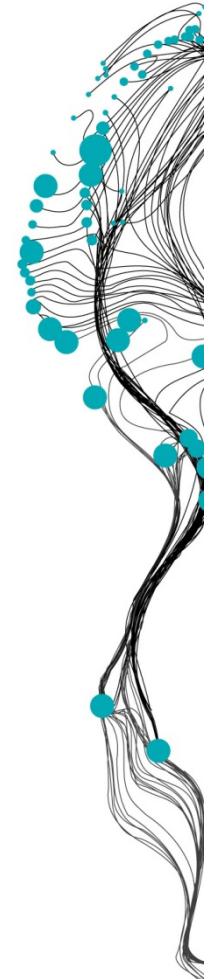


MODELLING OF SEMI-ARID RANGELANDS FOR SUSTAINABLE MANAGEMENT WITH THE PYTHON API OF THE ILWIS GIS/RS SOFTWARE

CLAUDIO PICCININI 2016
c.piccinini@utwente.nl

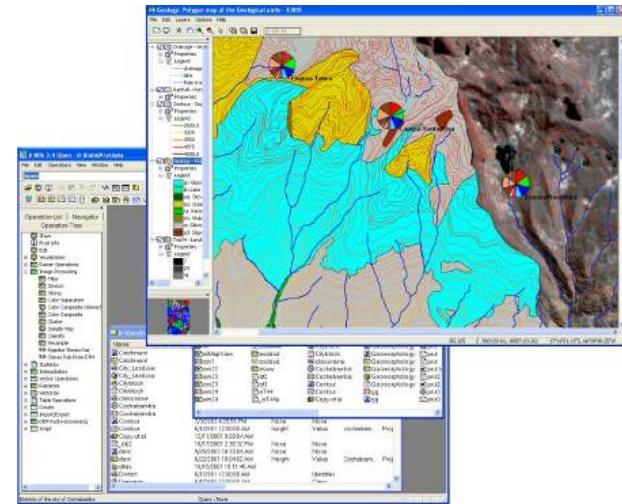


CONTENTS

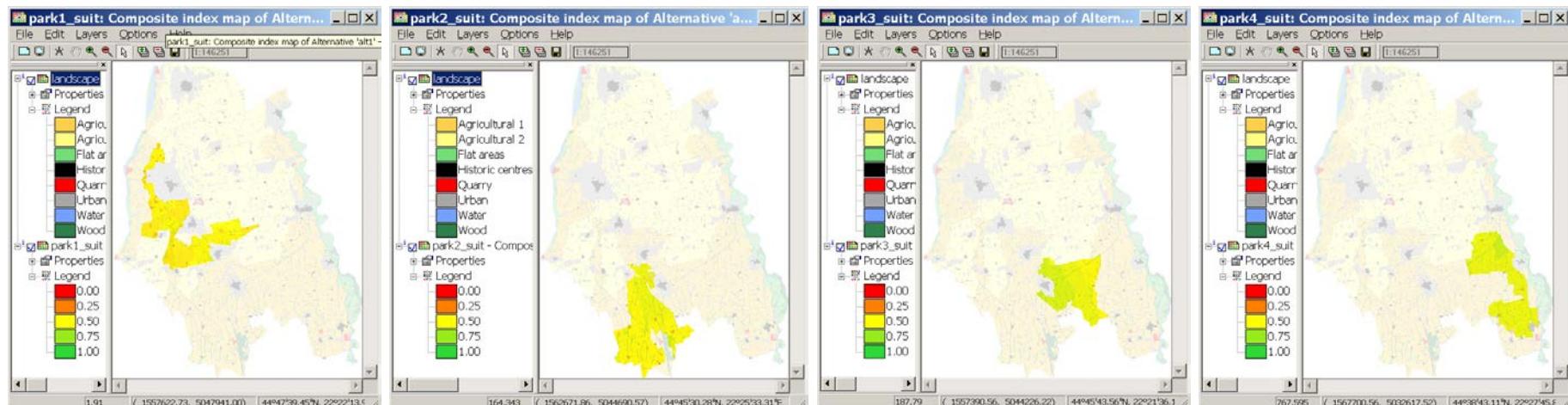
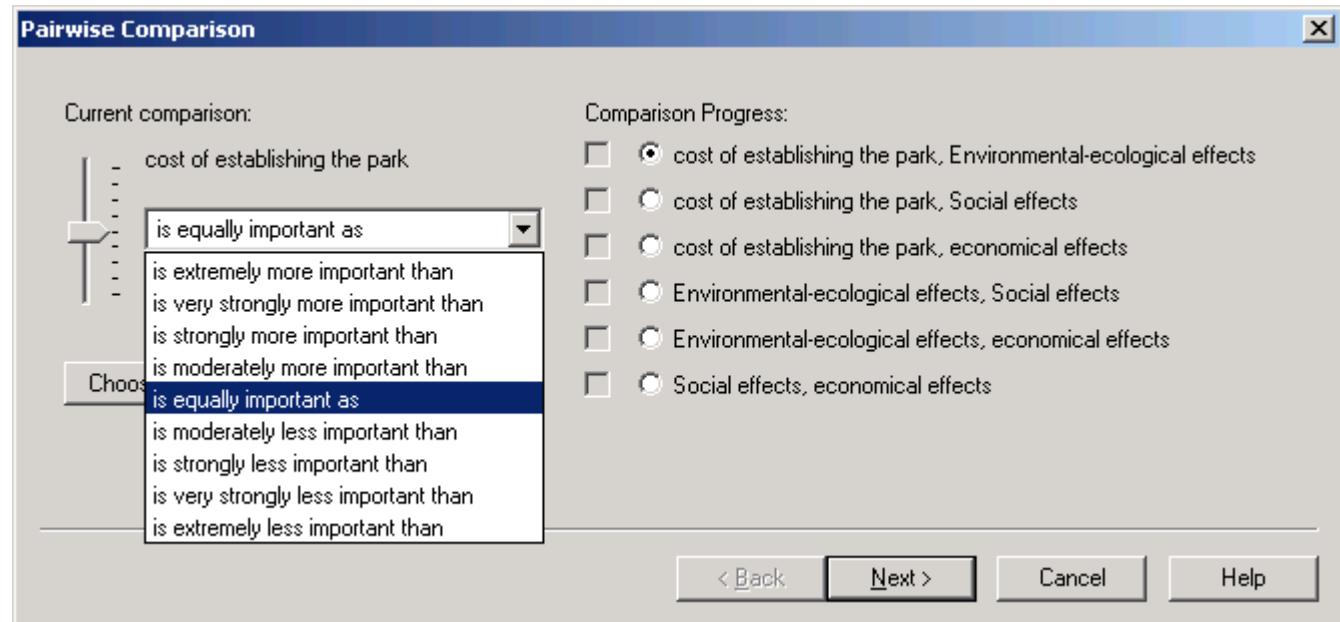
- Introduction to Ilwis
- The MaMaSe project
- Installing Python3.4 and libraries
- Working with IlwisObjects API

