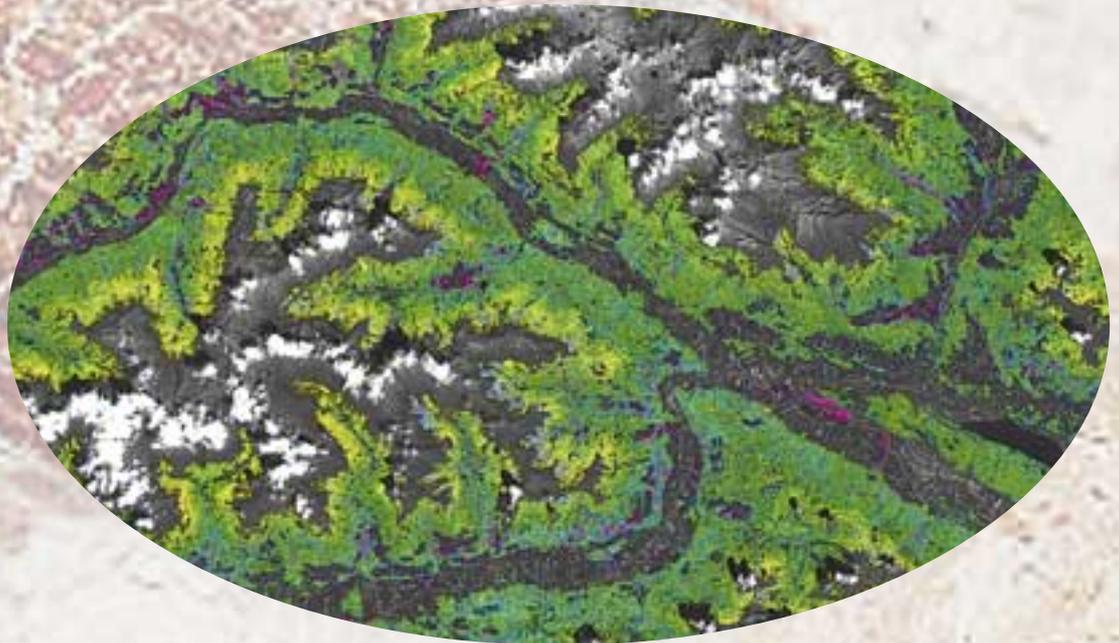


IEA Bioenergy

Task 25

Greenhouse Gas Balances of Bioenergy Systems



**Summary of the workshop
Land-Use, Land-Use Change and Forestry:
the Road to COP6**

28 September 2000

Joensuu, Finland

K.A. Robertson, and B. Schlamadinger (eds.)

September 2000

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IEA Bioenergy

Task 25
Greenhouse Gas Balances of Bioenergy Systems

**Summary of the joint Task 25 and COST E21
Workshop session**

Land-Use, Land-Use Change and Forestry: the Road to COP6

28 September 2000

Joensuu, Finland

K.A. Robertson, and B. Schlamadinger (eds.)

October 2000

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Land-use, Land-use Change and Forestry: the Road to COP 6

Summary of workshop session on 28th September 2000

K.A. Robertson and B. Schlamadinger

This workshop session on Thursday 28 September was organised by IEA Bioenergy Task25 (www.joanneum.ac.at/iea-bioenergy-task25) in collaboration with COST E21 (Contribution of Forests and Forestry to Mitigate Greenhouse Effects, <http://www.bib.fsagx.ac.be/coste21/>), the European Forest Institute (www.efi.fi) and the University of Joensuu (www.joensuu.fi). Other meetings took place during the same week:

- Conference: Woody biomass as an energy source: challenges in Europe (25-27 September)
- COST E21 meeting (continued on 29 and 30 September).

Proceedings of both events are forthcoming and will be available at <http://www.efi.fi/publications/>

The purpose of the session summarised here was to provide a discussion forum for issues concerning the land use, land-use change and forestry (LULUCF) sector that are currently subject to negotiations under the United Framework Convention on Climate Change (UNFCCC). In December of 1997 the Kyoto Protocol was adopted which allows land use and forestry activities to be used in meeting emission reduction commitments. Particularly, afforestation, reforestation and deforestation, if they occurred since 1990 and are direct human induced, are included. The Kyoto Protocol also sets forth that additional human induced activities in the LULUCF sector may be agreed to in the future. However, many details, such as definitions, accounting rules, and decisions on eligibility of activities, have been left open and subject to further negotiations leading up to the Sixth Conference of the Parties to the UNFCCC (COP6) at The Hague, 13th to 24th November 2000, where important decisions are to be made so that the Kyoto Protocol can be ratified by Parties thereafter.

It was only three months after the conclusion of the Kyoto negotiations that IEA Bioenergy Task 25 organised a workshop on LULUCF issues in Rotorua, New Zealand (March, 1998). The proceedings of that workshop can be downloaded at www.joanneum.ac.at/iea-bioenergy-task25. Many of the issues negotiated now were raised for the first time at this workshop. This workshop session summarized below constitutes a continuation of the work by Task 25 researchers on the issues of LULUCF, bioenergy, and global climate change.

