

Production of an initial LULC Map for a Biosphere Reserve Purpose of the Lake Tana Region, Ethiopia



**BASED ON A MULTISPECTRAL CLASSIFICATION OF
LANDSAT (TM) IMAGERY**

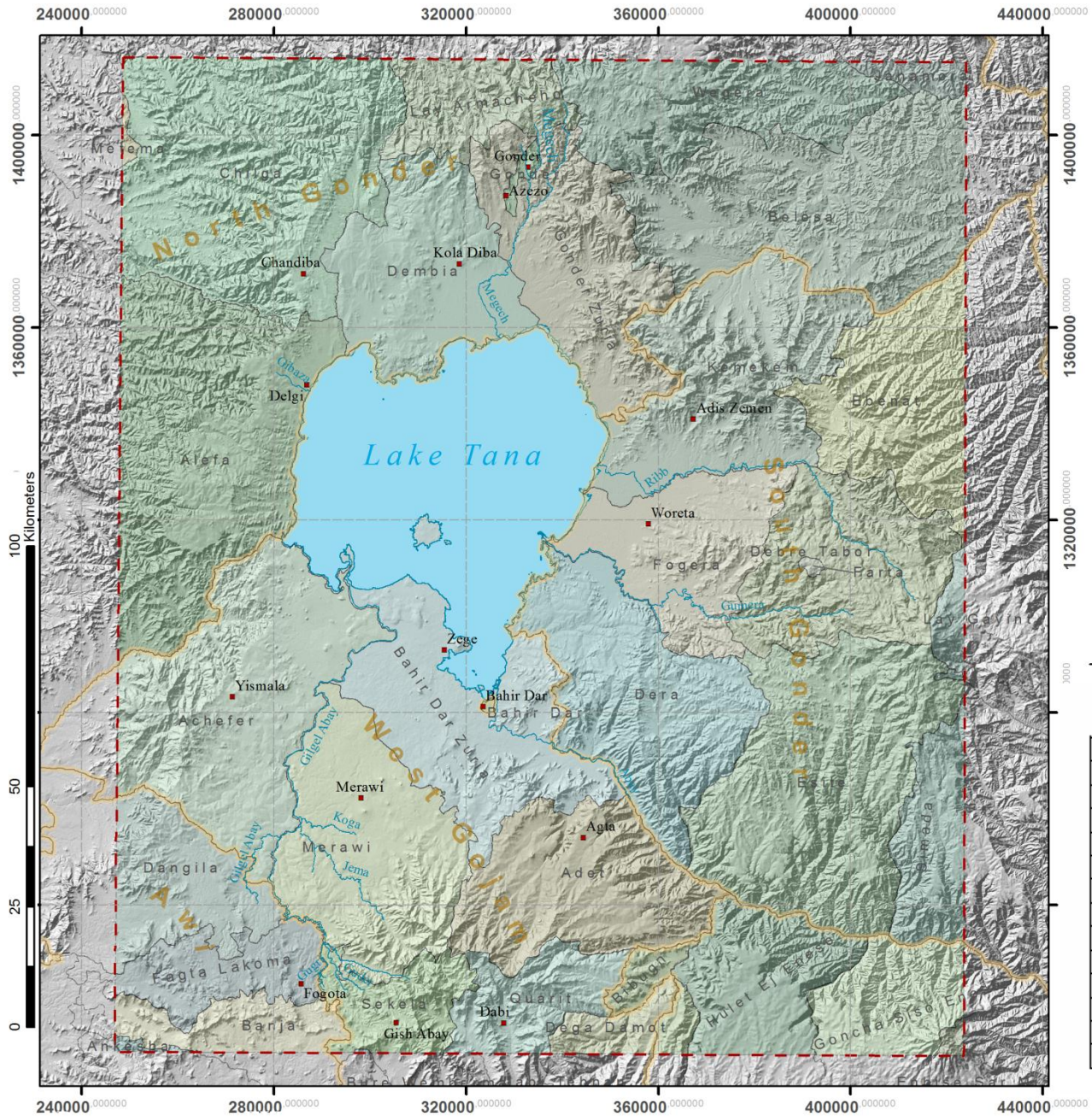
FIT RESEARCH COLLOQUIUM 2013

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Outline



- Introduction
 - ✦ Lake Tana Region, Ethiopia
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Lake Tana Region - Ethiopia Overview Map (1:1.150.000)



Table 1: Land Use/ Land Cover of LTW

Type of land use/land cover	Area (ha)	%
Cultivated	824,285	54.95
Water	315,960	21.06
Grassland	155,735	10.38
Shrub land	134,250	8.95
Wetlands/Swampy/	24,000	1.6
Plantation forest	16,410	1.09
Rock	7,925	0.53
Natural forest	5,910	0.39
Others/Settlement	5,330	0.36
Woodland	4,710	0.31
Bare soil	3,310	0.22
Afro-alpine	2,235	0.15
Total	1,500,060	100