ILWIS: the Integrated Land and Water Information System

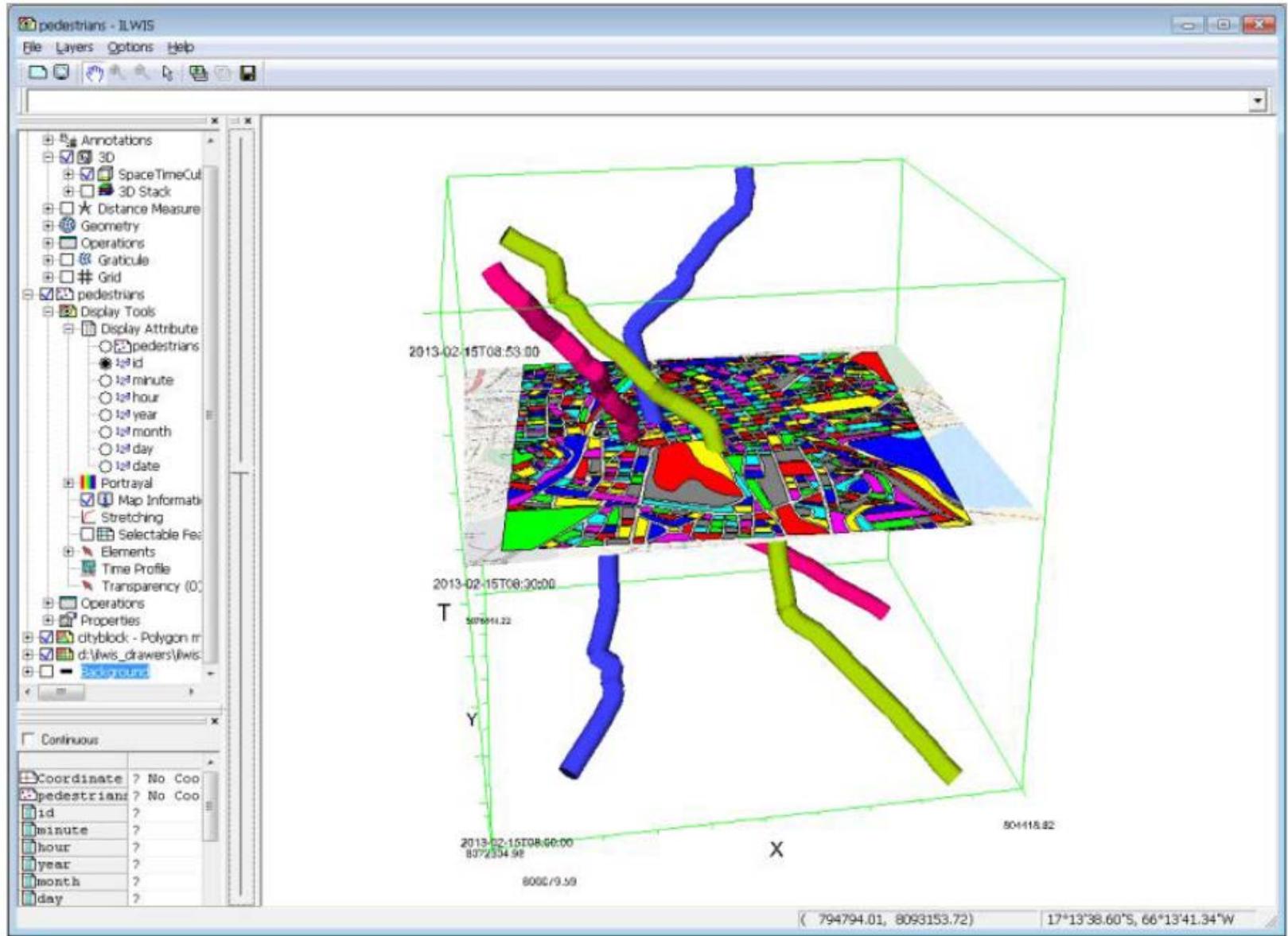
- PC-based integrated Geographical Information System (GIS) & Remote Sensing software
 - Developed by ITC
 - Originally designed in 1985 for a land use zoning and watershed management project in Sumatra
 - Used extensively in courses in and outside ITC, in research and projects



ILWIS Functionality – SDSS

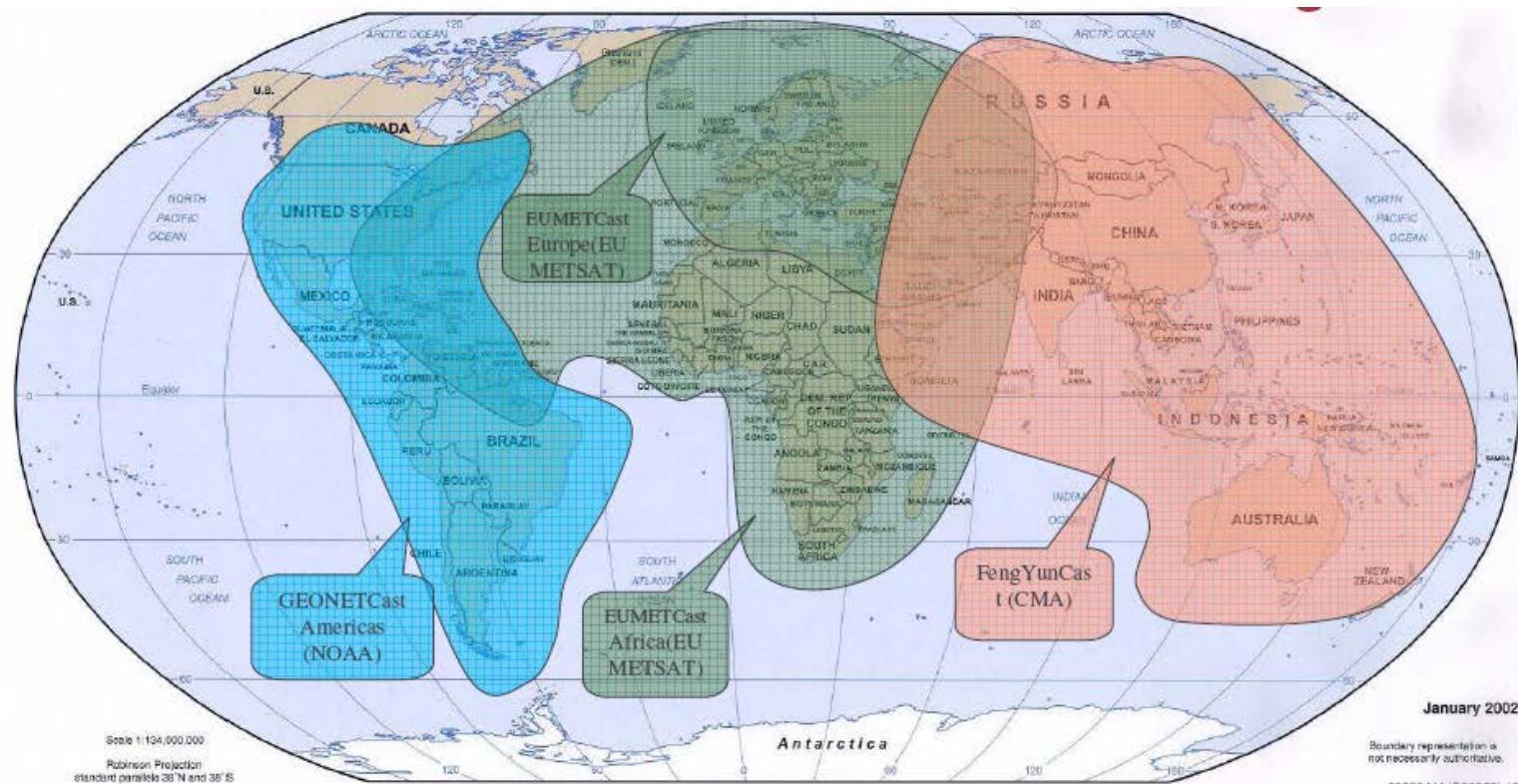


Space-Time Cube with ILWIS



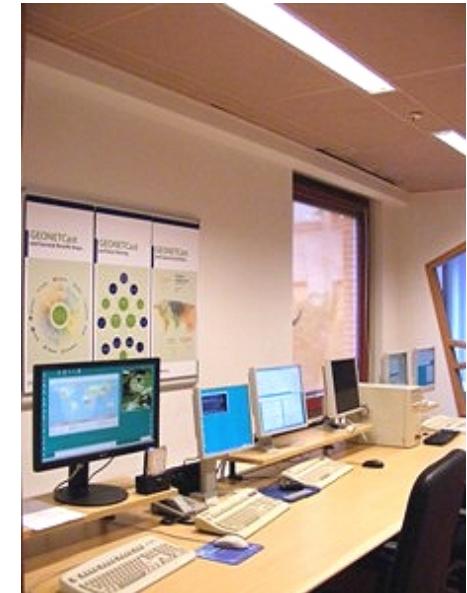
GEONETCast

- Near real-time global network of satellite-based data dissemination systems
- Easy and low cost access to environmental data

