ENDELEO Newsletter

March 2010 **Number 5**

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Introduction

In this newsletter we are proud to present the first two case studies made by ENDELEO users, demonstrating their practical experiences with the ENDELEO data. Mwangi J Kinyanjui from the 'Department of Resource Surveys and Remote Sensing' (DRSRS) presents the use of NDVI to identify changes in Mau forest complex since 1998. Festus Ihwagi from 'Save the Elephants' summarizes his preliminary results on the relationship between elephant ranging and vegetation quality.

Following these examples, people who are willing to describe a case study about the application of ENDELEO data in their work, are very welcome (mail to Flore.Devriendt@UGent.be or Josefien.Delrue@Vito.be). We are particularly interested in experiences with decision making based on the combination of field data and ENDELEO data. In this way, we are able to demonstrate for which real world applications the ENDELEO data is used and work experiences between users can be shared. The case studies will be included in the following newsletters and will be made available on the ENDELEO monitoring website. For sure, all users can rely on our support to compose a case study and to comment on proposals.

In this issue we also want to announce some modifications to the ENDELEO monitoring website. The website has been updated recently and a new functionality has been added to the ENDELEO image viewer.

We will also give a short overview of some results we got so far from the questionnaire that has been sent to all ENDELEO users. We want to express our gratitude to all users who participate at the questionnaire.

Improvements of ENDELEO monitoring website

On the ENDELEO workshop in April 2009, several recommendations on the ENDELEO monitoring website (http://endeleo.vgt.vito.be/) have been formulated by the users to better suit their needs. After a feasibility study, a list of adjustments was prepared to be done. Since the last newsletter of November 2009 until now, a number of these adjustments to the website have been implemented. A short overview is given.

Previously, newsletters, reports and presentations/posters created in the framework of the ENDELEO project had to be consulted on a separate 'project website'. All this information is now merged in the ENDELEO monitoring website under the section 'download data < documents'. From now on, **all information about the project is assembled** on the ENDELEO monitoring website.

At the **introduction page** of the ENDELEO monitoring website, an official map of Kenya has been added in alternation with some Kenyan landscape pictures. As such, the scope of the project is clear to the website visitor at a first glance.

A new functionality is added to the image viewer of the monitoring website to **switch on or off three different layers**: districts, protected areas and NRT conservancies (see red rectangle in the figure 1 below). By toggling on these vector layers, the corresponding borders appear on the image.
During the last workshop in Nairobi April 2009, it was suggested to add besides these three layers also roads, villages, rivers/lakes, boreholes, cropping areas, wildlife corridors and constituencies. In the near future, the feasibility for gathering and implementing these features will be examined.

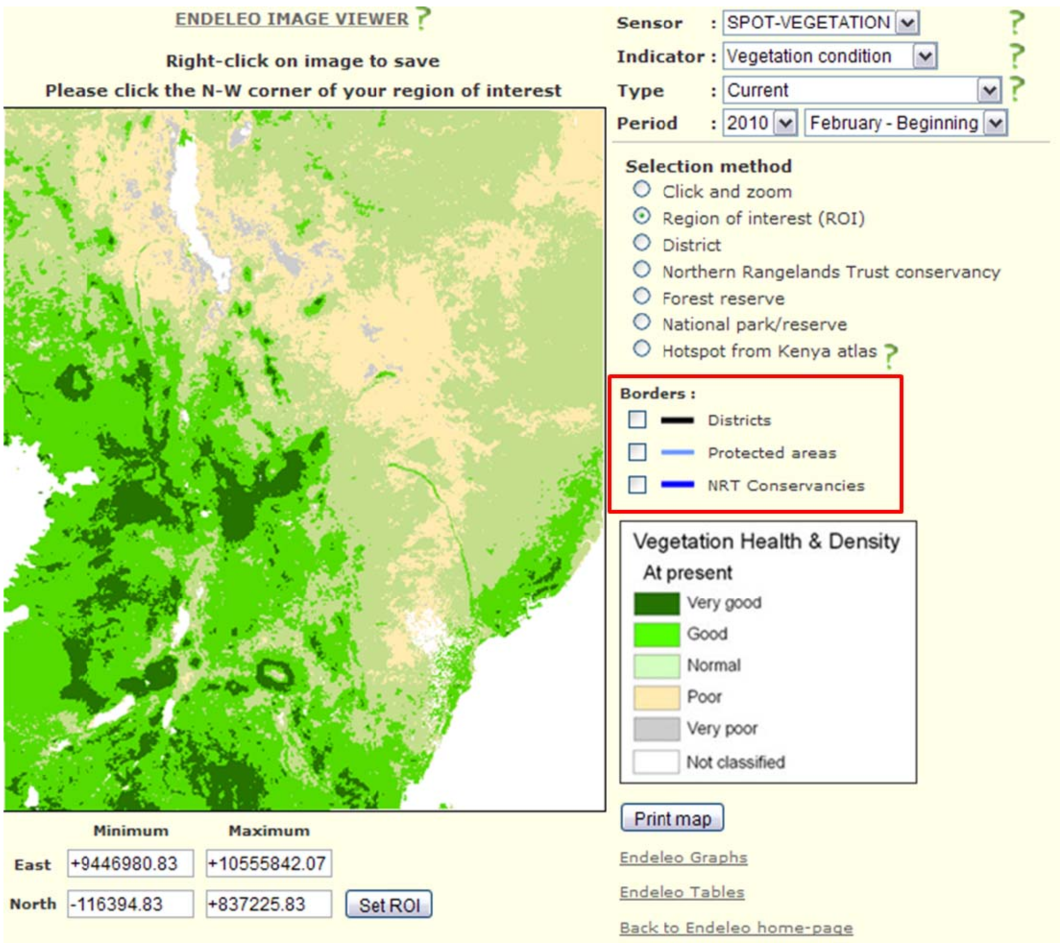


Figure 1: The new functionality of the image viewer allows switching on or off different vector layers.

As some users indicated in the questionnaire to experience comprehension problems when using the **table function, a more clear explanation** of what can be calculated by this function is given.

An official **Help Desk** is added at the 'help' section. If you have a question concerning the ENDELEO project, if you need assistance or if you don't find the information you require, all users can rely on our support. Do not hesitate to contact us. Email addresses and phone numbers are available under 'Help > Help desk'. Based on the received questions the **FAQ** section of the monitoring website will be updated.

In the near future, **product specification sheets** for all data products will be prepared or further completed. In this way, ENDELEO users can easily consult the identification information, data content, data quality, attribute information, etc. of each product. The product specification

sheet will be downloadable together with the data product on the ftp and will be available on the ENDELEO monitoring website under the section ‘Help > Data products’. As such, the content and the applicability of the downloaded or examined data will be more clear for the users. More information will be given when all files are in process.

Evaluation of the ENDELEO questionnaire

In order to improve the services of the ENDELEO project, both the web based monitoring tool and the data distribution system, the ENDELEO users have all been invited to fill in a questionnaire. People that have not yet send in their questionnaire are still very welcome. The feedback is very valuable to us to know where there is room for improvement and which services are most appreciated and should be further elaborated. An overview of the received outputs we got so far is given below.

We got response of approximately 30% of the ENDELEO users, belonging to different organizations, amongst which the ‘Department of Resource Surveys and Remote Sensing’ (DRSRS), Save the Elephants, the ‘International Lifestock Research Institute’ (ILRI), African Wildlife Foundation, Mpala Research Centre, Kenya Forests Working Group and Amboseli Trust for Elephants. Besides, some independent users also responded.

Figure 2 demonstrates graphically how frequent the interviewees visit the ENDELEO monitoring website.

