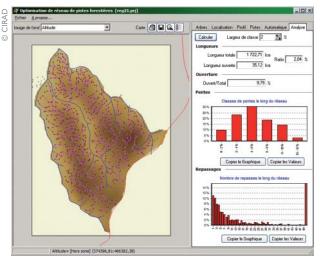


GIS tools are essential for tropical forest management



▲ Map interface of a support tool for forest trail network planning.

Since the Earth Summit (Rio, 1992), principles that promote ecologically sustainable management of tropical forest ecosystems are widely recognized. In Central Africa, sustainable forest management has become a key element of new forestry policies. Over the last 10 years, geographic information processing tools (GPS, image processing software and GIS) are widely used by professional stakeholders and GIS has become an essential tool for African forest managers.

Within the framework of companion research, CIRAD has been involved for over 15 years in the development of remote sensing methods to monitor forest cover and of GIS-based decision support tools.

Because of the complexity of the objectives (especially reconciling multiple uses), forest managers are hampered to an increasing extent by the problem of translating their objectives and potential management scenarios into a set of mathematical equations. This difficulty is partly due to the fact that foresters are unable to determine the state of a target system at any given time, and to the imprecise or even intuitive nature of the decisionmaking elements.

The research under way is geared towards the development of tools to support decisionmaking on planning forest trail networks, on creating plot layouts, on designing 'reduced impact' logging and on predicting stand growth. Because of the contextual limits (acceptance and adoption by stakeholders) of automated and mathematical optimization approaches, CIRAD aims to develop interactive and semiautomated management support tools. GIS software is a key tool for facilitating information integration and cartographic analysis, while also serving as an interface between users and automatic computation procedures.

Prototypes are currently being field tested in French Guiana, Central African Republic and Gabon.

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Satellite vegetation data as a tool for paleoecology research in Central Africa

Climate change and human activities can trigger flora and vegetation structure modifications. In the Central African forest region, paleoenvironmental research sites, where the evolution of the vegetation cover and associated forcings over the last millenia can be traced, may be represented by a few scattered dots on a map. To reconstruct a regional history of the range and nature of the forest, this point information should be interpolated via spatialization of functional models that are able to deduce the features of plant formations according to the climatic and pedological characteristics.

In Central Africa, outputs of these models can be interpreted in terms of the vegetation structure, e.g. by assessing the total biomass, the grass-tree cover distribution in savannas and the proportion of deciduous tree cover in forest areas during the dry season. This information on the actual vegetation status, which was for a long time limited to small areas, is now available on a large scale via remote sensing tools. These data (generally open source) are highly useful for the task set out by ISEM (Institute of Evolutionary Sciences, CNRS, UM2) of integrating ecological and paleoecological knowledge on Central Africa: i) they compensate for the lack of field measurements to calibrate paleoenvironmental indices required to trace the history of the vegetation structure; ii) they enable a regional comparison

Percentage deciduous forest cover

Percentage deciduous forest cover

Percentage deciduous forest cover

Percentage deciduous forest cover

Proventage deciduous forest cover

Proventage deciduous forest cover

▲ Map of the dry and humid rainforest region based on floristic associations (phytogeographical domains identified by White, black lines) or on the percentage deciduous tree cover (evergreen forest in dark green, semideciduous in pale green).

between the vegetation patterns and phytogeographical domains, i.e. the distribution of floristic associations on which current vegetation maps are based; iii) they provide a reference source for validating vegetation models; these latter could thus more accurately represent the current situation before being used to reconstruct or predict past and future changes.

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