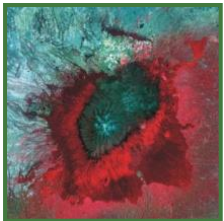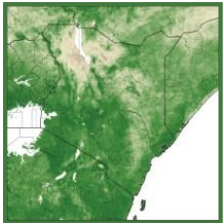# Remote sensing based services to monitor vegetation dynamics in Kenya: the ENDELEO tool

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Belgian Earth Observation Day, Oudenburg, 25 May 2011

belspo

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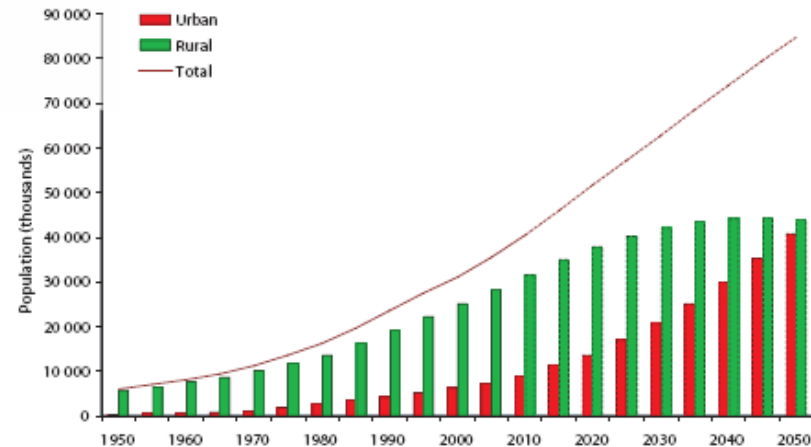 christian.lambrechts@unep.org

Context

- Ecosystems in East Africa have been changing significantly in the last decades.

- Drivers of change include:
  - population dynamics
  - market forces
  - climate change

Kenya's projected rural and urban population, 1950 – 2050 (Source: UNPD 2008).

- Preventing further impact on these ecosystems in order to decrease the vulnerability to the naturally recurring drought in Eastern Africa.

Context

- Ecosystems play an important role in key sectors such as tourism, energy and agriculture.


- Therefore the conservation and sound management of natural heritage is of paramount importance.

Context

- There is an increased demand from ecosystem managers for updated information on the condition and the changes of the vegetation.

- Frequently updated indicators derived from satellite images allow to monitor the vegetation status and understand the temporal dynamics.
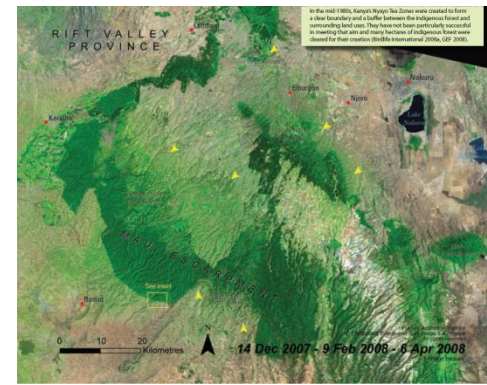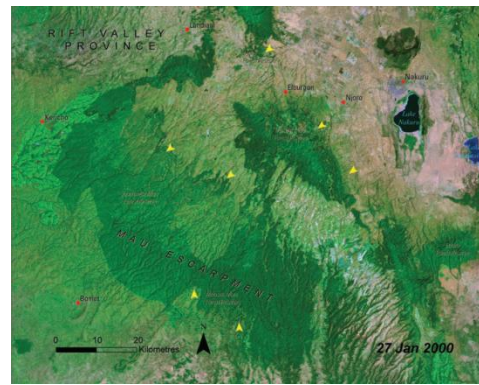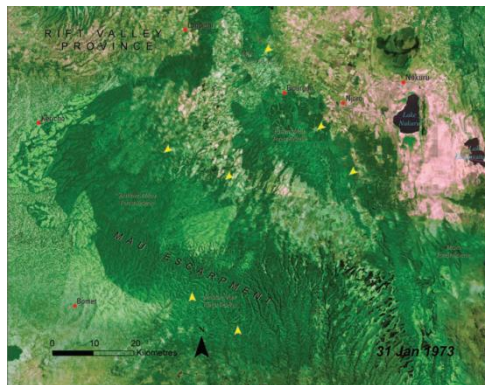
Aim