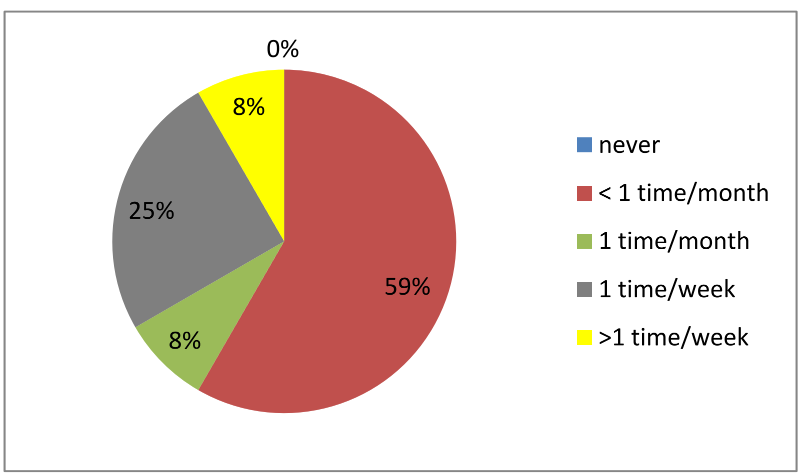
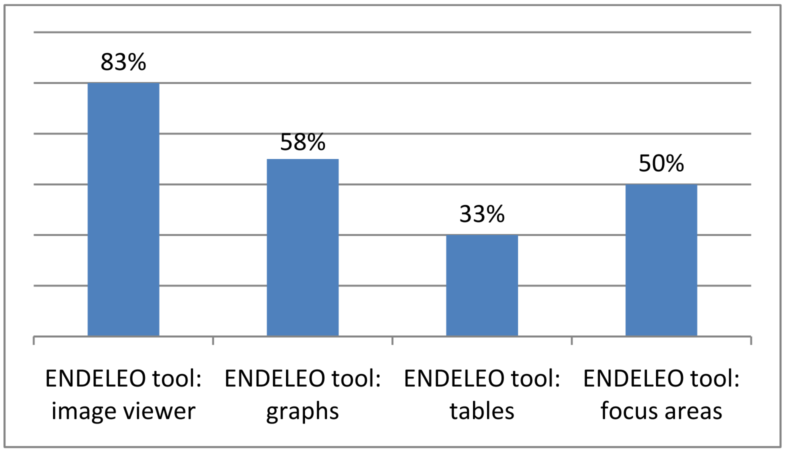


Figure 2: Pie chart indicating the frequency of visits to the ENDELEO monitoring website by the users.

Around 60% of the ENDELEO users indicated a frequency of less than one visit per month to the ENDELEO monitoring website. Eight percent of the users pays a visit once a month. A quarter of the users attends the website once a week and eight percent even surfs the website more than once a week.

Figure 3 shows the percentages of users that apply the different ENDELEO tools.

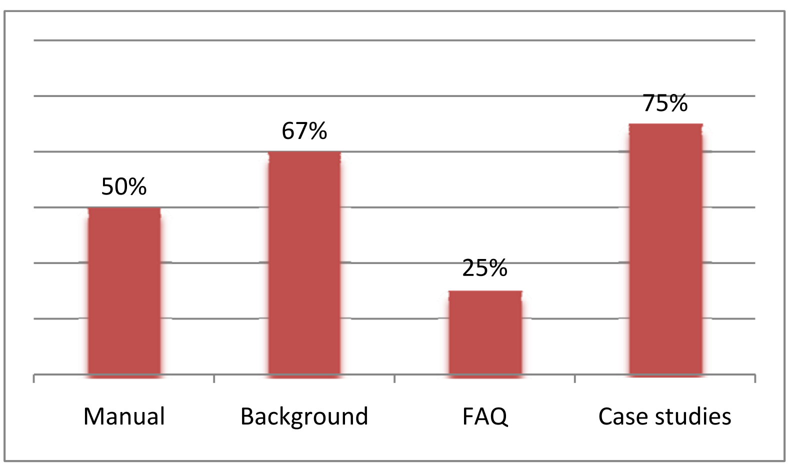


The image viewer is used by most of the interviewees. At least halve of the people make use of the graphs and are interested in the focus areas. The table tool appears to be somewhat less consulted.

Figure 3: Columns indicating the percentages of users applying the different ENDELEO tools.

The interviewees reported diverse purposes for which the tools are used, e.g. biomass estimation, land cover mapping, study of wildlife movements etc. Some examples are the detection of land cover change in Athi Kapiti Ecosystem and Nairobi National Park; the conservation status of Mau complex forests; analysis of elephant habitat and movements in relation to vegetation conditions.

Figure 4 indicates the percentages of users consulting the different sections of our help menu.



The case studies are most frequently visited, followed by the background information on remote sensing. Fifty percent of the users make use of the manual. Less people consult the FAQ section in order to search a solution for their problems.

Figure 4: Columns indicating the percentages of users applying the other webpages.

At last, figure 5 summarizes how frequently registered ENDELEO users download ENDLEO data from the ftp-site.

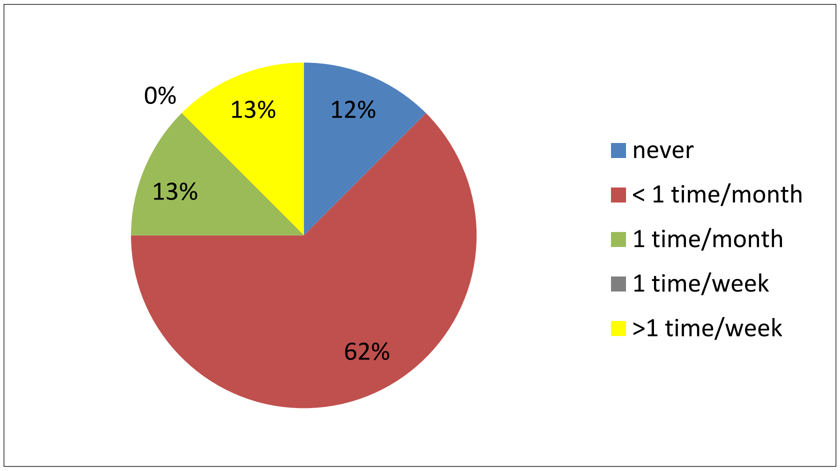


Figure 5: Pie chart of the frequency of downloading ENDELEO data from the ftp-site.

The majority of the users downloads less than once a month. A quarter of the users accesses the data once a month up to several times a week. Some users did not download any data from the ftp-site although they are registered.

The kind of data most downloaded by the ENDELEO users, are NDVI images.

Unfortunately, two third of the users experiences problems with the connection speed when downloading data from the ftp-site. As we were aware of this problem before, the ENDELEO tools (image viewer, statistics and focus areas) were specifically designed to allow exploring the images and performing basic analysis without actually having to download the data itself.
In case users face difficulties when downloading data from the ftp-site, they should report us and we will try to find a solution. Projects as DevCoCast and AMESD will considerably improve the distribution of images to Africa in the future.

Case study on elephants' ranging behavior in relation to vegetation quality: preliminary observations

by Festus Ihwagi and Iain Douglas-Hamilton

Save the Elephants (www. savetheelephants.org)

Since 1998, Save the Elephants (STE) has monitored elephants' movement in Laikipia, Samburu and Isiolo districts through GPS and GSM tracking. Several elephants have been tracked at different times and for varying durations within the decade. It was hypothesized that the distances walked by elephants is related to vegetation quality. Three Samburu matriarchs *Sera*, *Jerusalem* and *Monsoon* have been tracked for 37, 51 and 36 months respectively, with fixes recorded at one hour interval. Tracking data were split into monthly sections and total distances walked were calculated taking into account only months with complete tracking data. The vegetation dynamics were derived from ten day interval NDVI from the SPOT-VEGETATION sensor. This data was obtained from ENDELEO for the entire study period. The values were temporally smoothed with an algorithm inspired by BISE (Viovy e.a., 1992). It inspects each pixel's profile and removes all abrupt local minima (supposedly clouds), as far as they don't persist longer than four decades.
To match the monthly sets of tracking data, the average NDVI values of each of three corresponding decades were calculated. *Pearson's correlation* was used to test for the correlation between mean monthly track lengths and mean monthly NDVI for Samburu District.

