Verification of Land-Use, Land-Use Change and Forestry Activities as specified by the Kyoto-Protocol: The role of remote sensing and GIS within a scientific verification concept

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Every international treaty requires a solid solution on verification. Currently for the verification of Kyoto reports it is suggested that countries that are parties to the protocol submit baseline data and their inventory mechanisms for external review. However, only independent observations can lead to meaningful verification. Particularly Europe, with a leading role in the post-Kyoto negotiations, should further strengthen its position by establishing an autonomous European verification capacity of potential global outreach.

This paper presents the key elements pertaining to a solid scientific verification concept (SVC) and, based on this, further highlights a methodology for a cost-efficient, practical independent mechanism to verify Kyoto LULUCF activities. The verification mechanism itself considers critical issues including sustainability criteria, uncertainty, quality control and verification from a local to regional level.

The platform for the SVC is full greenhouse gas accounting, and considers five phases, from data plausibility to the application of remote sensing at local and national scales. The five phase approach is necessary in order to keep the long-term perspective and afford a flexibility to adapt to changing requirements. However, the SVC also pursues verification at a “pre-carbon” level; a type of verification that is urgently needed to support the Protocol in the short-term. The SVC embraces appropriate knowledge and independent observations from site inspections and satellite imagery. The integrity of systems and is underlined as being an important requirement, together with the efficient reuse of data such as GIS data related to topography, soil, vegetation, forest inventory, region boundaries, and other land and landscape information.

A methodology demonstrating operational verification techniques is illustrated built upon the technologies used in the EU’s Control with Remote Sensing (CwRS) programme The CwRS programme is a well established tool for the control of area-based agricultural activities across Europe and is enforced by Council regulations. The experiences gained from CwRS have been used to clearly identify technological needs and institutional frameworks. The intelligent use of remote sensing and the efficient integration of existing GIS techniques and data ensure a cost effective approach for this verification task.

Based on the SVC the CwRS techniques are extended and applied to the Kyoto Protocol by introducing LULUCF specific verification methods. In other words, the scientific verification concept provides the larger framework and CwRS provides the technological basis on which the demonstration work is built upon.