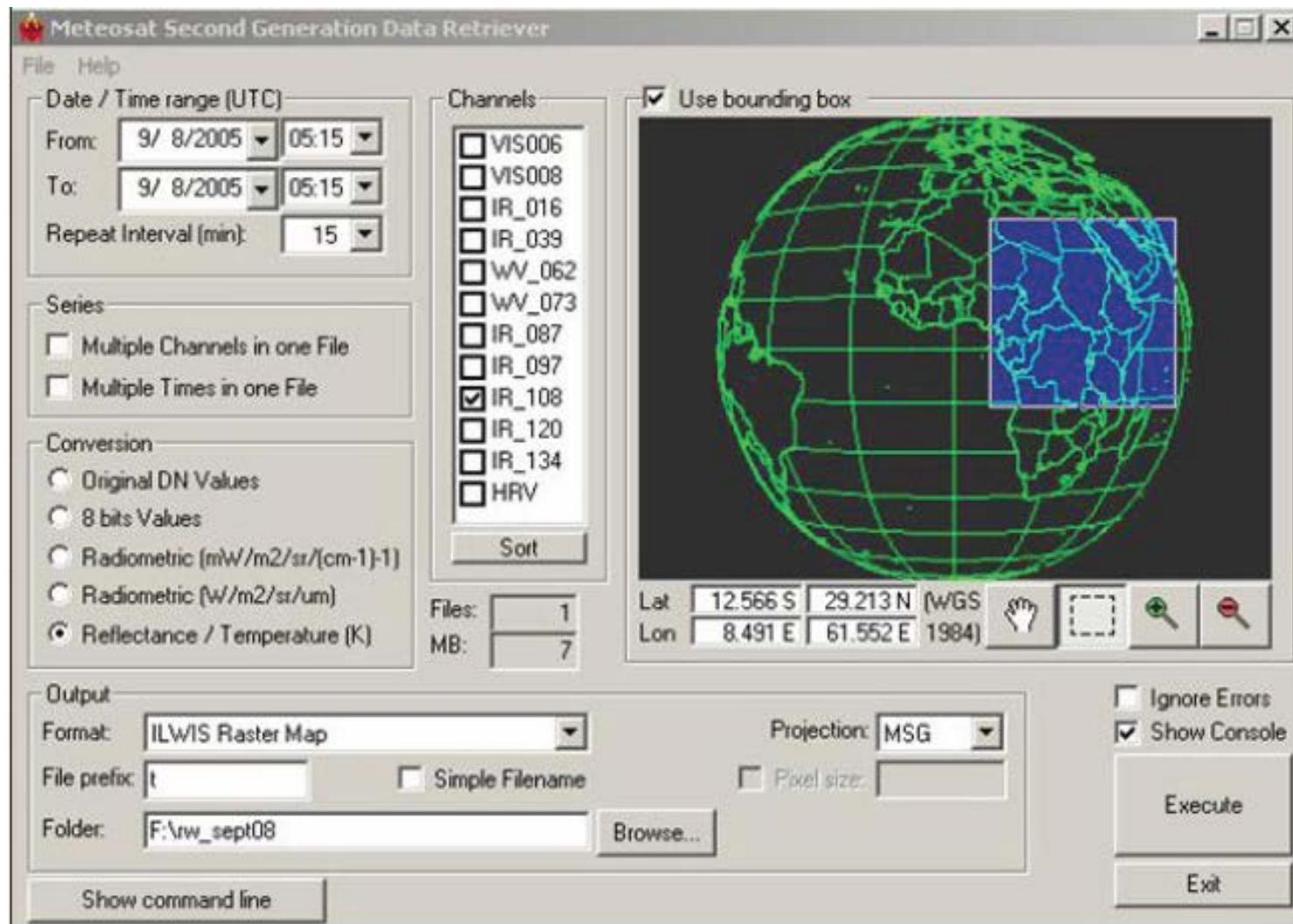


GEONETCast: low cost hardware

- Satellite antenna dish
- Receiver card or box
- Personal computer

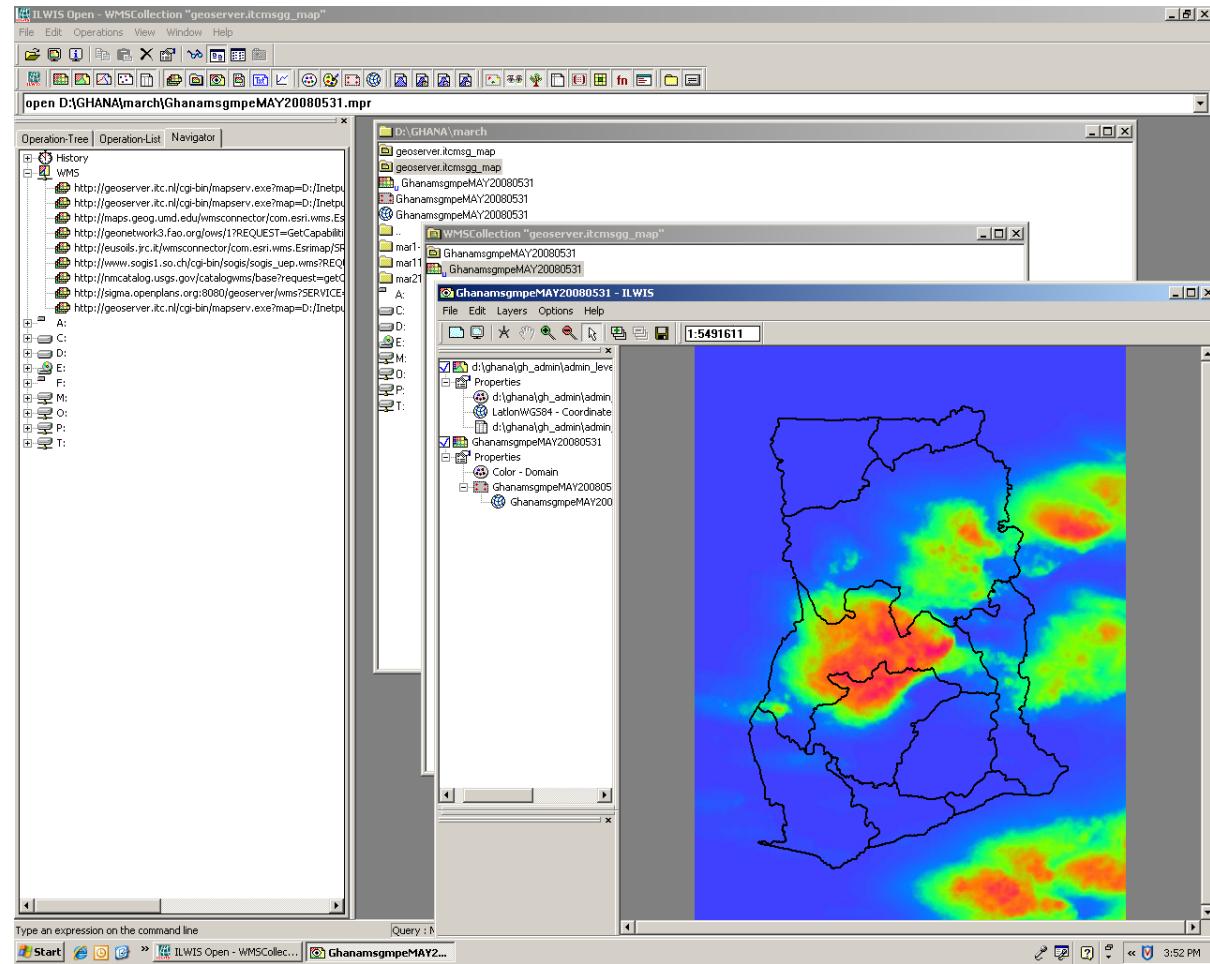


GEONETCast: Import toolbox for ILWIS

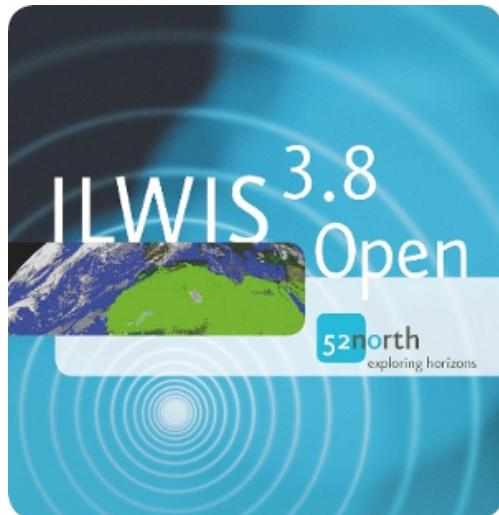


GEONETCast: Visual analysis in ILWIS

Integrated view of Geonetcast, Web Map Services & local data



The next generation tool framework for GIS and Remote Sensing



