

EDITED BY ALESSANDRO PERESSOTTI

LOCAL STRATEGIES FOR LAND USE MANAGEMENT ACCORDING TO KYOTO PROTOCOL

**EXPLORING NEW MANAGEMENT TOOLS
FOR CO₂ SEQUESTRATION IN
AGRICULTURAL LANDS AND FORESTS**



Project part-financed
by the European Union

Cross-border-areas: A new network of interdisciplinary monitoring of terrestrial carbon mitigation options

B. Felbermeier¹

Introduction

One of the main objectives of Carbon-Pro consists in pinpointing integrated cross border methods of sustainable management of agricultural and forest resources for the CADSES area towards a shared carbon balance. The specific methodological targets are (i) to evaluate the role of forest and agricultural resources in retaining carbon, (ii) to evaluate the effects deriving from variation in the management of such resources, (iii) to demonstrate management methodologies and methodologies of sustainable use of forests and agricultural land, able to strengthen the capability of absorption of greenhouse gas, (iv) and to apply estimation, measure and monitoring methods to evaluate the impact on the carbon cycle, which derives from changes in managing agricultural and forest resources.

The analysis should be based on representative cross border areas of intensive monitoring for the carbon cycle. The selected territories should be representative of the whole CADSES area, and should consist of

- mountain forests, represented by natural forests (especially in the Balkan area) and mature alpine forests, and closer to natural forests;
- agro-forestry surfaces of the fluvial Danube lands;
- Mediterranean forests;
- fast growing forests in agricultural areas (poplar-growing);
- commercial high productive forestry areas.

Building up a network of cross border areas

A network of project areas in the partner countries was installed according to these objectives building the common scientific basis of the project. The selection of the areas followed EU-regulations, which define cross border areas as a network of regions with homogeneous features and functional interdependencies at administrative spatial contexts primarily based on NUTS-3-Level (Council of Europe, 1972; Perkmann, 2003; Europäisches Parlament, 1995, 2003; Commission of the European Communities, 1992).

¹Technical University Munich, Germany.

Carbon-Pro uses standard classification schemes of climate, soil, vegetation, land cover, and present management to describe the homogeneity of spatially different regions (Umweltbundesamt, Deutsches Fernerkundungsdatenzentrum; Deutsches Zentrum für Luft und Raumfahrt, 2003; Europäisches Parlament, 2003; FAO, 2006; Köppen, 1936; Kommission der Europäischen Union, 2007). It uses the regional opportunities for the assessment of carbon mitigation and the proposed future carbon management strategies to derive functional interdependencies between the project regions.

Data of different areas were collected from all partners to quantify the regional characteristics and test them by cluster analysis. As the final result following regions were selected to build up the Carbon-Pro network of cross border areas (Figure 1):

- Bayerische Alpen (Technische Universität München, Germany)
- Belluno Province (Regione del Veneto, Italy)
- Dubrovnik and Neretva County (Forest Research Institute, Croatia)
- Friuli Eastern Prealps (Università di Udine, Italy)
- Friuli Venezia Giulia lower plain area (Regione Friuli Venezia Giulia, Italy)
- Friuli Venezia Giulia mountain area (Regione Friuli Venezia Giulia, Italy)
- Friuli Venezia Giulia plain (Università di Udine, Italy)
- Kocevski Rog (Slovenian Forestry Institute, Slovenia)
- Nyugat Dunántúl (Hungarian Meteorological Service, Hungary)
- Pohorje (Slovenian Forestry Institute, Slovenia)
- Salzburg (CERE, Austria)