- Aim:

  - Facilitating the access to regularly updated satellite derived information on environmental quality in East Africa

  - Lowering the barriers to its use

- The project focuses on rangelands and forests.
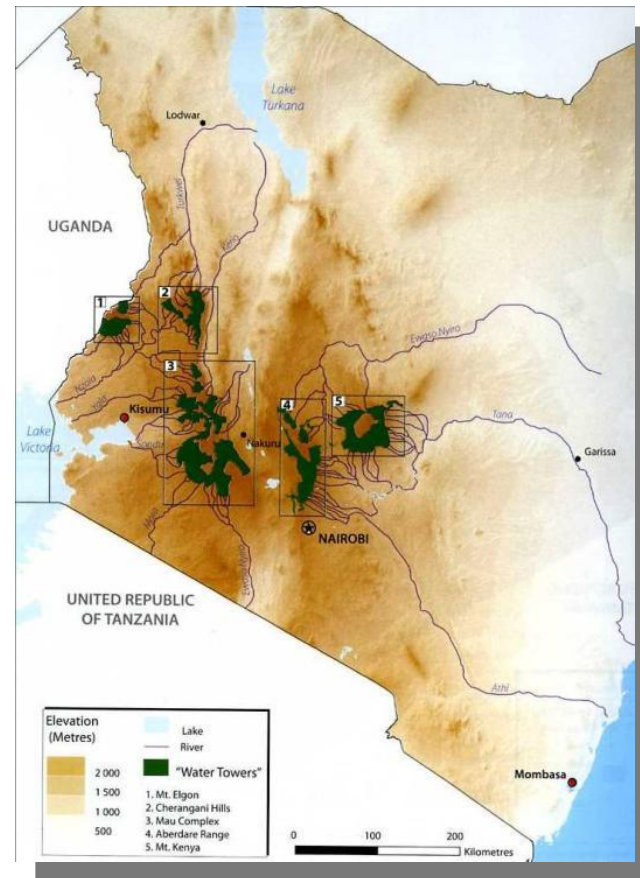
Aim

Rangelands

Aim

Forests

Five 'water towers':

Kenya's water catchments

Aim

- Objectives:

  - ❑ Supply indicators suitable for forest and rangeland monitoring

  - ❑ Lower the barrier for all stakeholders to use RS

  - ❑ Enhance user involvement
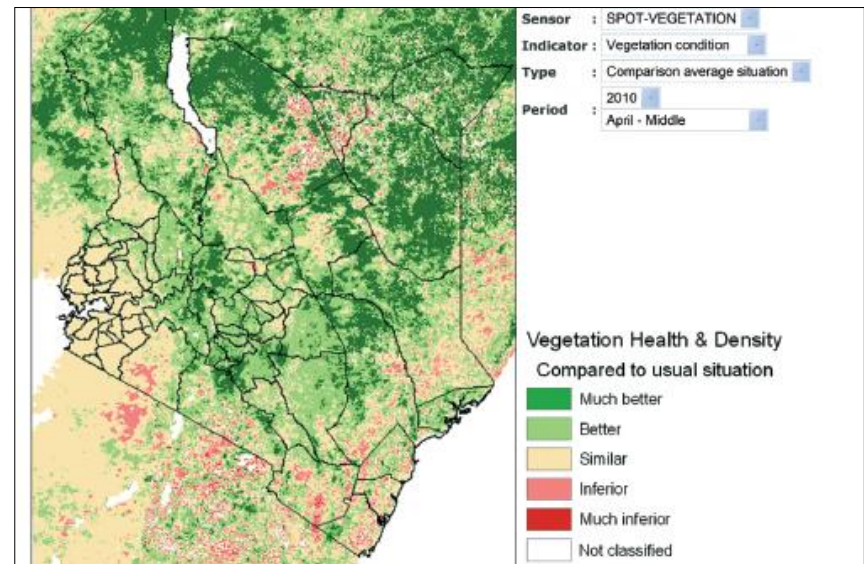
  - ❑ Ensure sustainability

Indicators

- Product portfolio on two indicators:

  - NDVI: indicative of vegetation health and density
  - DMP: indicative of growth rate (kg DM/ha.day)

- Product portfolio incorporates:

  - Actual image
  - Relative difference of current value with previous dekad
  - Relative difference of current value with previous year
  - Relative difference of current value with historical average

Indicators

- All data products are derived from SPOT-VEGETATION and Terra-MODIS sensors.