A framework to make ILWIS fit for the future – support a wider spectrum of use, users and developers

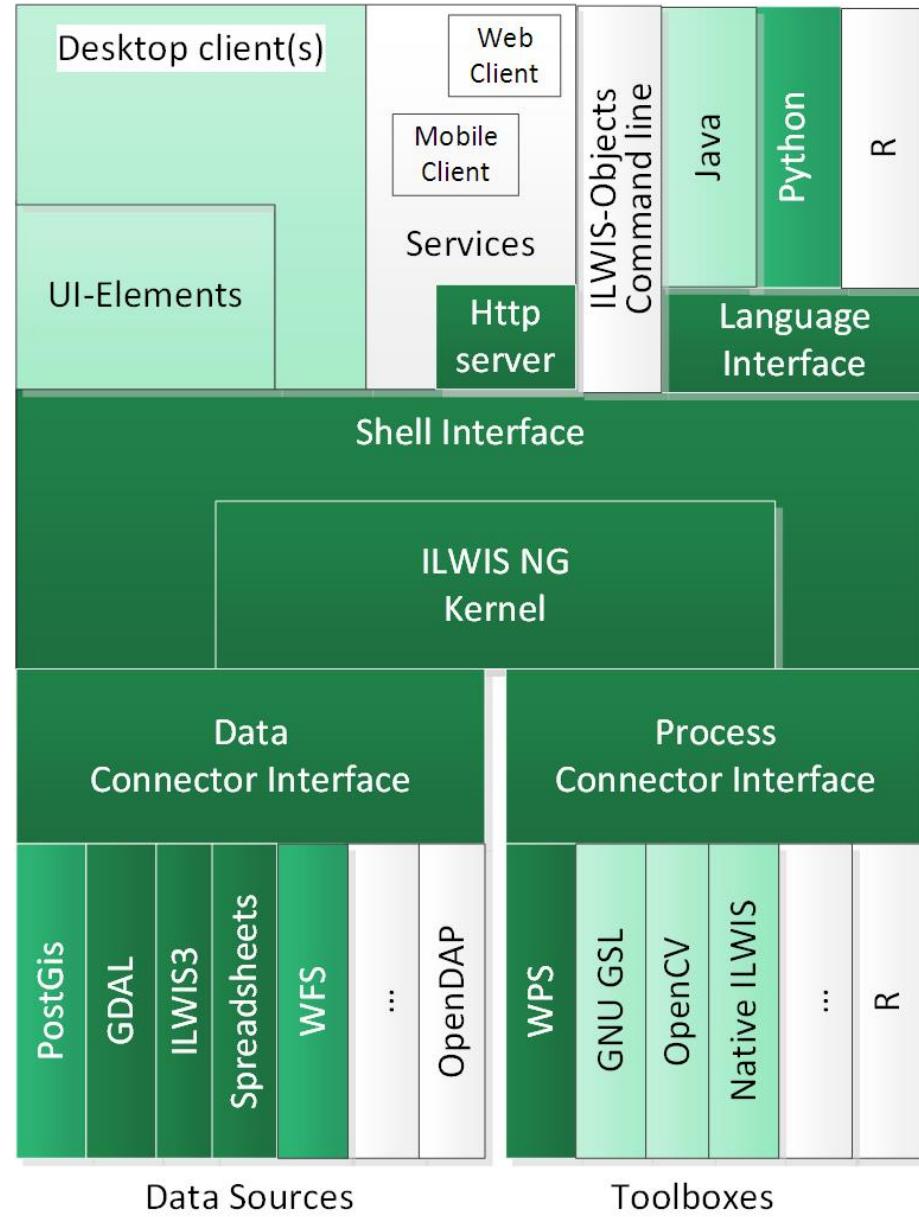
Easily implement, store and share scientific and project methods via software

ILWIS4 Architecture

Features:

- Modularity - Extensibility
- Interoperability
- Ease of development & use
- Support Web and Mobile users
- High performance

Implementation in Qt

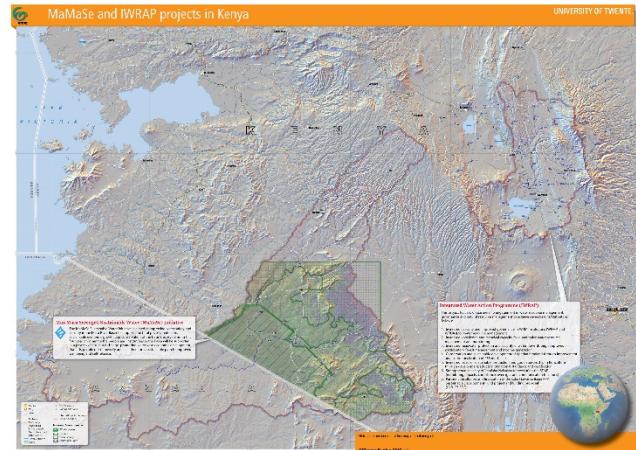
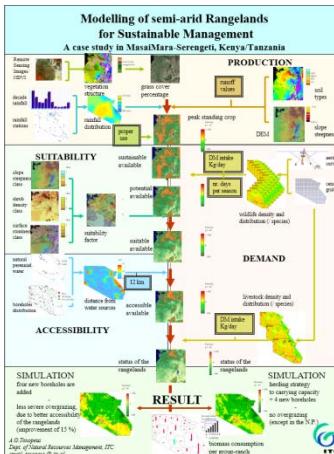


