

PARTICIPATORY MAPPING OF BIODIVERSITY IN THE EASTERN MAU FOREST (KIPTUNGA)

Preliminary assessment



manitese*
UN IMPEGNO DI GIUSTIZIA



*3RD INTERNATIONAL
CONFERENCE
Environmental monitoring and
assessment*

*AARHUS, DENMARK,
1st -2nd OCTOBER 2015*

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***A multiple approach for a Rapid Biodiversity Assessment:
The use of participatory, field and GIS techniques in The MAU forest, Kenya.***

A rapid (15 days) biodiversity assessment was carried on the KIPTUNGA forest, eastern MAU complex, Kenya. Participatory mapping, field-work, and a landscape-analytical approach were mixed: we (i) set up a participatory workshop, by which the community mapped ecosystem services and described bird and mammal species detectable in the forest; we (ii) checked information on the ground by recording land use reference points and examples of ecosystem services utilization and by a direct camera-trapping activity of animal diversity and (iii) we performed satellite and aerial pictures based GIS analyses to map the actual land use of the forest. The three methods led to a coherent view of the differences of conservation status between logged and pristine areas, showing the decrease of biodiversity linked to deforestation. Relevant ecosystem services (hunting, gathering, bee-keeping) also appeared to occur only in the untouched areas, this having consequences on the possibility for the people to carry on elsewhere a sustainable and traditional lifestyle.

We would like to report an example of how a multiple approach, both technical and based on local knowledge, can provide useful results for very rapid assessments. We also conclude that it should be warned how, in times of carbon off-set policies implementation, re-forestation strategies unable to take in account the quality of the forest ecosystem are often not sustainable ways to reduce climate change impacts.

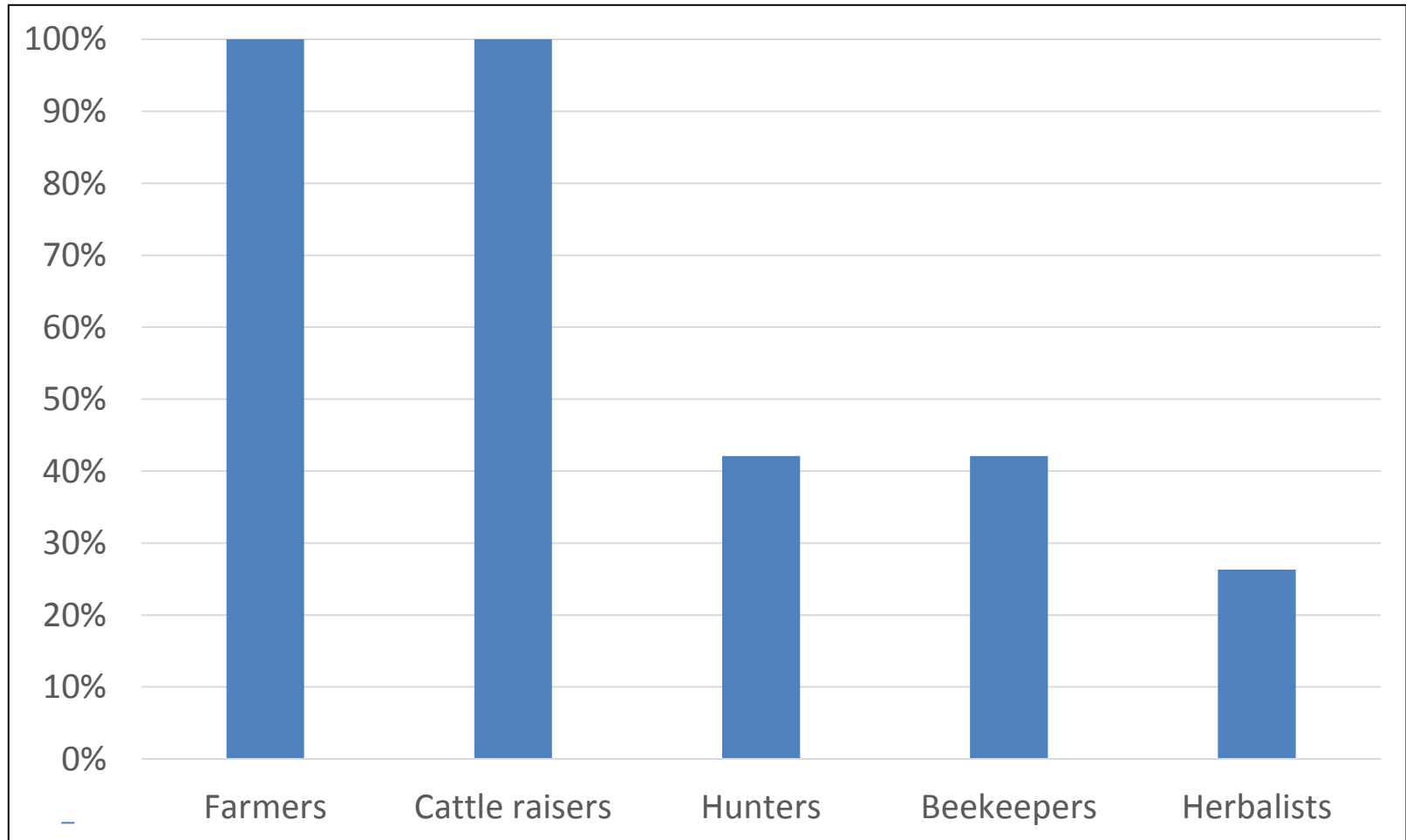
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WORKSHOP WITH THE COMMUNITY



19 informants chosen by NECOFA among the **community of Mariashoni**

INFORMANTS' PROFILES



WORKSHOP - TRAINING

- Basic notions of **ecology** and **evolution**
- **Biodiversity** and **ecosystem services**
- **Discussions** and **debates**
- **Sustainability** and **prey-predator relations**
- **Basics of biogeography** (side effect, fragmentation)



WORKSHOP – PARTICIPATORY MAPPING (1)

- Identification of target by pictures
- Identification of the **local name** to ensure the recognition
- Cross checking **discussions** and map localisation



WORKSHOP – PARTICIPATORY MAPPING (2)

- Mapping of animal **biodiversity** (omeotherm fauna)
- Mapping the **ecosystem services**
- Mapping of **potential touristic sites**
- Identification of **threats and fragmentation analysis (GIS)**





*Participatory mapping of
biodiversity and ecosystem services*



Mapping ecosystem services: Potential tourism sites

- Identification of **sites** with a **potential value for tourism**
- As many sites as possible were **visited and assessed** during the **fieldwork** (this week)

RESULTS:

- Caves
- Waterfalls
- Traditional apiary sites
- Forest transects
- Monumental trees



| NAME | WHAT | AREA |
|-------------------------|---|-------------------|
| <i>lomet /engapunne</i> | <i>big valley with caves</i> | <i>Lengape</i> |
| <i>Napuyiapui</i> | <i>source of the mara river</i> | <i>Kamweu</i> |
| <i>kap-keringet</i> | <i>tunnel built</i> | <i>Mariashoni</i> |
| <i>Osururiet</i> | <i>waterfall</i> | <i>Cheboin</i> |
| <i>Songi</i> | <i>waterfall</i> | <i>Kamweu</i> |
| <i>Kutung'iin</i> | <i>Traditional apiary site</i> | <i>Kiboet</i> |
| | <i>caves</i> | <i>Ccheboin</i> |
| | <i>big cedar (approx. 8 people diameter)</i> | <i>Kamweu</i> |
| <i>Lengape</i> | <i>baboon meeting</i> | <i>Lengape</i> |
| | <i>traditional corridors for wildlife/hunting</i> | |
| | <i>traditional corridors for crossing forests</i> | |



| WILDLIFE SPOTTING SITES | | |
|--------------------------------|--|----------------|
| <i>Colobus monkeys</i> | | <i>Kiboet</i> |
| <i>Colubusu monkeys</i> | | <i>Lengape</i> |
| <i>birdwatching</i> | | <i>kamweu</i> |
| <i>snakes</i> | | <i>Lengape</i> |



