

Senate Standing Committee on Economics
ANSWERS TO QUESTIONS ON NOTICE
Innovation, Industry, Science and Research Portfolio
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AGENCY/DEPARTMENT: OFFICE OF THE CHIEF SCIENTIST

TOPIC: Carbon Sequestration

REFERENCE: Question on Notice (Hansard 21 October 2009, E36)

QUESTION No.: SI-28

Senator JOYCE—Unless Dr Christine Jones is wrong in the peer review papers—and I imagine she is right—and it is the case that more carbon is sequestered through summer grasses than through dry sclerophyll forests, wouldn't it be the case that to reduce carbon emissions we should be changing from dry sclerophyll forests to grasslands?

Prof. Sackett—Questions such as that are very complex because one can ask the question to achieve a given reduction in CO₂ equivalent, for example, over a certain period of time, but there are other uses for the land as well. So, in the end, how land is used is actually a policy matter.

Senator JOYCE—If reducing carbon emissions, which also should involve carbon sequestration, is at the forefront of our minds, then shouldn't another part that goes hand in glove with any policy be policies that increase carbon sequestration?

Prof. Sackett—I cannot comment on a particular policy decision, but I can say that solutions that are being mooted do include looking at carbon sequestration in a variety of forms, and it is expected that different countries will have a capacity to contribute to that in different ways. The individual choices of how that is done will be matters of policy.

Senator JOYCE—Would you find it peculiar if there were a policy such as carbon sink legislation where actually the carbon sink will sequester less carbon than if the land had been left as summer grassland, which has now been proven to sequester more carbon than the carbon sink which is a dry sclerophyll forest?

Prof. Sackett—I believe I understand your question, and I believe it is a question on policy.

Senator JOYCE—It is a question on science. The question on science I am asking—and you can take it on notice—is: can you find out, through your own research, whether summer grasses sequester more carbon than dry sclerophyll forest? I admit that rainforests probably sequester more carbon than summer grasses. If that is the case, we now have a policy before our nation where we are moving to a less carbon-effective sequestration and we are getting a tax deduction to do it.

Prof. Sackett—I would be happy to take the question of the matter of science on notice.

ANSWER

Further to SI-27 which indicated that scientific sources suggest that dry sclerophyll forests sequester up to an order of magnitude more than grasslands such as summer grasses. From this, and a review of Dr Jones' work, a change from dry sclerophyll forests to grasslands, as your follow-up question suggests, does not appear to be supported scientifically.

The difference in the total carbon storage between grasslands and woodlands depends on the nature of the ecosystems and the depth to which the carbon pool is tested.

As an example, studies done in 1999¹ and again in 2005 show that reduced tree cover will tend to decrease deep recalcitrant soil carbon pools². The 2005 study showed that the amount of soil organic carbon was significantly lower in grassland sites at a depth of 80 to 100 centimetres with only 25 tonnes per hectare compared with treed savannah sites storing 30 to 70 tonnes per hectare.

As a point of comparison, the NSW Department of Primary Industry investigated soil organic carbon under perennial pasture only in high rainfall areas of land in the mid north coast of NSW, and compared these high rainfall pastures with native hardwood forests within a 100 kilometre radius. They found there was no significant difference in the soil organic carbon stock to 20 centimetres between the paired sites of perennial pastures and native forests with an average storage of 72.9 tonnes per hectare in the pasture versus 76.5 tonnes per hectare in the native forest sites³.

In a recent study by ANU of another ecosystem, and using detailed measurements from real forests, scientists estimated that Australia's unlogged, natural eucalypt forests hold an average of 640 tonnes of carbon per hectare⁴.

It is important to note that if existing dry sclerophyll forests or woodlands were to be cleared to produce grassland, then the loss of carbon from removing the trees is a net carbon debt that would need to be re-paid (i.e. carbon uptake) before a grassland system can be considered as a mechanism for mitigation by future sequestration.

¹ Boutton T W, Archer S R and Midwood A J 1999 Stable isotopes in ecosystem science: structure, function and dynamics of a subtropical Savanna. *Rapid Commun. Mass Spectrom.* 13, 1263–1277

² Chen X, Hutley LB and Eamus D, (2005), Soil organic carbon content at a range of north Australian tropical savannas with contrasting site histories, *Plant and Soil*, Volume 268, Number 1 / January, 2005, <http://www.springerlink.com/content/p0123502p0515w05/>

³ McCoy D, Ky C, (2009) Australian Society for Soil Science Inc, <http://www.asssi.asn.au/downloads/soils2008/Tu42%20107-G-McCoy%20et%20al.pdf>

⁴ Mackey BG, Keith H, Berry SL and Lindenmayer DB, (2008) Green Carbon - The role of natural forests in carbon storage, A green carbon account of Australia's south-eastern Eucalypt forest, and policy implications, ANU E Press, http://epress.anu.edu.au/green_carbon/pdf/whole_book.pdf