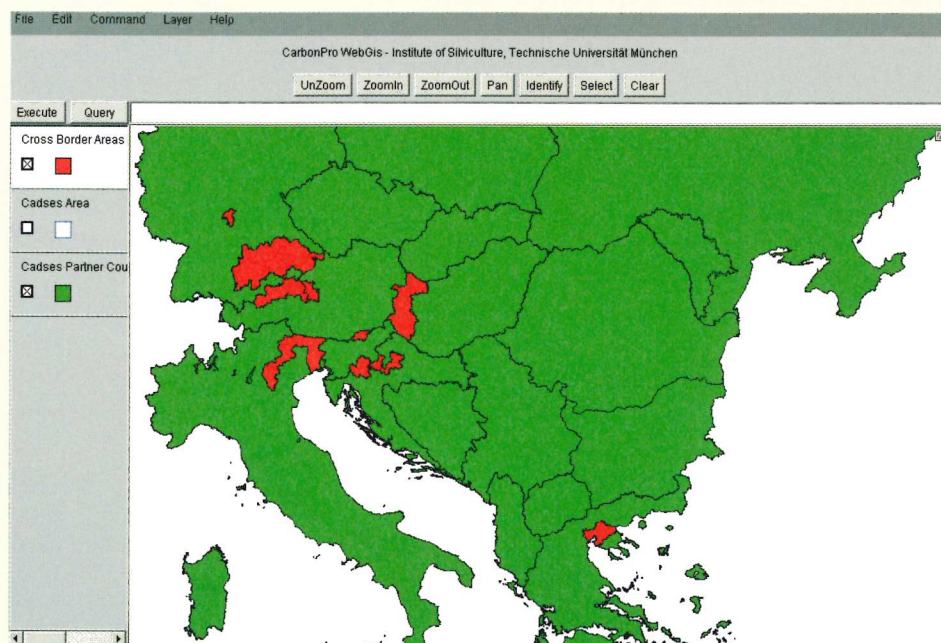


Figure 1. Map of the selected cross border areas (Source: Carbon-Pro WebGis).

- Schwaben (Technische Universität München, Germany)
- Thessaloniki (Municipality of Thessaloniki, Greece)
- Vicenza Province (Regione del Veneto, Italy)
- Unterfranken (Technische Universität München, Germany)
- Zagrebacka County (Forest Research Institute, Croatia).

The selected areas show clear homogenous features in the natural conditions (i.e. mountainous areas), but demonstrate that management is primarily based on national and traditional aspects. This transnational network of test areas offers therefore the opportunity for the partners to use existing and collect new regional data for the development of new common transnational strategies, which can improve the carbon mitigation options in the CADSES area.

Development of a common approach for carbon balance accounting

Carbon balances are based on measured data and the application of carbon models. The deviation of management effects on the carbon balance can be described by time series. Therefore a common approach for carbon balance accounting is developed based on regional observation data, which allow the production of time series for carbon balance modeling.

By a comparison of available data in the partner countries three major resources for car-

Region	Climate			Soil						Vegetation															
	Monthly Temperature Statistics	Monthly Precipitation Statistics	Monthly Solar Radiation Statistics																						
	Soil Type	Soil bulk density	Soil Microflora	Soil Humus Composition	Soil Organic Carbon	Soil Total Carbon	Soil Total Nitrogen	Soil Total Phosphorous	Stand Topography	Stand Age	Stand Species Composition	Stand Mean Height per Species	Stand Mean Diameter per Species	Stand Diameter Distribution per Species	Stand Timber Volume per Species	Stand Timber Volume Increment per Species	Stand Biomass Living above Ground	Stand Biomass Living below Ground	Stand Biomass Deadwood	Stand Biomass Dead Litter	Stand Biomass Living above Ground Increment	Net Ecosystem Productivity	Net Primary Productivity	Land Use	Livestock Density
Bayerische Alpen																									
Belluno Province																									
Dubrovnik and Neretva County																									
Friuli Eastern Prealps																									
Friuli Venezia Giulia lower plain area																									
Friuli Venezia Giulia mountain area																									
Friuli Venezia Giulia plain																									
Kocevski Rog																									
Nyugat-Dunántúl																									
Pohorje																									
Schwaben																									
Unterfranken																									
Vicenza Province																									
Zagrebacka County																									

Table 1. Data available in the cross border areas.