- Every 10 days the ENDELEO products are extracted from continental-scale imagery for both Kenya as well as a number of specific regions within Kenya.
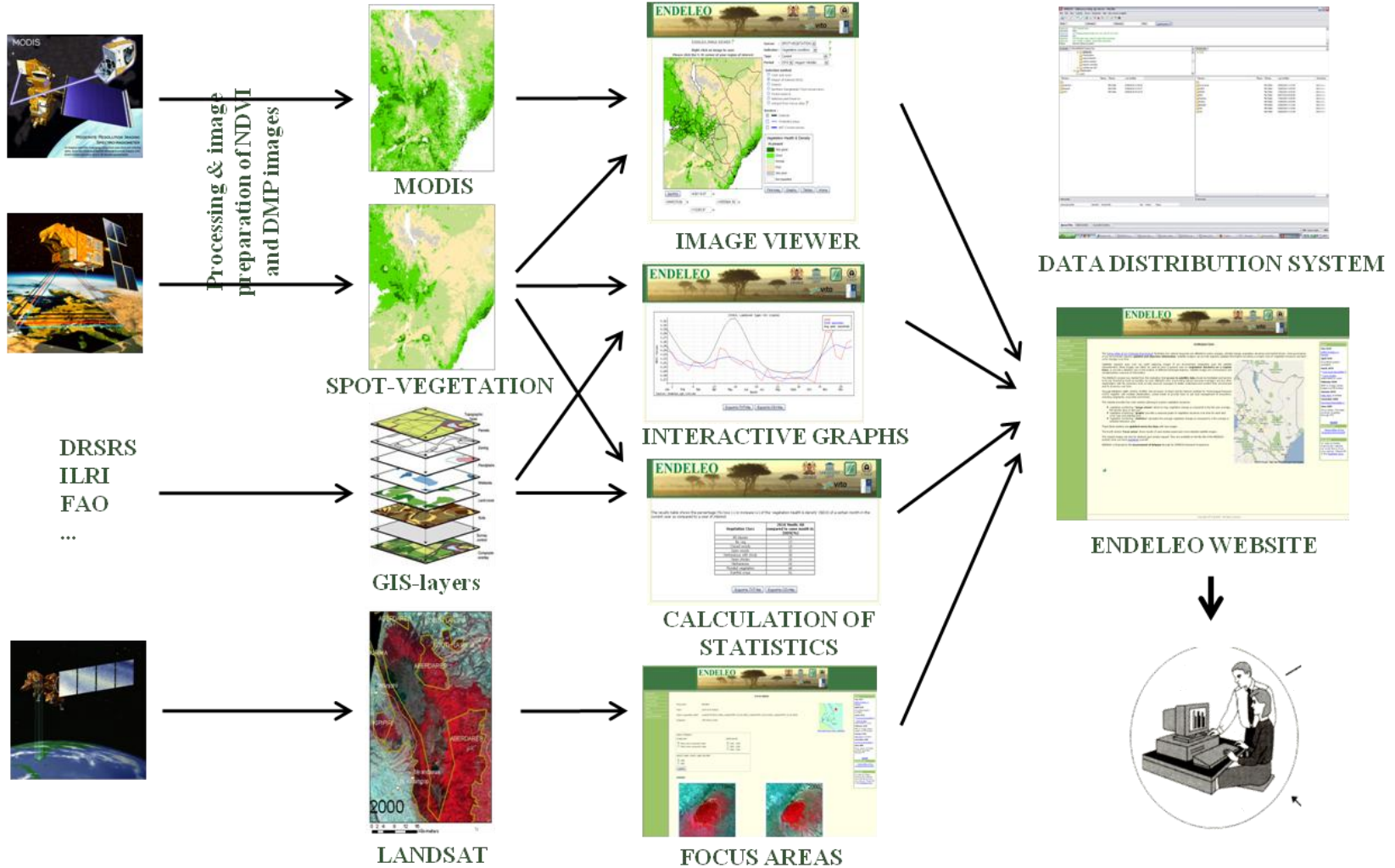
Sensor	:	SPOT-VEGETATION
Indicator	:	Vegetation condition
Type	:	Comparison average situation
Period	:	2010
		April - Middle