Introduction



Lake Tana Region, Ethiopia

- National and international valuable cultural and natural heritage
 - ✦ monasteries partly established within the 14th century
 - ✦ religious churches and abbeys gather the remaining pieces of primary forest (< 0.25 and 5.0 ha)
- Lake Tana
 - ✦ biggest freshwater lake in Ethiopia and the highest located lake of whole Africa
 - ✦ source of the Blue Nil
 - ✦ high importance water resource
 - ✦ consist largest area of unique Ethiopian wetlands
 - ✦ birds overwinter survival region
 - ✦ endemic flora and fauna

Introduction



Lake Tana Region, Ethiopia

- **Challenges and Threats**
 - ✦ Fertile Region – Intensive Utilization (80 % agricultural sector)
 - 3 Million people
 - 43 % living in absolute poverty
 - ✦ Economical growth is directly linked to poverty guided urbanization processes as well as environmental stress and damage
 - ✦ Intensification of the resource utilization is forecasted →
 - the degradation of the natural ecosystems will increase
 - Decreasing agrarian and ecological productivity
 - Eutrophication of the lake
 - Conversion of wetland area in agricultural and graze land
 - Impoverishment of the local population

Introduction



“For people and nature – Establishment of a UNESCO biosphere reserve at Lake Tana, Ethiopia”

- Naturschutzbund e.V. (NABU)
Deutschland
 - Michael Succow Stiftung
 - Nature and Biodiversity
Conservation Union (NABU)
Ethiopia
 - funded by the German Ministry
of Cooperation and Economic
Development
 - UNESCOs “Man and the
Biosphere (MAB)” programme
 - ✦ holistic and interdisciplinary
approach – intensive
comprehension of the local
people
 - ✦ improve sustainable resource
management and development
 - ✦ conserve natural and cultural
heritage
- **Nominate Biosphere Reserve
to protect invaluable natural
and cultural heritage**

“For people and nature – Establishment of a UNESCO biosphere reserve at Lake Tana, Ethiopia”

- geoSYS_{net} – providing geo information services in national and international context
- supervision of the subcomponent “Mapping for zonation of the proposed Tana Biosphere Reserve”

Biosphere Reserve Mapping and Zonation

- ✦ Production of high definition maps (1:50 000) based on satellite images
- ✦ Identification of ecological and cultural valuable areas
- ✦ Identification of utilization types and ecosystem services, based on „Zonation Committees“ on governing and local level
- ✦ determination of core zones, buffer zones and transitions zones
- ✦ Development of the obligatory zonation maps for the application to the UNESCO, based on the participative compiled information's

Methodical Technical Approach

Material

Satellite Material

- Four Landsat (TM) Satellite Imageries – 2010
- Processed with the software packages ArcGis 10.0 (Esri) and ERDAS Imagine (ERDAS Inc.)