SESSION 1: OVERVIEW OF IPCC SPECIAL REPORT ON LAND USE, LAND-USE CHANGE AND FORESTRY

The Intergovernmental Panel on Climate Change (IPCC) had been requested by SBSTA (Subsidiary Body for Scientific and Technological Advice under the UNFCCC) to prepare a Special Report on Land Use, Land-Use Change and Forestry (LULUCF), to provide a basis for the negotiations now under way. The report was prepared under enormous time pressure and subject to intensive expert and government review. It was accepted by governments at a plenary session of the IPCC in Montreal in May of 2000. The Summary for Policymakers of the report can be downloaded at

www.ipcc.ch, and the full report is available from Cambridge University press (www.cup.org search for keyword “land use”).

Gert-Jan Nabuurs of ALTERRA Green World Research, Netherlands, gave an overview of Chapter 2 of the report: Implications of different definitions and generic issues. There are over 240 different definitions of a 'forest', some of these are very country specific and reflect national circumstances. They can be grouped into 3 categories, administrative, land-use and land cover definitions. Land cover definitions of forest do not always include all wooded land, for example if the cover threshold is low (20%) then countries with high cover forest will be able to deforest to the threshold level without this being accounted for. Conversely if the forest cover threshold is high, forested land in some countries will never reach this threshold, some types of savannah with tree cover for example. Therefore this 'forest' could be deforested without it being accounted for; there are also no incentives for increasing the area of this type of ecosystem.

There are many issues which are affected by definitions, such as consistency of methodologies, comparability, transparency, verifiability, accuracy, and cost effectiveness. Should LULUCF activities be accounted for based on activities or land units? Land based accounting would involve identifying the land, then accounting for all C stock changes on that land in the commitment period. Activity based accounting involves first identifying the activity and counting the carbon stock changes directly associated with that activity. Which activities should be accounted for under Kyoto Protocol Article 3.4? Other accounting issues include baselines, system boundaries and leakage.

There is no one ideal method for monitoring and verifying the stock changes on ARD land, but perhaps the best is a combination of forest inventory, soil sampling and remote sensing, while models could be used for verification. 'Kyoto' projects may have side impacts including sustainability, biodiversity, employment, water quality, soil erosion; and impacts on harvested wood products and the forest industry.

The overview of Chapter 3 on Afforestation, reforestation and deforestation (ARD) was given by Bernhard Schlamadinger of Joanneum Research, Austria. Chapter 3 focuses on Article 3.3 of the Kyoto protocol, ARD activities and how to account for them. Accounting methodologies also depend on the definitions of ARD and the implications of several definitional scenarios (combinations of definitions of ARD and “forest”) are given in the chapter. ARD could be accounted for using land-based or activity-based accounting. Using the land-based accounting, the FAO definition of reforestation could lead to net debits in the first commitment period. With activity-based accounting, which excludes debits from harvest that precedes reforestation, overall net carbon credits would accrue for regrowing trees after harvest. Globally carbon debits from deforestation are likely to exceed credits from afforestation in the first commitment period (CP1), if a “land-use change” definition of reforestation is used (also referred to as “IPCC definition” because it is used in the IPCC Guidelines for National Greenhouse Gas Inventories). For example afforestation will be credited for the carbon stock change in the commitment period (5 years carbon increase) and only for those stands established since 1990, while deforestation will be debited for the carbon losses on ALL stands deforested. Chapter 3 also deals with the possible “perverse incentive” to deforest stands after 1990, put them into an alternative land use for a few years and then reforest to gain carbon credits, and proposes some options to address this. Finally, the presentation suggested that carbon credits could be given for landscape average carbon stock rather than following the ups and downs of afforestation, thinning, harvesting, and regeneration.

The overview of Chapter 4: Additional human induced activities – Article 3.4 was presented by Gregg Marland of Oak Ridge National Laboratory, USA. The chapter contains many ideas, with

much focus on soil science and which activities could be included under this article. The 'how' to account for carbon stock changes due to additional human-induced activities is less discussed. There are two ways in which activities could be defined. If defined in a broad way, activities could be land management within a land-use category (forest management, cropland management, pasture land management) or land-use changes between these categories (afforestation, deforestation, etc.). This definition of activities would require minimum monitoring and verification costs, and potentially yield large amounts of carbon credits, perhaps even with no change in management practices. A narrow definition of activities to be included could result in a long list of practices to be considered. This approach would increase accounting requirements and the associated costs but could be used to closely limit the extent to which the LULUCF sector is included in the Kyoto Protocol.

It is important to note that the admittance of activities under Article 3.4 would affect the ability to meet already-set emission reduction targets, in most cases making the targets easier to achieve. The 'modalities, rules, and guidelines' for accounting for activities under Article 3.4 need to consider several issues including; whether only additional activities undertaken since 1990 should be accounted, whether credits should be limited to cases above 'business as usual', whether they should be accounted for as changes in carbon stocks, whether the banking of carbon credits is allowed, whether credits under Article 3.4 should be limited, and whether carbon credits should decrease as a function of uncertainty.

