



# INFORMS for Central Africa

## An Integrated Forest Monitoring System (INFORMS) for Central Africa



### Monitoring Logging in Central Africa

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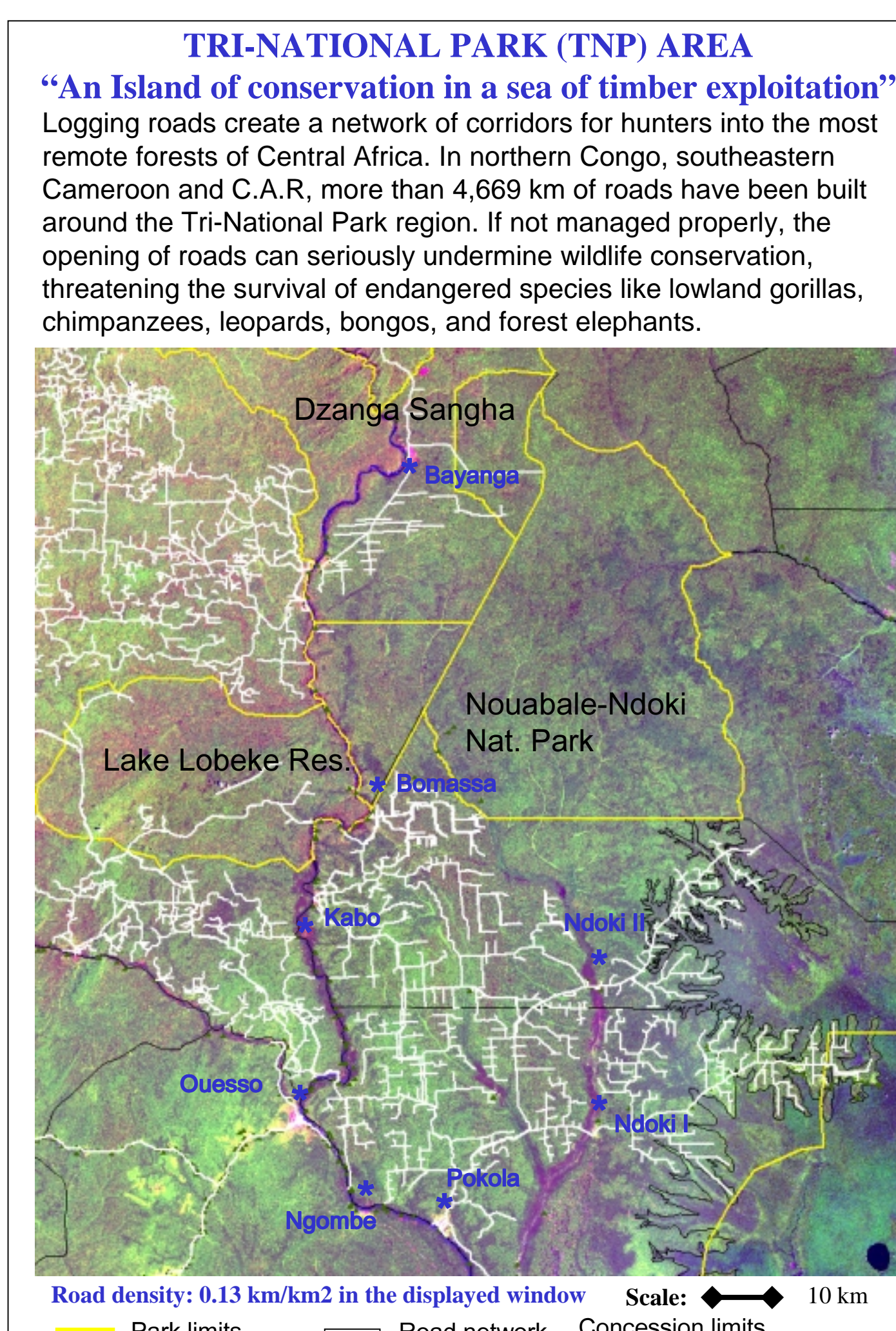
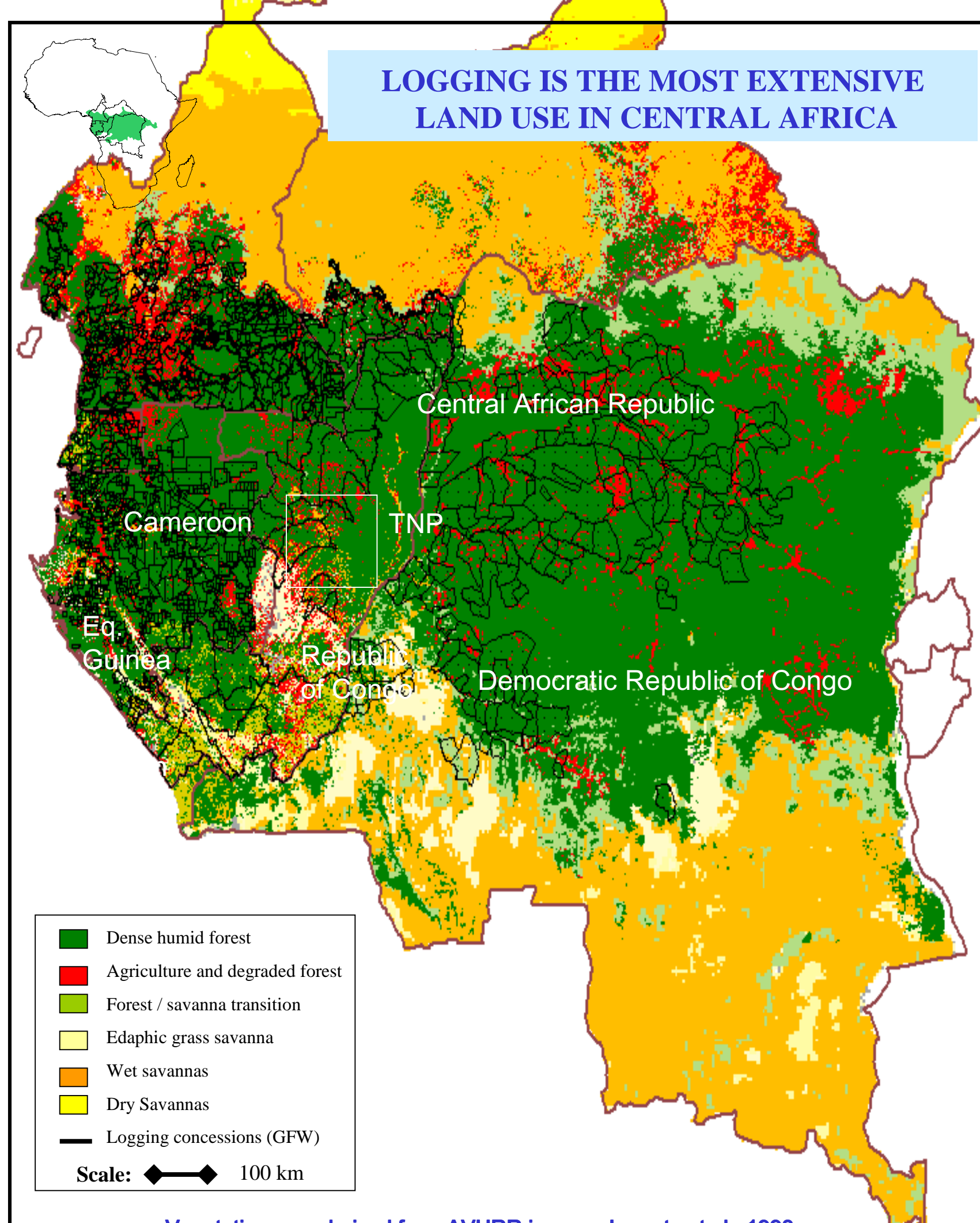
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**Introduction** The dense humid forest of Central Africa is one of the less studied area of the world. As a result, national forest services, park managers, and the research community lack the most basic information on forest distributions, biomass, and rates of land use change. In collaboration with Central African partners, including government forest agencies, conservation groups, and logging companies, we are developing a system for monitoring forest resources that emphasizes on the integration of remote sensing with forestry and biodiversity inventories.