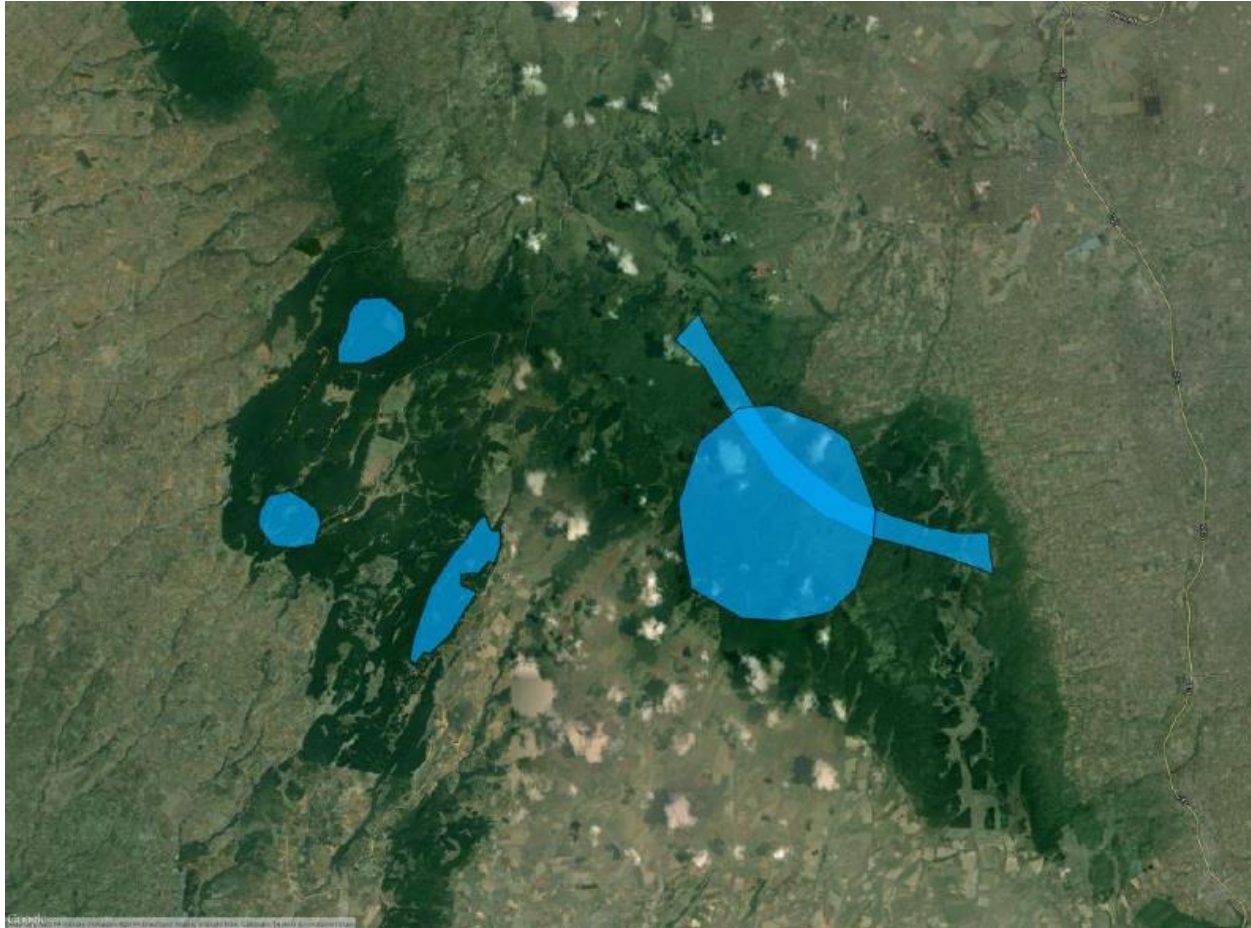


Logging areas



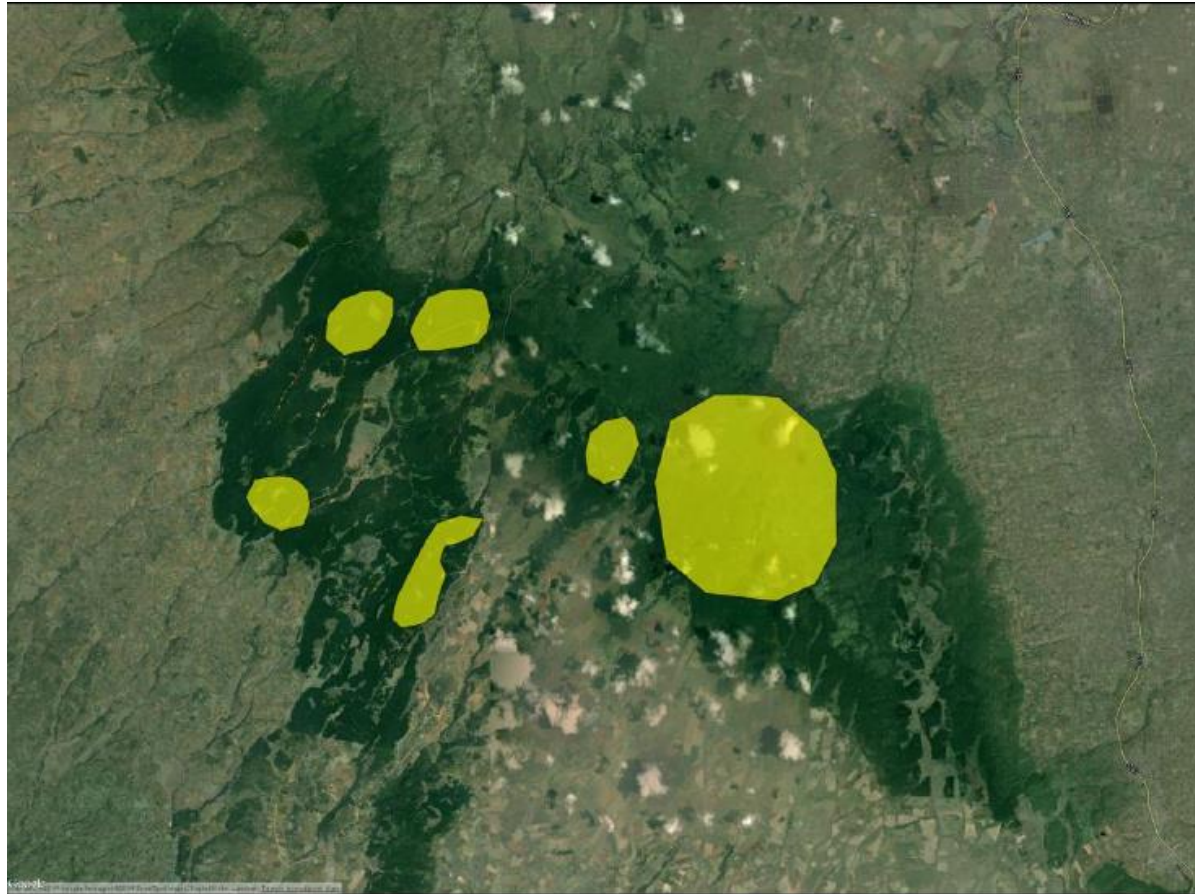
Charcoal production
In rainforest areas

Mapping ecosystem services: «Past» hunting areas

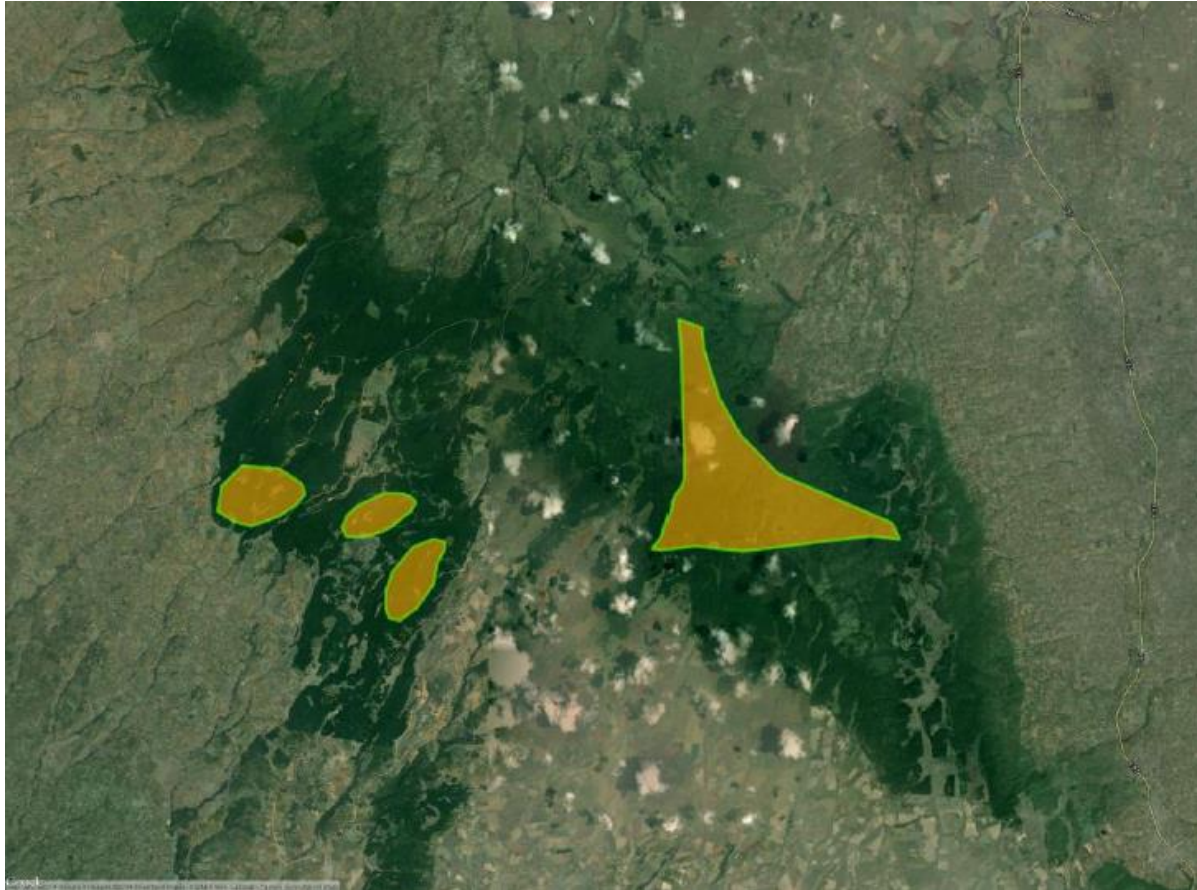


«Some disappeared species remained in Chebuin»
«Some species migrated because of land use»