Although biofuels are not included under Article 3.4, it was thought important that something be said about them: Biofuels are included in the Kyoto Protocol as part of the renewable energy portfolio that can help reduce emissions from fossil fuels. Biofuels can, however, yield a double gain if they come from newly established plantations for which carbon stocks are accounted in the LULUCF provisions of the Kyoto Protocol. The chapter looks at the tradeoffs between biofuels production, carbon sequestration, direct and indirect materials substitution, and food production.

Chapter 5: "Project based activities" was presented by Omar Masera, University of Mexico, Mexico. There has been significant experience at the project level but few projects that deal specifically with greenhouse gas mitigation. To date experience has been gathered in 30 projects, covering 3.5 Mha. These projects include carbon sequestration, avoidance of degradation or deforestation, and multi component projects.

Some of the key concerns about GHG accounting at the project level include:

- the setting of baselines to ensure additionality. There is currently no agreed upon standard method for calculating baselines;
- leakage - this can be addressed by using buffer zones, claiming only some components of the carbon sequestration, for example, only claiming for above ground carbon not soil and litter carbon;
- measuring and monitoring;
- permanence (risks), these could be addressed by: debiting when carbon is released, replacement with a new project, claiming only partial credit at beginning of project, or the creation of buffer zones at the project outset;
- sustainability - extent and effectiveness of local people participation, technology transfer and adoption, capacity to develop and implement guidelines

Justin Ford-Robertson of Forest Research, New Zealand presented chapter 6: Implications of the Kyoto Protocol for the reporting guidelines. The aim of the guidelines is to provide a basis for estimating and reporting greenhouse gas emissions and removals, and to ensure comparability

between country data. They were not designed with the Kyoto Protocol in mind, however they could be adapted to provide a framework for reporting required by the Protocol. The guidelines are specified in the Kyoto Protocol for reporting national inventories. Some of the issues to be addressed include:

- the application of the 'since 1990' clause,
- lack of consistency between country data because of the flexibility of definitions
- a methodology for accounting for harvested wood products, currently it is assumed that the stock of wood products does not change. It was noted that the issue of how harvested wood products can be accounted for will be considered by the UNFCCC in 2001 (submissions on this issue are due by March 15).

The session was concluded with questions from the audience, which were mainly intended for clarification of the details in the IPCC Special Report.

SESSION 2: CARBON ACCOUNTING METHODOLOGIES

Kim Pingoud of VTT Energy, Finland presented an evaluation of the ton-year index as a basis for carbon accounting of forestation projects under the Climate Convention. Several carbon sequestration scenarios are explored including afforestation, afforestation followed by later deforestation, and afforestation with bioenergy use. The results show that: tonne-year crediting can give permanent carbon credits even if deforestation occurs and the C stock decreases; temporary sequestration can increase the atmospheric CO₂ concentration in the long term and be in contradiction with the ultimate objectives of the UNFCCC. The conclusion reached is that tonne-year indices may result in inappropriate allocation of resources to meet its objectives.

Annette Cowie of State Forests New South Wales, Australia presented a paper by Miko Kirschbaum et al. on an alternative accounting procedure for land-use change and forestry activities under the Kyoto Protocol. The proposed accounting system takes into account that management of terrestrial carbon stocks can only have a lasting impact by replacing low carbon-storage potential land-use types with types with higher carbon-storage potential, and that only anthropogenic factors should earn credits or debits. The accounting system divides the biosphere into land use types that each have a characteristic average carbon storage potential. Credits or debits are then allocated based on a change in land use type and human induced change in carbon storage potential within a land-use type. The potential for carbon storage is calculated based on an equilibrium carbon density (carbon storage potential of native forest) multiplied by a land-use factor. Most debits and credits are likely to accrue due to land-use change for which only the area undergoing land-use change would need to be monitored. The area undergoing a change then simply needs to be multiplied by the difference in carbon stocks (according to the difference in land-use factor). The proposed accounting method is simpler and has less data requirements than current methods. The full paper is available from www.ffp.csiro.au/publicat/pdfs/alternative_kyoto.pdf

Several issues were raised by the audience regarding the proposed system including:

- Land productivity varies across a region, and land use tends to be determined by productivity, so equilibrium carbon density should be different for each land use type, as a certain land use may not have the potential to reach the equilibrium carbon density based on native forest. Response: the region could be further subdivided to accommodate levels of land productivity.
- This method of accounting seems to require high advance data needs, for instance the equilibrium c stocks and the land use factor. This can be seen as an advantage because once the

equilibrium carbon stocks and the land use factor are known the system does not require continual monitoring of the carbon stock changes but only the area changes.