Selective logging is the most extensive land use in the region, with millions of hectares of forested land under concession (i.e. allocated for logging). In order to better manage these forests for timber extraction and biodiversity conservation, we are using satellite imagery (30m Landsat and 1-4m IKONOS) and field surveys to monitor and analyze logging activities at several study sites in the region. Here we focus on the Tri-National Park area on the border between Cameroon, Central African Republic, and the Republic of Congo.

Our Integrated Forest Monitoring System (INFORMS) for logging includes: (A) maps of the distribution of logging activities in the region, (B) development of new integrated monitoring and wildlife conservation, and carbon modeling activities, (D) quantification of deforestation rates around logging towns, and using satellite imagery. All of these results are conveyed to a newly created Central Africa Global Observations of Forest Cover re available through our project web site.



#### LOGGING MONITORING APPROACH

##### Forest Information Users & Collaborators

- National forest services
- Logging companies
- Conservation programs
- Research community

##### Bringing expertise for field surveys:

- Forest and fauna inventories
- Validation of forest maps

#### INFORMS Project

##### Remote Sensing Analysis & Data Set Integration

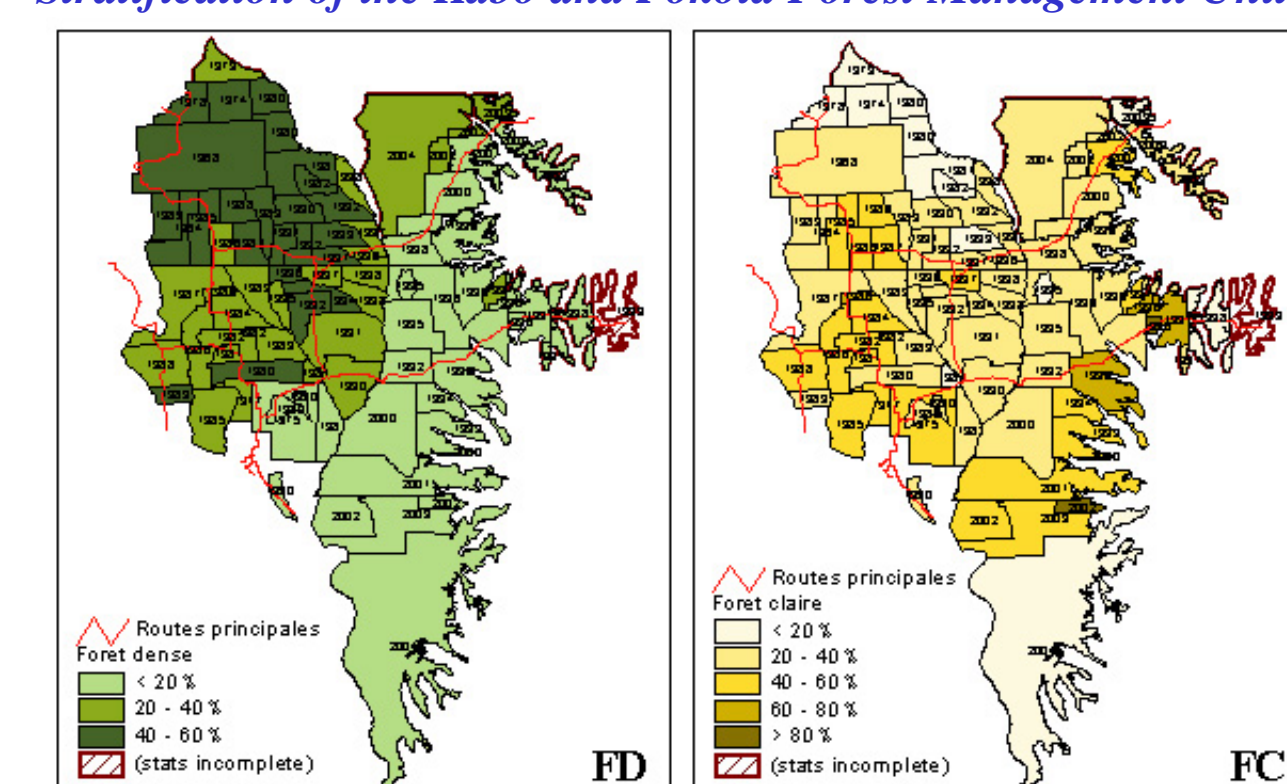
- Technical backstopping of OSFAC network [www.osfac.org](http://www.osfac.org)
- Remote sensing data acquisition and distribution
- Development of new validation methods (video/inventories)
- Remote sensing analysis & ecological field data integration
- Remote sensing/GIS training (Lope workshop 2000)
- Primary study sites (Tri-National Park area - C.A.R, Rep. of Congo, and Cameroon; Okapi Reserve- D.R.C)