There was a positive correlation between NDVI for each of the most habitat types and distances walked by the elephants in Samburu (see table 1). Figures 1 until 3 graphically show this positive relation for the three Samburu elephants. The variation in NDVI and the corresponding distances walked by *Jerusalem* (figure 1) are given for the period from March 2003 until November 2009, for *Monsoon* (figure 2) from March 2001 until September 2005 and for *Sera* (figure 3) from Oktober 2006 until Oktober 2009. The dotted lines denote the separation of datasets of different collars deployed on them.

Table 1. Correlation coefficients between distances walked by the three elephants and NDVI values for different vegetation types.

Vegetation type	*Jerusalem*	*Monsoon*	*Sera*
all classes*	0.734	0.426	0.644
closed woody	0.793	0.297	0.738
open woody	0.725	0.415	0.667
closed shrubs	0.744	0.369	0.716
open shrubs	0.726	0.428	0.633
herbaceous	0.703	0.429	0.593

* The category "all classes" takes into account other less important vegetation types in addition to the ones listed.

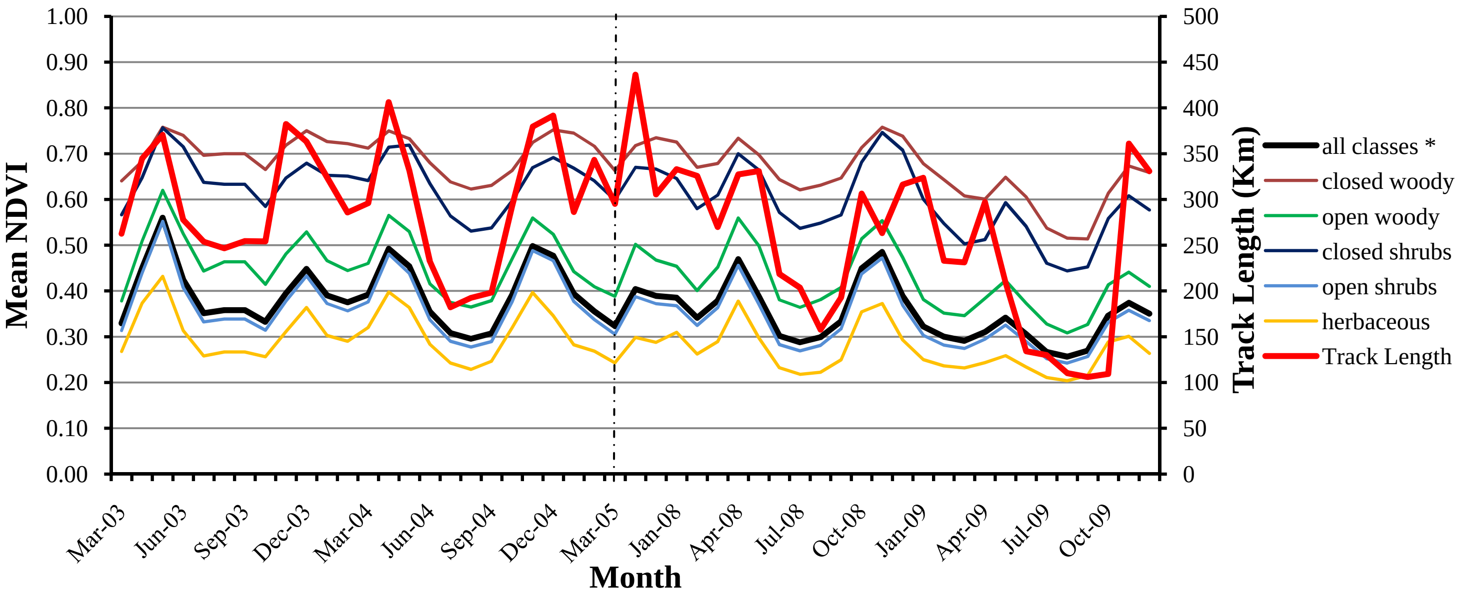


Figure 1. Variation in NDVI values and corresponding distances walked by Jerusalem. The dotted line denotes the separation of datasets of two collars deployed on her.

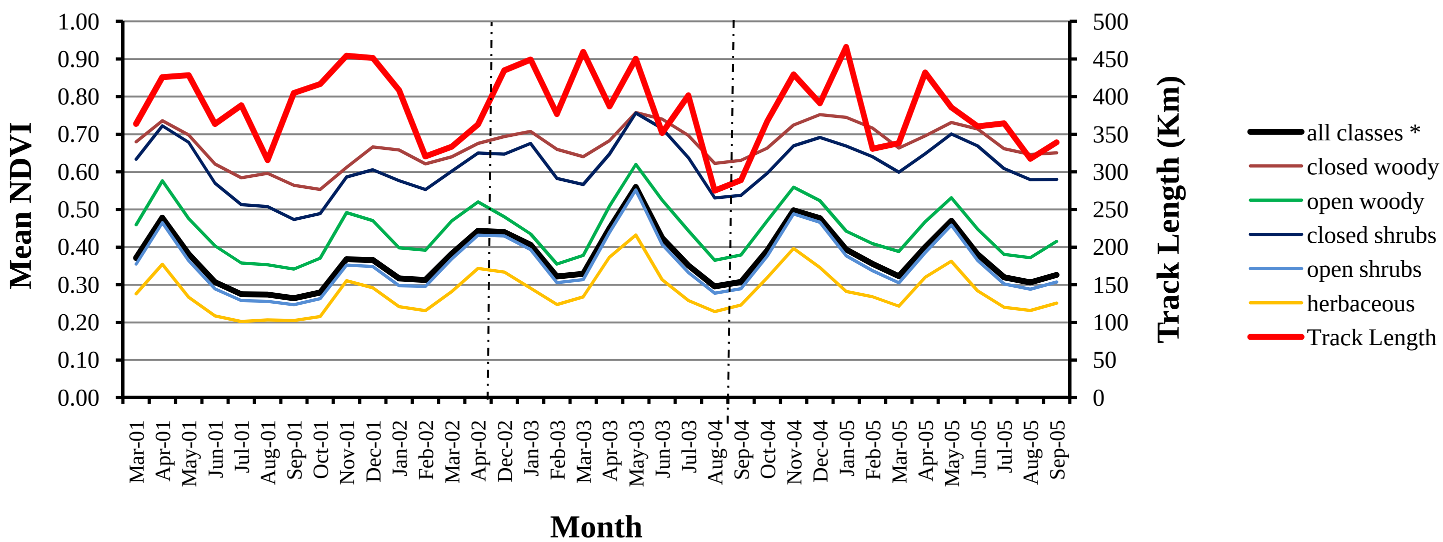


Figure 2. Variation in NDVI values and corresponding distances walked by Monsoon. The dotted lines denote the separation of datasets of three collars deployed on her.