- How would the carbon stock changes be verified and the uncertainties assessed? Verification could be carried out using standard statistical or inventory methods. There are huge uncertainties in the current system, and this system should reduce them but uncertainty has not been assessed to date. It must also be acknowledged that whatever system is used, management of the biosphere will be difficult, and uncertainties will remain. The proposed scheme has the potential to carry fewer difficulties and uncertainties than other schemes, but even with this scheme, management of the biosphere will still be difficult.
- How does this method fit with the wording of the Kyoto Protocol? If a broad interpretation of the wording in the Kyoto Protocol is taken then this method can be used.
- How is permanence dealt with, for example if fire or insects reduce the carbon stock? If the disturbance is part of the normal forest cycle then this effect is included in the average carbon density. If the disturbance is not part of the normal system then the disturbance would result in a change in land use or equilibrium carbon stock.
- The monitoring system will also require periodic ground based verification and the use of remote sensing.
- It was suggested that the equilibrium carbon density may not be needed as there is no standard forest C stock.
- Is the carbon accounting methodology as described in Kirschbaum et al wishful thinking? It depends on how entrenched negotiators are in particular positions, some countries oppose sinks. This method can be used without over stating the role of sinks

Justin Ford-Robertson of Forest Research, New Zealand presented a comparison of real-time, tonne years and carbon density accounting approaches. “Real time carbon accounting” reflects reality and usually produces a saw tooth pattern associated with the growing and harvesting of a forest stand. This method would allow a credit/debit for every change in carbon stocks. Measurements are required annually, or every five years, therefore the measurement/transaction costs are high and could extend indefinitely into the distant future, eroding the benefits of carbon credits,

“Tonne-year accounting” has been developed to make it easier to trade carbon at the project level. Tonne-years combines the quantity of carbon sequestered in a project with the longevity of the project. This method is based on the removal of carbon from the atmosphere for a time equivalent to that which would allow those sinks to restore atmospheric concentrations to their former level. Calculations based on this premise suggest that between 42 and 150 tonne-years are equivalent to one tonne of emission reductions. There are several difficulties with the tonne year approach including the use of a reservoir to counteract a source, that it provides a disincentive for afforestation and that it is incompatible with the Kyoto Protocol.

The benefit to the atmosphere of afforestation/reforestation lies in the initial decision to convert from a low carbon density land use to a land use with higher long term average carbon density. With “carbon-density accounting” approaches, carbon credits could be a one-off payment made to a land owner who has increased the long-term average carbon density of a piece of land. No further transactions would be required unless the land owner makes land use/cover decisions which will change the long-term carbon density again. Debits will occur if the long term average carbon density decreases. The long-term benefit of trading in carbon sinks may be to stimulate planting and thereby permit the formation of a sustainable biomass resource.

One question concerned the treatment of LULUCF carbon stock increases that are only temporary: If deforestation occurs a debit is received. The issue of permanence is more relevant to the CDM.

An alternative system for accounting for LUCF projects in the CDM has been proposed by Columbia, which regards all LUCF projects as potentially non-permanent and a temporary credit is issued. After the end of the LULUCF project the credit has to be replaced with a credit from another project (either in the energy or LULUCF sector).

The carbon density accounting method is simple and evens out changes. Is there a danger of a country being more interested in increasing C density in forest rather than increasing harvest for increasing bioenergy? In New Zealand the forest industry is generally not in favour of C distorting. C credits may not change industry decisions, may extend rotation but not reduce harvest levels, therefore will not decrease harvesting and processing residues availability.

Robert Matthews (UK Forest Research) and Rebecca Heaton (Cardiff University, UK) investigated the effectiveness of different LULUCF carbon accounting methodologies in achieving the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol; and the impact of different accounting methodologies on a range of hypothetical countries with different characteristics of fossil fuel emissions and LULUCF sinks/sources. Final results will be available by COP6. First conclusions are that

- If LULUCF is to be included in the Kyoto Protocol, the accounting procedures can, indeed must, be kept as simple as possible, otherwise anomalous results and perverse incentives are very likely to arise.
- Many examples of accounting procedures give undue weight to carbon sequestration through LULUCF projects compared to projects aimed at direct emissions reduction involving use of bioenergy. Care must therefore be taken in formulating accounting rules and indices to safeguard the potential contribution to emissions reduction that can be made by bioenergy.
- Carbon sequestration in wood products appears not to be important at a global level, but can be of marginal importance for some countries.

The model used in this evaluation was CARBINE (originally developed by UK Forest Research in 1989) and it includes wood products, bioenergy and substitution effects and is similar to other carbon sequestration models.

It was asked by a participant that given an increasing world population and increasing housing stock, why is the carbon stock in wood products not increasing? The presenters responded that available information, although limited, indicates that wood products are not important globally but could be important for individual countries. Evidence from country-level analyses and global-level simulations suggests that the global carbon stock in wood products is increasing, but at an insignificant level compared to stock changes in forests and fossil fuel reserves.

During discussion it was commented that the presentations on analyses of accounting indices and rules did not seem to address potential impacts on societies and local communities, both within and outside the Kyoto process – how could such issues be addressed? The response from presenters was that, ultimately, the Kyoto process is a political one. Scientists could only provide evidence, estimates and analyses on which the political negotiations could be based, and evaluate whether accounting systems would support the ultimate objective of the UNFCCC.

