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Responding to the Kyoto Protocol through forestry: A comparison of opportunities for several countries in Europe

Maria Nijnik [a,*], Livia Bizikova [b,c,1]

[a] Socio-Economic Group, the Macaulay Land Use Research Institute, Craigiebuckler, Aberdeen, Scotland, AB 15 8QH, United Kingdom
[b] Adaptation and Impacts Research Division (AIRD), Environment Canada, W. Maurice Young Centre for Applied Ethics, The University of British Columbia, 428-2202 Main Mall, Vancouver, B.C., Canada V6T 1Z4
[c] Institute for Forecasting, Slovak Academy of Sciences, Sancova 56, Bratislava, 811 05, Slovakia

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Abstract

Climate change has become an important environmental policy issue. Numerous carbon sequestration policy initiatives, potential benefits of which in environmental, economic and social terms could be substantial, are directed toward both woodland expansion and using of wood as a substitute for fossil fuels. There is a great deal of uncertainty, however, on how to define sustainability of such policies in a broadly acceptable and efficient way; how to translate sustainability requirements into policy guidelines; how to overcome market limitations and where to place biomass production in the general context of land use where contemporary agricultural change will likely be influential. On the basis of several countries from Europe (the United Kingdom, the Netherlands, Slovakia, and Ukraine) this paper highlights social and economic problems of moderating carbon emissions through afforestation. It provides an indication of whether forestry can offer a socially acceptable and a low-cost opportunity for carbon uptake. The conclusion is that along with carbon sequestration potential, the level of land use integration and the stage of institutional development play important roles for effective implementation of climate policies. The necessity is then to link these policies with regional developments, and to back them up with adequate economic incentives, appropriate institutions and with public engagement in environmental decision-making.

Keywords: Forestry; Policy; Climate change; Carbon sequestration; Sustainable development; Europe; the United Kingdom; the Netherlands; Slovakia; Ukraine

1. Rationale

The Kyoto Protocol (KP) to the United Framework Convention on Climate Change (UNFCCC, 1998) became legally binding on its 128 Parties on 16 February 2005 (UNFCCC, 2004). The Parties committed themselves to stabilization of atmospheric greenhouse gas (GHG) concentrations, including those of CO_2. The target of 8% reduction of GHG for the EU was distributed on the differentiated basis to individual Member States (EC, 2002a). This target can be achieved by reducing emissions and by removing GHG from the atmosphere. Article 3.3 of the KP states that biological sources and sinks may be used for meeting the commitments during the stipulated period, but limits them to afforestation, reforestation and reducing of the rates of deforestation since 1990. Article 3.4 provides the possibility of using additional land use change and forestry to address the KP.

Since the Conference of the Parties, COP 7 (UNFCCC, 2002), afforestation, reforestation and improvement of existing forests, their protection and sustainable management, as well as soil carbon have become eligible climate policies. The total area of EU forests (113 Mha) has expanded by 3% over the last decade, with 1 Mha been afforested in 1994 through 1999 (EC, 2002b). Further expansion of woodlands will result in the creation of carbon sequestration (CS) potential of 3.84 Mt C/yr during the commitment period of the KP, whilst the potential of 34 Mt C/yr may be reached in the long run (EC, 1998).

An increase in the area of short rotation tree plantations (SRTP), regeneration of secondary forests, wood production for fuel and a replacement of energy intensive products with wood are also considered important (EC, 1998). The Environmental strategy (EC, 1997) necessitates the increase of energy

* Corresponding author. Tel.: +44 0 1224 498200x2360; fax: +44 0 1224 311556.
E-mail addresses: m.nijnik@macaulay.ac.uk (M. Nijnik), liviab@interchange.ubc.ca (L. Bizikova).
[1] Tel.: +1 604 822 1685, +421 2 52 49 52 50.

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production from renewables from 6% in 1998 to 12% in 2010 where woody biomass is seen among the most promising energy sources. The potential to sequester carbon from SRTP and substitution of biomass for fossil fuels is in the range of 4.5–9 Mt C/yr (EC, 2003b). To achieve these carbon savings proper incentives, however, are needed to enhance the link between agricultural and land use CS policies, particularly related to set-aside and marginal agricultural lands (EC, 1997; Van Kooten and Eagle, 2005).