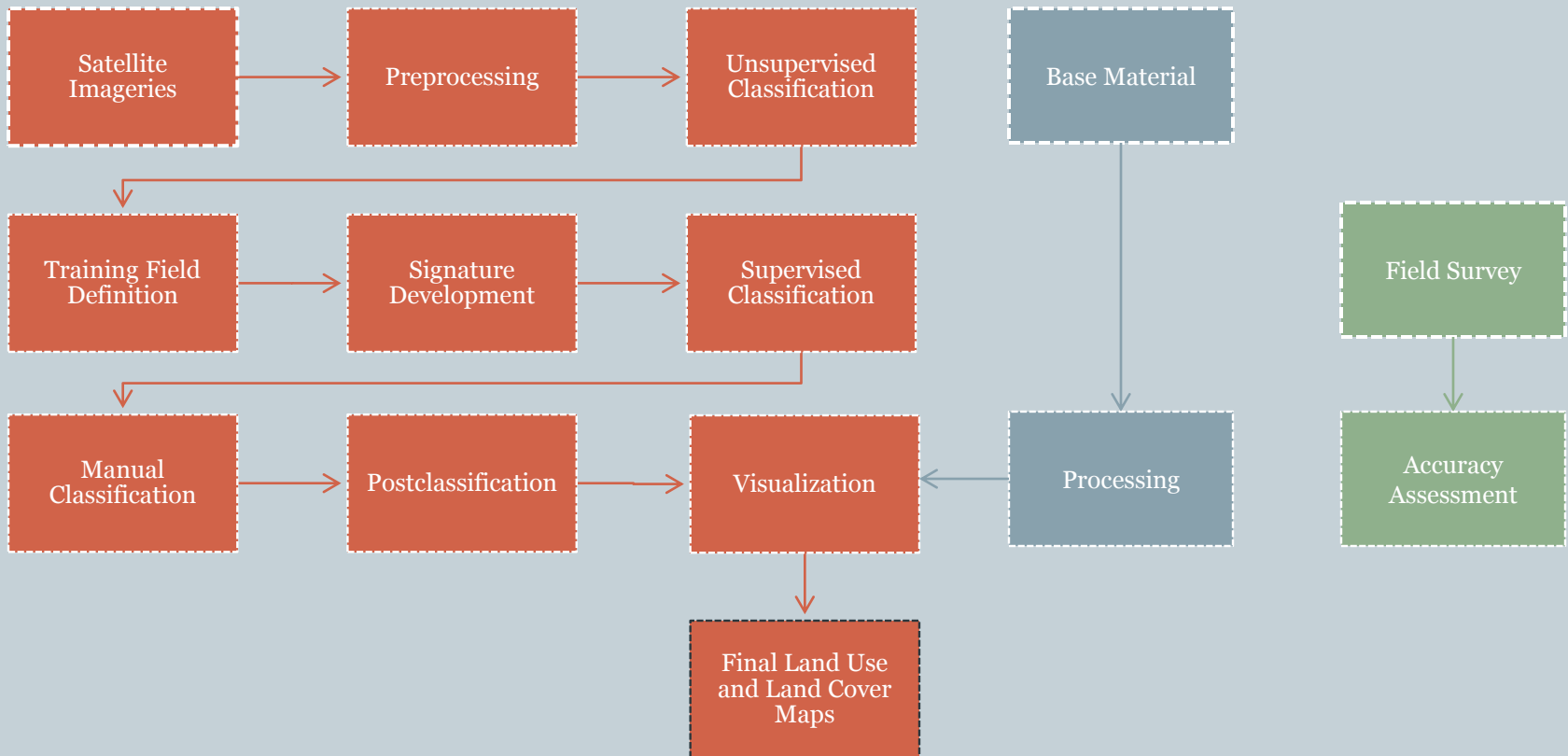
Base Material

- Topographical Maps (EMA)
- Previous LULC Map of GEF
- DTM
- External Spatial Data (FAO, OSM, SEI)
- Google Earth



Methodical Technical Approach

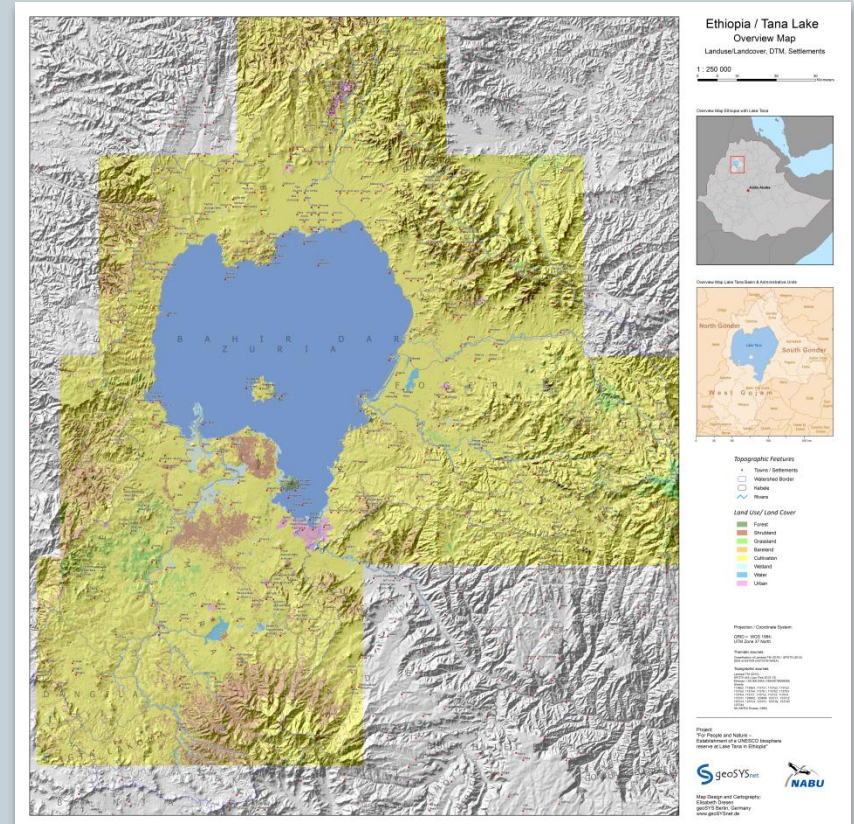
Operating Process – Classification Approach



Result

“For people and nature – Establishment of a UNESCO biosphere reserve at Lake Tana, Ethiopia”

- Overview Map (1:250 000)
- High Definition Maps (1: 50 000)
 - ✦ 10 single maps to cover whole region
 - ✦ Format A0
 - ✦ 7 Classes
 - Water
 - Cultivation
 - Bareland
 - Forest
 - Shrubland
 - Grassland
 - Wetland



Future Prospects



“For people and nature – Establishment of a UNESCO biosphere reserve at Lake Tana, Ethiopia”

Technical

- Multi-temporal image analysis to detect hot spots of land use change (deforestation, urban spreading, land reclamation, sedimentation)
- Object oriented analysis of the heterogeneous features

Inclusive

- Workshops and meetings with local communities and other stakeholders to discuss results of geoprocessing and remote sensing analysis (*Participatory development of BR zonation*)
 - Identification of ecological and cultural valuable, as well economic important areas, to accentuate it in the criteria catalog for the BR zonation

Thank you for your Attention



Photographer: Stefan Kreft



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