

## GIS-based zoning plan for the Rwandan Volcano National Park - Toward an environmental decision support system

G. Rwanyiziri\*  
J-P. Dushimumuremyi\*  
M. Schilling\*  
F. Lasry\*

*\*Centre for Geographic Information Systems and Remote Sensing, National University of Rwanda,  
BP 212, Butare, Rwanda, email : [cgis@nur.ac.rw](mailto:cgis@nur.ac.rw)*

### **Abstract:**

The resources of a protected area are not distributed in a homogeneous way, and the first stage of any management and planning system should consider this distribution by using cartographic tools allowing their localization and their visual representations.

Zoning is a technique of planning which allows evaluating and classifying the territories, according to the values of the resources, the sensitivities and the desired conditions or the objectives of management. It aims at indicating the places where the various strategies of conservation or development are carried out, and determines the future of a protected area.

A recent study lead by the Center for Geographic Information Systems and Remote Sensing of the National University of Rwanda focused on producing a zoning proposal for the National Park of Volcanos (NPV). After having taken into account the constraints and the opportunities described in a preliminary inventory, and based on a GIS support system, it will be used as a geographical basis for the various strategic programs developed in the Park,. The following parameters were proposed: (i) the typology of the peripheral zones, (ii) the determination of the zones of influence between the NPV and the communities, and vice versa (tourism, agriculture, supply water, damage by the animals of the park, illegal activities,...) and (iii) the activities of development and priority proposals for alternatives.

The GIS-based decision system was developed based mostly on land survey and satellite image data, integrated in a geodatabase for queries, analysis, and mapping.

The results showed that the case of the National Park of Volcanos (NPV) as regards of zoning is interesting in more than a way. Following the strong demographic pressure that affected the North-West of Rwanda, the NPV was cut down successively in several parts during the period 1958-1974. These downgradings led to the creation of an interface zone without transition between the park and the bordering communities, without presence of zone-plug. The fields of the close populations begin literally where the forest ecosystems of the park stop. Operations of physical delimitation of the park were carried out in the past (installation of a belt of cypress, exotic species) or more recently (construction of an enclosing wall also being used as barrier for a series of savage animals coming from the NPV).

The relations, sometimes difficult, between the bordering NPV and its population constitute in fact a crucial laboratory for the comprehension of the interface between a protected surface and the communities neighbouring. It is indeed extremely probable that this extreme situation the NPV knows will be early or late the prerogative of a great number of protected areas in Africa. Thus the NPV represents a pilot site which will perhaps allow testing new approaches that will be then taken in example by other African protected areas.