Results/Outputs: Forest monitoring methods Forest type maps Biomass distribution Logging intensity estimates

#### MANAGEMENT OF FOREST CONCESSIONS

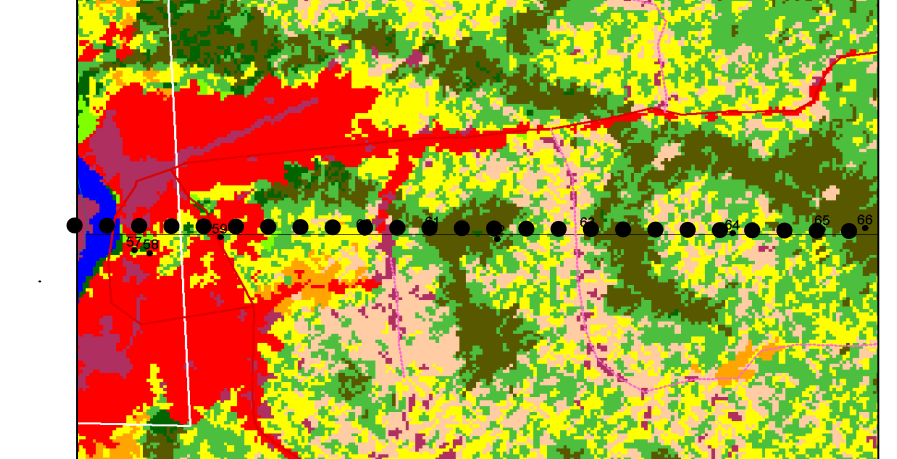
Sound management of forest concessions requires accurate mapping of forest types. In collaboration with WCS and the CIB logging company, maps were produced for the Kabo and Pokola concessions using Landsat imagery. Detailed fauna and flora inventories covering more than 1 million hectares in area have been completed for the Kabo concession by WCS and CIB. Using simple GIS techniques, statistics for forest types were derived from the vegetation maps (D1). Inventory data are now being used for validation (D2). These data sets also can be used to better understand wildlife distributions in relation to logging activities.