One presenter also commented that the method of Kirschbaum *et al.* seemed to meet such aspirations in a number of important ways. Firstly, it provided a simple, transparent and scientifically derived framework that could be applied consistently by different nations. Secondly the method had the potential to avoid excessive monitoring costs, enabling wide involvement of

communities and countries with varying resources to commit to the Kyoto process. Thirdly arguments over the details of land classification and carbon densities at the national level were, rightly, left ultimately to the Parties to negotiate and agree, and this process could be viewed and understood by stakeholders both inside and outside the process. Finally the method met the requirement for monitoring to be verifiable, and this was a potential continuing role for scientists, acting as commentators and referees during the deliberations of the negotiators, as well as during implementation of the methodology. The scientists could 'verify' approaches to land classification, attribution of carbon density values and discounting assumptions. When scientists evaluated proposals and schemes, it was important not to be unduly concerned about whether the methodology was correct as a detailed geographical, physical and biological representation, but rather to evaluate whether it would support the ultimate objective of the UNFCCC if implemented.

SESSION 3: LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER ARTICLES 3.3 AND 3.4.

Timo Karjalainen of EFI presented a study on carbon sinks and sources in the European Union (Liski et al, 2000). The analysis is to demonstrate the relative impact of different definitions on carbon stock estimates for EU countries, and a uniform data set was gathered and the same methods applied to the entire region so there is some consistency in results. Results were presented for all forests and ARD (afforestation, reforestation and deforestation) lands under Article 3.3 using FAO and IPCC definitions of ARD. In the EU as a whole ARD lands account for 2-9% of total forest area. Applying either definitions of ARD, the carbon stock changes under Article 3.3 were negligible (-5.4 Tg/yr for FAO, and 0.1 Tg/yr for IPCC definitions) when compared with the carbon sink in all forests (63 Tg/yr). However for individual countries ARD lands can represent a considerable carbon sink or source. The majority of forest lands in the EU are not covered by Article 3.3 but may be accounted for under Article 3.4 at a later date.

A presentation on the 'Domestic Options for Carbon Management' was given by Doug Bradley of Domtar Inc, Canada. There are a range of forest management projects that could increase the long term carbon stocks including pest and disease control, fire control, juvenile spacing and tree improvement. Carbon stock increases for a juvenile spacing trial were presented as an example. The results showed that juvenile spacing or pre commercial thinning decreases carbon stocks in the short term but in the long term can enhance tree growth and increase the average carbon stocks on high productivity sites. The issue of possible 'early crediting' by governments was also discussed. Early crediting could provide: the incentive needed to implement more 'enhanced carbon sequestration' projects than would otherwise occur; provide a wider range of options for meeting Kyoto net emission reduction targets and allow least cost solutions. There are also risks with early crediting such as issuing credits when the carbon sequestration is overestimated or never occurs.

The presenter was asked whether people/companies will react if given some early credit? Bradley replied that 'yes', currently electricity utilities and energy companies are interested in obtaining carbon credits from such projects because they cost less than other greenhouse gas reduction measures. What is the motivation for establishing such a systems when the government owns the forest estate? Bradley explained that much of the forest land in Canada is owned by the government (93%) but forest product companies manage the forest and own the trees therefore it is contested that they own the carbon in the trees.

Susan Subak, a fellow of the American Association for the Advancement of Science, based at the US Environmental Protection Agency gave a presentation on agricultural soil carbon accumulation

and decisions to be made at COP6. In the US, carbon sequestration in agricultural soils is not as controversial as in forests because credits for soils would be of relatively small scale. In addition, many members of the U.S. Congress are supportive of the prospect of providing farmers with financial benefits related to carbon sequestration activities. The potential for agricultural soil C sequestration is estimated to be about 50 Mt/yr for the US, 43 Mt/yr for Europe and 340 Mt/yr for the Former Soviet Union. In the US, activities considered to have positive environmental and carbon impacts are no-till and cover crop systems. There are several issues on soil C to be addressed to enable accounting under the Kyoto Protocol, these include: additionality, verifiability, reversibility and indirect effects. The Kyoto Protocol requires a decision whether or not agricultural soils are included, taking into account uncertainties, transparency and verification. This may not be possible because sufficient evidence may not be available to meet these requirements.

It was pointed out in the discussion that some countries are close to achieving saturation levels of carbon in their soils. Should credits then be given to countries that have a significant potential for sequestration because they have mismanaged their soils in the past? Subak stated that some countries have so little sequestration potential that investing in a expensive monitoring program may not be justified. The developing world has large areas of degraded soils, so in the long-run it would be constructive to develop soil carbon sequestration incentive programs.

Annette Cowie of State Forests New South Wales, Australia, gave a presentation on measuring and marketing of carbon sequestered in planted forests. The issue of who owns the carbon has been addressed by the State government and separated from the ownership of trees. Several carbon trades have already been made by State Forest New South Wales, and a standard carbon credit product is being developed. Carbon measuring and modelling is linked to existing stem production management systems, expansion factors are then used to estimate other carbon pools. The carbon accounting system must be robust, cost-effective, transparent and stand up to international scrutiny. Once carbon is measured, independently verified and certified it will be available for trading at three levels (40, 60 and 80 % of estimated carbon stock changes), the number depending on the measurement uncertainty. Management of a carbon pool that includes a number of forests or stands was also discussed. The advent of carbon trading provides a challenge to integrate forest management for wood and carbon values.