Vegetation Health & Density
Compared to usual situation

- Much better
- Better
- Similar
- Inferior
- Much inferior
- Not classified

Web tools

- Development of monitoring tool accessible to a broad group of users (endeleo.vgt.vito.be)

  - ❏ Easily interpretable products

  - ❏ Extensive help menu including help desk

  - ❏ Demonstration of use of tools in case studies

- Fully automatic

  - ❏ New data automatically added to the website on a 10 daily basis

Web tools

Web tools

- **Based on low resolution images (250 m – 1 km)**
    - ❑ Image Viewer

Web tools

- **Based on low resolution images (250 m – 1 km)**

  - ❑ Image Viewer
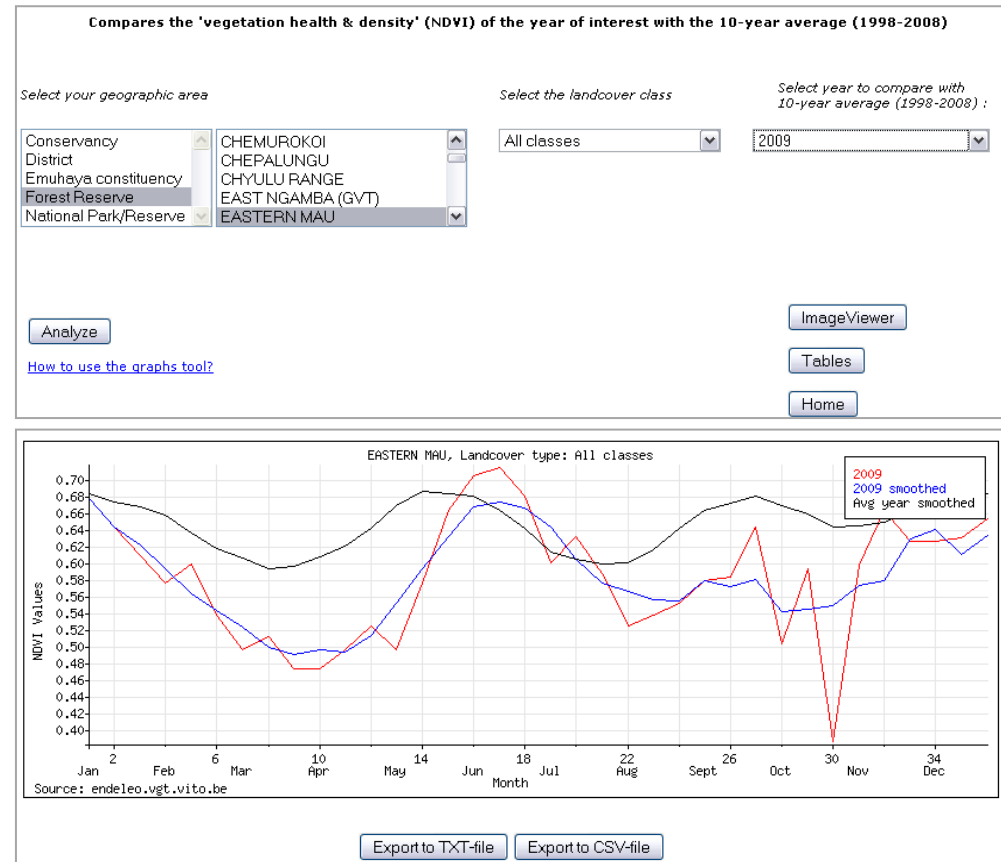
  - ❑ Graph tool

Web tools

- **Based on low resolution images (250 m – 1 km)**
  - ❑ Image Viewer
  - ❑ Graph tool
  - ❑ Table tool

