



NITROUS OXIDE EMISSIONS FROM CULTIVATED HISTOSOLS

Authors: Simon Wear

Main Purpose: ☐ Decide ☒ Discuss ☒ Note

Purpose of Report

1. For the Agricultural Inventory Advisory panel to note definition of the activity data (i.e., New Zealand area of organic soils) used to estimate the emissions of nitrous oxide from cultivated histosols will not change but that the activity data will change due to better mapping.
2. Attached to this paper are the reports
 - a. *“Area of Organic Soils.-Landcare Research final report”.*
 - b. *A review by Louis Schipper Waikato University.*

Summary

Background

3. New Zealand has an obligation under United Nations Framework Convention on Climate Change Convention (UNFCCC) to report the anthropogenic greenhouse gas emissions and removals every year. Emissions are reported in the annual submission of the National Inventory Report submitted to the UNFCCC. New Zealand also has a responsibility under the Kyoto Protocol to reduce emissions growth and if not successful will incur a financial cost.
4. The National Inventory Report forms the base of any financial cost that the country may have under the Kyoto Protocol. Therefore reported emissions and removals need to be as accurate as possible. New Zealand has a long standing research program in estimating country specific emission factors to aid in the improvement of reported emissions and removals from the land based sectors.
5. Changes beyond the default methodology and emission factors to take account of country specific factors are encouraged and need to be well documented and transparent.

6. Histosols is an international term (coming out of the USA) and refers to organic soils having 40 centimetres or more of organic soil material in the upper 80 centimetres. Within New Zealand we refer to these simply as organic soils.
7. Cultivation of organic soils make up a small percentage of New Zealand's total Agricultural emissions (0.12% in 2009) so are not a key category when assessed on an annual bases.
8. In 2010 New Zealand had an in-country review by an Expert Review Team (ERT) from the UNFCCC. The ERT recommended in the final report that the area of land defined as organic soils in agriculture be harmonised with the area of organic soils defined under Land Use, Land-Use Change and Forestry (LULUCF).

Current Inventory

9. The current values used in the New Zealand Inventory for the area of organic soil that is under pasture is 202,181 hectares, and it is assumed 5 percent is cultivated every year totalling 10,109 ha/year.
10. Currently the emission factor for cultivated histosols in New Zealand is 8 kg-N₂O-N/ha/year. This value is the mid point of the IPCC default range of 2-15 kg-N₂O-N/ha/year. Out of 28 Annex 1 parties to report emissions from cultivated histosols, 23 report using a default value 8 kg-N₂O-N/ha/year and only the USA uses a higher value of 9.2 kg-N₂O-N/ha/year.

Report

11. The Landcare research report (attached) was commissioned to harmonise the definition of organic soils reported under the sector and the LULUCF sector in New Zealand.
12. The authors held a workshop at MAF on 21 February 2011 to agree principles and objectives. The definitions of the histosols as defined in the IPCC1996 guidelines and the relationship with the New Zealand soil classification were agreed. The areas of organic soils (predominately Southland and Waikato) were mapped and the area of organic soils identified and estimated.
13. The report concludes continuing with the inclusion of mineral soils with a peaty layer when determining nitrous oxide emission from the cultivation of organic soils in New Zealand. This is because the cultivation of these mineral soils with a peaty layer are thought to react in the same way as cultivation of an organic soil.
14. Also, the international definition of histosols in the agriculture sector uses 40 centimetres but in New Zealand the area cannot be differentiated from areas with 30 centimetres of mineral and organic soils. This is because the mapping information has an uncertainty in the layer of mineral and organic soils of more than 10 centimetres. Therefore, the report concludes that no change to the definition depth is needed.

Proposed changes to inventory

15. The report recommends a value of 849,941 hectares be used as the total area of organic and peat mineral soils in New Zealand.
16. The report recommends that the activity data for the possible area of cultivated organic and mineral peat soil in New Zealand be 160,385 hectares (19% of the total organic soils area).
17. The present assumption that the area of cultivated soil is cultivated for pasture renewal once every 20 years is maintained and therefore the area of organic soils cultivated every year is estimated as 8019 ha/year.

Other recommended changes to inventory

18. The review and report both concede there is still a lot of uncertainty about the level pasture renewal on organic soils and the assumption that pasture renewal occurs once every 20 years is uncertain. Louis Schipper explains in his review that there is anecdotal evidence that the rate of pasture renewal is increasing over time. MAF is already planning to take a more thorough review of the rate of pasture renewal.

Implications for emissions estimates

19. Updating the activity data to the new value in the inventory will change the estimate of emissions from cultivated histosols from 39.40 GgCO₂-e per year to 31.25 GgCO₂-e per year.

Response to reviewer comments

20. The review on the final report was carried out by Louis Schipper, Waikato University. Simon Wear provided assistance around the interpretation of the IPCC guidelines.

Strategic Risks

21. The changes may not be accepted by another ERT organised by *the United Nations Framework Convention on Climate Change* (UNFCCC). However, if this is the case there is an extensive process which is followed in which New Zealand can state its case or change back to the IPCC default before any penalty would be applied.

Strategic Opportunities

22. New Zealand will be meeting the UNFCCC obligations of continual improvement of the national inventory.
23. Although the new values will not make any noticeable difference to the total emissions estimate for New Zealand, the values used will now be well documented, therefore meeting the UNFCCC requirement for transparency.

Recommendations

It is recommended that the Agricultural Inventory Advisory Panel:

24. ***Agree** to no change in the definition of organic soils.*

Agree / not agreed

25. ***Agree** to the revised mapping methodology for determining the area of organic soils in the agricultural sector.*

Agree / not agreed

26. ***Note** that the value for activity data (the area of organic soils cultivated every year) used to estimate emissions of nitrous oxide from cultivated histosols is changed from 10,109 ha/year to 8019 ha/year.*

Noted

Simon Wear
Senior Policy Analyst

Alice Marfell-Jones
Manager Information and Analysis
Chair Agricultural Inventory Panel

Date