Mapping the agricultural landscape of the taita hills
CHIESA seminar 7.10.2015
RAMI PIIROINEN
Who I am and my role in CHIESA project

PhD worker for University of Helsinki, Department of Geosciences and Geography

Master’s thesis for CHIESA project finished in summer 2014

PhD student in CHIESA for 1.6.2014 – 30.6.2015

Work continues with similar research questions concerning Taita Hills in other projects funded by Finnish Foreign Ministry
Topics of this presentation

Mapping agricultural crops and common tree species in the lowlands of the Taita Hills near Mwatate

Mapping the land cover of the highlands of the Taita Hills
  ◦ Especially the amount of trees on farmland

Mapping terrace farming practices in the Taita Hills

Mapping flowering trees in Mwingi Kenya
  ◦ Cooperation project with ICIPE
CHIESA study transect and my study site
Flight campaign and field measurements

Flight campaign for CHIESA in January 2012
- Other flight campaigns for different projects after that
Master’s thesis
Classifying common crops and trees

Most commonly found crops were mapped, while other species were excluded (picture on the right)

We can see what people are farming
Mapping the land cover of the highlands of the Taita Hills

Mapping agroforestry
- To generate accurate maps of land cover of the highland areas. Important information for the municipalities for land use planning and conservation
- Agroforestry mitigates consequences of forest loss. Mapping the extent is important to know the current situation
- Where the tree cover on farmland could be increased?

Mapping terraced farming
- Climate change and need to preserve soil and water conservation demands more sustainable agricultural practices
- Agriculture is the main source of income for most rural communities also in the future
- Adaptation to climate change is imperative
- Terrace farming is one method for decreasing soil degradation and saving water resources
Agroforestry more specifically

- Agroforestry is intentional growing of trees on farmland
- Store nitrogen from atmosphere and fertilize soil
- Extra income from lumber
- Trees act as carbon sinks
- Could preserve biodiversity
- Prevent soil erosion
- Gives shade for crops and animals
Agricultural landscape of the Taita Hills
Why the mapping is difficult compared to Finland for example?
Mapping the land cover in Taita Hills

• Land cover is highly mixed compared to many western countries
• Hard to observe boundaries even in the field

Fieldwork in 2015

- This year we are collecting more field data to validate our mappings
Preliminary results and questions we want to answer

- Are there gaps in the tree cover on farmland in Taita?
- What trees have the farmers planted on their farmland and what functions do they serve?
- Potential of local scale tree planting on farmland as carbon sinks?
- How are trees used to prevent land degradation?

Figure 4. Example of the level-1 classification (a) and level-0 classification based on the fractional cover of level-1 classes (b).
Possibly in the future
Questionnaire for the farmers

- What are the main benefits that you get from trees on your farmland?
- Why you chose these specific tree species?
- Why have you used terraces on your farmland?
- How are the terraces or trees helping to preserve soil and water?
Mapping soil and water conservation practices (terraces) in complex agroforestry systems in Kenyan Taita Hills using LiDAR data

Master’s thesis in progress by B.sc. Kirsi Kivistö
Terrace farming in short

Benefits of terrace farming:

- reduces soil erosion by breaking long slopes into a series of shorter ones
- protects water quality by intercepting agricultural runoff
- helps prevent gully formation by directing runoff to stable outlets
- makes it easier to farm steep slopes
- improves soil quality and productivity by improving moisture retention and reducing soil erosion

Generally terrace farming seems to be practiced widely in the Taita Hills

- Other parts of Kenya could learn from the people of Taita
Slope angle

-Terrain in the Taita Hills extremely slopy
Possible terraces are easily distinguishable in slope angle map (alternation of flat and steep areas)
Flowering mapping in Mwingi

What else can be done with this kind of data

Tobias Landmann from ICIPE led the research on flowering mapping

We mapped the short term changes in flowering

Important information for beekeepers
Thank you!