about the same cost as Eco-N for one year (i.e. about \$125 to \$130/ha). Furthermore, the grass seed for a permanent pasture will be a one-off cost for 10 years plus. Therefore a case might be made for subsidising High Sugar Grasses as they can be sown in many situations where farmers may be reluctant to use N-inhibitors, with long-term benefits to mitigating nitrogen pollution.

## The Importance of Research and Technology Transfer

The Pillars 1, 2 and 3 and to some extent, 4 depend on research and transfer of knowledge and technology into practise. The science and innovation system is an important structure in NZ for achieving these goals. However, a reliance on research without the concomitant resources and strategies to achieve those research needs will make a mockery of the document's goals.

We recommend that a Science Research Strategy be incorporated into this Government Sustainability Initiative, which will examine what we are now researching, and undertake to fill the gaps in research to meet the needs described in the document. The Science Research Strategy must have measurable targets that will actually enable adaptation and mitigation actions. We also recommend, for reasons of the science funding system and structure, that new appropriations should be applied to achieve the specific Sustainability Initiative goals in this Research Strategy, so it can proceed without jeopardising other, existing, important science research areas. The Research Strategy should be enforced by MAF or MoRST with support from other relevant agencies, e.g. TechNZ.

Currently, the Foundation for Research, Science and Technology (FRST) funds most of the 'public-good' research of the type that underpins the agricultural and forestry sectors. The structural problem lies in how the research required for this Sustainability Initiative would be supported through the current FRST portfolios. Within the FRST, the sustainable land management and climate change issues range across three main portfolios, plus another three with lesser association. The key ones are: SPS (Sustainable Production Systems), SRU (Sustainable Resource Use) and GLO (Understanding & Adapting to Global Environmental Change). But there's also PQA (Production, Quality & Assurance), ECO (Resilient, functioning and restored Natural Ecosystems) and NBP (Niche Biological Products and Services). It would be a great challenge for a coherent sustainable land management and climate change Science Strategy to be achieved across these six portfolios! There is a risk that if current portfolio funds are specifically directed towards research underpinning the MAF discussion document then other vital research areas will lose funding. Alternatively, if the research system is not 'managed' specifically to achieve the goals of the discussion document, then the underpinning research required may not successfully compete for the limited amount of research funding. There have been historical examples of research areas falling between the gaps, including New Zealand's soil science research and the FRST's Sustainability Round in 2003, so one can not assume that the research required will occur without a specific research initiative.

Technology transfer is always hard to implement, but without reaching the farm, the value of research goes unrealised. It is usually better to provide incentives than to enforce usage.

Given that specific research support *is* forthcoming, and that a strategic view is taken on the research needed to underpin the initiatives in this document, we applaud the forward-looking goals of the discussion document, and hope that they prove successful. Regarding the Pillar 2 initiatives, while there are concerns expressed on some aspects, we are glad that the government is taking action now to begin the process of accounting for the external costs and benefits of the primary sector. We look forward to increasing action in other areas to change the behaviour of our society and its economy.

## RESPONSES TO QUESTIONS

The following section answers the specific questions of the discussion document, although we point to the caveat that we considered some of this to be *fait accompli*, while other areas had little thought as to the overarching philosophy. The following advice is based on consideration by experts from various sectors, and where there was not a consensus, it is noted.

### **Goals for a Plan of Action**

1) *Are there any other goals you think should be included? (goals are listed pp24-25).*

We suggest that the existing Kyoto agreement may have too many limits. NZ should influence Kyoto parties to include other sources of GHG emissions and sinks, and contribute to measurement systems for these and other mitigation measures. For example, a wider range of carbon sinks should be considered such as horticultural (food-bearing) trees. Research may be required to determine carbon-sequestration levels of these, as well as sequestration in root sinks (with no-till agricultural and forestry practises) and even sequestration in marine plants, e.g. kelp forests, if these are measurable and substantial. We should think in more diverse terms for areas where research can contribute to the knowledge required for adaptation, mitigation and systems of accountability of GHG sinks and emissions. While some of these options are on the horizon under Pillar 1, others could become part of the solution now, given the political will.