Compares the 'vegetation health & density' (NDVI) of a certain month of the current year with a year of interest

Select your geographic area

Conservancy	EMBU
District	GARISSA
Emuhaya constituency	GUCHA
Forest Reserve	HOMA_BAY
National Park/Reserve	ISIOLO

Month to analyse

September

Year to compare with current year

2009

Analyze

How to use the table tool?

ImageViewer

Graphs

Home

The results table shows the percentage (%) loss (-) or increase (+) of the 'vegetation health & density' (NDVI) of a certain month in the current year as compared to a year of interest

Vegetation Class	2010 Month: 09 compared to same month in: 2009(%)
All classes	10
No veg	3
Closed woody	7
Open woody	10
Herbaceous with shrub	10
Open shrubs	7
Herbaceous	10
Flooded vegetation	31
Rainfed crops	-17

Export to TXT-file   Export to CSV-file

Web tools
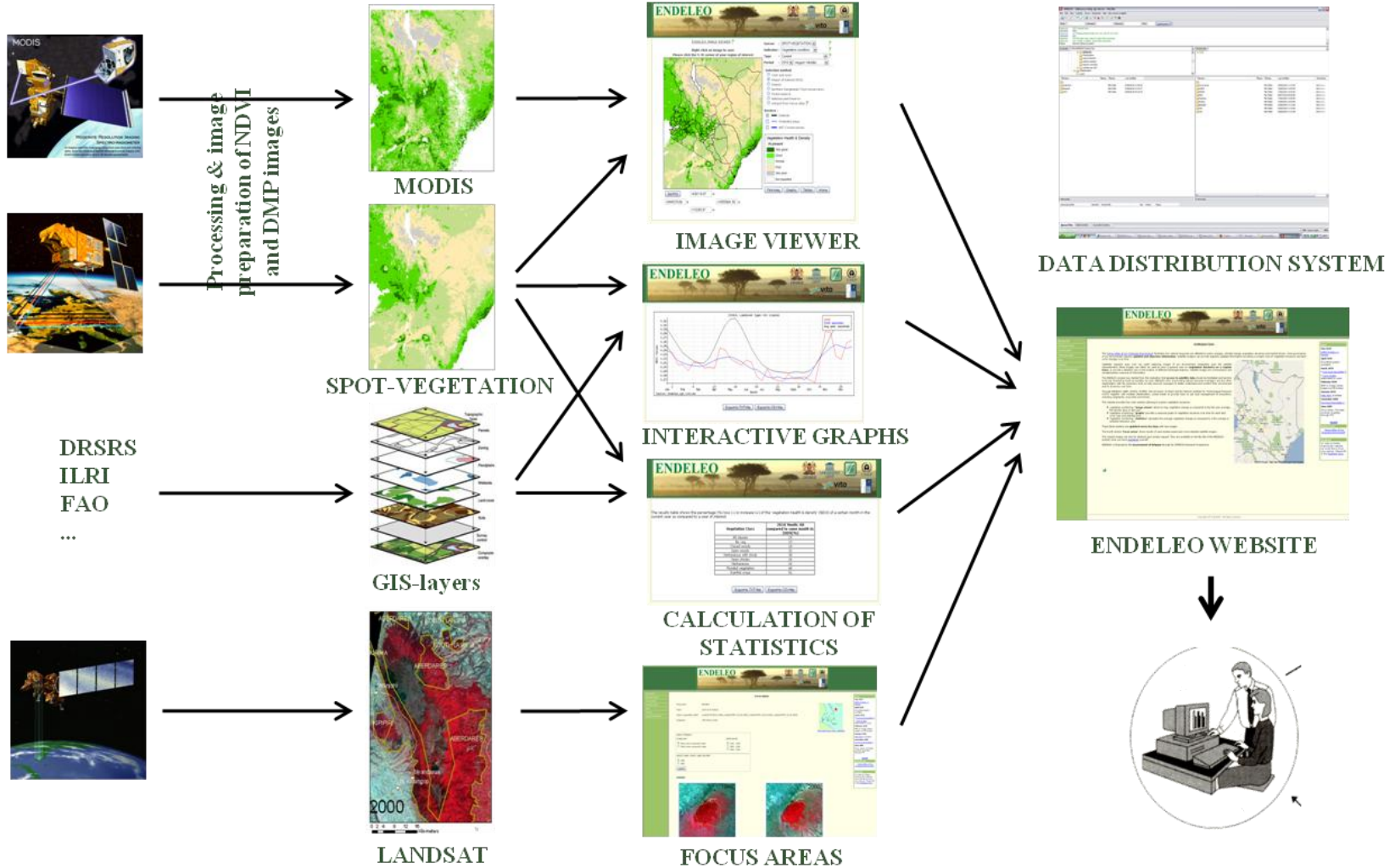
Web tools

- Based on high resolution images (15 m – 30 m)
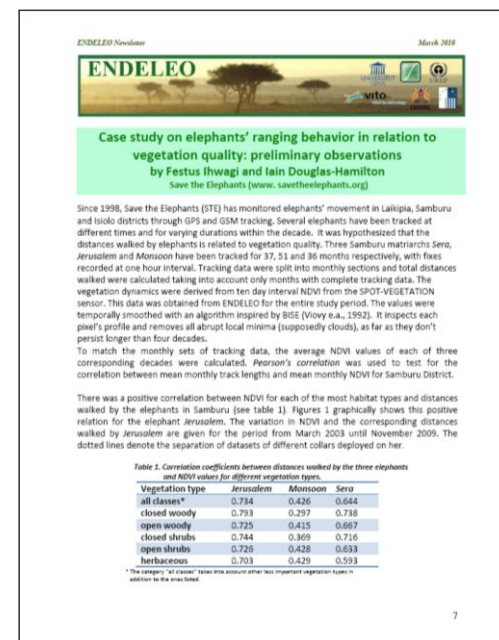 - ❑ Focus areas

Web tools
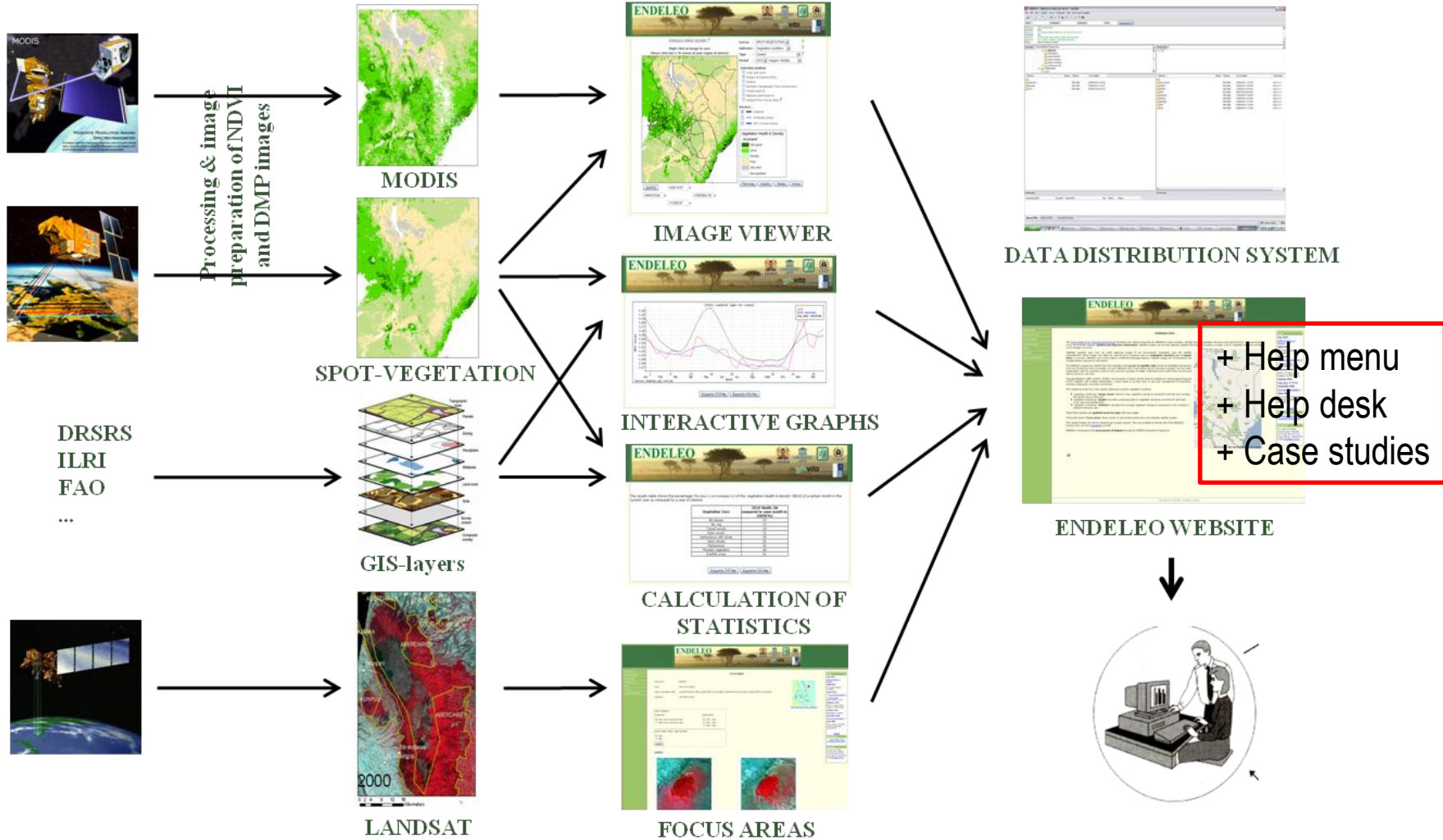
User involvement

- **Stakeholder involvement has been important during all stages of the project in order to achieve the project goals.**

- **Interaction through**
  - Online help desk
  - Case studies
  - Newsletters
  - Workshops

User involvement

- ENDELEO planning workshop (Nanyuki, Kenya, July 2007)
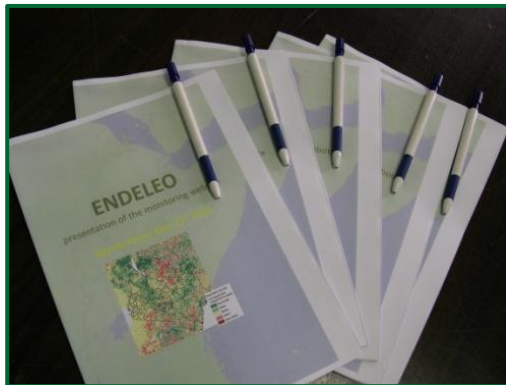
User involvement

- ENDELEO user workshop (Nairobi, Kenya, April 2009)

User involvement

- ENDELEO promotion mission (Nairobi, Kenya, May 2010)

User involvement

- ENDELEO final workshop (Nairobi, Kenya, November 2010)

Sustainability

- To ensure sustainability the system is operated locally in Kenya.

- Mirror server installed at DRSRS, national focal point for RS and spatial information on natural resources.

- Close partnership established with AMESD (African Monitoring of the Environment for Sustainable Development) to ensure follow-up.

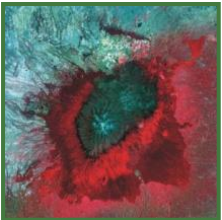- Project fits in larger frame of RS initiatives for East Africa.

Conclusion

- ENDELEO has reached its main objectives

  - Facilitate the access to RS information useful for ecosystem managers in Kenya

  - Enabling stakeholders without expertise in RS to visualize the data and perform basic analyses

- 165 users, several of them showed vivid interest and closely followed up on the activities of ENDELEO.

- However, hands-on support is required!

THANK YOU FOR YOUR ATTENTION

endeleo@vito.be