Replying to questions from the audience, Cowie said that the potential for C sequestration projects to cause social conflict in the Australian situation is not seen as significant, it is thought that they will have social and environmental benefits. In Australia forests can provide multiple benefits, such as addressing soil salinity and biodiversity issues while C sequestration is seen as an additional benefit.

The driving force for a carbon trading market in Australia is the requirement for national utilities to reduce emissions, and internationally because some people/companies are anticipating ratification of the Kyoto Protocol and emission reduction requirements.

In the discussion one participant pointed out that under Article 3.7 of the Kyoto Protocol there is the possibility of double crediting of the same unit of land. E.g. land deforested in or before 1990 would first increase the 1990 base year emissions and thus the assigned amount, and then could receive credits if reforested since 1990. The issue of reforestation credits following deforestation is discussed in the Special Report on LULUCF. One possibility to address it is to only give credits under Article 3.3 for land that was not forest in 1990. However, the "double crediting" would still partly remain for stands deforested just before 1990, due to their continued release of carbon in 1990.

SESSION 4: CURRENT STATE OF NEGOTIATIONS

Heikki Granholm from the Finnish Ministry of Agriculture and Forestry presented an overview of the current status of negotiations on LULUCF. Several key decisions are to be taken at COP6 in the Hague (Nov 2000) such as the inclusion of sinks, the flexibility mechanisms (JI, CDM and ET), compliance and the role of developing countries in the Protocol. There are high expectations that the Kyoto Protocol will be ratified by 2002 (Rio +10). Decisions made at COP6 will be confirmed by the first Meeting of the Parties (MOP1). While decisions at COP6 will be made at a political level, this would be facilitated by the agreement of technical solutions in the early stages of the negotiations.

The IPCC Special Report on LULUCF thoroughly explores Art 3.3, 3.4, and 3.7., helps policy makers for upcoming negotiations and has facilitated the policy process. Country specific data on Article 3.3 and 3.4 will also facilitate negotiations, because policy makers will be aware of the implication of these articles on country emission reduction targets.

Key decisions to be made at COP6 can not be postponed any longer if countries hope to meet their emission reduction targets. To ensure emission reduction targets for the first commitment period (overall, -5% of 1990 emissions) is met the Kyoto Protocol should be ratifiable, with some flexibility in how to meet emission reduction targets, retain its environmental effectiveness and provide a balanced treatment of all greenhouse gas sources and sinks. However there is still a need for intensive further research and methodological work in the next few years. Sinks were seen by some as the fourth flexibility mechanism agreed to in Kyoto, and therefore sinks should not have the opposite effect for countries that meet certain land-management related criteria. Finally, there should be a balanced treatment of all items

Andreas Fischlin (ETH Zurich) of the Swiss delegation provided his perspective on where the Kyoto Protocol is heading. Currently greenhouse gas (GHG) emissions are still increasing and are likely to grow further. The ultimate objective of the UNFCCC is the stabilisation of atmospheric GHG concentrations at safe levels. The Kyoto Protocol has to serve this objective. He gave an overview of three possible outcomes of the Kyoto Protocol including 1) the Protocol is abandoned at COP6 or COP7 because of the difficulties associated with sinks or other issues such as compliance, flexible mechanisms, or equity (Article 4.8, 4.9); 2) the protocol is ratified and becomes effective but because of the manner by which sinks are included net emission reduction targets are not met; and 3) the protocol is ratified, becomes effective and sinks conform to the ultimate objective of the UNFCCC. Major outstanding issues that still need to be addressed are the definitions of forest, the definition of ARD under Article 3.3, the eligibility of additional activities under Article 3.4, and the accounting framework, in particular with respect to factoring out certain effects like CO₂-fertilization, N-deposition, and beneficial climatic change effects. The inclusion of sinks is expected to affect many countries emission reduction requirements significantly. Fischlin pointed out that already in the first commitment period sinks, under Article 3.3 and 3.4 with land-based full carbon accounting, could exceed Annex I countries' emission reduction targets of minus 5% with respect to 1990 levels and in fact could allow even more than a 5% increase in fossil fuel emissions relative to 1990. He expects that the Kyoto Protocol negotiations will not be abandoned, but not all countries might be happy with the end result, not the least due to the inclusion of sinks.

In the following discussion one participant asked about the inclusion of soil carbon under Article 3.3: Some Parties are pushing for the inclusion of soil carbon, while others oppose this. Fischlin suggested they should be included, but doubts that they should be accounted as frequently as every five years (length of a commitment period), since measuring C uptake in soils after such short time

might be difficult. He emphasised that the Kyoto Protocol would have only a minor impact on the climate system, but was nevertheless of utmost importance as the foundation of a process towards climate protection and it would be important not to delay the process.