##### Stratification of the Kabo and Pokola Forest Management Units

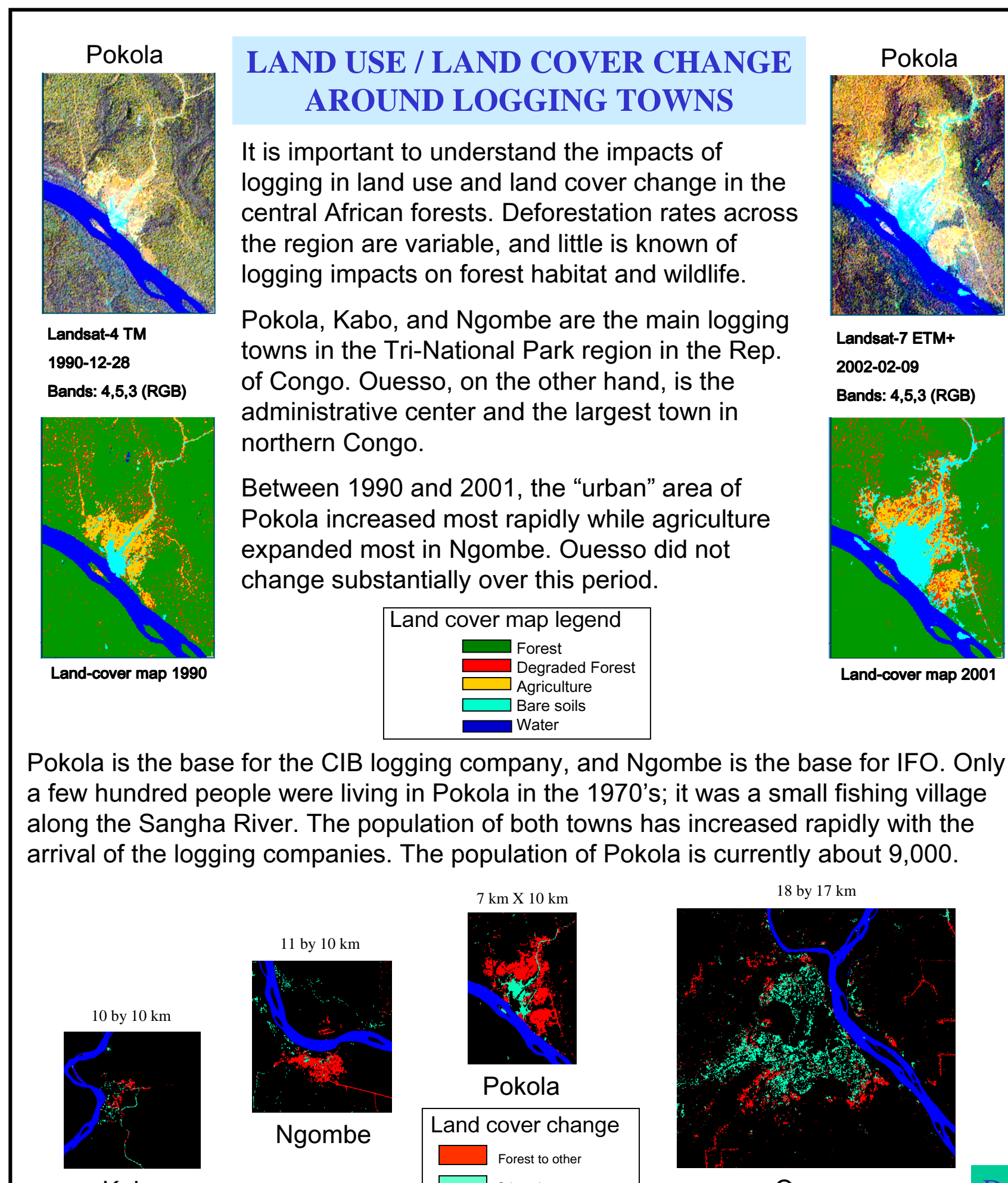
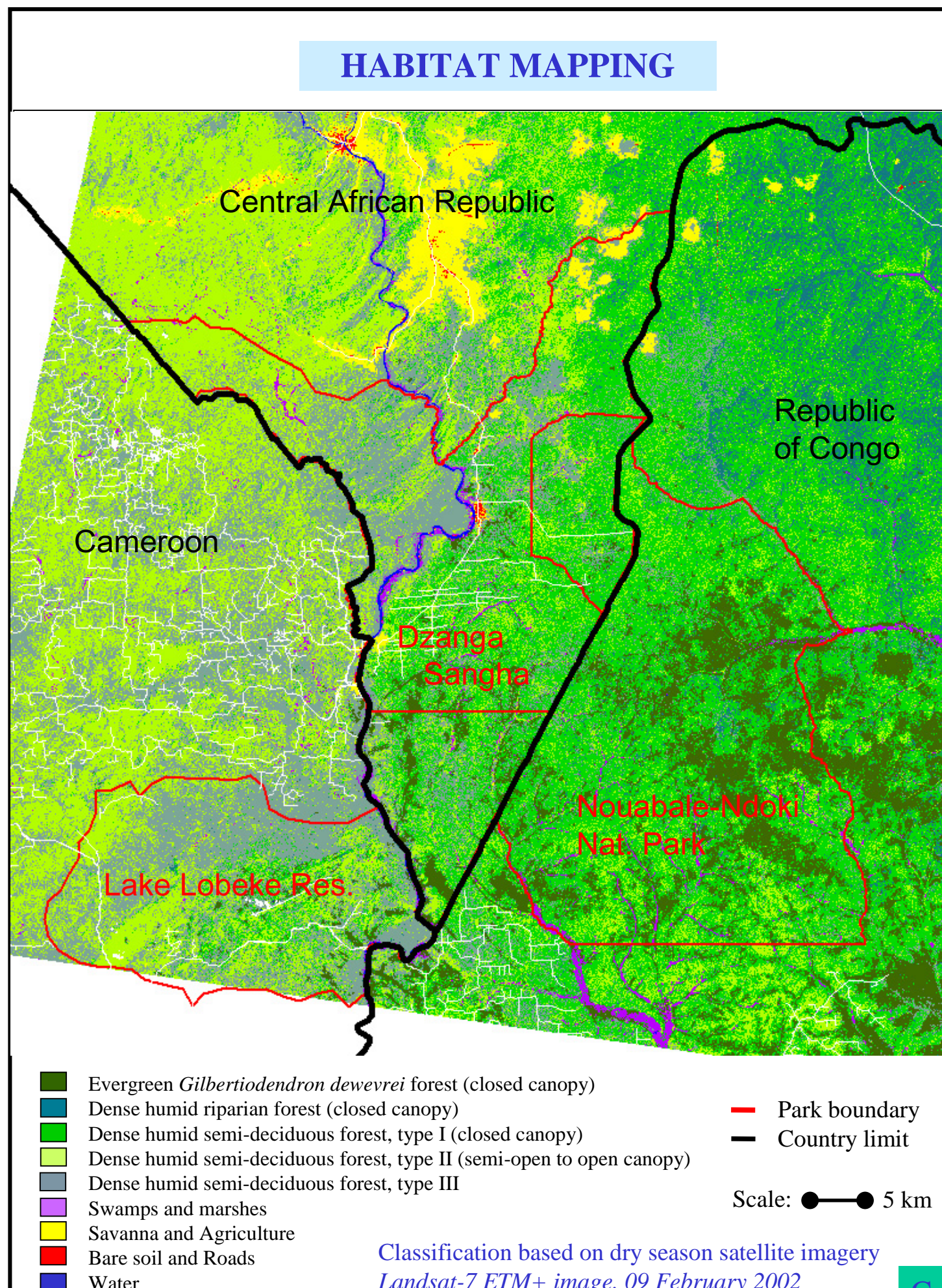