Mapping ecosystem services: Beekeeping

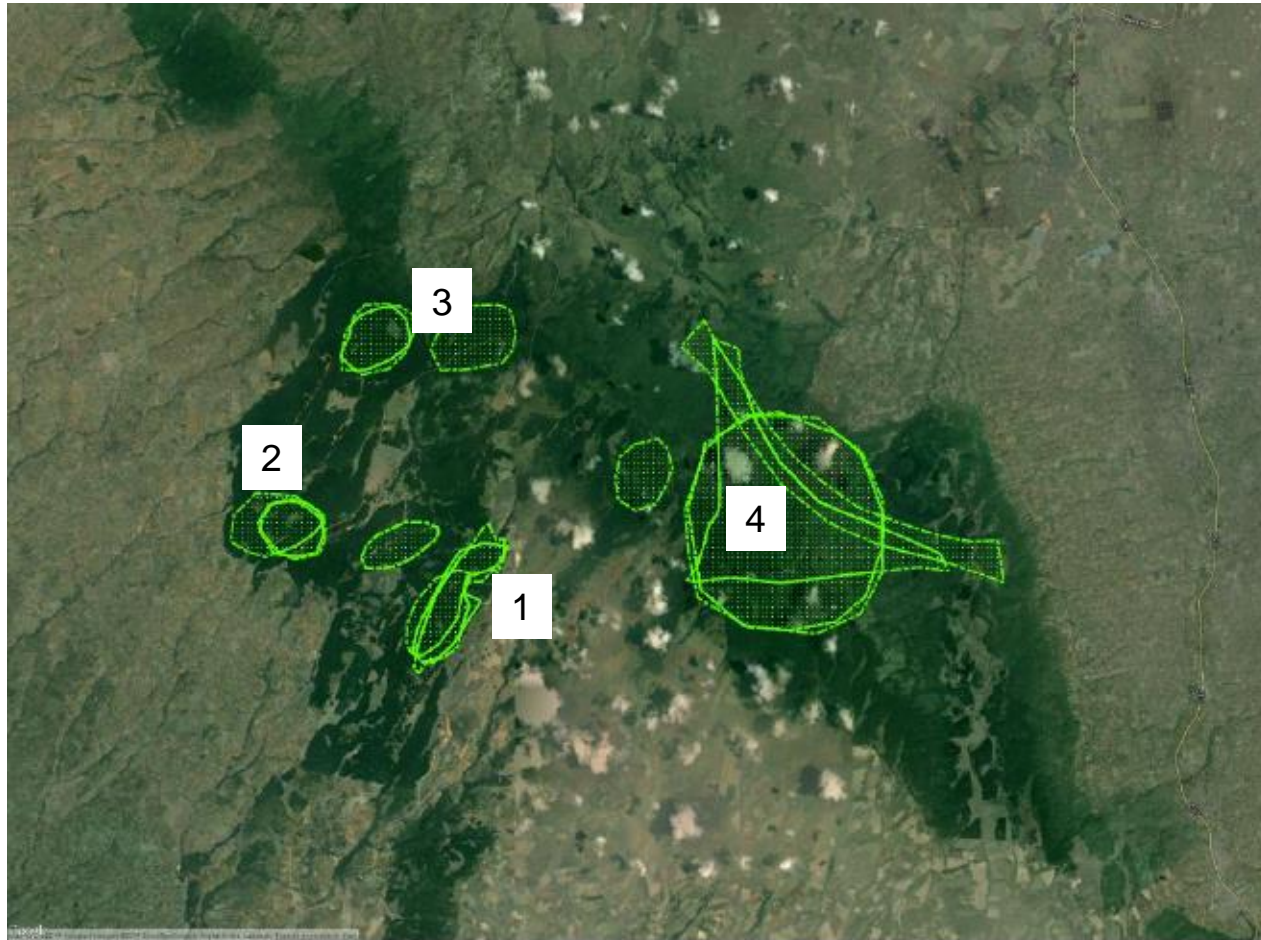


***Mapping ecosystem services:
gathering areas collecting***



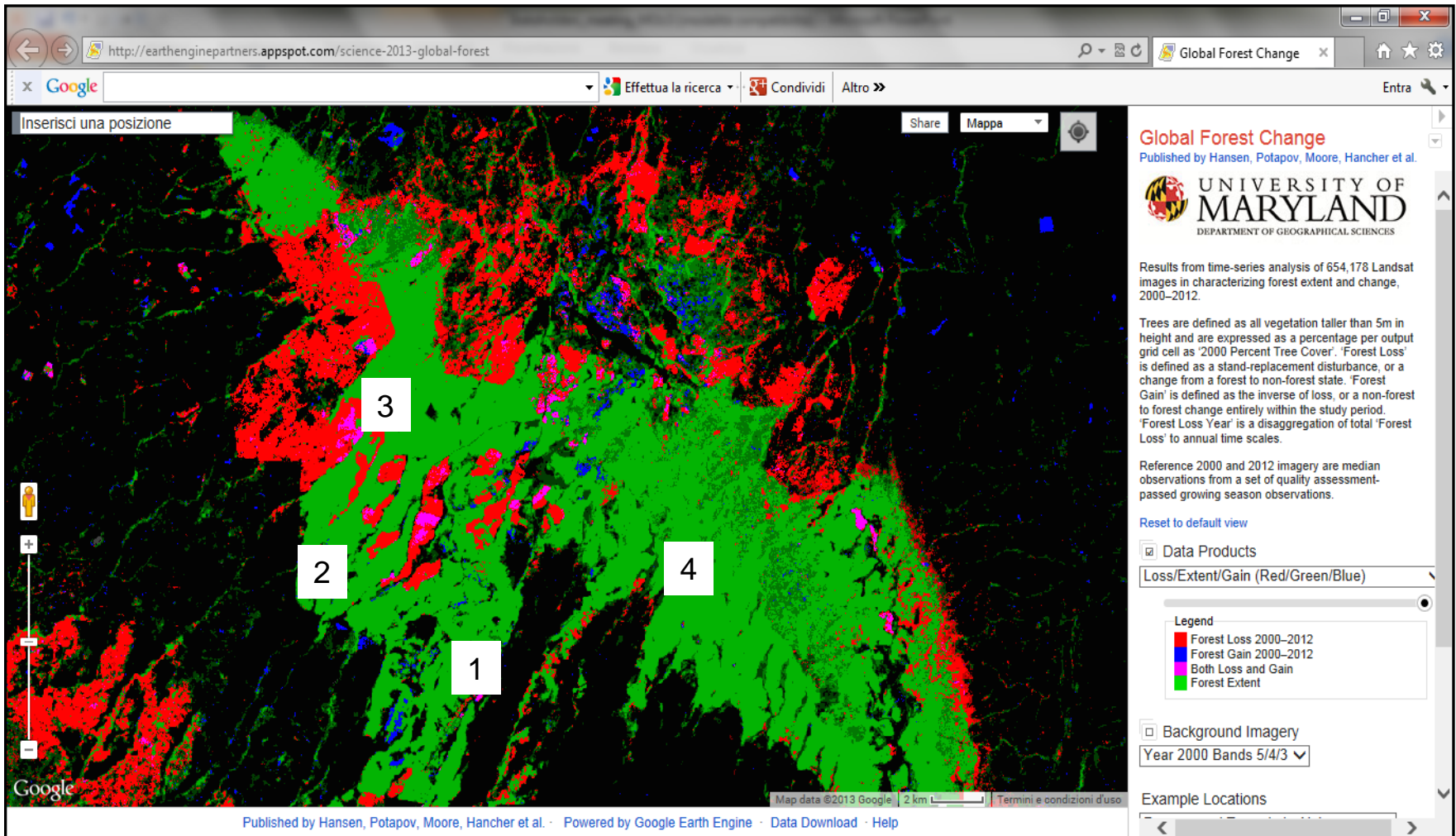
«I must go far, to find what I found closer...»

***Mapping ecosystem services:
Hunting, beekeeping, gathering areas***



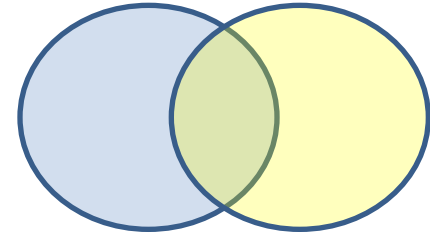
OVERLAY OF ECOSYSTEM SERVICES AREAS

Confirmation from remote sensing data