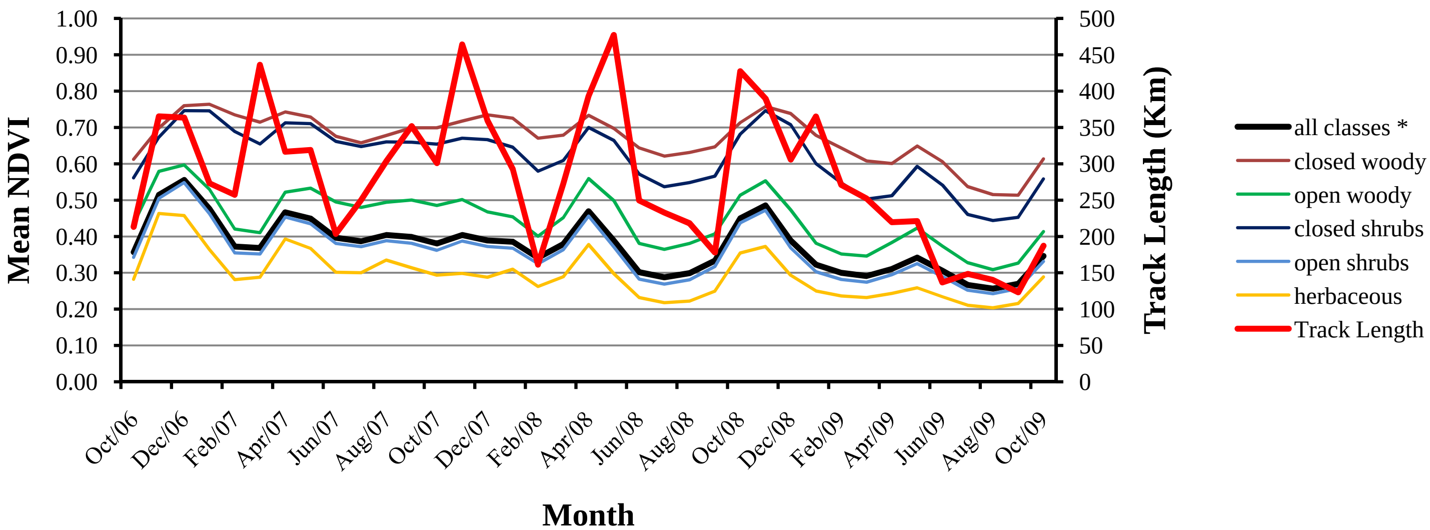


Figure 3. Variation in NDVI and corresponding distances walked by *Sera*.

The result of the preliminary analysis gives the motivation to refine the mean NDVI values to exact areas walked by elephants for a better understanding of its influence on elephant movements. While it is noticeable that the elephants respond to vegetation quality, it should be borne in mind that other factors like surface water distribution influence their ranging patterns too. From an ecological perspective, the major determinants of elephant distribution are availability of surface water (as a primary factor) and then other factors comes in like NDVI. Refining the NDVI to actual area trodden by elephants would hopefully disentangle the actual influences of vegetation quality and surface water on elephants.

This understanding may contribute to a sustainable wildlife management plan. From STE's long term monitoring of individually recognized elephants, it is known that elephants have limited home ranges during the dry season. In a place like Northern Kenya where surface water is very limited, elephants spend the dry seasons chiefly on the riverside forests along river beds where they get food from. Elephants have a coarse diet and extensively feed on the trees via debarking and felling to access palatable twigs. The bark is probably the richest source of proteins of all forage items and thus no wonder that elephants can survive on it during the dry season. After taking in such a coarse diet, they have to quench their thirst at nearby more permanent sources of water. It is in such dry times that the biggest damage to the riverside forests is immense because they over utilize the woody vegetation. The resultant degradation of forest cover is detrimental to other wildlife species and undoubtedly has a negative effect on future regional climatic conditions.

For questions related to this topic, please contact Festus Ihwagi (Ihwagi@gmail.com).

Case study on changes in NDVI values in the period 1998 – 2009: the case of Maasai Mau, Southwestern Mau and Eastern Mau

by Mwangi J Kinyanjui

The Department of Resource Surveys and Remote Sensing

Introduction

The Mau Forest Complex lies at approximately 0.0° to 0.91° South and 35.30° to 36.10° East in the South Rift region of the Rift Valley Province of Kenya. It is the most extensive block of montane forests in East Africa covering about 400,000 hectares (Wass, 1995). It is the catchment area for at least 12 rivers making it the largest of the water towers of Kenya (DRSRS and KFWG, 2006). Some of the rivers drain into Lake Victoria; Sondu, Nyando and Mara, while others drain into Rift Valley Lakes; Njoro, Molo, and Kerio. In effect, the Mau Forest Complex supports tourism and economic activities associated with the Mara Game Reserve, Lake Nakuru bird sanctuary and national park, and the Sondu Miriu Hydro Power project among others. Lake Nakuru is significant for its tourism potential being the largest bird sanctuary in the world. River Mara provides the crossing point of the wildebeests in their seasonal migration, and is the only dry season water source for wildlife in the extensive Mara National Reserve.

Climate and soil

The rainfall pattern is bimodal in distribution, peaking in April and August, and ranges from 1000 to 2000 mm. The rain days range from 120 to 200 per year. This rainfall pattern supports healthy forest vegetation. The temperatures range from $16^{\circ}C$ to $22^{\circ}C$ with July being the coldest month. The potential evapotranspiration is 1400 to 1800 mm per annum. The soil is mainly Mollic Andosols derived from tertiary volcanic parent material (Somroek *et al.,* 1980). In general, the soil is well drained, fine textured and of high agricultural potential.

Demographic characteristics

The rural population adjacent to the forest is generally poor. Bomet District, one of the districts adjacent to the forest was ranked third poorest district in 1999 with a very high prevalence of food poverty (M.F.P., 2000). Moreover, there has been land related violence among the resident communities since 1992. The violence results in burning of property and abandonment of land, which make the residents poorer. The adjacent forest is the only source of building material for reconstruction of destroyed buildings when peace prevails. Some of the fires lit during the violence spread to the nearby forests and destroy them.

Forest vegetation

The vegetation of the natural forest in the Mau Forest Complex is classified as afromontane mixed forest (White, 1983). Mutangah *et al,* (1993) used the dominant tree species to delineate forest formations. The forests on the windward side of L. Victoria are mainly moist mixed forests dominated by *Tabernamontana – Allophylus – Drypetes* forest formations (Kinyanjui, 2009) while the Eastern Mau is dominated by a dry upland conifer forest dominated by *Juniperus procera* (Hochst.ex Endl.) and *Podocarpus latifolius* (Thunb. Mirb). Primary colonizers like *Neoboutonia macrocalyx* (Pax), *Macaranga kilimandischarica* (Pax) and *Dombeya torrida* (J.F. Gmel.) are characteristic for degraded forests. Beentje (1994) listed over 61 tree species and 80 climbers and shrubs in the forests. The vegetation of the forest has been described as highly encroached due to high pressure from the forest adjacent communities (DRSRS and KFWG, 2006). Slash and burn techniques used by forest dwelling communities have also resulted in forest degradation. The communities occasionally use fires to improve pasture and prepare land for cultivation. This has resulted to existence in wide glades in the forest.

Indicators of forest vegetation changes

To limit the pressure on the forest, a sustainable management plan is required. To propose appropriate forest conservation measures, one should take into account the characteristics of forest vegetation, seasonal changes and between the years, and the response of the forest to the changing physical and human environment. Such information may amongst others be based on vegetation indicators derived from satellite imagery. A useful indicator is the Normalised Difference Vegetation Index (NDVI).

The NDVI has widely been used to detect changes in vegetation health and stocking (Anyamba and Tucker, 2005; Lotsch *et al*., 2003). It uses the principle that healthy vegetation absorbs most of the incident visible light emitted by the sun, and reflects a large portion of the near infrared light. Unhealthy or sparse vegetation reflects more visible light and less near-infrared light. The difference between healthy or well-stocked vegetation and that of unhealthy or sparse vegetation can be assessed by means of the NDVI

$$NDVI = (NIR - RED) / (NIR + RED)$$

where NIR is the near-infrared reflectance and RED is the reflectance of the red portion of visible light. The NDVI values generally range between -0.1 and 0.92, with higher values indicating denser and healthier vegetation like in tropical forests, moderate values (around 0.2

and 0.3) showing shrubs and grasslands, while very low values of 0.1 and below are typical to non-vegetated areas.

Study area

The study to identify trends of vegetation changes was set up in four selected blocks of the Mau forest complex in the period 1998-2009 (figure 1). These four blocks; Southwest Mau, Western Mau East Mau and Maasai Mau, are significant due to their role as water catchment. The forest varies in species composition and experiences varying levels of human degradation (Mutangah *et al.,* 1993; White, 1983).

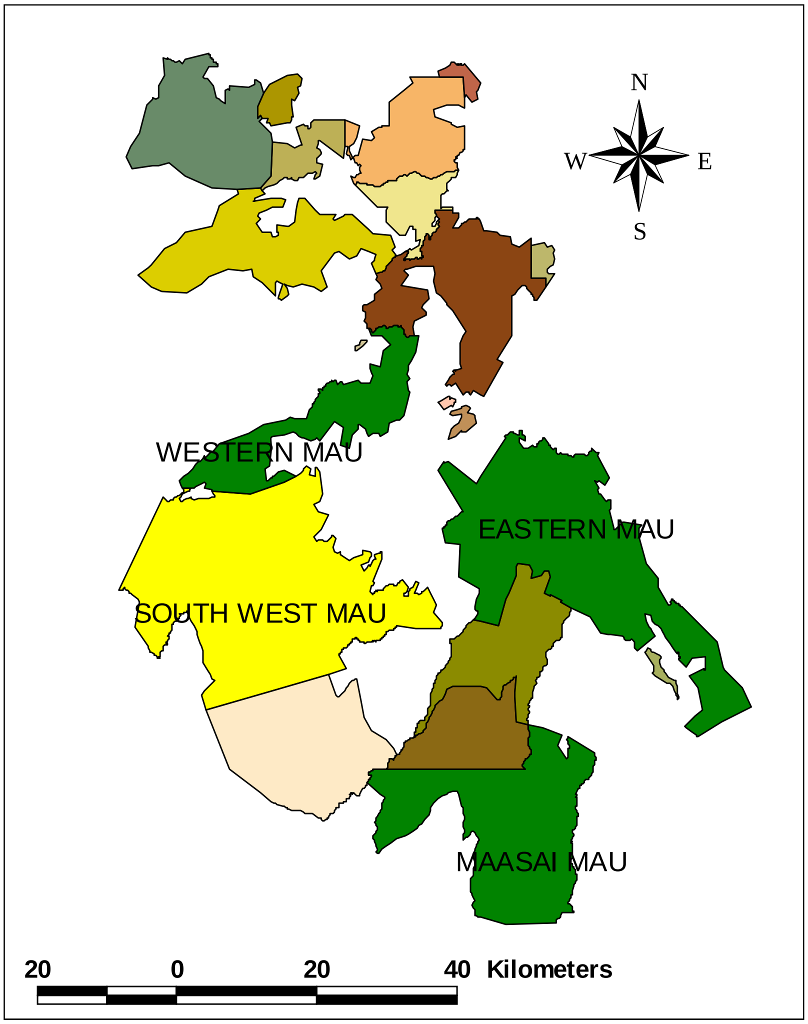


Figure 1. Study area.

Methods

Data was obtained from the ENDELEO project (http://endeleo.vgt.vito.be/) that provides remote sensing based data and tools to monitor the vegetation dynamics in Kenyan ecosystems. One of the products available are the ten daily NDVI composites since April 1998 obtained from the 1 km resolution SPOT-VEGETATION sensor.

This study focuses on the NDVI of the closed woody forest vegetation type for the four Mau sections. The dataset was smoothed over time, to remove possible dips related to bad values, e.g. due to undetected clouds, with an algorithm inspired like BISE (Viovy et all., 1992). It inspects each pixel's profile and removes all abrupt local minima (supposedly clouds), as far as they don't persist longer than four decades.

First the annual average NDVI values were compared, to define the obvious differences in the vegetation conditions for the different forest blocks.
Subsequently it was evaluated per forest block if there is a general trend in the status of the closed woody vegetation. The average NDVI values per decade over the 11 year period were standardized to the Standardized Difference Vegetation Index' or SDVI (Z-scores).

$$\mathbf{SDVI} = (\mathbf{NDVI_{current}} - \mathrm{NDVI}_{\mathrm{mean}}) / \mathrm{NDVI}_{\mathrm{standard\ deviation}}$$

The SDVI gives a relative measure of the increase or decrease as compared to the mean NDVI for the same decade and levels out the seasonality in the dataset.
Finally the NDVI values of the closed woody forests vegetation type for the selected forests were examined for three different months; March the driest season, July the wettest season and October the short rains period. The monthly NDVI averages were plotted over the different years and extreme values ($|\mathrm{SDVI}| > 2$) were eliminated. A linear regression was calculated. The R^2 was calculated to see whether the regression can be regarded as a trendline and an F-test was performed to test if decrease or increase in the trendline is significant.

Results and Discussion

Differences in yearly average NDVI

Figure 2 shows that the average annual NDVI values vary from year to year and after a decline in one year, there is a gradual improvement in the successive year. As a result, it is difficult to identify any positive or negative change in the forest health and stocking.
A notable finding from figure 2 is that East Mau has NDVI values that are lower than the other three forests and that it has larger variations. The extreme dry conditions in 2000 and 2009 have affected the vegetation conditions of East Mau more than in the other forest blocks. This forest block seems to be more fragile. It is located on the leeward side of Lake Victoria and the

rainfall received here might not be compared to what is received in the other forest blocks to facilitate vegetation growth. This assumption however can only be confirmed by comparing the rainfall data with the NDVI data. The East Mau forest block is more of a dry upland forest dominated by conifers like *P. latifolius* and *J. procera*, which may not have reflectance characteristics like N. macrocalyx and M. kilimandischarica, pioneer species that dominate degraded forests in the other forest blocks. Ground truth data shows that fires also affected parts of the forest in the late 1990s and much of the vegetation has not recovered. Furthermore it can be observed that Masaai Mau followed the same trend as Western and Eastern Mau until 2007. From 2008 onward the NDVI has become slightly lower. This may be a subject for further investigation.

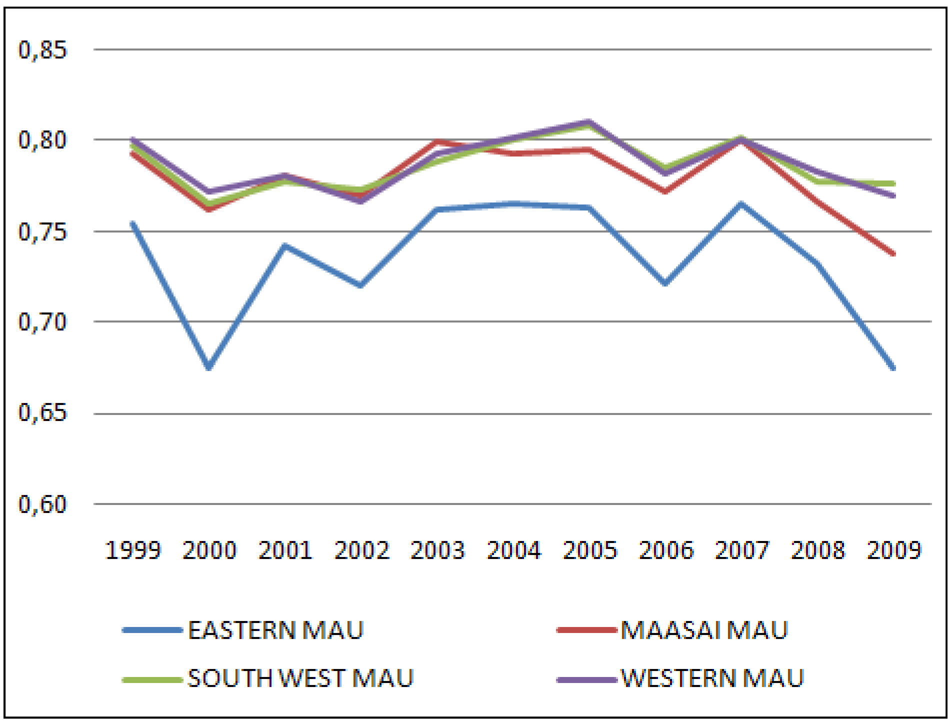
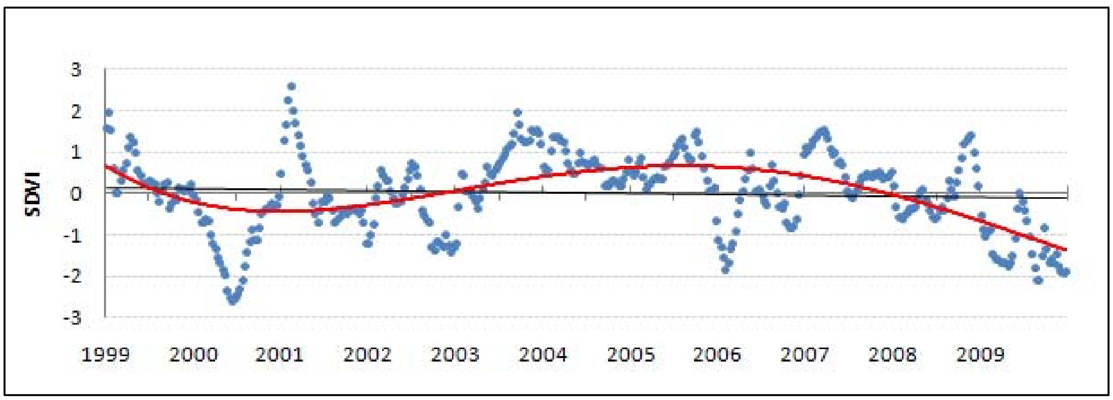


Figure 2. The average trends comparing NDVI values in the four forest blocks over the study period.

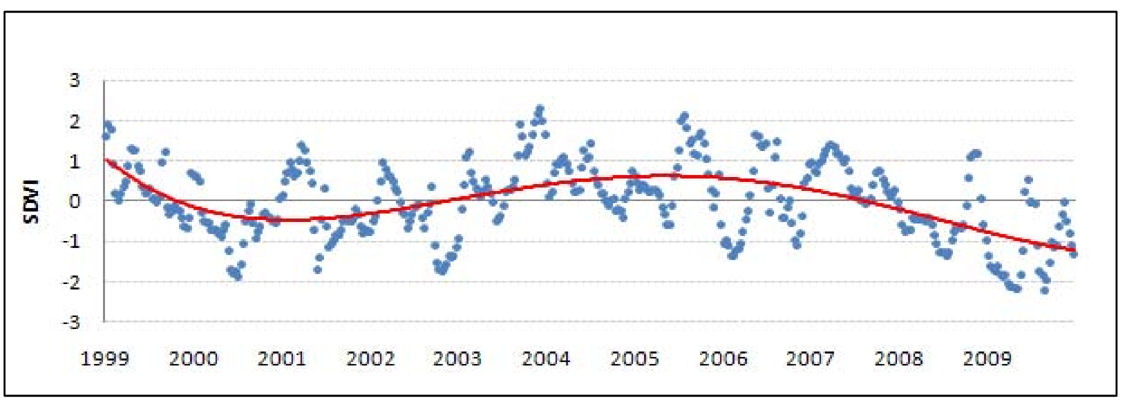
Trend of ten daily NDVI values

The SDVI plots in figure 3 show large variations between the different years. These are most likely related to the erratic rainfall conditions which are characteristic for the Horn of Africa. The trend of the SDVI that may be observed over the years is rather cyclic, corresponding to the rainfall variations with alternating wet and drier years. In the period from 2000-2003 and from 2008 on, the vegetation seems to perform less good. It takes a number of years before the

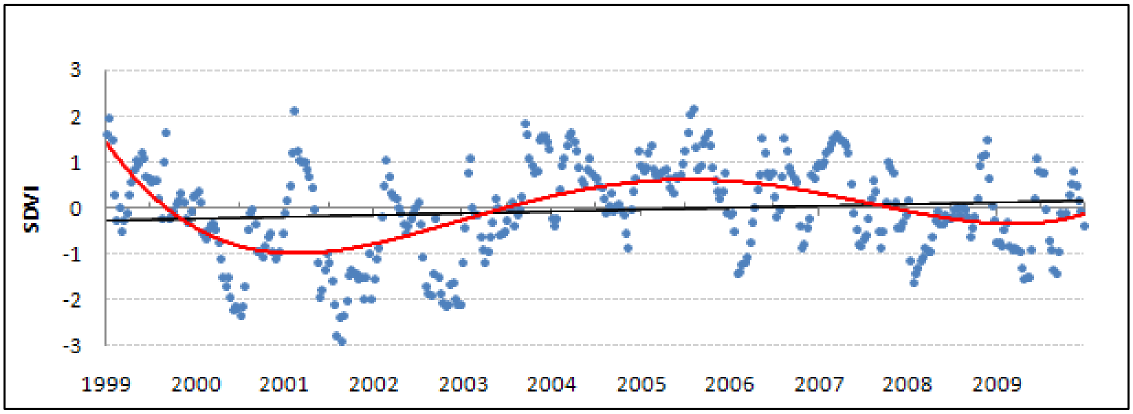
forest recovers. For East Mau and Masaai Mau, the trendline does not show an upward movement at the end of 2009 and the SDVI values are still negative. The forest does not seem to recover yet from the latest drought. For West and Southwest Mau, an upward trend can already be observed. Because of this cyclic behavior of the vegetation conditions, it is difficult to derive if there is a long term overall decrease or increase in the NDVI. This could be an indicator of respectively an improvement or a decline in the vegetation health or stocking density in the forests studied over the ten year period. An analysis approach should be used which eliminates the effect of rainfall variability. It can only be confirmed over a longer period of monitoring. Alder and Synnott (1992) note that changes in a natural forest are gradual and slow and require at least five years to be noticeable.



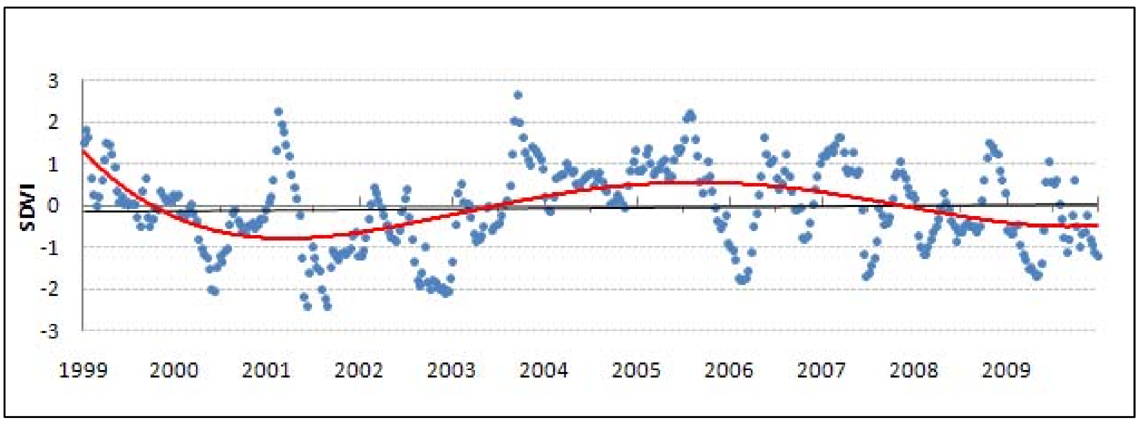
East Mau



Masaai Mau



Southwest Mau



West Mau

Figure 3. Scatter plots and polynomial lines showing the variability and the trend of the SDVI values over the study period in the four blocks of Mau forest Complex.

Seasonal variations in NDVI

In the month of March, being the driest month, the NDVI values strongly vary from year to year (figure 4). The results may imply that the drought conditions differ over the years, dependant on the performance of the preceding rain season, or that the onset of the growing season is variable. There is no clear trend in the values over the study period. Only in West Mau a minor correlation indicates a possible decline in the NDVI. This possibly signifies that the rainy season is starting later or the dry conditions in vegetation are becoming more severe over time making the vegetation more stressed. Though, the correlation and significance of the trend are too low to make strong conclusions.

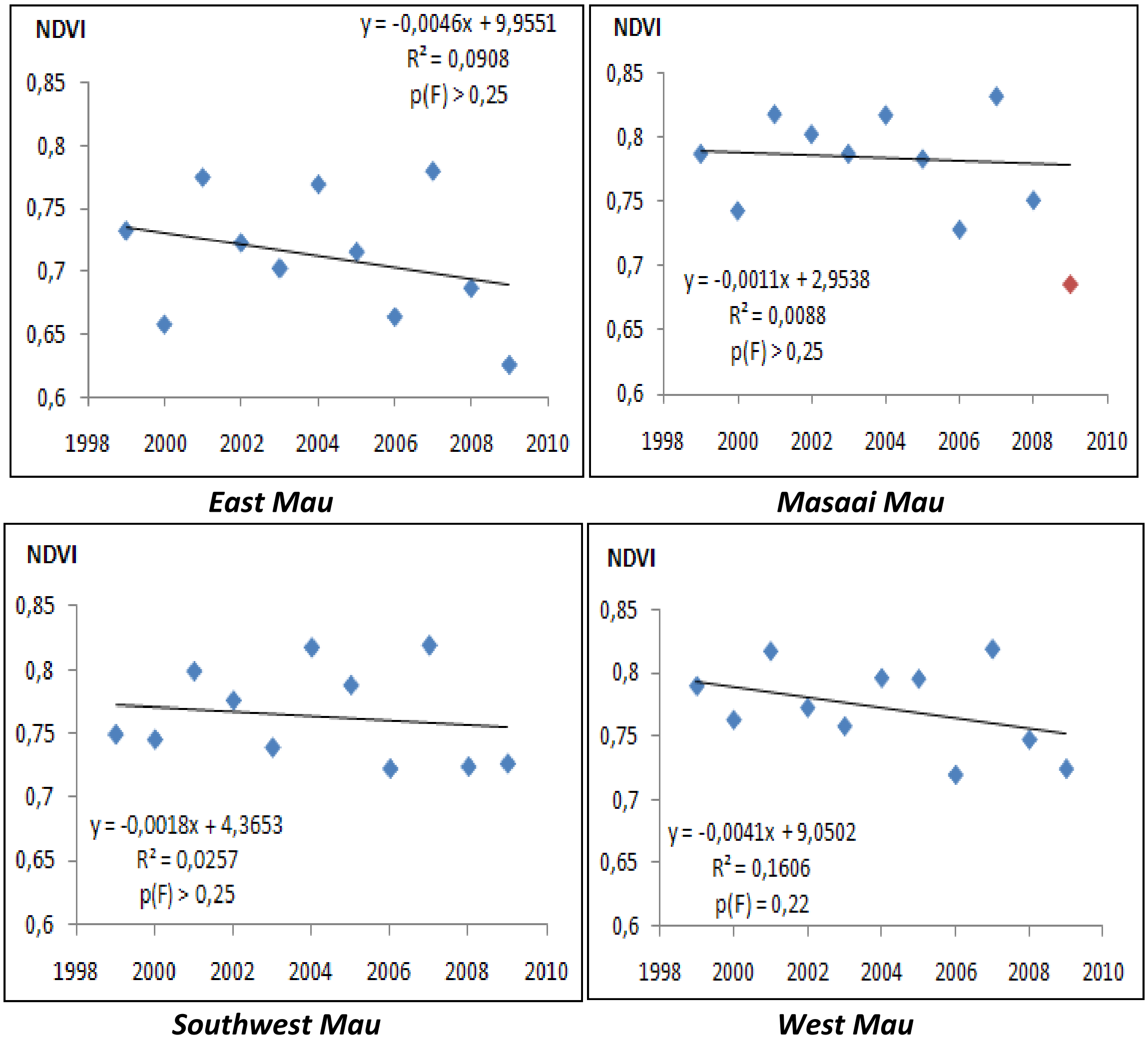
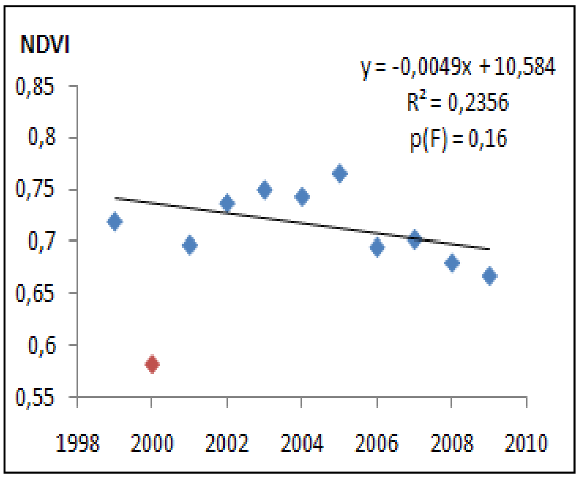


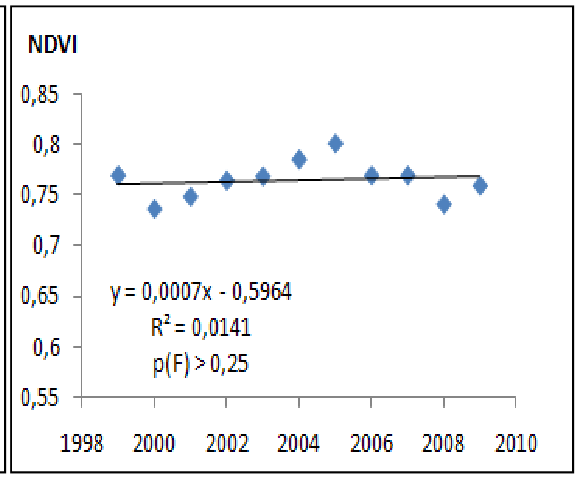
Figure 4. Trend of NDVI values over the study period for the month of March. NDVI values with │Z-score│ > 2 are represented are not taken into acount for the regression line (red dots). p(F) is probability of F-test.

In July, the variability in NDVI is lower over the years. This means that vegetation conditions during the rainy season are less dependent on the performance of these rains than during the dry season. Minor correlation and positive trend line in the scatterplot of Southwest Mau may show an increase in the NDVI values over the study period while for East Mau forests there might be a decline (figure 5). For Masaai Mau and West Mau, no trend is observed. July is always a wet month and the vegetation is expected to be recovering from the drought stress. The increasing trend in NDVI values in the Southwest Mau block may possible signify that the

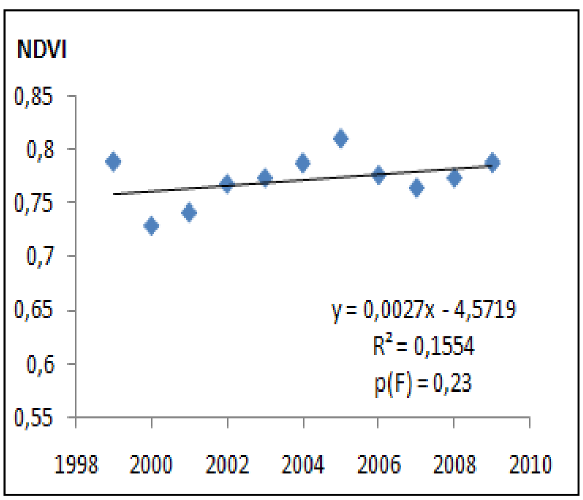
forest has been responding better and the vegetation is improving over the ten year study period. The opposite might be true for East Mau. The results should be interpreted carefully due to the low correlations.



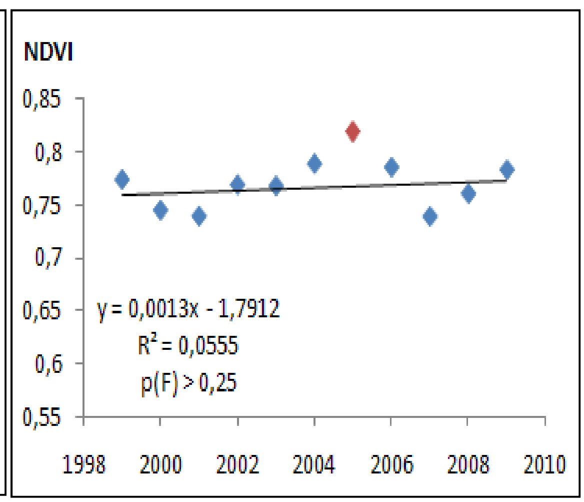
East Mau



Masaai Mau



Southwest Mau



West Mau

Figure 5. Trend of NDVI values over the study period for the month of JulyNDVI values with │Z-score│ > 2 are represented are not taken into acount for the regression line (red dots). p(F) is probability of F-test.

In the month of October (figure 6), the scatter plot of Southwest Mau shows a minor correlation for an increase in NDVI values over the study period. This might indicate a delay in the end of the growing season from the late 1990s to 2009.

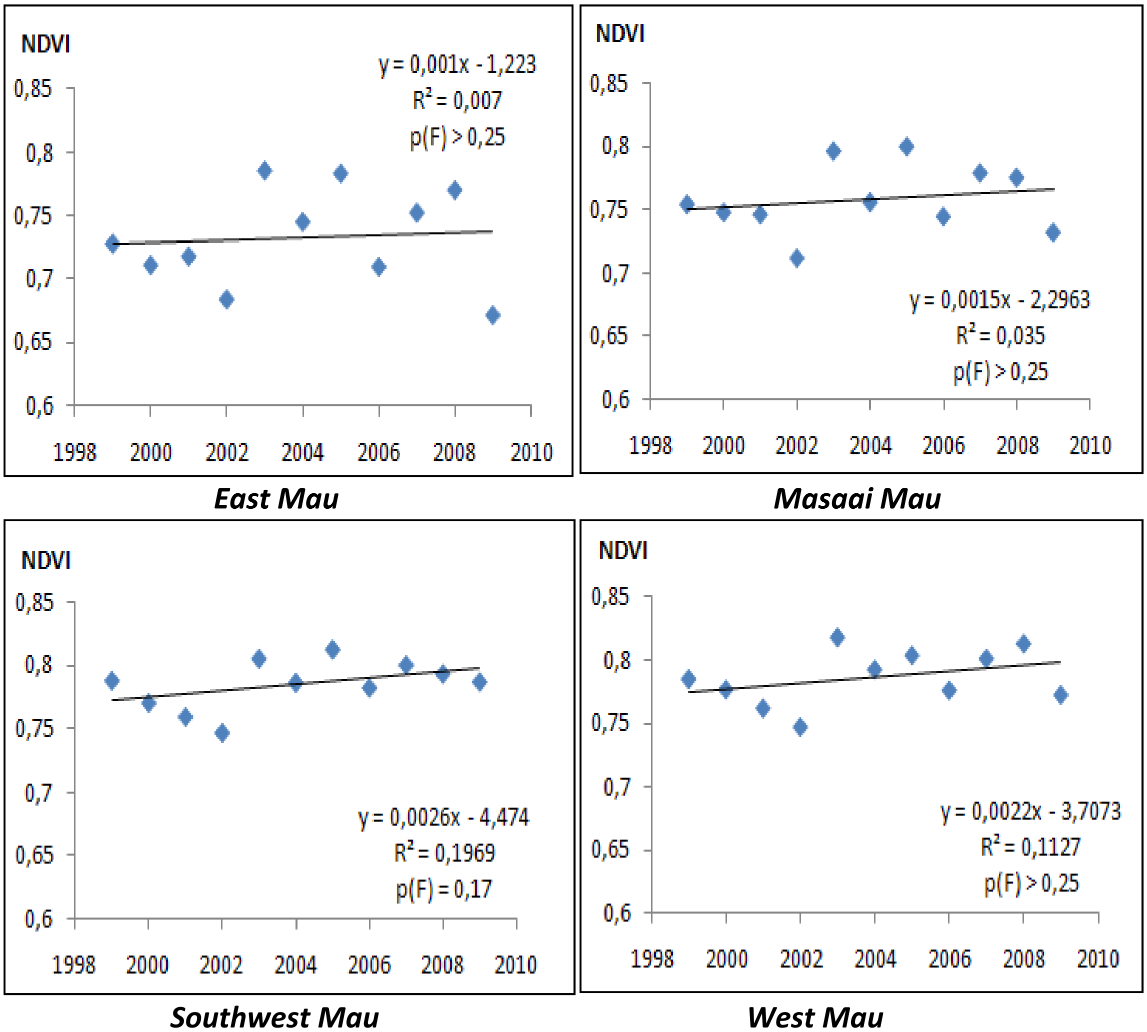


Figure 6. Trend of NDVI values over the study period for the month of October p(F) is probability of F-test.

Considering all scatterplots together, they do not proof any significant trends. Though, it can be noticed that the trendline for March is slightly negative, for July the slope is slightly positive, except for East Mau, and for October there is again a slightly positive trend. This may signify that the growing season has shifted a bit. The July results for East Mau might indicate a slightly vegetation degradation trend. Even though no strong conclusions can be made, they point out for which periods or areas further research would be interesting. More data is needed to confirm the status of the vegetation on the ground.

Discussion

Maasai Mau forest has received the greatest rate of degradation in the last ten years with communities clearing and settling in the forests. The average yearly NDVI does not differ much from West and Southwest Mau, except for the last two years it has become slightly lower. There is a slight negative trend for the NDVI values of July, in the middle of the wet season when vegetation should be least stressed, but this result has to be interpreted carefully.

East Mau was heavily excised taking about 40,000 hectares from the original 65,000 hectares. The remnant forest has a lot of pressure from the forest adjacent community. The dry upland conifer forests are most affected by fires which have been very common in this forest. A section of the bamboo zone in this forest was affected by fires and has not recovered since then. The average yearly NDVI values are clearly lower than for the other forests. A rather slow recovery from drought can be observed when taking into account the trend of all ten daily NDVI values. Though no clear trend can be derived from the seasonal NDVI study. This is a forest that calls for more attention especially because it is a catchment area for L. Nakuru.

Southwest Mau and West Mau forests are on a trend of recovery after forest fires were stopped in 2003. The vegetation conditions vary less over the years and the forest recovers quicker after a dry spell. The fact that these forests are on the leeward side of L. Victoria implies that heavy rainfall enhances vegetation recovery after degradation. This can be confirmed by the presence of the gregarious *N. macrocalyx* that colonises degraded areas very fast. It is in these blocks that there was recent eviction of illegal forest settlers and it is expected that the vegetation will improve in the next years.

Suggestions for further research

Rainfall is very variable in Kenya and has a major impact on the vegetation status, leading to large changes in NDVI from year to year. This makes it quite difficult to identify trends. Therefore it is necessary to obtain rainfall data and examine the relationship between NDVI and rainfall. It may also be interesting to perform an NDVI analysis specifically on those areas where degradation.

Year 2009 was a very dry year all over the country. It is necessary to monitor the forests after the year 2009 to see if they recover after drought. This will confirm the self-recovery process of the forests and may justify which forests need enrichment planting.

Ground truthing should be focused on special cases like East Mau so that remedial action may be taken to save the forest whose role in the Lake Nakuru Ecosystem is very significant.

For questions related to this topic, please contact Mwangi J Kinyanjui *(*mwakinyaa@yahoo.com).

Miscellaneous

- A mirror server for the ENDELEO monitoring website is being installed at DRSRS to assure sustainability of the website in the future. Ultimately the ENDELEO services will be maintained independently by the Kenyan partner. The status of the server will be followed up in next newsletters.

- A third ENDELEO workshop is planned for September. A major focus will be on exchanging experiences and ideas on the use of remote sensing based tools for local ecosystem management. All people showing interest in the workshops will be contacted for invitation and case study possibilities. This workshop will be the official start of the ENDELEO project independently operated by the Kenyan people.

- All partners involved in the project (Kenya Forests Working Group, Save the Elephant, LEWA Wildlife organisations, African Wildlife Foundation, Mpala resource center and conservancy, CETRAD, ILRI, DRSRS, RCMRD and UNEP) have been contacted to ask if they can hand possibilities to promote the ENDELEO project by announcing the project in their newsletter or by providing a link of the ENDELEO monitoring website on the website of their organisation. The awareness of the ENDELEO project to the Kenyan community is one of our key goals in the last phase of the project. It is an important aspect as well to assure sustainability of the ENDELEO project in the future.

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Links:

ENDELEO Monitoring website