This paper explores viability of encouraging land use CS activities, and investigates which measures can be adopted for the creation of carbon (C) credits. The KP has established flexible mechanisms known as joint implementation (JI), the clean development mechanism (CDM) and emissions trading (ET) designed to help Annex B countries to meet their emissions reduction targets at least cost (UNFCCC, 1998). According to these mechanisms, the fall in C emissions primarily due economic recession in non-EU transition countries provides opportunities of selling C offsets to the industrialised countries included in Annex B (Petkova and Faraday, 2001). The opportunities arise not only due to the decline of CO_2 emissions during the economic transition since 1990, *i.e.* "hot air", but also out of selling of C offsets from newly established woodlands on the abandoned land. The paper does not proceed to the analysis of flexibility mechanisms. However, it touches ET by (1) addressing CS forestry projects and (2) analysing of the CS potential in forestry under several policy scenarios and across the studied countries.

Differences across countries make it hard to define a unified solution for policy measures targeting Europe, as a whole. The efficiency and effectiveness of CS policies are strongly linked to institutional developments (Merlo and Paveri, 1997). These aspects have been discussed by Nabuurs et al. (1999); Slangen et al. (1997); Van Kooten and Bulte (2000); Van Kooten, 2004, *etc*. In transition countries, they have been examined by Sabonis-Helf (2003), Fankhauser and Lavric (2003), Den Elzen and De Moor (2002), and Nijnik (2005). This paper extends their work by exploring CS potentials and institutional settings for implementing CS policies in several countries in Europe.

2. Logical framework

A regional approach based on evaluation of climate policies and institutions, as well as on the estimation of CS potentials across several European countries has been chosen for this study. We analysed countries with different socio-economic and institutional characteristics and with a distinctive association with the EU. The UK plays a leading role in global efforts to tackle climate change and shows a sound example of CS policy implications. The Netherlands makes a sound comparison with the other countries as in the addressing of Kyoto it can hardly rely on forestry. It heavily invests in energy efficiency and successfully implements the JI and CD mechanisms (Van Kooten, 2004). The selection of Slovakia (already a EU Member State) and Ukraine is based on the analogy between the development paths of these countries, which include the transition to a market economy and the setting up of new institutional frameworks, after an achievement of their independence. Important is that marginal and abandoned lands are available in these countries (Nijnik and Van Kooten, 2000; FAO, 2006) where tree-growing conditions are good and plantation establishment costs are relatively low (Nijnik, 2005). Given that, an economic analysis of afforestation for CS in Slovakia and Ukraine is a motivating topic (Table 1).

The selected countries enabled us to compare the impacts of international agreements and of national laws and regulations on climate change mitigation priorities and capabilities, and on associated policy implications. The case studies were analysed for the purposes of:

- Elaboration of the framework for estimation of CS potentials under different scenarios;
- Application of the examples from the UK and the Netherlands on how to improve climate policies, *e.g.* by identifying synergies for "win–win" solutions and by addressing trade-offs;
- Exploration of the reasons of why the countries may be interested in climate policies involving forestry;
- Demonstration of the importance of strengthening the linkages between international agreements and the EU and national policies in an integrated way.

The first sections of this paper address study approach and background information about the case studies. Then, on the basis of the models developed and discussed in-depth in our earlier papers (Nijnik 2002, 2005; Bizikova 2004; Bizikova and Tubiello, 2007; Nijnik and Bizikova, 2007), the study recaps research methodology and presents CS forest policy scenarios (storage vs. energy options), as well as their comparative analysis across the four countries. Information resulting from the estimation of CS potentials and from the analysis of policy instruments and institutional structures in each of the studied countries is then synthesised. We draw a special attention to capturing of the convergence in the development of CS policies in the transition countries and project their policies and practices against the experiences from the UK and the Netherlands. The importance of institutions and of stakeholder involvement in the development of conditions for carbon offsetting in forestry is finally highlighted.

3. Methodology in brief

The examination of the potential benefits of CS has provided the data necessary to demonstrate whether there is a role of forestry, along with other policy initiatives, in coping with

Table 1
Carbon storage in forests across countries and their potential for afforestation

Countries	Wooded cover, % to area	Forest area, Mha	Stock of forest above-ground biomass, Mt	C in forest, above ground, Mt	C in forest soil, Mt	Projected increase of wooded cover, %
Netherlands	10.8	0.365	43	21	40	20.5
Slovakia	40.1	1.929	334	167	270	21.5
UK	11.8	2.845	190	95	719	25.0
Ukraine	16.5	9.575	1199	600	n.a.	23.9

Source: FAO (2006).