Mapping biodiversity: methodology for a Sensitive birds check list

- Birdlife International MAU area check list
- Sensitive species according to Bennun et al. (1996)

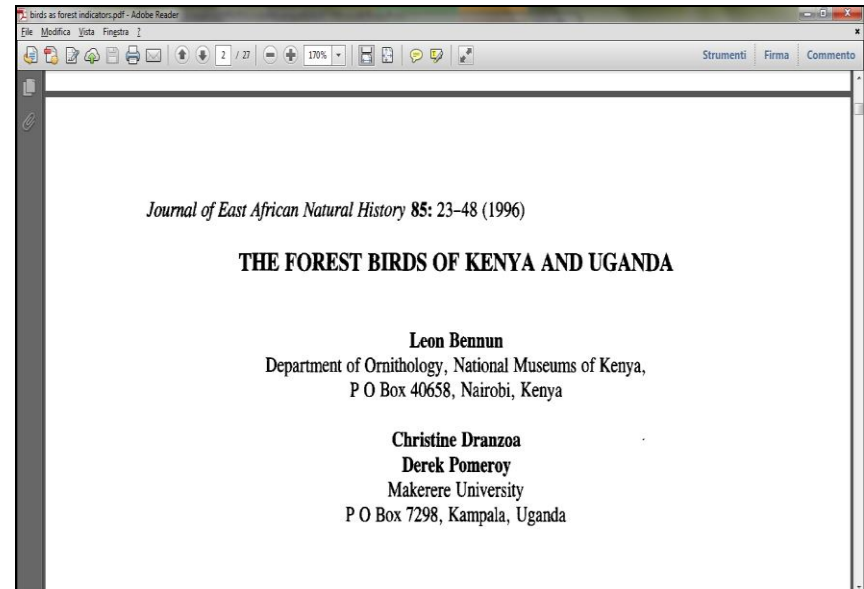


Chosen species are defined as

very sensitive species
(good forest indicators)

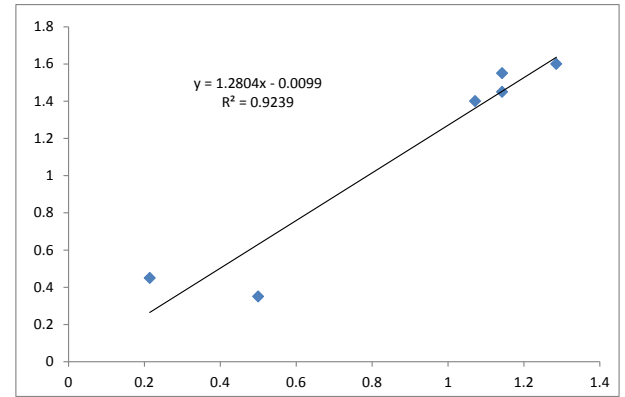
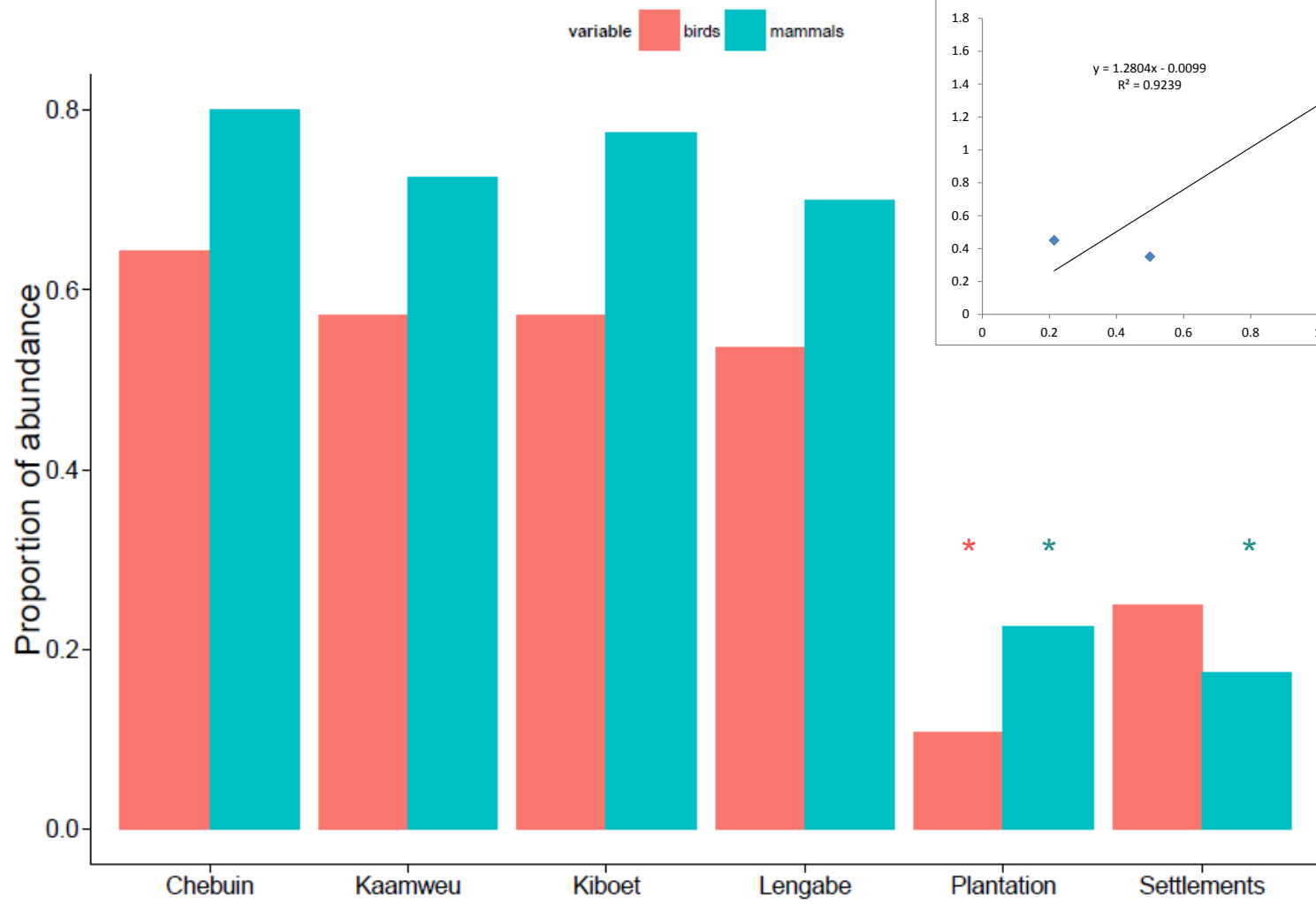
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listed in the MAU complex
B.I. check list
(15/22)