2) *Agricultural Goals: on a scale of 1 to 5 how do you rate your level of support for the proposed goals for agriculture in this section? (1 = don't support, 5 = strongly support)*

**4, agree**, but not strongly, as there is room for improvement. We notice a large gap in the Agricultural Goals which fail to include *adaptation* for agriculture. Both adaptation and mitigation are needed. The whole strategy should include building in resilience to climatic extremes, which would have immediate benefits in terms of resilience.

We also see a need to fill the knowledge gaps e.g. how to account for emissions or sinks in different farming situations and practices as well as carbon in root sinks, marine plants, food-bearing trees, and other alternatives.

3) *Forestry Goals: on a scale of 1 to 5 how do you rate your level of support for the proposed goals for forestry outlined in this section?*

**4, agree** - the goals are aspirational and take regard of environmental costs of land use while aiming for an internationally competitive forestry sector. However, there are issues around conditions placed on land to be used for farming under the RMA that are not dealt with. Again, these proposals focus on mitigation and could include adaptation responses. For example, several actions are available now that could deliver co-benefits of both mitigation and adaptation. Forests provide both mitigation (C-sequestration) and adaptation (e.g. protection from flooding - particularly flash-floods), but further adaptation is required to enable resilience to new threats – such as new diseases or pests, higher fire risk, and how to manage long-term forests in a changing climate.

4) *Comment on the reasons for your choices:*

Please see our comments above. In addition, there are no goals relating to equity for land users in this process.

The Agricultural Sector goals rely strongly on new research – and we believe there needs to be a better match between those goals and the research funding system. We would reiterate that this

Government Sustainability Initiative needs to be backed up with **new budget appropriation** to increase research on the relevant areas without diminishing existing, much needed research funded via existing sources.

### **Adaptation**

5) Do you have any comments on the ideas for adaptation discussed in Pillar1?

In general we applaud the goals, but are concerned about the lack of reasoning for them.

The ideas are all top-down ideas, and could be enhanced by building adaptive capacity from the 'bottom-up'. The latter would involve 1) awareness (the receiving side of 'sharing of information'), 2) monitoring, 3) resilience and 4) responsiveness. This whole process would enable land users to adapt to the increase in extremes of variability that are occurring now and in the future. While science is needed for guiding all adaptation responses, (e.g. climate modelling and predictions, evidence on impacts of adaptation measures etc), science does not alone ensure adaptation happens. That takes action on the ground by land users whose interest is in the future of their properties, and may require the political will to provide incentives or other support. Adaptation measures implemented now provide benefits now and in the future.

A good first step to building in more resilience is to help people to identify what they can do to cope with current extremes and variability.

The main top-down idea missing from the list of ideas in Pillar 1 is the high-level discourse on what land use is ideal in various parts of the country, and how to encourage the investment decisions by land owners that will ultimately engender optimal land use. Investment decisions for adaptation require planning and an analysis of priorities is needed. Investments for adaptation are necessarily long term and have long term benefits, e.g. water storage, irrigation, hardwood planting, etc. Therefore, such investments need to be informed by climate change expectations based on the best available scientific evidence.

6) Are there any other actions you consider might be useful in helping the land management sectors adapt to climate change?

Zoning land for specific uses, (or, more accurately, against some uses) e.g. preventing building-up on flood plains, zoning steep hills for afforestation, zoning stream and river banks for riparian planting. Preventing low-lying coastal forests from logging (especially native forests) would safeguard coastal zones from rising storm surges and sea levels. This may follow an overarching audit or review of current versus optimal land uses throughout the country (mentioned later in our response).

7) How important is it that the proposed Plan of Action includes an ongoing process to adapt to climate change? This is a leading question; we answer **5**, of course it's important, but at what cost to mitigation measures?

8) How strongly do you agree or disagree that the adaptation actions outlined are heading in the right direction? **5, strongly agree**, and we think this list should be expanded.

9) If you agree, who do you think should lead the process to adapt to climate change? **Government.**

10) If you wish to make any comment on the reasons for your choice, please do so.

Adaptation actions need evidence-based policy. Government needs to consult with researchers and practitioners in the sectors when developing policy, but the overarching leadership needs to come from government. The government must recognise that the responsibilities under Kyoto are a national issue. Sectors can be brought alongside as and when they are able, using the right policy instruments to provide incentives and a level playing field.

Local and regional government have delegated responsibility for implementation but central government needs to show leadership in setting standards and expectations; and follow through with enhanced support for local government to act (support being financial, policy and logistic).

11) Are there any other ideas you would like to put forward regarding potential business opportunities?