##### Kabo Concession, Kabo Village

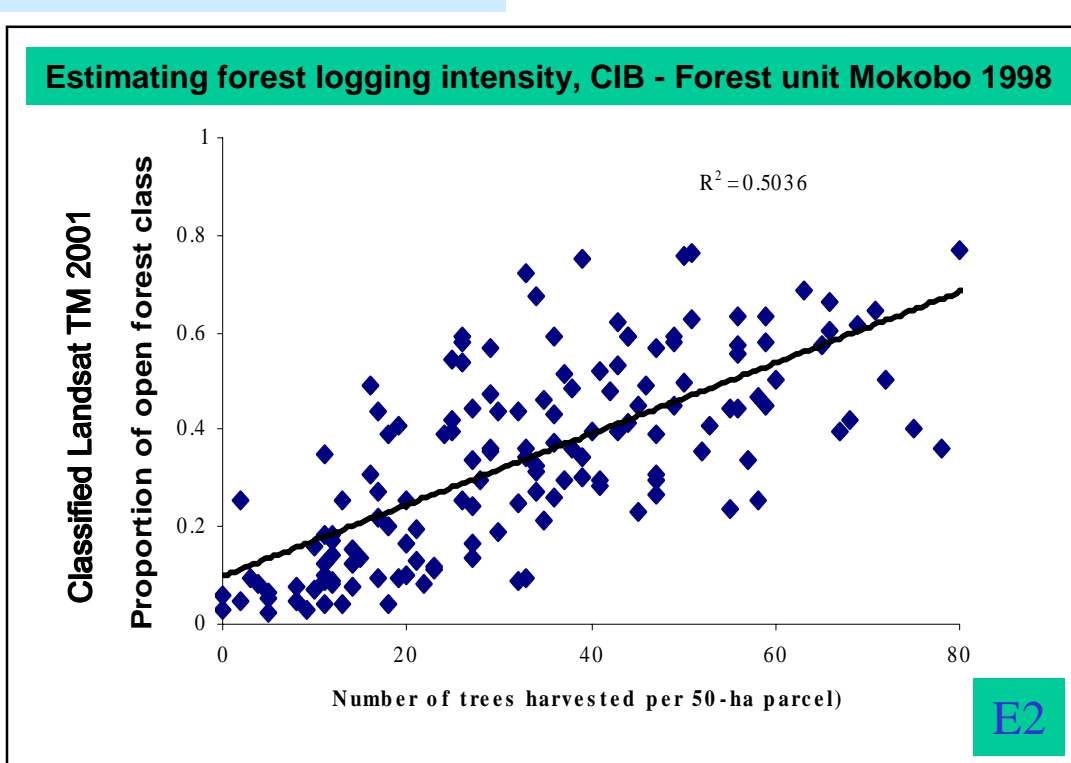
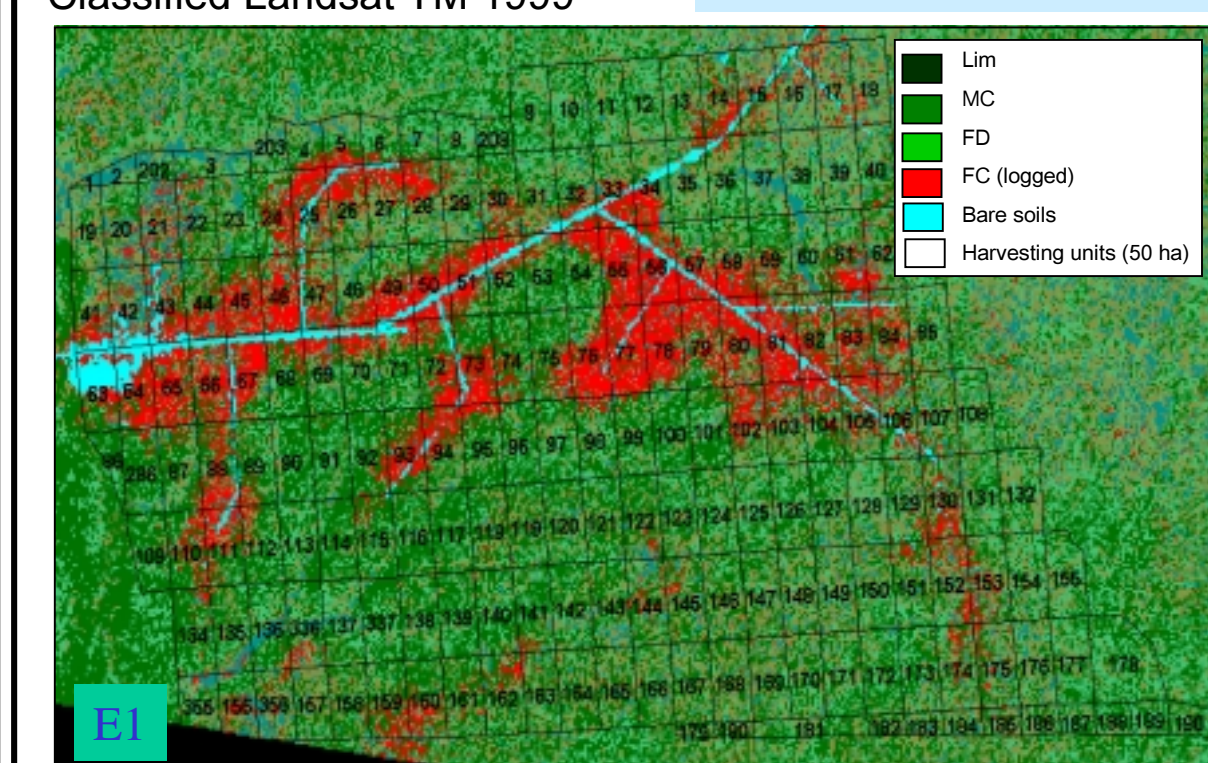
Inventory transect #10 super-imposed on the forest stratification map derived from 2001 Landsat imagery



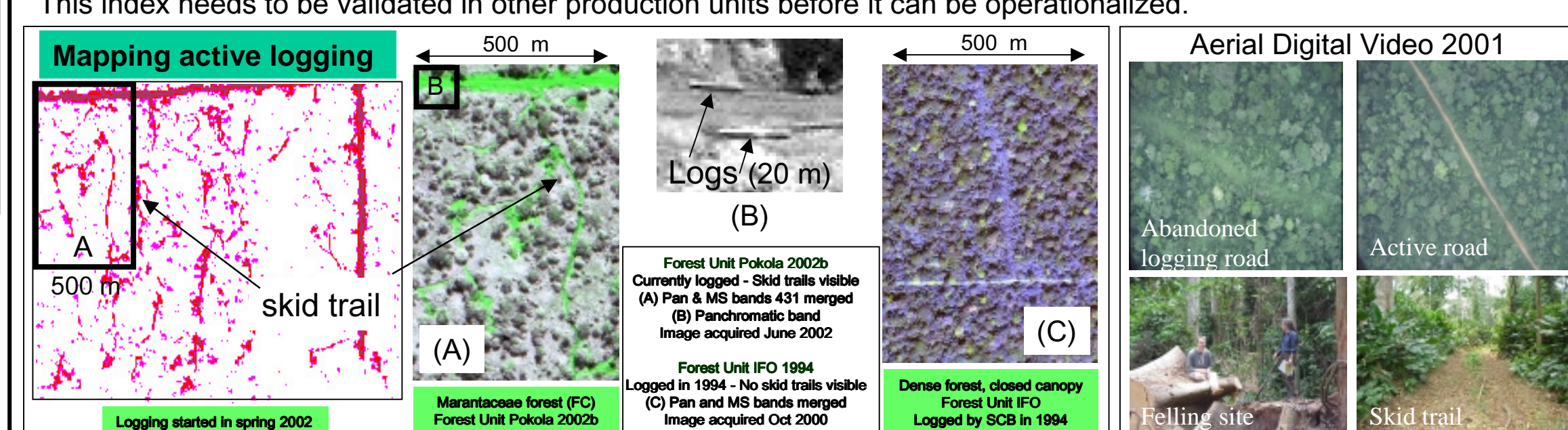
UFA	FD	FC	Lim	MC	Ag	Misc
Kabo	43%	23%	13%	17%	0%	2%
Pokola	19%	42%	8%	23%	0%	5%
Total	26%	36%	10%	24%	0%	4%



#### ESTIMATION OF LOGGING INTENSITY



A simple logging index, derived from Landsat satellite imagery (E1), allows the estimation of the number of trees logged by harvesting unit (E2). This relation was established for the CIB forest unit of Mokobo in the Kabo UFA. Logging began in 1998 and completed in 2000. Only 2 recent cloud-free Landsat images are available for this forest unit (1999 and 2001). An index estimating logging intensity was developed using a classification derived from the 2001 Landsat image. This index needs to be validated in other production units before it can be operationalized.



After selective logging, forests regenerate rapidly along skid trails with secondary species like *Musanga sp.* These regenerating forests often have spectral signatures similar to those of naturally open forests (i.e. short swamps), making automatic classification difficult. The same problem is observed with very high resolution IKONOS imagery at 1 & 4 m resolution. Three years after logging, only major and abandoned secondary roads are visible on the images. Only aerial digital videographies and/or field surveys allow us to validate the maps developed from satellite imagery.

**References**

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