Lorenzo Ciccarese from the Italian Environmental Protection Agency presented an overview of issues surrounding the inclusion of sinks in the Clean Development Mechanism (CDM). He noted the most important issues to be addressed are: the type of projects to be included, how the baselines will be set, leakage, additionality, and whether CDM projects also meet countries sustainable development objectives. In an overview of the benefits of inclusion of sinks in the CDM the following were highlighted: promotion of 'early action'; promotion of (re)afforestation programmes; and sinks projects could also have other benefits, such as increased biodiversity and rural development. However there are issues and risks involved in including sinks in the CDM, that need to be addressed, such as the methodological and technical problems; how 'leakage' is to be accounted for; ensuring additionality; and permanence. The CDM could also represent a risk to the environmental integrity of the Kyoto Protocol because of the high potential for sinks resulting in a lot of LULUCF projects instead of projects that enhance clean energy development. One way of addressing some concerns is to put a cap on the percentage of LULUCF in the total CDM volume that a country can use to offset emissions. Concerns about livelihood impacts should not prevent carbon forestry projects' inclusion in the CDM. In this regard, the use of Social Impact Assessment standards, already used in other contexts, could ensure that no activities are carried out that reduce local population rights to land access and discourage sustainable development. Finally, in order to avoid conditions of discrimination for small-scale projects, it is important to define guidelines for project design and standardised contracts and to introduce other elements that reduce transaction costs.

In the discussion it was pointed out that some countries have so far played an active role about sinks and the CDM (especially South-American countries); others have expressed their opposition to the inclusion on sinks in the CDM (Eastern European countries and China). Some African countries tend to think of forestry as part of adaptation measures and not of direct use of carbon forestry projects in the CDM

Assuming sinks are included to some extent in CDM, should all projects be admitted or the same as for Annex 1 projects? Ciccarese responded that it is counter productive to assume very open inclusion of sinks in the CDM, their inclusion will probably be conditional, eg a 'positive list', and it may be important to view CDM credits as part of group of benefits, including sustainability, rural development.

FINAL DISCUSSION

To frame the final discussion, the question was posed to the presenters and to the audience: "If you had a choice, what would be your wish-list, and in your opinion a positive outcome from COP6 in The Hague?"

Responses by participants were:

The Protocol should still lead to a 5% reduction in GHG emissions between 1990 and the first commitment period, so that the atmosphere is not experiencing more emissions than originally intended by the Kyoto Protocol. A fear of "do-nothing-sinks" credits was expressed. Genetically modified species may pose another threat.

Inclusion of sinks but with strict boundaries and simple carbon accounting methodology, so that the role of sinks is not overstated. LULUCF rules should be applied consistently across countries, i.e., a generic system but nations decide how much and what to spend on monitoring sinks, if they think they are important. Sinks included in CDM, but hard to implement in a way that does not distort KP.

Could include sinks in 3.4 and CDM. However, only a fraction (e.g. 5%) of the carbon on the site should be tradable, to cope with uncertainty, and long term maintenance costs of terrestrial carbon stocks.

Delegations go into the process based on good science and concern for the well-being of ecosystems, the Kyoto Protocol is a door to pass through and not the final objective.

One participant would not like to see an outcome in Hague that takes another 3 years to explain what has been agreed to. A simplified and robust approach to accounting for sinks is preferred, because a detailed approach may rather cause damage to the process. The outcome should reflect what the atmosphere sees (i.e., consider more than only stock changes on 2% of the land), and be consistent with sustainable forest management objectives. The credibility of the Protocol will be improved if sustainable forest management, and stock increases lead to credits rather than debits. It is important to have decisions at the Hague on sinks, and to know what sinks mean for different countries.

Another participant argued for the inclusion of sinks, but that clear and strict guidelines for projects are needed. He saw carbon as the by-product to strengthen other social and environmental objectives. He sought a limit on the percent reduction that can be met by CDM, and limit on the percentage of sinks share in the CDM. Start simple and slowly. Should not just include new plantations or other specific land-uses, because this would give the wrong signal, and could provide incentive to deforest old growth and other forests.

One participant feared that people involved in the negotiating process may not all be aware of the subtleties between different definitions and processes in terrestrial ecosystems (e.g., GPP vs. NBP etc.). There is the danger of looking at too much detail, simple systems should prevail. For instance, using the pig example, he suggested that one should rather weigh the pig (measuring stocks) than to look at the flows in and out (fluxes). The pig eats a lot relative to the weight gain!. One should strive for an accounting system which reflects "what the atmosphere sees", and not get lost in nitty-gritty details and overlook the major effects of relevance to the climate. On the other hand, the factoring out of some aspects such as so-called natural effects,(CO₂-fertilization, nitrogen deposition, beneficial climate change effects) is of outmost importance. If they are not separated from other effects, net emissions will actually not decrease relative to a business-as-usual scenario without the Kyoto Protocol. Of course, many questions remain, whether certain disturbances such as fires, insect outbreak, negative impacts of climate change etc. will all have to be factored out as well?

Again the need for a decision on the inclusion of sinks was stressed. The world community needed to move forward.