Software development & activities

Education, Research, Projects



Collaboration platform for research-oriented open source software development

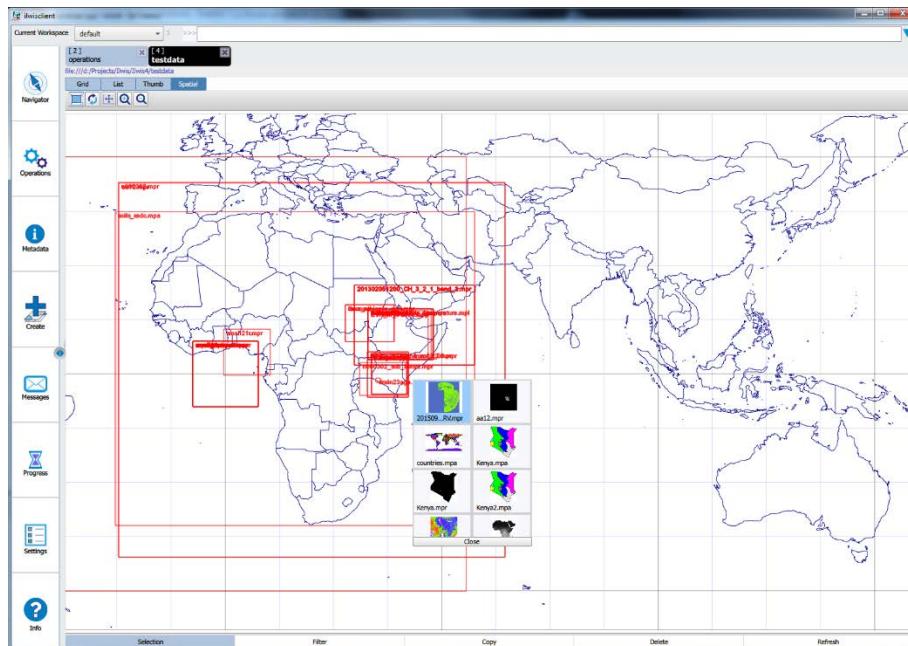
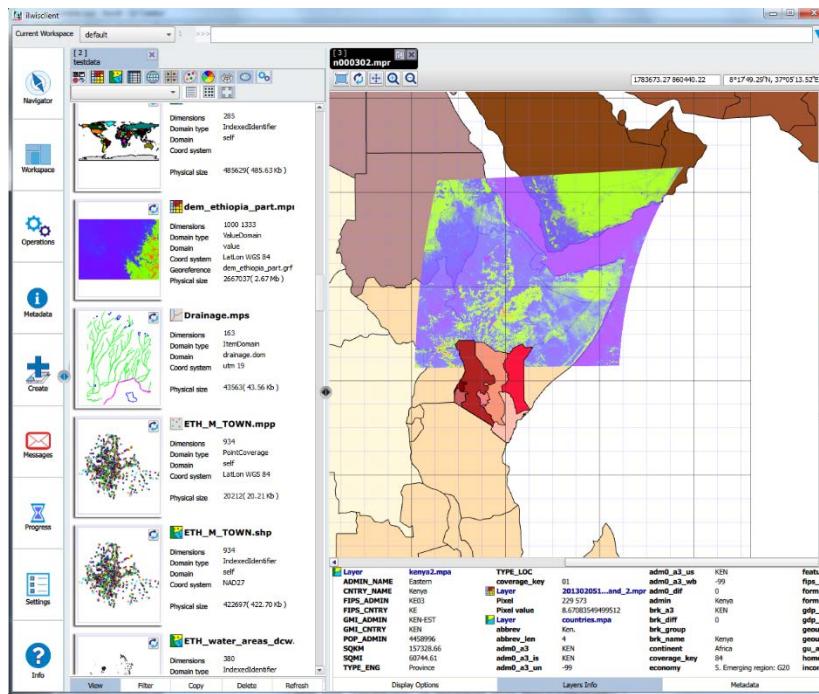


UNIVERSITY OF TWENTE.

ILWIS 4 Desktop Client

Features:

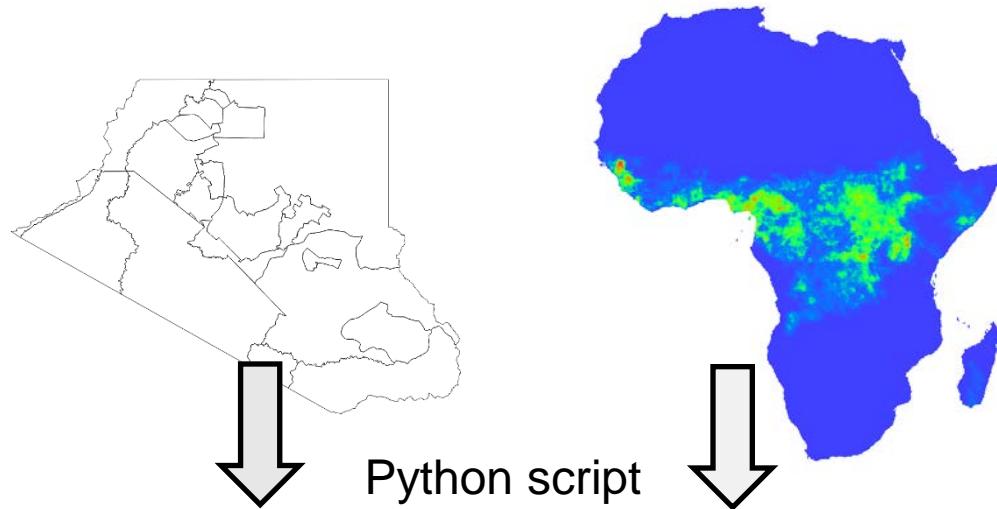
- Access to high-performance raster and vector operations
- User-friendly access to metadata
- Drag-and-drop
- Instant rendering of changes to display properties
- Touch-enabled
- Workflow builder



Python Interface

Features:

- Automate repetitive tasks
- Use extra constructs: conditions, loops, etc.
- Connect with other software libraries
- Reuse Python script with other data, with other parameters
- Share Python script with other users



```
ilwisdemo3.py - D:\ilwisdemo3.py (3.4.3)
File Edit Format Run Options Window Help
#save individual polygons into shapefiles:

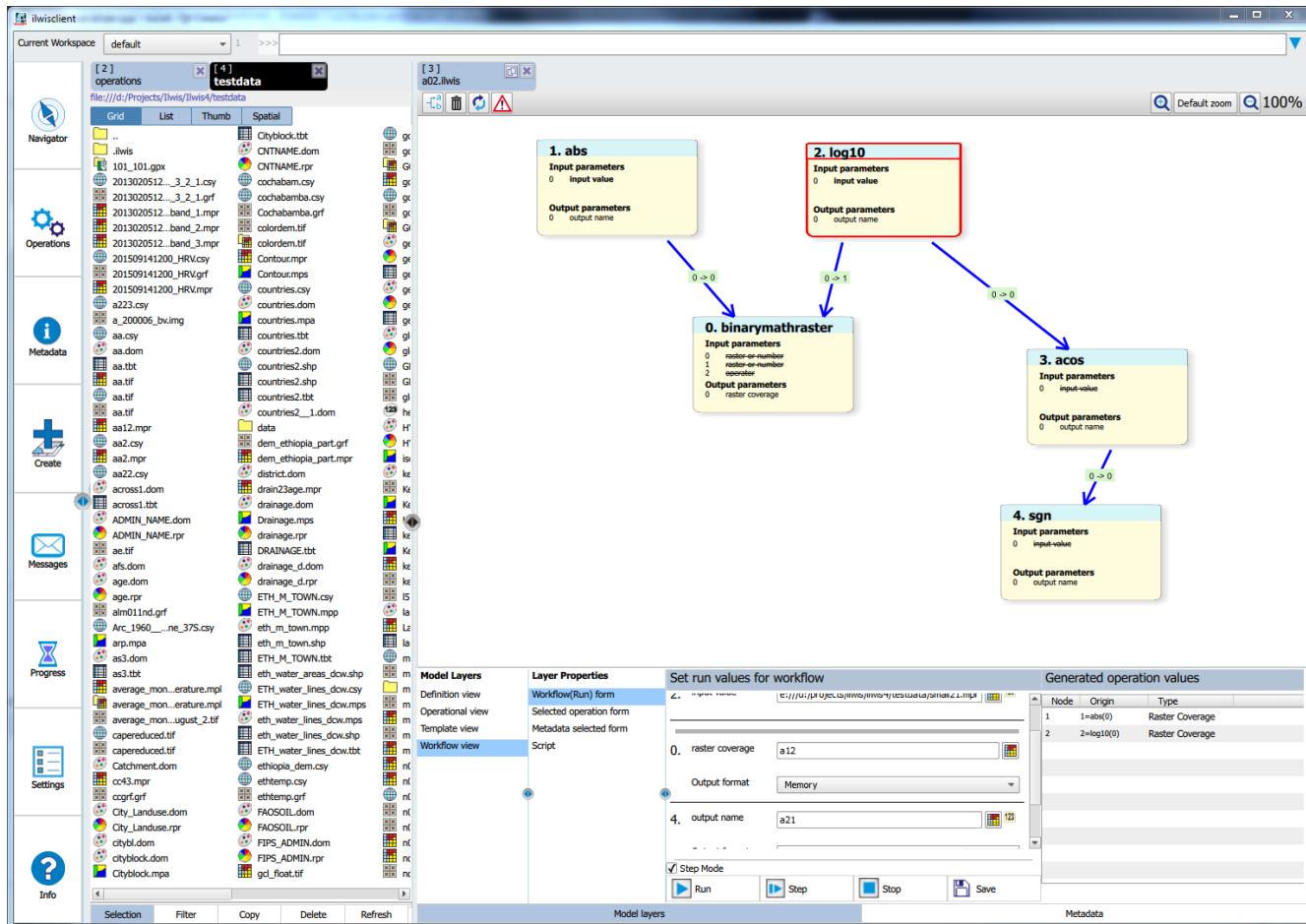
import ilwisobjects as ilwis
units = ilwis.FeatureCoverage("file:///D:/ilwis4/Bou
rfe = ilwis.RasterCoverage("file:///D:/ilwis4/rfe201
processlist = ["Maji Moto", "Naikarra", "Enonkishu",
for unit in units:
    name = unit["Name"]
    if name in processlist:
        outname = "output_" + name.replace(" ")
        geom = unit.geometry()
        rcSel = rfe.select(geom)
        stats = rcSel.statistics(ilwis.Property)
        rainfall = stats.prop(ilwis.Property)
        print(name, rainfall)
        rcSel.store("file:///D:/ilwis4/" + c
fc = ilwis.FeatureCoverage(outname)
```

Average rainfall per conservancy

Workflow Builder

Features:

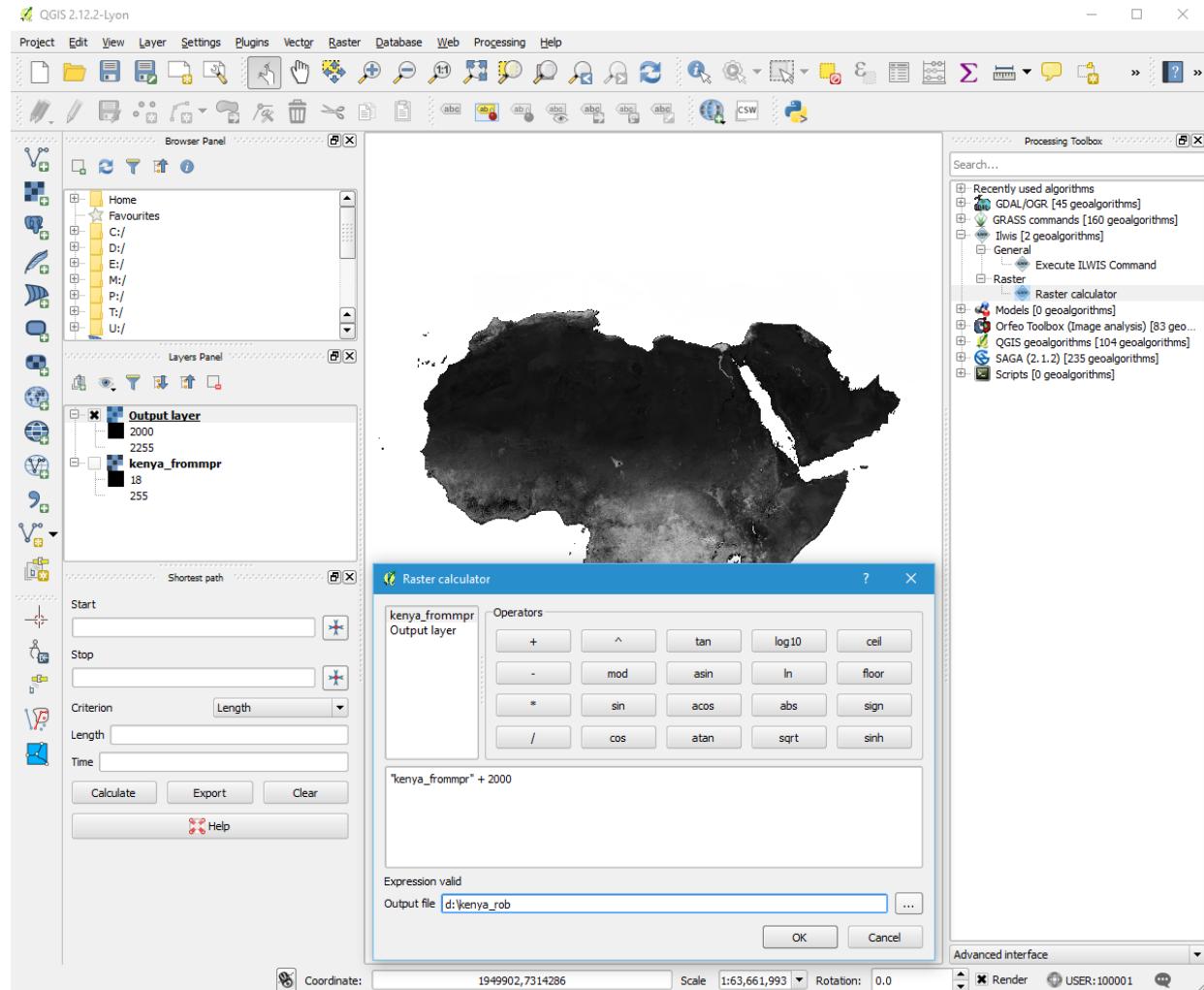
- Drag-and-drop data sources and operations
- Visual validation
- Step-by-step run mode
- Aggregated workflows
- Conditional statements
- Store – reuse - share