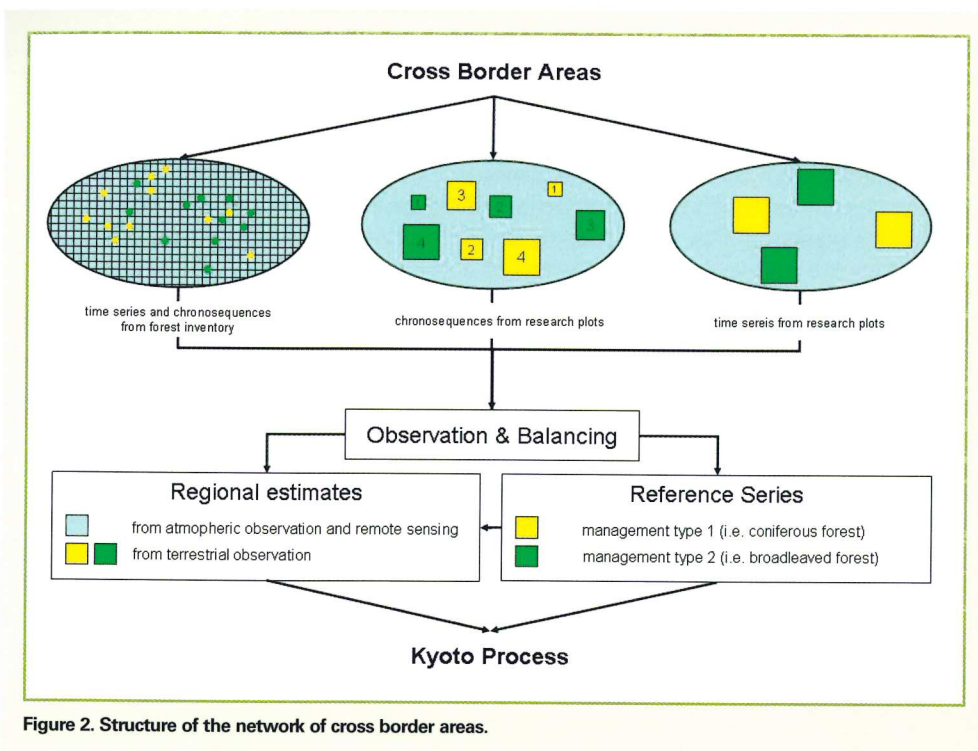


Figure 2. Structure of the network of cross border areas.

bon measurements were identified: (i) Long term observation plots, (ii) chronosequences of intensive research plots, and (iii) spatial information from forest inventory and remote sensing data (Figure 2). A comparison of the available data showed, that the environmental conditions and the structure of terrestrial ecosystems are well documented, while gaps exist in biomass measurement and soil carbon estimation (Table 1). Therefore additional data had to be collected for the calculation of carbon balances according to the present international guidelines (Intergovernmental Panel in Climate Change 2006). As a common result carbon balances were calculated demonstrating the present status and future options of carbon mitigation in the cross border areas.

References

- Bortz J. (1999), *Statistik für Sozialwissenschaftler*, Berlin, Springer.
- Council of Europe (1972), 1. *Europäisches Symposium der Grenzregionen*, Die Zusammenarbeit europäischer Grenzgebiete, Strasbourg.
- Commission of the European Communities (1992), *A Practical guide to cross-border cooperation. Enterprise policy*, Luxembourg, Directorate-General XXIII of the Commission of the European Communities.
- FAO (2006), *World reference base for soil resources 2006: A framework for international classification, correlation and communication*, World Soil Resources Reports 103.
- Europäisches Parlament (1995), *EU Cross-Border Co-operation: up to 2006*, Bericht vom 22.6.2005, Strassburg.
- Europäisches Parlament (2003), Verordnung (EG) Nr. 1059/2003 des Europäischen Parlaments und des Rates vom 26. Mai 2003 über die Schaffung einer gemeinsamen Klassifikation der Gebietseinheiten für die Statistik (NUTS).
- Intergovernmental Panel in Climate Change (2006), *IPCC Guidelines for National Greenhouse Gas Inventories*.
- Kommission der Europäischen Union (2007), Verordnung (EG) Nr. 105/2007 der Kommission vom 1. Februar 2007 zur Änderung der Anhänge der Verordnung (EG) Nr. 1059/2003 des Europäischen Parlaments und des Rates über die Schaffung einer gemeinsamen Klassifikation der Gebietseinheiten für die Statistik (NUTS).
- Köppen W.P. (1936), *Das geographische System der Klimate*, Nendeln/Liechtenstein.
- Perkmann M. (2003), *Cross-Border Regions in Europe: Significance and Drivers of Regional Cross-Border Co-Operation*, European Urban and Regional Studies, 10(2), 153-171.
- Umweltbundesamt, Deutsches Fernerkundungsdatenzentrum am Deutschen Zentrum für Luft- und Raumfahrt (2003), *Landnutzungsdatensatz CORINE Land Cover 2000*.