- More development of ‘carbon-neutral’ marketing, with registered, effective carbon sinks for sale to GHG emitters.
- The insurance sector should be integrated in to adaptation and mitigation measures. A possibility is to levy insurance companies (to make an equitable business environment for insurers) to contribute to flood protection etc. Levies would be passed on to customers who would benefit from improved adaptation investments. Alternatives include local projects funded by insurers and levied against locally-insured customers, with possible co-funding from other government funds. Those uninsured should not receive government hand-outs when climate-related ‘disasters’ occur, thereby promoting a business environment where insurers and insured can take responsibility for local adaptation measures.

We recommend some strategic thinking and investment relating to green technologies. However, it should be remembered that there is an existing economic market for business opportunities, and we shouldn’t get diverted on business opportunities, they are peripheral to the main issue. The environmental costs of GHGs and other externalities are not accounted for through current economics (except where cap and trade or other charging schemes exist) and these are where the focus needs to be.

12) How important do you think it is that the proposed Plan of Action includes actions to capitalise on business opportunities? **2 less than neutral**, because such capitalisation resides more in the realms of business than government.

13) If you think this is important who do you think should lead the process of identifying and developing new business opportunities? **Sectors** rather than government or government-sector partnership.

14) Are there other comments on business opportunities? (none)

### **Working Together**

15) Do you have any comments on the proposals and ideas about the Government, local govt and sectors working together on the Proposed Plan of Action?

Where a policy requires strategic cooperation, the responsibilities of each player need to be made clear up front; e.g. if research is needed to underpin a new development or technology, then the science and innovation system, overseen by MoRST, must guarantee that it gets funded.

We suggest that the NZ academy of sciences (RSNZ) could be used as a source of expert scientific input to decision making, so policy is developed based on the best available evidence. The RSNZ has a large database of scientists and experts in a multitude of technologies on which to draw for advisory panels etc. Government agencies seem to be reluctant to include scientists on ‘expert’ panels and we recommend that when engaging a team to investigate a topic for policy options, that at least one or two scientists be included on the team.

16) How supportive are you of the land management sectors working together with local and central govt under the Proposed Plan of Action? **3, neutral** We note that the MAF document contains lots of ‘sticks’ to enforce behavioural and land-use changes, whereas the Ministry of Economic Development’s draft Energy Strategy contains lots of ‘carrots’ (incentives). This inequity should be resolved.

### Agricultural Options

17) Are there other options for addressing agricultural GHG emissions you would like to put forward? Stepping back to look at the big picture, we see the need to shift the economy from low- to high-value products from primary industries – from commodities to ‘added-value’ products.

[Case study example:

The rationale for this comes from the fact that methane emissions are totally tied up with efficiency and productivity of agriculture. As an example of both, there has been a surge in the dairy industry of efficiency and productivity as it seeks to gain market share and become a price-setter rather than price-taker. This increased share comes at a cost to water availability, nitrification of waterways and methane emissions. In order to afford the costs of these environmental impacts (externalities), this industry, for example, needs to move to higher value products, so that it can then afford the costs of these impacts. The application of pricing on externalities needs to be at international levels (i.e. setting a level playing field). This is why we advise for gradual devolution of costs and liabilities, and to advocate, to the Parties of the Kyoto agreement, measures that create internationally equitable trade conditions that include the costs of these externalities.]

18) If you have to make one choice of Options 5, 6, 7, and 8, which is your first preference?

**Option 8**, RMA standards to control agricultural GHG emissions. (NET GHG emissions greater than 1990 levels.) While this option was preferred, some considered offset schemes for emissions also an important option, and potentially cheaper and easier to implement.

19) If you have to make one choice from options 9 and 10 which would it be?

**Option 10** – a charge for deforestation to agricultural use should work to reduce deforestation. However we refer to our concern that there needs to be an overarching audit of current land uses and optimal land uses considering environmental needs, for example local water availability, fire risk, water quality and soil protection.

Systems that allow flexibility to adjust from agricultural land use to afforestation, and vice versa if it is appropriate, may be better than rigid systems that do not take into account local conditions.