Finally, it was said that some certainty for future investments is needed. For example, countries setting up accounting systems need more information now in order to proceed.

Much attention has been given to carbon sequestration, and less to substitution options (bioenergy, materials substitution). The desire was articulated to recognise the complexity of the problem, and to yield a better balance between carbon sequestration and substitution options. In any case, measuring and monitoring must be possible.

IEA Bioenergy

Task 25 Greenhouse Gas Balances of Bioenergy Systems

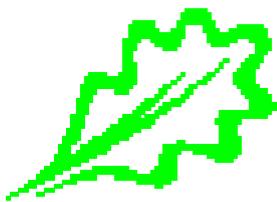
Final Programme of the
session on

Land-Use, Land-Use Change and Forestry: the road to COP6

28 September 2000

Joensuu, Finland

Jointly organized by



European Forest Institute
Torikatu 34, FIN-80100,
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Cost E21



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Task 25 Website: www.joanneum.ac.at/iea-bioenergy-task25

Land-Use, Land-Use Change and Forestry: the road to COP6

Organised by: IEA Bioenergy Task 25 "Greenhouse Gas Balances of Bioenergy Systems"

Co-organised by: COST E21 "Contribution of Forests and Forestry to the Mitigation of Greenhouse Effects"

European Forest Institute (EFI)

University of Joensuu, Faculty of Forestry.

Thursday 28 September, 2000

Moderator: Bernhard Schlamadinger

8.15 Introduction

Session 1: Overview of the IPCC Special Report (15 min pres and 5 min of questions)

- 8.30 Chapter 2, Implications of different definitions and generic issues
Presented by Gert-Jan Nabuurs, ALTERRA Green World Research, the Netherlands
- 8.50 Chapter 3, Afforestation, Reforestation, and Deforestation (ARD) Activities
Presented by Bernhard Schlamadinger, Joanneum Research, Austria
- 9.10 Chapter 4, Additional human-induced activities - Article 3.4
Presented by Gregg Marland, Oak Ridge National Laboratory, USA
- 9.30 Chapter 5, Project based activities
Presented by Omar Masera, University of Mexico, Mexico
- 9.50 Chapter 6, Implications of the Kyoto Protocol for the reporting guidelines
Presented by Justin Ford-Robertson, Forest Research, New-Zealand
- 10.10 Discussion, elaboration of innovative ideas in light of the negotiations
- 10.30 Coffee

Session 2: Carbon accounting methodologies

- 11.00 Effectiveness of LULUCF carbon accounting methodologies in supporting climate-conscious policy measures
Robert Matthews¹ and Rebecca Heaton², ¹Forestry Commission Research Agency, Wrecclesham, U.K. ²The Salix Project, University of South Wales, U.K.
- 11.20 The ton-year index as a basis for carbon accounting of forestation projects under the Climate Convention
Kim Pingoud, VTT Energy, Finland
- 11.40 A practical procedure of accounting for LUCF activities under the Kyoto Protocol
Miko Kirschbaum et al, CSIRO Forestry and Forest Products, Australia. Presented by Annette Cowie, State Forests New South Wales, Australia

- 12:00 Carbon accounting methodologies – a comparison of real-time, tonne years and one-off stock change approaches
Piers Maclaren, Forest Research, New Zealand
Presented by Justin Ford-Robertson, Forest Research, New Zealand
- 12:20 Discussion, elaboration of innovative ideas in light of the negotiations
- 12:40 Lunch.

Session 3 : Land use, land-use change and forestry activities under Articles 3.3 and 3.4

- 13:40 Trees as C sinks and sources in the EU in light of Kyoto Protocol Article 3.3 and the ongoing negotiations
Jari Liski, European Forest Institute
- 14:00 Domestic Options for Carbon Management
Doug Bradley, Domtar Inc, Ottawa, Canada
- 14:20 Addressing COP6 decisions on agricultural soil carbon accumulation
Susan Subak, Environmental Protection Agency, U.S.A.
- 14:40 Measuring and marketing of C sequestration in planted forests in New South Wales, Australia
Annette Cowie, State Forests New South Wales, Australia
- 15:10 Discussion, elaboration of innovative ideas in light of the negotiations
- 15:30 Coffee.

Session 4: Current state of negotiations

- 16:00 Status of the negotiations on LULUCF
Heikki Granholm, Ministry of Agriculture and Forestry, Finland
- 16:20 To agree or not to agree: perspectives for LULUCF negotiations
Andreas Fischlin, ETH Zurich, Switzerland
- 16:40 Sinks and the CDM: status of negotiations and the outlook to COP6
Lorenzo Ciccarese, National Environment Protection Agency, Italy
Davide Pettenella, University of Padova, Italy
- 17:0 Discussion; elaboration of innovative ideas in light of the negotiations
- 18:00 End of session.

**IEA Bioenergy Task 25 and COST E21 Session at the “Woody Biomass as an Energy Source” Conference
 “Land-Use, Land-use change and Forestry: the road to COP6”
 28 September 2000, Joensuu, Finland.**

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