

use and landscape pattern changes at the meso-scale. GISCAMÉ is a software platform including a hierarchical multicriteria assessment framework in which information on the impact of land-use pattern and its changes on the provision of eco-system services is iteratively aggregated. This includes (a) an indicator-based qualitative assessment of the impact of land-use classes in their local site and proximity context, and (b) an assessment of the additional impact of the land-use pattern by a set of landscape metrics. Based on selected case studies, we demonstrate that ignoring landscape structural effects in estimating regional potentials to provide aesthetically valuable landscapes with functioning ecosystem processes would lead to a systematic error. Landscapes with the same share of major land-use classes such as forestry or agriculture, but with different spatial pattern are either over- or underestimated. Furthermore, we could prove that replacing land-cover classes by land-use classes which use regional management knowledge (silvicultural planning + forest inventory; agricultural statistics) is an essential request to come to a sound estimation of regional ecosystem services provision potentials. In our case studies, opportunities to optimize the landscape pattern based on land-cover classes were limited. Integrating land-use knowledge and landscape structural aspects gave the basis for a detailed analysis on how to improve regional services provision under consideration of realistic opportunities to restructure the pattern of agricultural and forest land-use types which link land management knowledge with spatial planning.

Key words: GISCAMÉ, ecosystem services, land-use & land-cover classes, landscape metrics, impact assessment.

Acknowledgements: We wish to acknowledge the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) for supporting the RegioPower project (22019911 (11NR199)) in which the case studies were made.

Payment for ecosystem services in Brazil: situation and challenges

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Despite Brazil's forceful environmental legislation which has been evolving since the 1930s, the country has not been able to fully achieve sustainable development. The command and control strategies preconized in its laws have been proven to be insufficient. In view of this context and following global trends, some ways to implement economic instruments in environmental management have been discussed since the 1990s. The objective of this study is to present the Brazilian experience in implementing economic instruments as a tool for environmental management and as a promoter of sustainable development. In Brazil, many strategies are being used to implement programs and carry out actions of Payment for Environmental Services (PES), such as: Ecological Sales Tax; Private Nature Reserves; Forestry and Green Grant Programs; REDD projects; Proambiente Program; Water Producer Program; and others. Despite such actions, the lack of some legal basis and adapted governance schemes still represents a limitation; however, several law projects are being discussed in the Brazilian Congress. An example is the one that establishes the Environmental Services National Policy and the PES Federal Program. The need for technical knowledge to support PES policies has emerged as a new challenge, motivating many research projects in the country. As a conclusion, it is important to point out that PES initiatives have multiplied quickly in Brazil and are being used as a complementary tool to promote environmental preservation, the responsible use of natural resources, and gradual processes of sustainable agricultural transition. However, there are still some challenges to be met.

Key words: environmental policies, ecological services, research, ecological processes, governance.