20) Rank agricultural options presented 1 = don't support, 5 = strongly support

Option 1	5 (needs commitment of research funding)
Option 2	5 (needs incentives for tech transfer and use, add to monitor farms also)
Option 3	1 (doesn't work without incentives)
Option 4	5 (incentive especially on Dairy farms, less relevant in some other industries, e.g. horticulture)
Option 5	3 (charge on N fertiliser may subsidise other schemes, but would not reduce its use significantly)
Option 6	4 need to begin to develop systems for long term C trading.
Option 7	4 offset schemes particularly useful.
Option 8	4 NET emissions above 1990 levels, (although there was concern on the costs of controls and the bureaucracy involved – the cost may not be justified and market schemes may be more efficient than regulatory schemes).
Option 9	4 (controls should be on NET emissions)
Option 10	1 (should really devolve liability and costs; although a charge is simpler to enforce, measure and sends clear signal in advance of 2012. Different groups had different opinions on this question.)

21) Additional comments? (See above table)

### **Afforestation Options**

22) Are there other options for encouraging Afforestation to put forward?

Introducing carbon trading eventually will provide benefits to foresters to maintain forests. The clear price signals and benefits would enable investment decisions to increase afforestation. However, this would need to be matched with payment by other businesses for their carbon liabilities, otherwise there is a mismatch – therefore gradual introduction of schemes would enable signals to be sent, and businesses to prepare.

An important factor is that under the RMA, local bodies can create the barrier of 'Conditional Use' for land which owners wish to plant in forest. This is an additional barrier to a use that we need to promote. Streamlining this process and altering 'conditional use' would make it easier to convert land for forestry.

We recommend that some overall thought be given to our existing land uses and what needs to change i.e. where we are farming and where we are foresting?, what are the water supply and quality issues that can be remedied through land use change?, what is the effect of afforestation on other land uses? Land use changes can be tied in to both mitigation responses and adaptation responses.

For various reasons of historical development and ownership rights, our current legislation unfortunately supports the 'status quo' of land uses, and this is not necessarily the best way for us to allocate our productive primary sectors across NZ. The Motu research endeavour, funded by FRST may inform this process<sup>1</sup>; however, there seems to be too little modelling and analysis of land use currently underway in New Zealand.

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<sup>1</sup> Integrated economics of climate change, Dr Suzi Kerr, Motu Economic and Public Policy Research Trust, 2006  
[http://www.frst.govt.nz/Research/GLO\\_Approved\\_Concepts.cfm#4](http://www.frst.govt.nz/Research/GLO_Approved_Concepts.cfm#4)

23) Rank the afforestation options 1 don't support 5 = support strongly

Option 1 (grants) **3 neutral**

Option 2 (choice of grants or forest sink C credits and liabilities.) **2 less than supportive**

24) If afforestation Option 2 were implemented, which mechanism would you choose if you were establishing new forests?

**Devolved credits and associated liabilities (gradual)**

25) Any additional comments on the above?

The devolved credits must be implemented **gradually**, in order to prevent shock to the businesses, and to create a level playing field.

**Deforestation options** (Questions 26, 27 and 28 – we refer to Q29 – additional comments).

29) Do you have any additional comments?

Some of the recommended schemes create hurdles to change in land use – this may end up keeping land in its current, inappropriate use. We need to retain flexibility.

If credits were devolved it would avoid net deforestation.

A charge for deforestation for pre-Kyoto forests is quite unfair to many landowners. We should consider the free services provided in the past by these forests in terms of water quality, soil protection, and carbon sequestration. Charging people who have been freely providing these services up to now, if they wish to change their land use, is considered to be unfair. Furthermore, this may impact on Māori communities to a greater extent than other landowners, as they gain economic status and begin to develop their land into more productive uses.

We were concerned, throughout the discussion document, that the options were based on stop-gap measures. This system of trying to tweak current legislation rather than review the whole system means that the status quo for land use may be perpetuated even if it is not the ideal use. We have suggested that an audit may be useful to choose the best use for land based on local conditions, and then set up incentives to best allow those land uses (i.e. create hurdles for the 'wrong' or 'suboptimal' uses, rather than having costs associated with change that may even be an improved use of that land considering all environmental factors).

This is an example of overarching strategic thinking regarding this issue, which could be applied to many of the topics in the discussion document.

<p>The Royal Society of New Zealand is happy to supply further information or clarification regarding this response. Please refer any questions to Dr Kathleen Logan, Policy Unit, RSNZ, Kathleen.Logan@rsnz.org tel. 04-470 5754.</p>
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