| PICTURES (LINKS) | NAME USED BY THE COMMUNITY | Chebuin | Kiboet | Lengabe | Kaamweu | Plantation | Settlements/ open areas |
|---|----------------------------|-----------|----------|-----------|-------------|------------|-------------------------|
| eastern mountain greenbul | ABUYUKTET | 2 | 2 | 1 | 2 | 0 | 0 |
| Abyssinian ground thrush | ELUBE | 2 | 2 | 1 | 2 | 0 | 0 |
| White browed crombec | NO NAME | 1 | 1 | 1 | 1 | 0 | 0 |
| Stuhlman's starling | NO NAME | 1 | 0 | 1 | 0 | 0 | 0 |
| Green sunbird | CHIKIRIRI | 0 | 0 | 0 | 0 | 0 | 2 |
| Thick billed seedeater | KIMUGULKUTIET (ENKISAMBU) | 2 | 1 | 1 | 1 | 0 | 1 |
| Tullberg's woodpecker | KIPKONGONIET | 1 | 1 | 1 | 1 | 0 | 0 |
| waller's starling | KWAACH(OLEGISHU) | 0 | 0 | 0 | 0 | 0 | 1 |
| Hartlaub's Turaco | MEREWET | 2 | 2 | 2 | 2 | 1 | 0 |
| Brown capped weaver | NEGORGOR (OLTINYOE) | 2 | 2 | 2 | 2 | 1 | 0 |
| African hill Babbler | OLARIAKI | 0 | 0 | 0 | 0 | 0 | 2 |
| Grey cuckooshrike | PUSIENDET (ORPUS) | 2 | 2 | 2 | 2 | 0 | 0 |
| Mountain Buzzard | TIEPAMWAREG | 1 | 1 | 1 | 1 | 1 | 1 |
| Shelley's greenbul | TISS | 2 | 2 | 2 | 2 | 0 | 0 |
| | SUM | 18 | 16 | 15 | 16 | 3 | 7 |
| | AVERAGE BIRDS | 1,2857143 | 1,142857 | 1,0714286 | 1,142857143 | 0,2142857 | 0,5 |

| species | Local name (Ogiek / Maasai) | Chebuin | Kiboet | Lengabe | Kaamweu | Plantation | Settlements/ open areas |
|------------------------|-----------------------------|------------|-------------|------------|-------------|-------------|----------------------------|
| colobus guereza | Soiret / orkoroe | 2 | 2 | 2 | 2 | 1 | 0 |
| baboon | mosiot / oekenyi | 2 | 2 | 2 | 2 | 1 | 1 |
| Blue monkey | tisiet / orkuluo | 2 | 2 | 2 | 2 | 1 | 0 |
| Warthog | puteito / orbitir | 1 | 1 | 1 | 1 | 1 | 0 |
| Bushpig | toraet / orguya | 2 | 2 | 2 | 2 | 0 | 0 |
| Bushbuck | poinet / orpuaa | 2 | 2 | 2 | 2 | 1 | 1 |
| Spotted hyena | chemuguguit / orng'ojine | 2 | 2 | 1 | 1 | 1 | 1 |
| Aardvark | kutet / oloishiri-dama | 2 | 2 | 1 | 1 | 1 | 1 |
| Rock hyrax | inderit / enderr | 2 | 2 | 2 | 2 | 0 | 0 |
| black backed jackal | lelwot / orbarie | 1 | 1 | 2 | 1 | 1 | 1 |
| Porcupine | sapitet / oyai | 1 | 1 | 1 | 1 | 1 | 1 |
| Red duiker | mindet-nepirir / emintet | 2 | 2 | 2 | 2 | 0 | 0 |
| black fronted duiker | mindetaptegat / erongo | 2 | 2 | 2 | 2 | 0 | 0 |
| Suni ? | pechenit | 1 | 2 | 1 | 1 | 0 | 0 |
| Leopard | apiyet / olowarukeri | 1 | 1 | 1 | 2 | 0 | 0 |
| Serval | kimelsegutek / eseperua | 1 | 1 | 1 | 1 | 0 | 0 |
| honey badger | kokto / orpilis | 2 | 2 | 1 | 2 | 0 | 0 |
| Tree hyrax | inderit / enderr | 2 | 2 | 2 | 2 | 0 | 1 |
| Giant forest hog | tumda / orgurweorok | 0 | 0 | 0 | 0 | 0 | 0 |
| African buffalo | soet / olosokwan | 2 | 0 | 0 | 0 | 0 | 0 |
| SUM | | 32 | 31 | 28 | 29 | 9 | 7 |
| AVERAGE MAMMALS | | 1,6 | 1,55 | 1,4 | 1,45 | 0,45 | 0,35 |



Kruskall-wallis rank sum test

Comparison of count by type (Bonferroni)

| | Difference | pvalue | sig. | LCL | UCL |
|--------------------------------------|--------------|---------|------|----------|----------|
| Chebuin - Kaamweu | 3.892857143 | 1 | | -19.8929 | 27.67863 |
| Chebuin - Kiboet | 3.892857143 | 1 | | -19.8929 | 27.67863 |
| Chebuin - Lengabe | 5.357142857 | 1 | | -18.4286 | 29.14291 |
| Chebuin - Plantation | 29.35714286 | 0.00528 | ** | 5.571371 | 53.14291 |
| Chebuin - Settlements..open.areas | 21.57142857 | 0.1122 | | -2.21434 | 45.3572 |
| Kaamweu - Kiboet | 0 | 1 | | -23.7858 | 23.78577 |
| Kaamweu - Lengabe | 1.464285714 | 1 | | -22.3215 | 25.25006 |
| Kaamweu - Plantation | 25.46428571 | 0.02622 | * | 1.678514 | 49.25006 |
| Kaamweu - Settlements..open.areas | 17.67857143 | 0.40827 | | -6.1072 | 41.46434 |
| Kiboet - Lengabe | 1.464285714 | 1 | | -22.3215 | 25.25006 |
| Kiboet - Plantation | 25.46428571 | 0.02622 | * | 1.678514 | 49.25006 |
| Kiboet - Settlements..open.areas | 17.67857143 | 0.40827 | | -6.1072 | 41.46434 |
| Lengabe - Plantation | 24 | 0.04611 | * | 0.214229 | 47.78577 |
| Lengabe - Settlements..open.areas | 16.21428571 | 0.63468 | | -7.57149 | 40.00006 |
| Plantation - Settlements..open.areas | -7.785714286 | 1 | | -31.5715 | 16.00006 |