ILWIS plugin in QGIS

Features:

- (Part of) ILWIS functionality accessible in QGIS
- Combine and visualise ILWIS results with other data and web resources

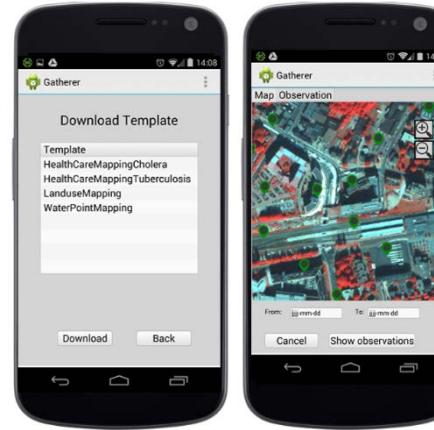


Other projects – Geoinformatics MSc projects

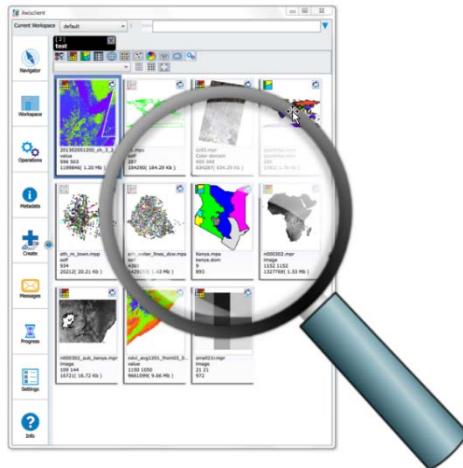
GIS on a tablet



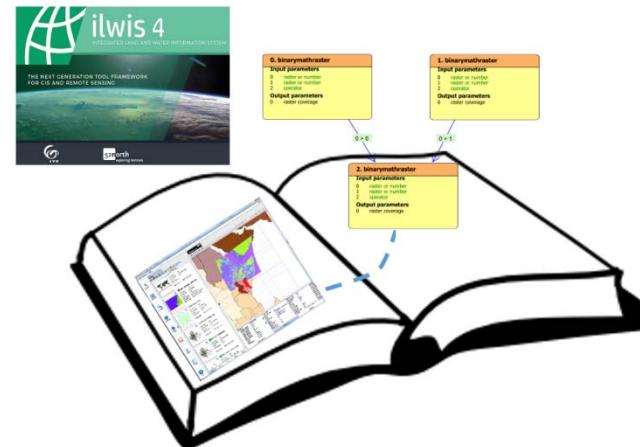
Integration of satellite images and crowdsourced geoinfo from mobile phones



Semantic previews

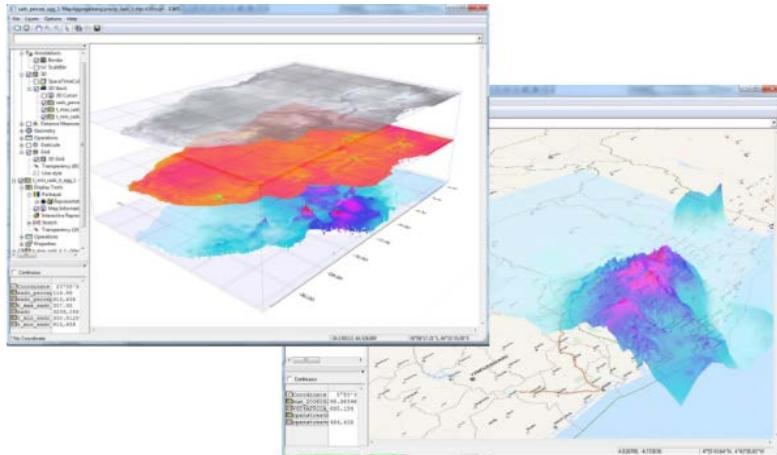


Wiki-based GIS workflows

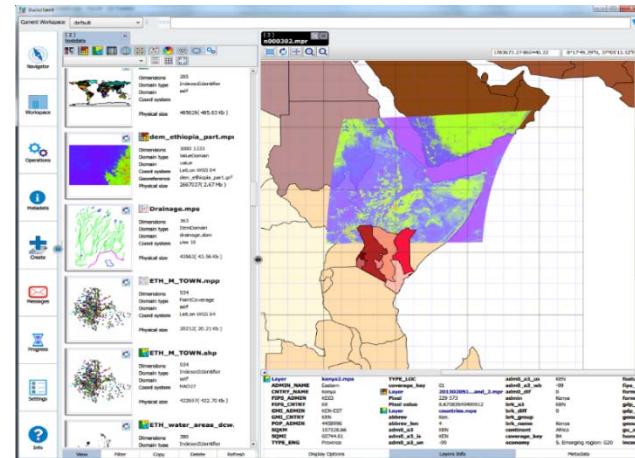


Other projects – Computer Science students

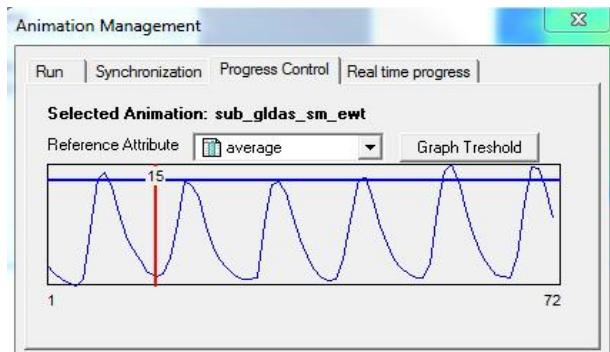
Modelling data in 3D



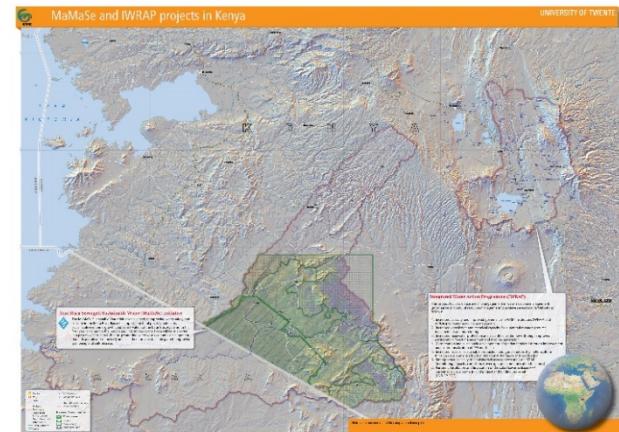
On-screen digitizing of geodata



Animation of time-series



Hill-shading with OpenGL based on raster and height data





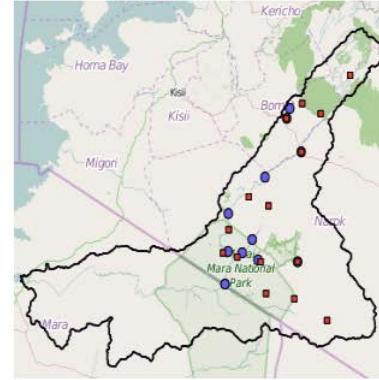
News

ENVIRONMENTAL FLOW ASSESSMENT ALONG MARA RIVER
E-Flow Assessment

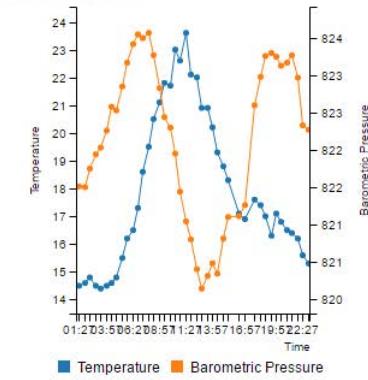
MARKET DRIVEN FOREST CONSERVATION INITIATIVES IN THE UPPER MARA BASIN
COMMUNITY FOREST ASSOCIATIONS

SUSTAINABLE RANGE-LAND MANAGEMENT IN THE MARA ECOSYSTEM: PILOTING HOLISTIC MANAGEMENT IN THE UPCOMING SIANA AND ENONKISHU CONSERVANCIES
HOLISTIC MANAGEMENT

Featured Map

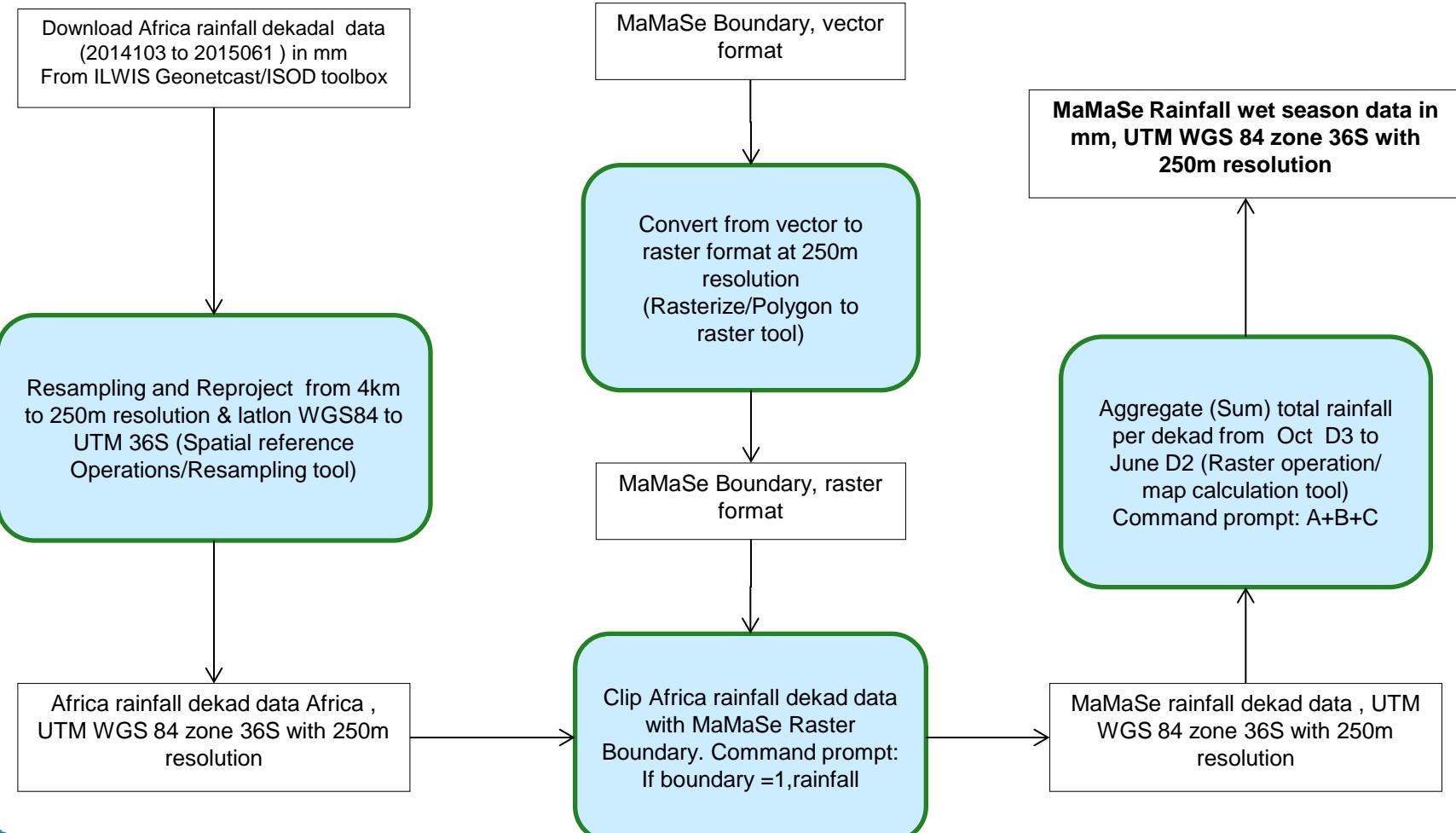


Real Time Data



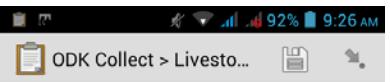
The MaMaSe Sustainable Water Initiative is aimed at improving water safety and security in the Mara River Basin to support structural poverty reduction, sustainable economic growth and conservation of the basin's ecosystems. In this four year programme the people and institutions in the basin will be supported in a process of structural change, promoting water-wise economic development that lifts people out of poverty and sets them on a sustainable path to improved well being and self-reliance.

Use in projects



Workflow in JSON for sharing between applications and users

```
1  {
2      "subworkflows": [
3          {
4              "id": 0,
5              "metadata": {
6                  "longName": "PRODUCTION",
7                  "description": "The workflow for the MaMaSe project",
8                  "syntax": "MaMaSeWorkflow(raster,raster,raster,raster)",
9                  "resource": "Ilwisi",
10                 "keywords": "workflow, MaMaSe, drainage",
11                 "inputParameterCount": 4,
12                 "outputParameterCount": 2
13             },
14             "operations": [
15                 {
16                     "id": 0,
17                     "metadata": {
18                         "longName": "Anoperation",
19                         "description": "AnOperationDescription",
20                         "syntax": "thefirstoperation(inputrastermap)",
21                         "resource": "Ilwisi",
22                         "keywords": "operation, keyword, operation",
23                         "inputParameterCount": 1,
24                         "outputParameterCount": 1,
25                         "final": false
26                     },
27                     "inputs": [
28                         {
29                             "id": 0,
30                             "url": "veg.com",
31                             "term": "",
32                             "type": "map",
33                             "value": "",
34                             "units": "",
35                             "min": "",
36                             "max": "",
37                             "name": "Vegetation structure",
38                             "show": true,
39                             "change": true,
40                             "description": "",
41                             "picture": ""
42                         }
43                     ]
44                 }
45             ]
46         }
47     ]
48 }
```



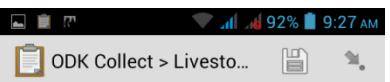
You are at the start of Livestock market information. Swipe the screen as shown below or tap the arrow buttons to go backward and forward.



backward to
previous
prompt



forward to
next
prompt



GPS location

Replace Location

Latitude: N 52°13'24"

Longitude: E 6°53'9"

Altitude: 0m

Accuracy: 23m

Goats (1)

Breed goat

- Breed goat 1
- Breed goat 2

Sex goat

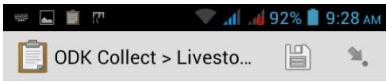
- Female
- Male

Age goat

- Goat kids
- Goat medium 1
- Goat medium 2
- Goat big size

Quality goat

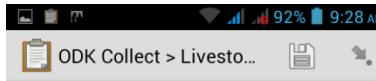
- Goat fat (condition score 4)
- