

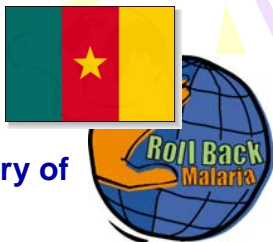
Pädagogische Hochschule
Heidelberg

Geomedical Information System for Africa
GeoMedIS

BUILDING A GEOMEDICAL INFORMATION SYSTEM (GeoMedIS) FOR ANTIMALARIAL PREVENTION CAMPAIGNS IN YAOUNDE, CAMEROON

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Pädagogische Hochschule Heidelberg
Abteilung Geographie



UYI
Université de Yaoundé I - Cameroun



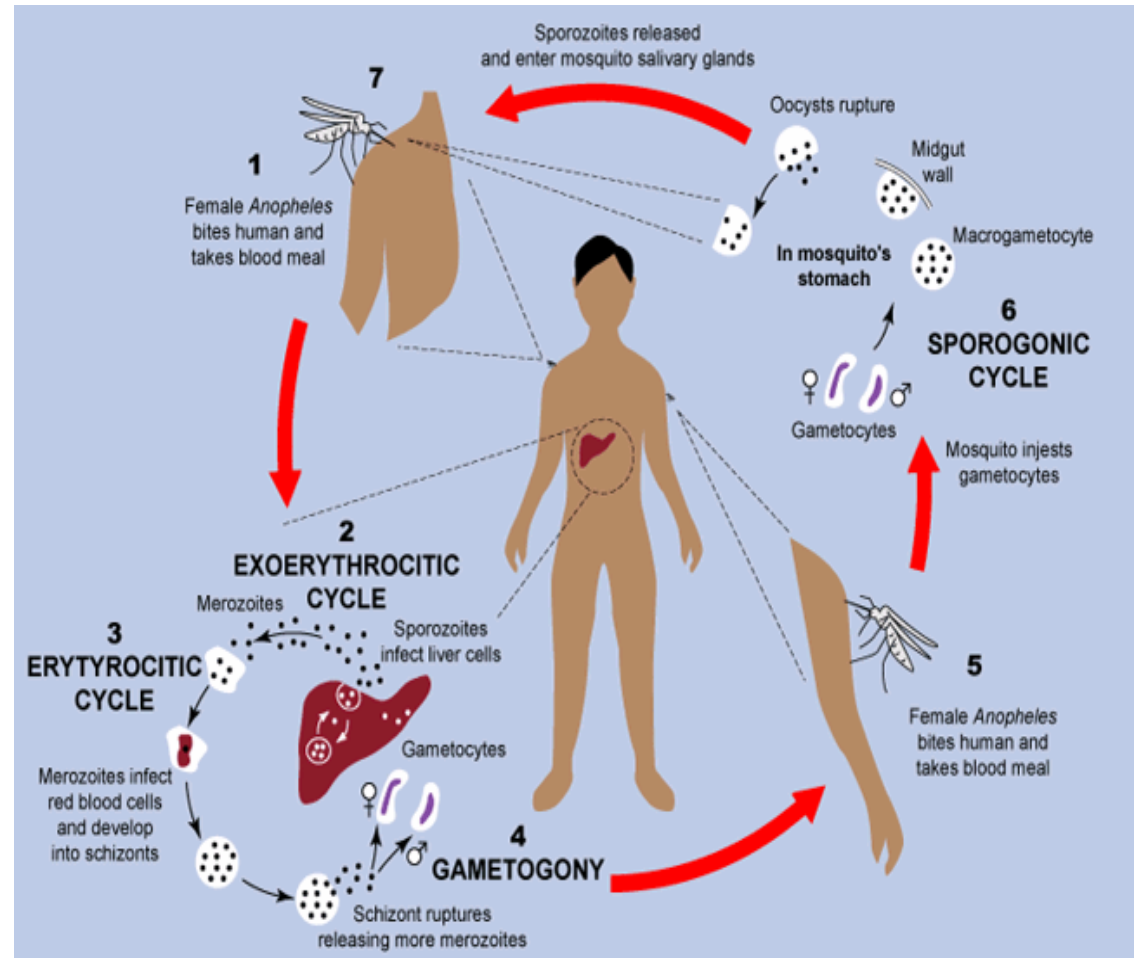
CONTAIN

- WHAT IS MALARIA ?
WAS IST MALARIA?
- STATE OF THE ART
STAND DER FORSCHUNG
- THE GeoMedIS PROJECT
DAS PROJEKT GeoMedIS
- PRELIMINARY RESULTS
ERSTE ERGEBNISSE

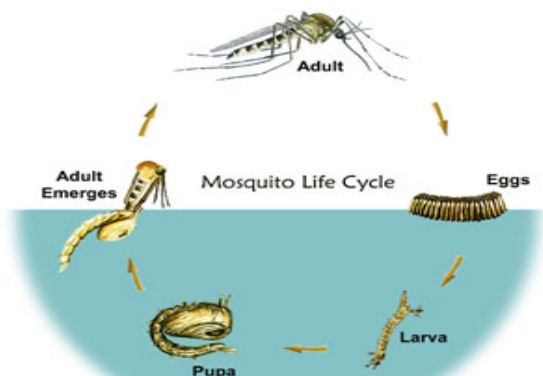
WHAT IS MALARIA ? WAS IST MALARIA?

A vector borne disease caused by a **Mosquito (*Anopheles*)**. Usually needs Vertebrate (Human Blood) For its life cycle.

The good eclosion of this life cycle need Suitable ecological conditions (water proximity, Temperatures...)



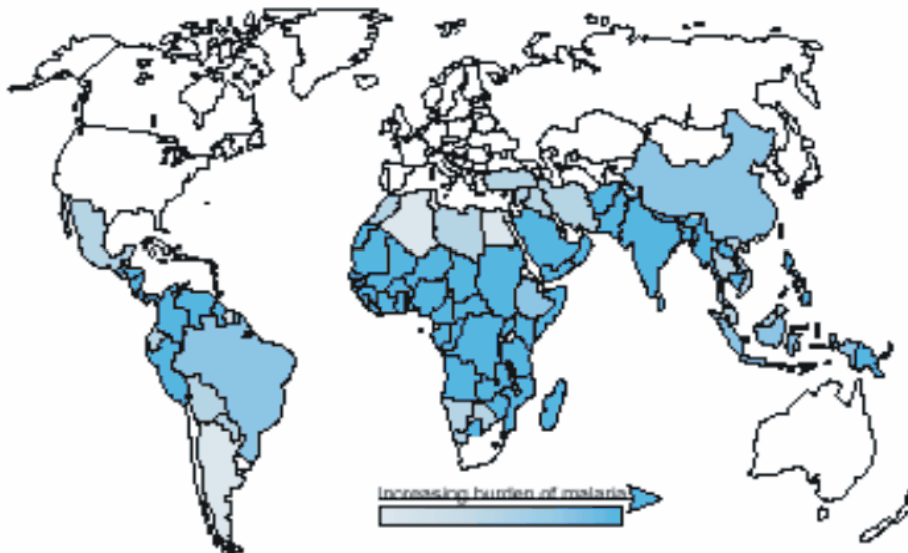
Malaria life cycle



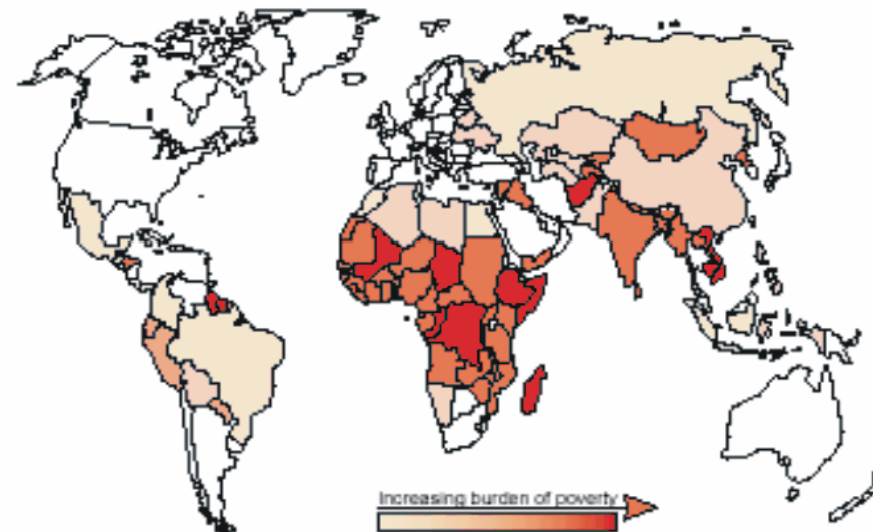
MALARIA : A COMPLEX AND HARMFUL REALITY IN SUB SAHARAN AFRICA.

- Remains the first cause of morbidity and mortality in Africa : a prevalence of 90%.
- Children are the most exposed.
- Is in a complex interaction with the poverty in Africa.

Estimate of world malaria burden



Estimate of world poverty



STATE OF THE ART *STAND DER FORSCHUNG*

MALARIA MODELS

MOSTLY WEATHER DRIVEN MODELS

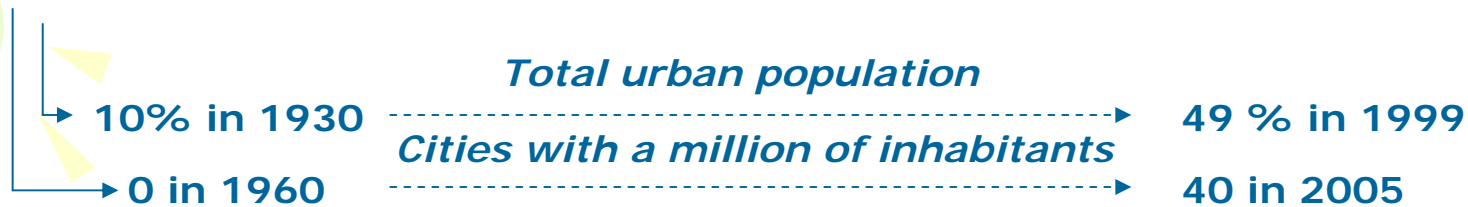
The MARA project
The Liverpool model

IMPLEMENTED AND TESTED AT A LOW SPATIAL SCALE
(CONTINENTAL)

USUALLY DO NOT INCLUDE THE HEALTH COMMUNITY SYSTEM
IN THE DATA GATHERING PROCESS

URBAN MALARIA IN SUB-SAHARAN (SSA) COUNTRIES

THE VERY HIGH GROWING RATE OF URBAN POPULATION IN SSA



RURAL
EXODUS

THE DISSYMETRY BETWEEN HIGH GROWING POPULATION RATES AND URBAN FACILITIES

DRUGS RESISTANCE & INNACCESSIBILITY

THE EPIDEMIOLOGY OF URBAN MALARIA IS COMPLETELY DIFFERENT FROM THAT OF KNOWN RURAL MALARIA

- ↳ Less immunized and resistant populations than in rural areas
- ↳ Expectations of very severe cases in urban areas.

URBAN MALARIA IN YAOUNDE

THE MAJORITY OF THE URBAN CITIZENS ARE MOSTLY ORIENTED TOWARDS SELF TREATMENT OF MALARIA WHICH LEADS TO DIFFICULTIES IN MONITORING MALARIA.



But since 2 years people are organising themselves By building a Community health care delivery system Which is more adapted to their economic capacities

**THE GeoMedIS PROJECT: RESEARCH
QUESTION OBJECTIVES AND
DESIGN**

***DAS PROJEKT GeoMedIS:
PROBLEM ERSTELLUNG ZIELE UND
DESIGN***

WHAT DO WE WANT TO STUDY ?

THE RESEARCH QUESTION



How can we combine key ecological, epidemiological and Social factors into a predictive model dedicated to Antimalarial campaigns?

THE OBJECTIVES

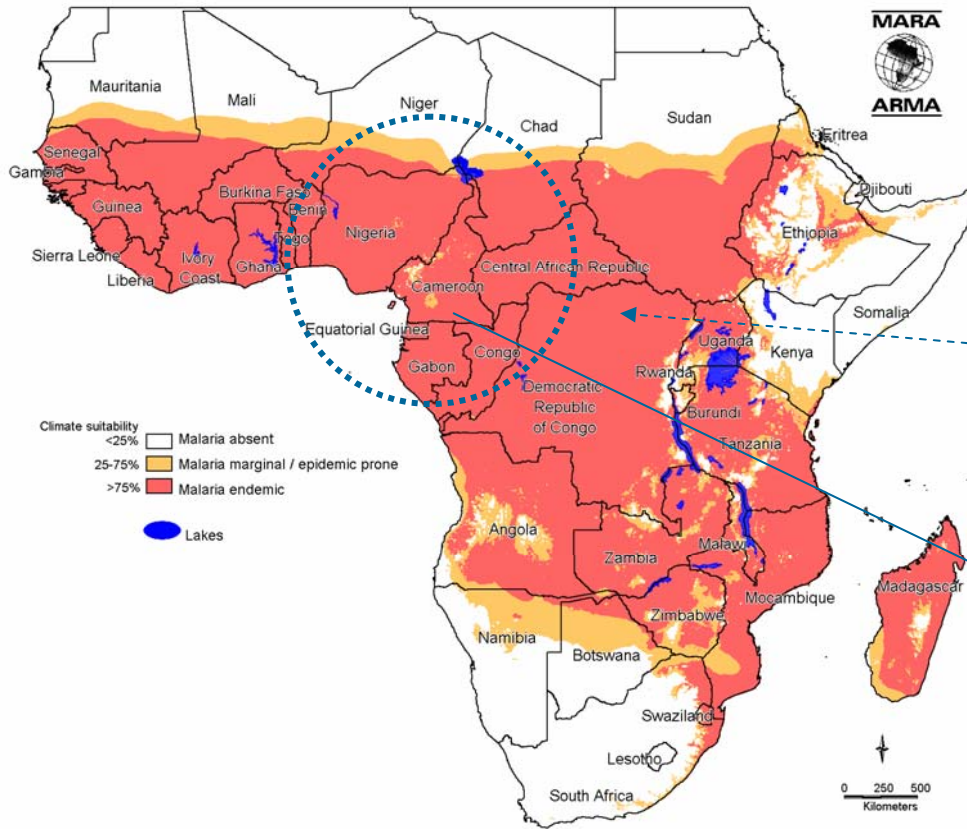


*to develop and validate an explicit probabilistic statistical and spatial malaria transmission risks model, integrating the local community and school health system.
To implement the results into an integrative Early warning system (EWS)*



TO USE THE RESULTS FOR
CAMPAIGNS PREVENTIONS

THE STUDY SITE: YAOUNDE



- Central Africa.
- In Cameroon.
- The capital city
- West African equatorial climate regime

Malaria endemic zone



YAOUNDE: A COMPLEX OF SUITABLE SOCIO-ECOLOGICAL FACTORS

THE SOCIO -DEMOGRAPHIC PATTERNS

10% OF THE POPULATION ENJOYING
A VERY HIGH LEVEL OF LIFE

30 % OF THE POPULATION
LIVING IN FAIRLY GOOD CONDITIONS
EMPLOYED BY THE LOCAL
ADMINISTRATION

60 % OF THE POPULATION
LIVING IN THE POVERTY

THE EPIDEMIOLOGICAL PATTERNS

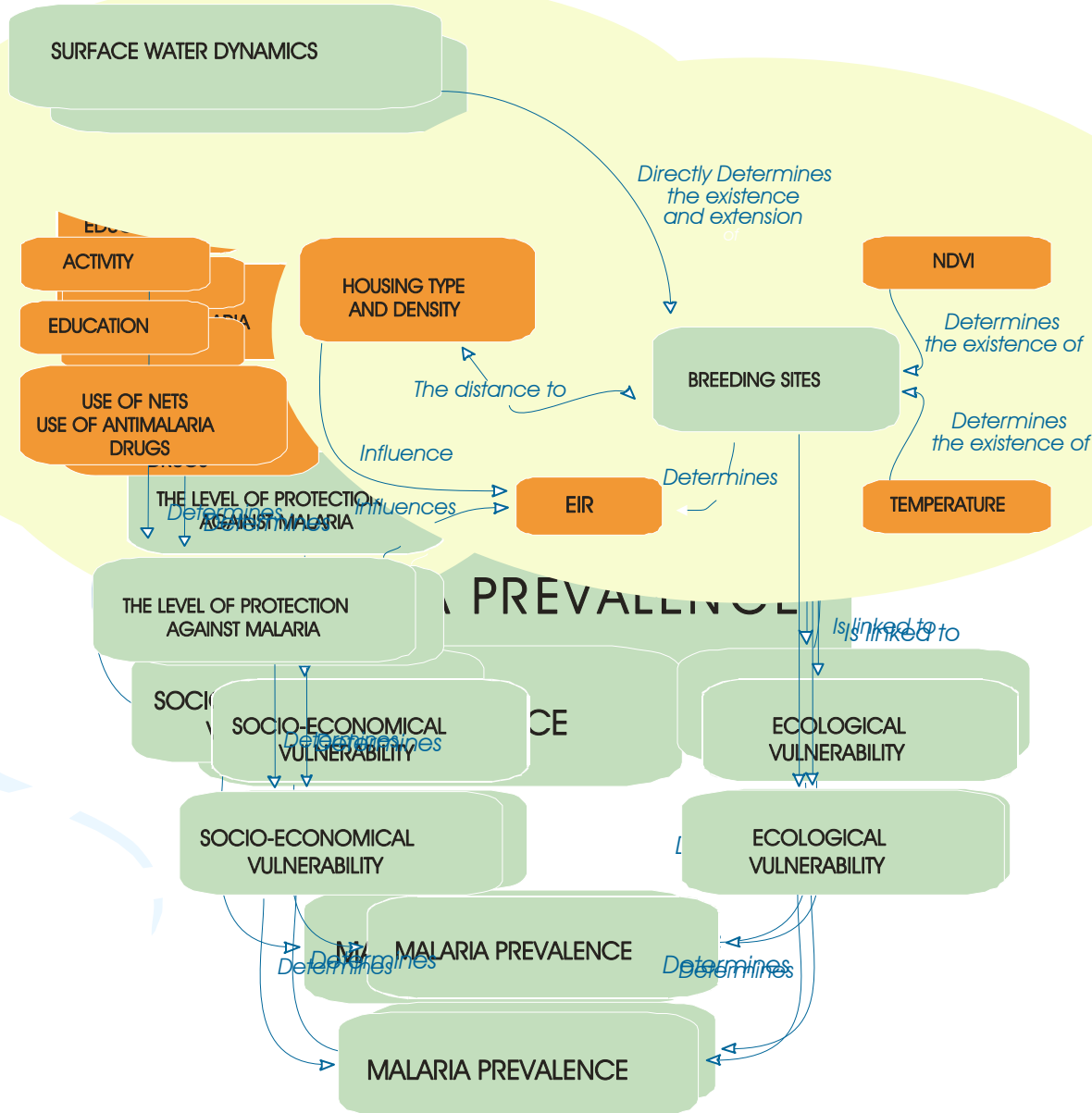
NOT EXPOSED TO MALARIA TRANSMISSION RISKS

NOT ALL EXPOSED TO MALARIA TRANSMISSION
RISKS.

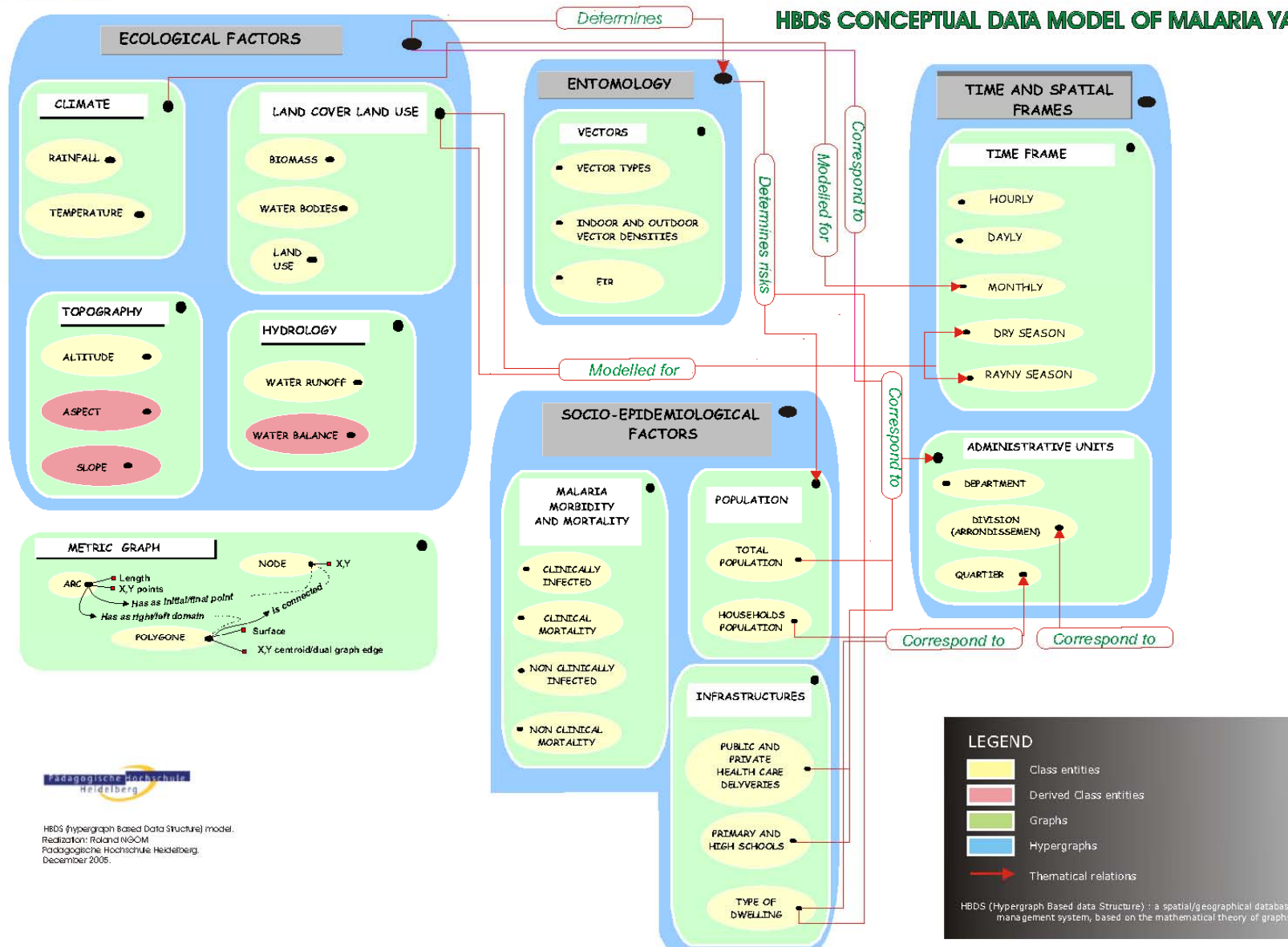
EXPOSED TO MALARIA TRANSMISSION
RISKS

STUDY DESIGN

The environment



HBDS CONCEPTUAL DATA MODEL OF MALARIA YAOUNDE



HBDS (Hypergraph Based Data Structure) model.
Redaktion: Roland NGOM
Pädagogische Hochschule Heidelberg,
December 2005.

Is being declined into a physical model which, will be the basic element for the building of a computerized module simulating the transmission risk.



MATERIALLY

Data will be primarily and mainly gathered through local community health care deliveries and schools.

We will obtain a Geodatabase that will contain multiple layers Geolocalized Information on:

- MALARIA EPIDEMIOLOGY
- MALARIA ECOLOGY
- MALARIA SOCIOLOGY



Of exposed communities

↳ **A dynamic transmission model identifying hot spots in space and time Of one year period.**

*As well as a Geodatabase of **school communities (primary, secondary)***

**THE DEFINITIVE DYNAMIC MODEL COULD THEN BE TESTED AND IMPLEMENTED IN A PERENNIAL WAY, INTEGRATING POOR AND SCHOOL COMMUNITIES IN THE PROCESS OF DATA PRODUCTION
POOR AND SCHOOLS TARGET COMMUNITIES
FOR PREVENTION CAMPAIGNS**

school (primary secondary) and poor communities

INTEGRATIVE EARLY WARNING SYSTEM DESIGN



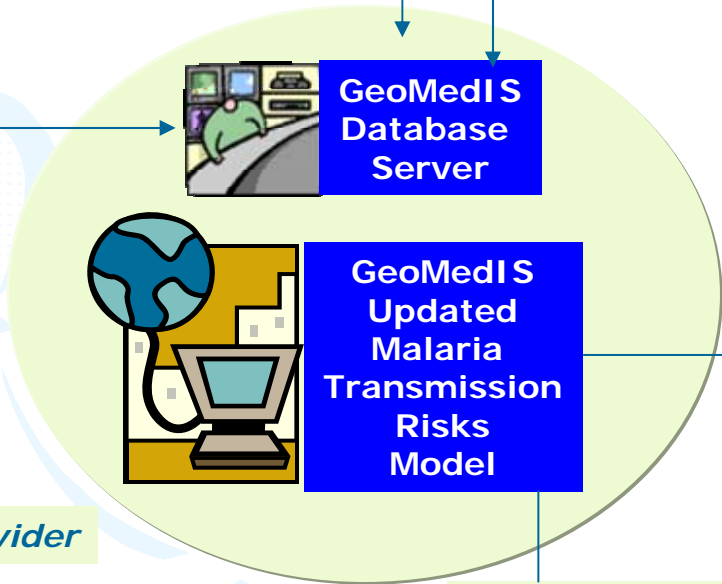
H Public and Private Classic Health care deliveries

Data provider

Community Health care Deliveries (GIC-Santé)

Schools

Data provider



Data provider

Data provider

Intervene into

campaigns

Exposed local Communities

Data provider

NGO

UNESCO
UNICEF
WHO
Others

Intervene into

Administrative Authorities

Ministry of health
Ministry of Urban management
Ministry of Education
Local administrations

PRELIMINARY RESULTS ERSTE ERGEBNISSE

OFFICIAL CONTACTS ESTABLISHED WITH PARTNERS IN YAOUNDE
DUTIES NETWORK IMPLEMENTATION



Ministry of
Public Health



GIC-SANTE

Centre de Santé Pour
Tous de Tsinga Elobi
CINSOL



LIVERPOOL
SCHOOL OF
TROPICAL
MEDICINE



Institut de recherche
pour le développement

UYI

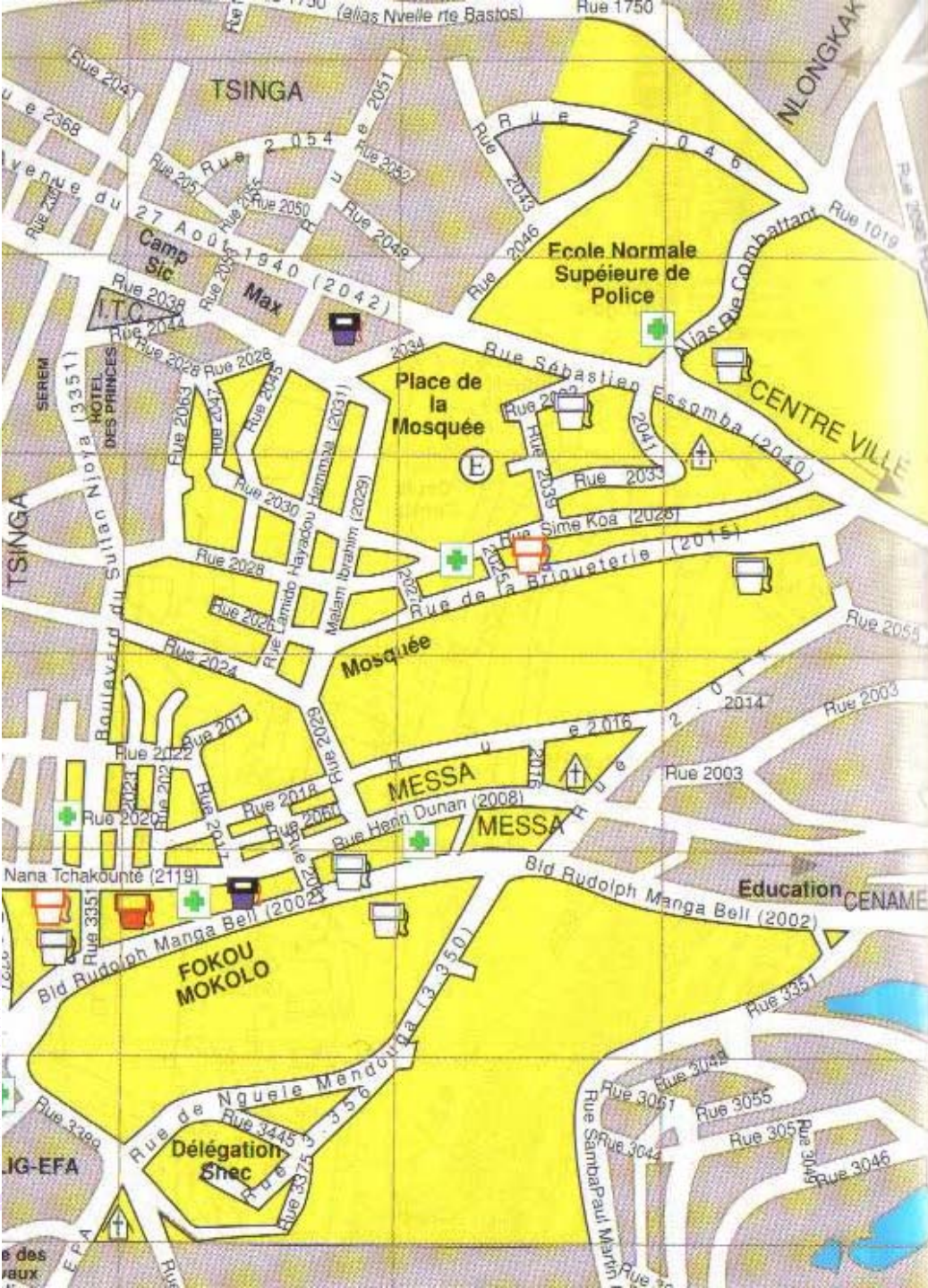
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ECOLE NORMALE
SUPERIEURE
DE YAOUNDE

CHOICE OF 3 STUDY TEST
SITES.

1: *Briquettrie-warda-Tsinga*

has more human densified
zones, mixing urban agriculture
and commercial activities.



CHOICE OF 3 STUDY TEST
SITES.

2. Essos

is mixing planned areas and
shanty zones in valleys?



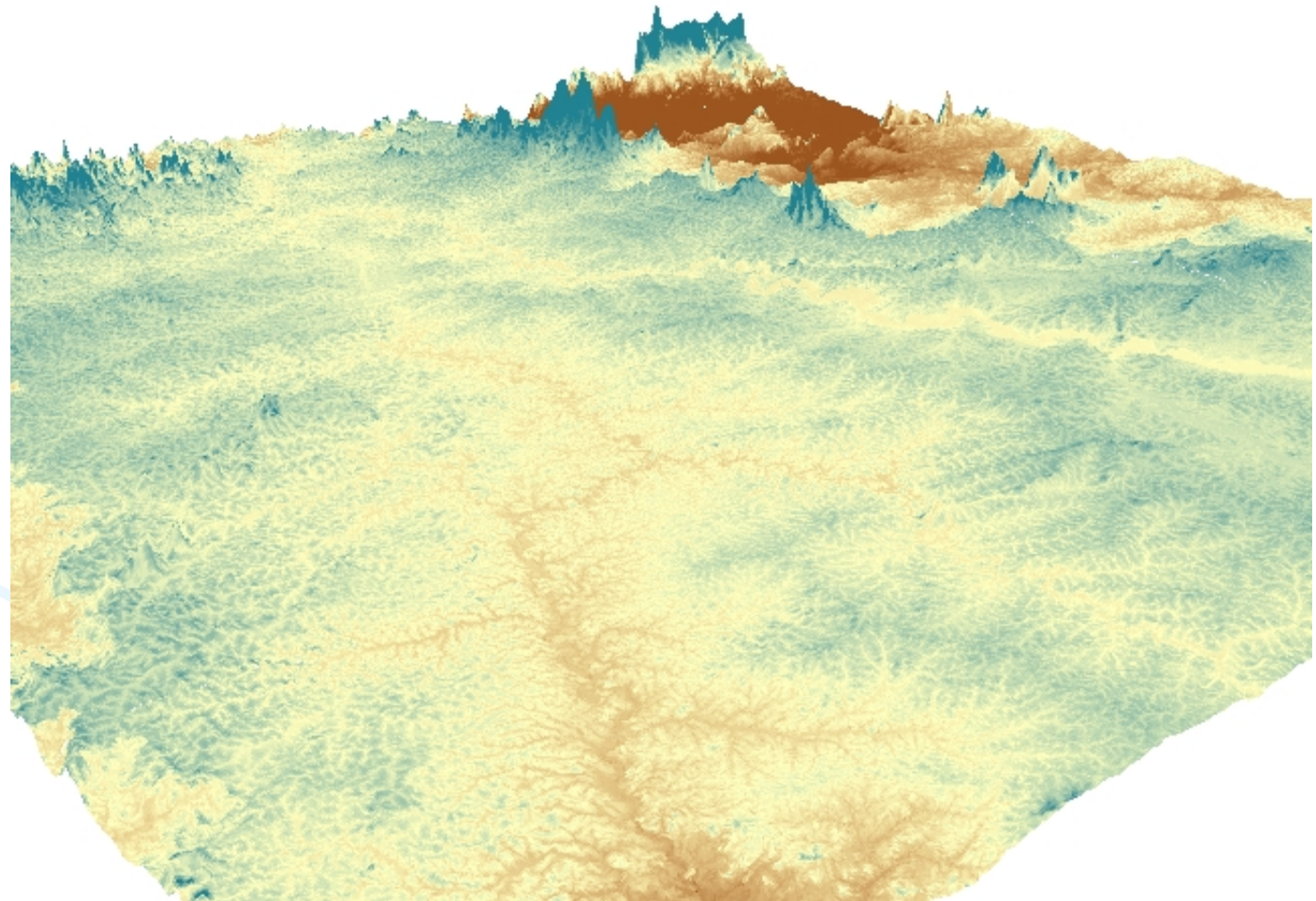
CHOICE OF 3 STUDY TEST
SITES.

3. Simbok

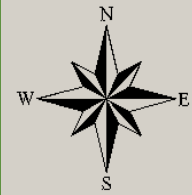
situated at the periphery of the city and mixing former rural population and newly installed one.

GATHERING AND PROCESSING OF ECOLOGICAL DATA

A digital
elevation
model of
Yaoundé

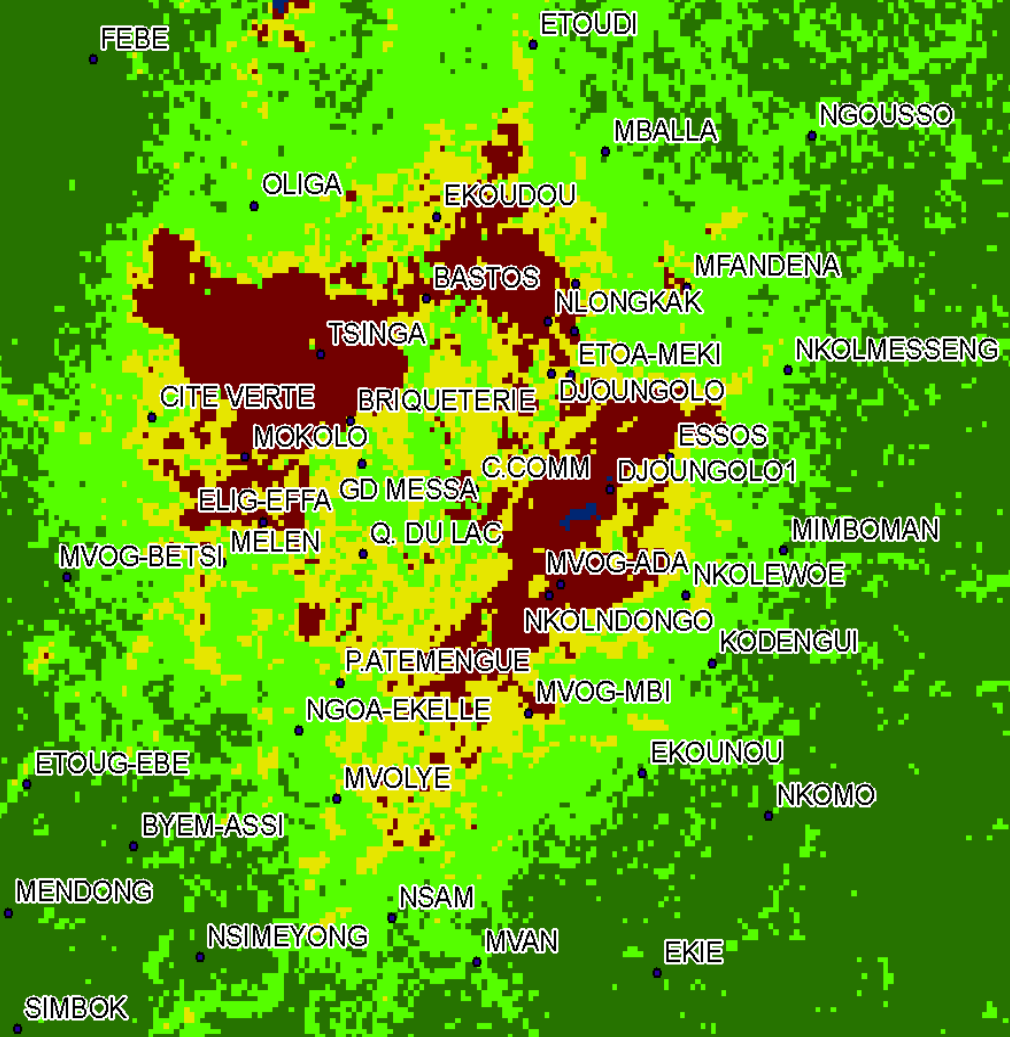


YAOUNDE LAND COVER FROM UNSEPERIVED CLASSIFICATION LANDSAT IMAGE OF 1973

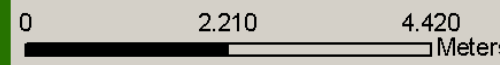


LEGEND

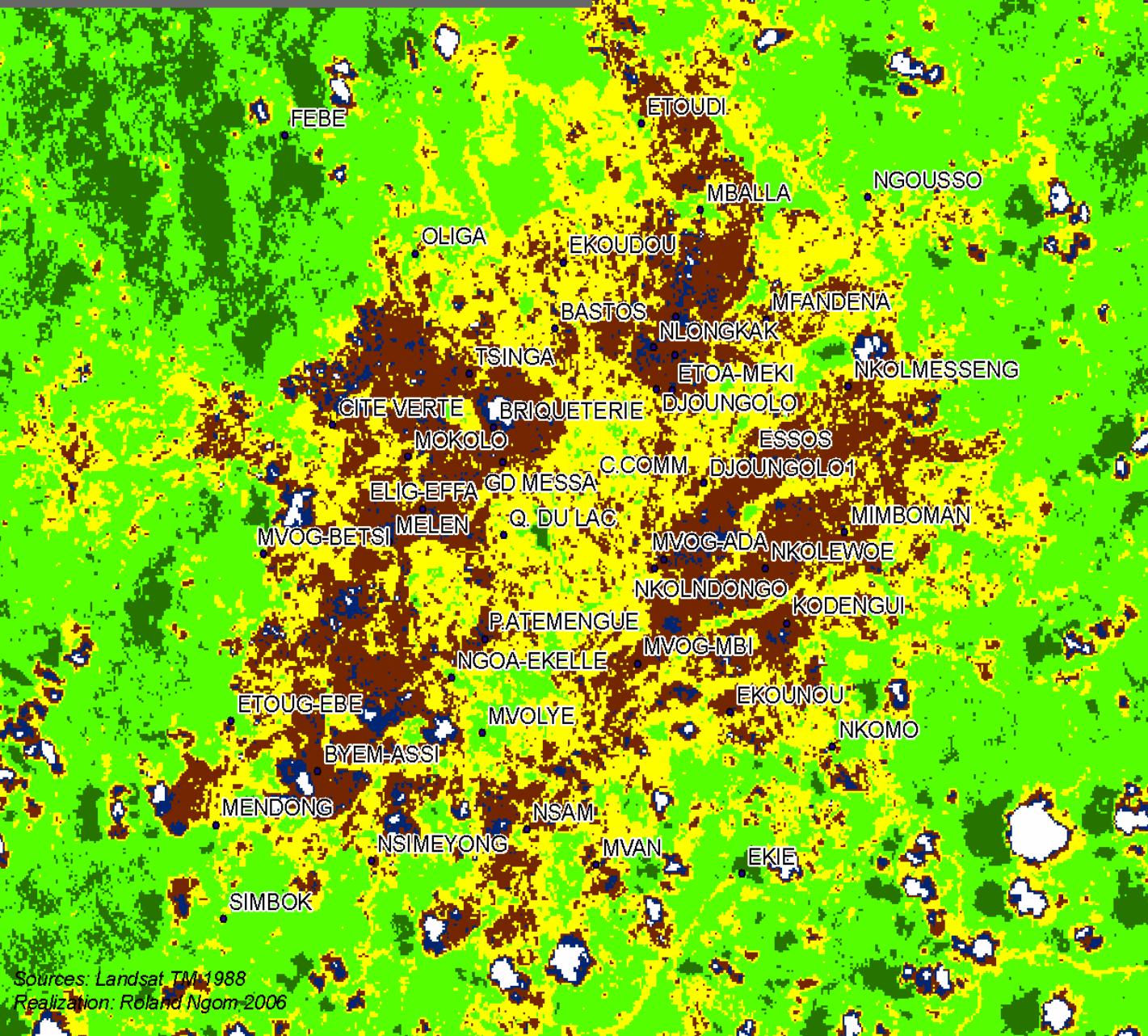
- Districts
- Healthy forest vegetation
- Deciduous forest vegetation
- Densified built areas
- Built areas
- Water
- Clouds



Sources: Landsat MSS 03.08.1973
Realization: Roland Ngom 2006



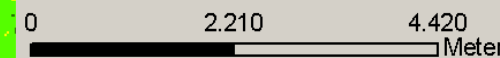
YAOUNDE LAND COVER FROM UNSEPERIVED CLASSIFICATION LANDSAT IMAGE OF 1988



LEGEND

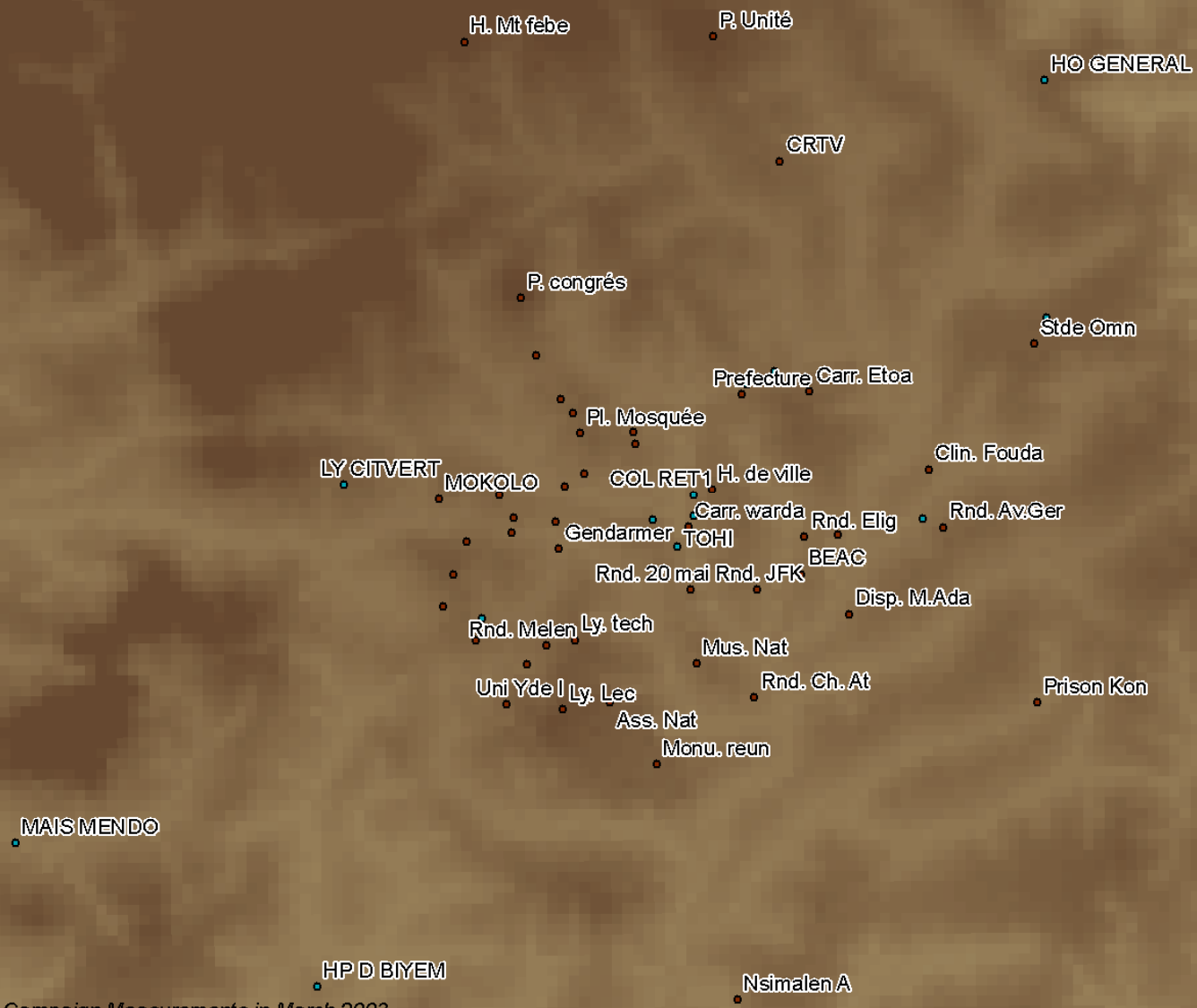
- Districts
- Healthy forest vegetation
- Deciduous forest vegetation
- Densified built areas
- Built areas
- Water
- Clouds

Sources: Landsat TM 1988
Realization: Roland Ngom 2006

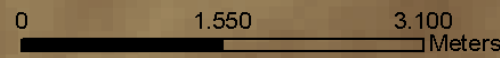


GEOLOCALIZATION OF SOME SCHOOLS AND HEALTH CARE DELIVERIES

YAOUNDE: GPS DATA MEASUREMENTS



Sources: GPS Campaign Measurements in March 2003
SRTM data from NASA
Realization: Roland Ngom 2006



NEXT STEPS

- **Epidemiological and entomological and social data gathering.**
- **Climate data gathering**
- **Building of a multiple logistic statistical model.**
- **Spatial extrapolation of the statistical model.**

**THANKS
FOR YOUR
ATTENTION**