BIRDS

Kruskall-wallis rank sum test

Comparison of count by type (Bonferroni)

| | Difference | pvalue | sig. | LCL | UCL |
|--------------------------------------|------------|----------|------|----------|----------|
| Chebuin - Plantation | 47.175 | 0 | *** | 23.34741 | 71.00259 |
| Chebuin - Settlements..open.areas | 50.825 | 0 | *** | 26.99741 | 74.65259 |
| Kaamweu - Settlements..open.areas | 44.55 | 0 | *** | 20.72241 | 68.37759 |
| Kiboet - Plantation | 45.35 | 0 | *** | 21.52241 | 69.17759 |
| Kiboet - Settlements..open.areas | 49 | 0 | *** | 25.17241 | 72.82759 |
| Lengabe - Settlements..open.areas | 42.325 | 0 | *** | 18.49741 | 66.15259 |
| Kaamweu - Plantation | 40.9 | 3.00E-05 | *** | 17.07241 | 64.72759 |
| Lengabe - Plantation | 38.675 | 6.00E-05 | *** | 14.84741 | 62.50259 |
| Chebuin - Kaamweu | 6.275 | 1 | | -17.5526 | 30.10259 |
| Chebuin - Kiboet | 1.825 | 1 | | -22.0026 | 25.65259 |
| Chebuin - Lengabe | 8.5 | 1 | | -15.3276 | 32.32759 |
| Kaamweu - Kiboet | -4.45 | 1 | | -28.2776 | 19.37759 |
| Kaamweu - Lengabe | 2.225 | 1 | | -21.6026 | 26.05259 |
| Kiboet - Lengabe | 6.675 | 1 | | -17.1526 | 30.50259 |
| Plantation - Settlements..open.areas | 3.65 | 1 | | -20.1776 | 27.47759 |

MAMMALS

Photographic traps (only qualitative data)

WHY- direct qualitative sample of Kiptunga terio-fauna

HOW - Selection of the sites (**map + local knowledge**: informants + assistant forester).

Traps 24h/24 by the means of **thermoreceptors**.

WHERE - 2 traps in **Lengabe** (week 1)
2 traps **close to the plantations** (week 1)

2 traps in **Kiboet** (week 2)
2 traps in **Chebuin** (week 2)

*Other information on wildlife given by **indirect signs** (footprints, dung, hairs, etc.) during the fieldwork*



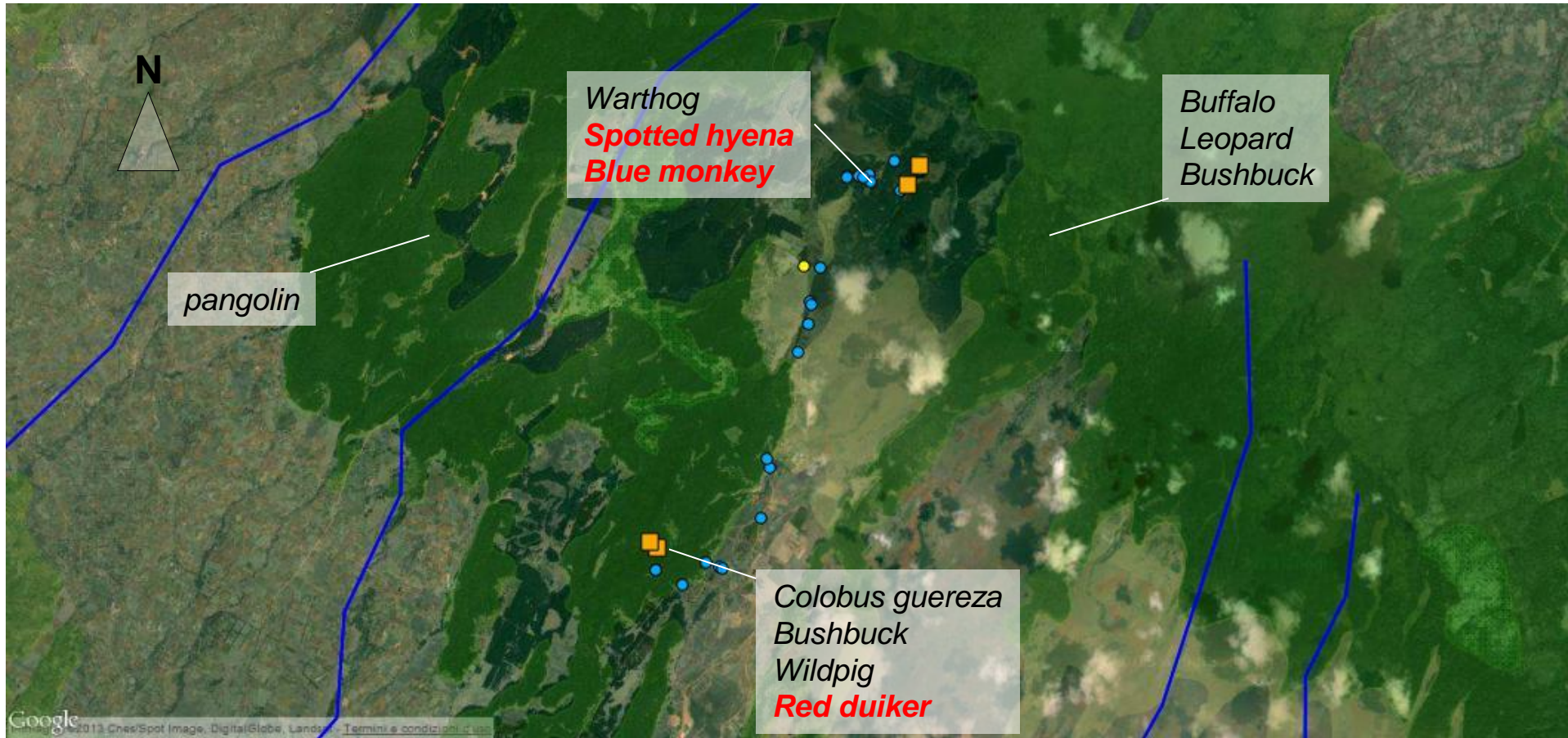
The red duiker is linked to a forest in good condition (www.iucnredlist.org) , while hyenas can persist in human settlements ...

Table 4: photo-trapped species in Kiptunga forest

| AREA | trap | sp- 1 | sp- 2, 3 |
|-------------|------|-----------------|------------------------|
| PLANTATIONS | A | hyena | <i>cattle</i> |
| | B | | blue monkey |
| LENGAPE | A | bushbuck | <i>cattle</i> |
| | B | | |
| KIBOET | A | | <i>unidentif</i> |
| | B | bushbuck | |
| CHIBOIN | A | | <i>Scaly francolin</i> |
| | B | bushbuck | blue monkey |

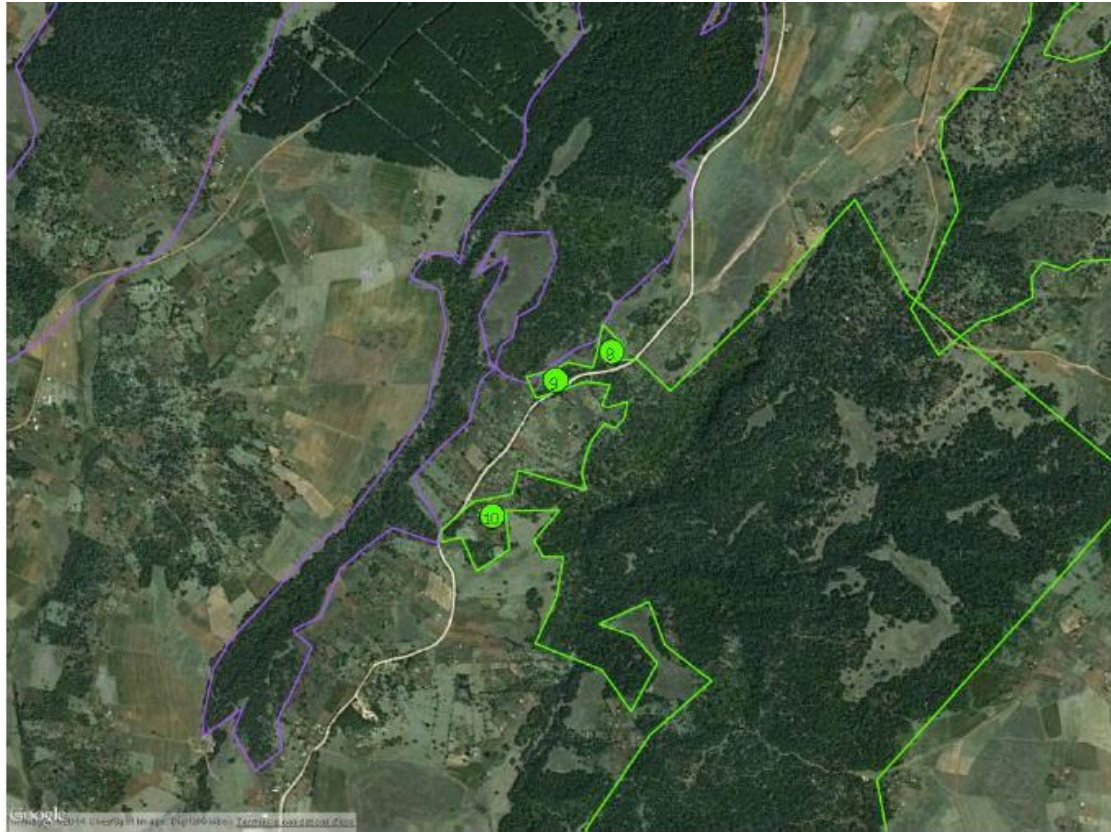


Other signs from the field (dung, footprints, direct sightings)



