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SUSTAINABILITY IN KARST RESOURCES MANAGEMENT: 
THE CASE OF THE GUNUNG SEWU IN JAVA

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for the degree of Doctor of Philosophy
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Abstract

Although land is abundant, biophysical constraints on Gunung Sewu Karst in Java, Indonesia, limit soil fertility and water availability. Gunung Sewu farmers depend heavily on the land for their survival yet they have a scarcity of the resources needed for productivity. Faced with the need to survive, they have developed cultural, physical and social self-insurance strategies to increase the return from those resources available to minimise the risks to their food security and income. Strategies for land use choices are driven by socio-economic circumstances (social, economical and cultural needs), while strategies for income are driven more by the physical environment. The study confirms that human adaptation strategies are as important as environmental circumstances in determining the consequences of people’s interaction with the land.

The rocky desertification that occurs in the area reflects the unsustainability of current rural practices, although this cannot be blamed entirely on current practices. Historical analysis of Gunung Sewu land use shows that environmental degradation is often triggered by external social factors such as population growth, politics and economic problems as much as, or more than, by the limitations imposed by biophysical factors. Therefore, the sustainability of current resource management in the area cannot be measured by the current extent of land degradation. Instead, there is a need to focus on the causes that underpin the dynamics of a system, not the effects (impacts), i.e. the underlying causes of people’s motivation and behaviour with respect to resource management must be considered. In effect, sustainability indicators for resource management in Gunung Sewu should be addressed through causal indicators portraying the interactions between people and environment.

A system dynamics approach coupled with steps from PICABUE methodology are used to develop sustainability indicators. From a system dynamics perspective, five interacting sub-systems make up the resource management system of Gunung Sewu, i.e. water, demography, food production, economy and culture (where water is treated as exogenous factor). Out of these sub-systems, culture is the most influential but the least influenced. The sustainability indicators for the system are soil conservation effort, interest in traditional farming, education level, births, on-farm income, outmigration, rice consumption and crops consumption, each crammed with sensitive parameters, most of which belong to the culture sub-system. This suggests the important of cultural indicators in an evaluation of the resource management sustainability of a resource-poor area.

Key words: Gunung Sewu Karst, sustainability, resource management, culture, system dynamics
Dedication

This work is dedicated to all people who rely on karst resources for their livelihood and to those who have worked so hard for the recognition of karst resources conservation in Indonesia.
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