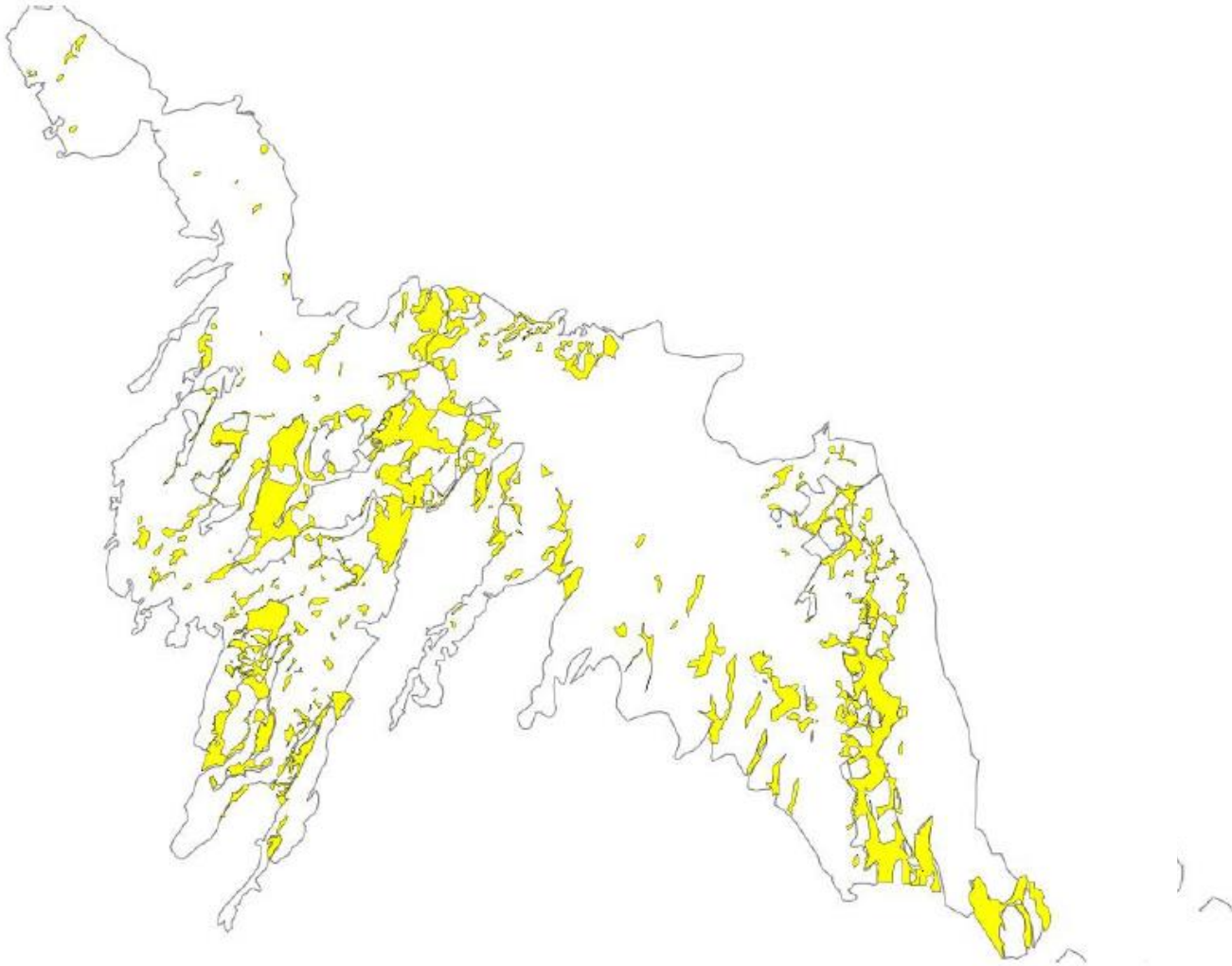
Data: www.wri.org and field-work

Analysis of the land cover (groundtruthing GPS points)

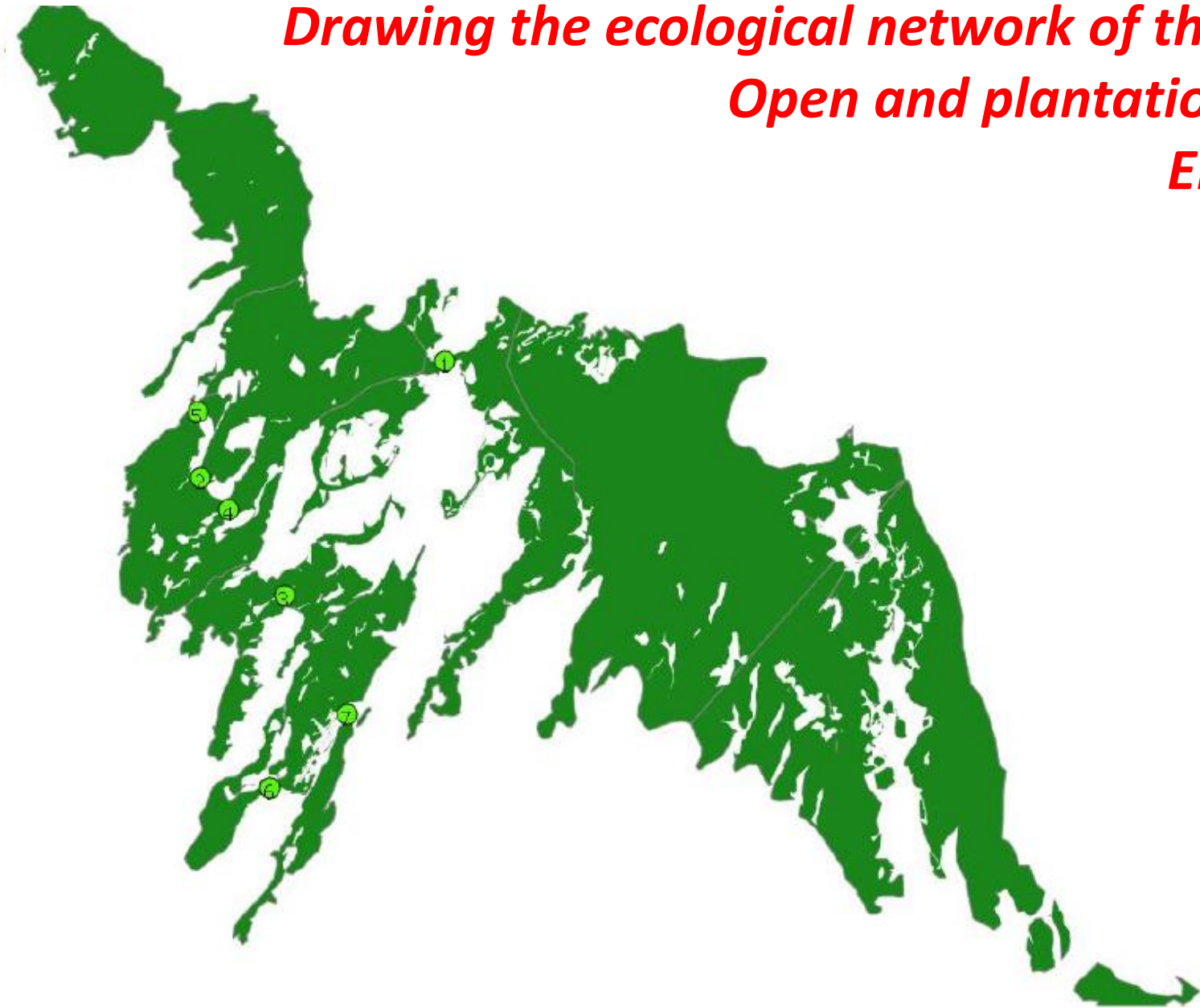


Side effect, ecological connectivity, species area relation (McArthur & Wilson, 1961)

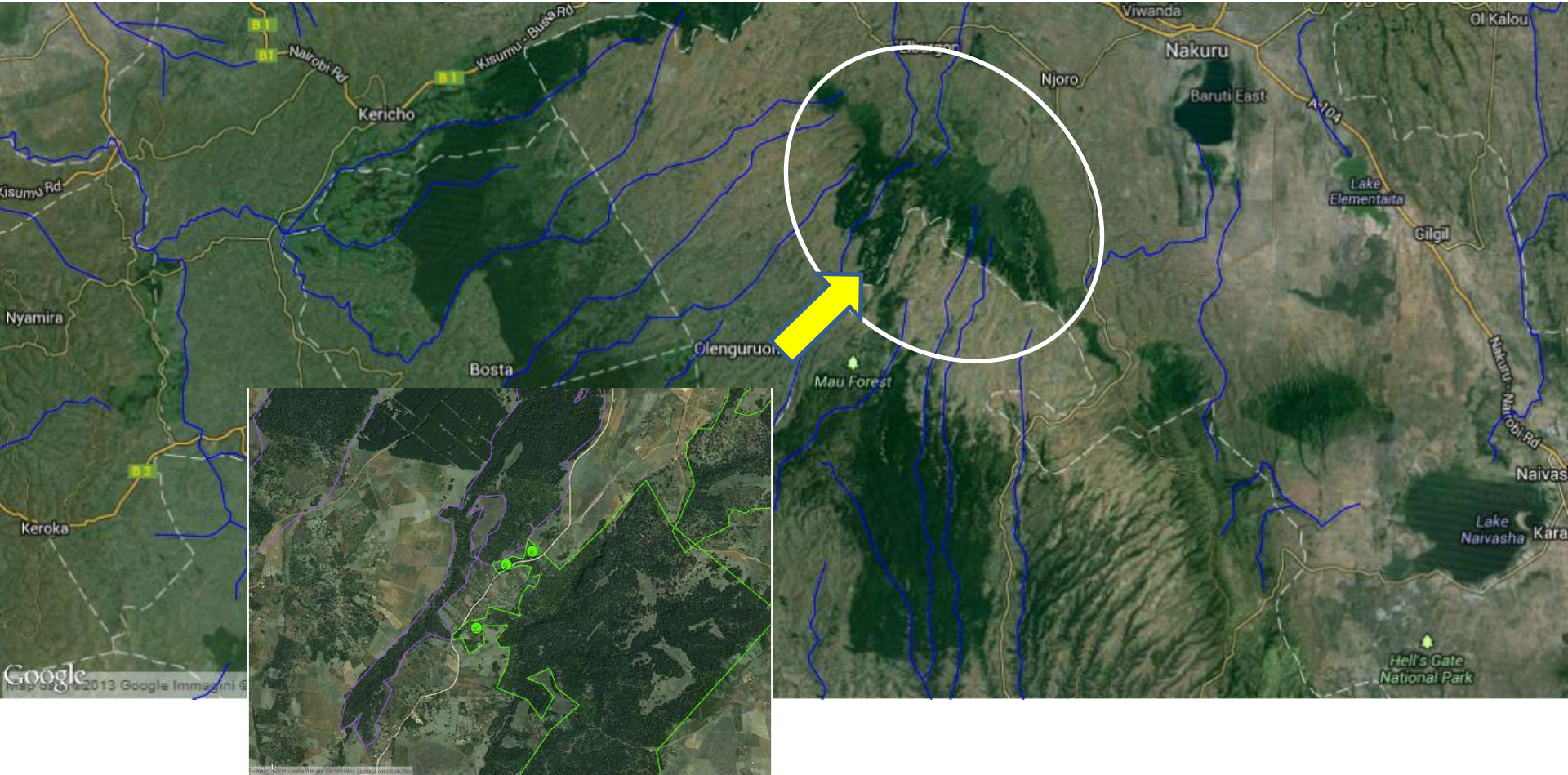
***Drawing the ecological network of the forest
Open and plantation areas***



Drawing the ecological network of the forest
Open and plantation areas
EROSION



ways forward to the Forest management plan ?

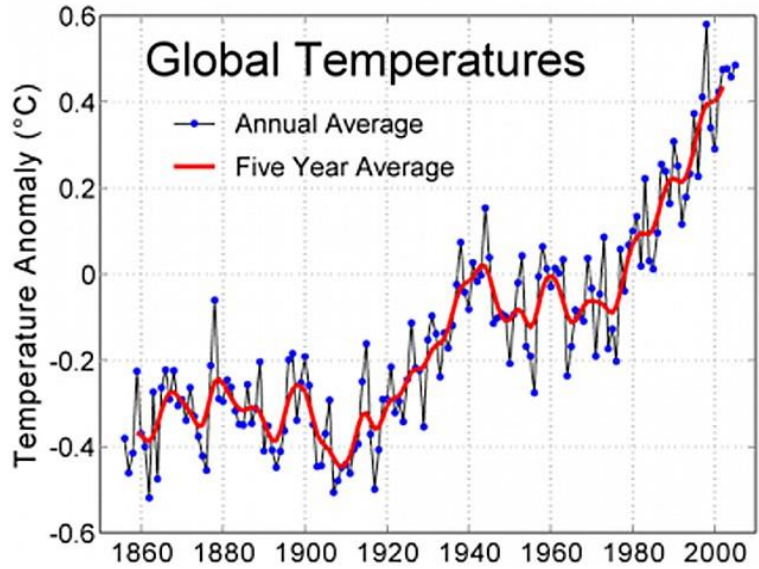
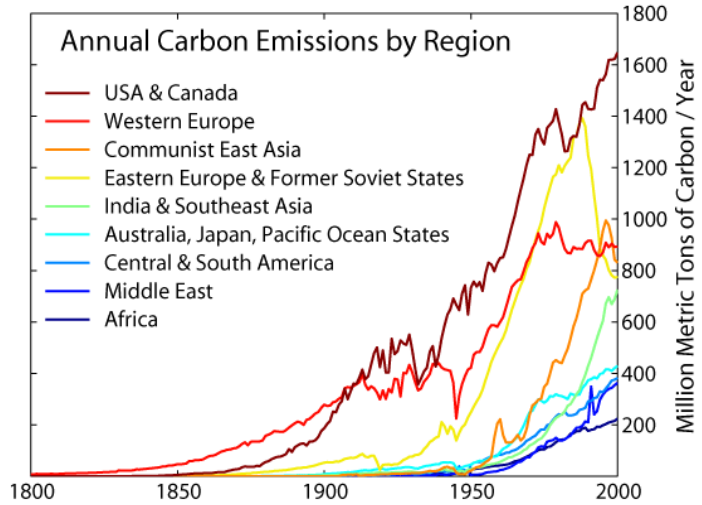


Conclusions (1)

- The informants (n=19) discussed, and gained some important concepts useful to participate to a forest management plan. **These concepts have generated a participatory forest management plan through Community Forestry Associations (CFAs)**
- They showed a good level of interest, as well as a sense of protection for «**their own forest**». The development of a community based tourism can only increase this will, with positive results.
- Some traditional habits (the reported **clan structure**) could bring something positive to the management of the Kiptunga forest

Conclusions (2)

- This first work with the community has provided a **first frame of the KIPTUNGA forest** under an ecological (and touristic) point of view.
- Participatory data about the detectability of wildlife seem to fit with the widely known situation of ecological fragmentation of the forest and represent a strong demonstration of ecological theories.
- **Other field work (ongoing)** is necessary and **could in the long term confirm the results from the participatory assessment**. A larger sample is necessary, as well as sampling other areas of the forest (Kiboet, Cheboin, Kamweo, the plantations themselves)



Low quality plantations exclude the presence of ecosystems and biodiversity



lack of sustainability in the traditional market of carbon credits



Thank you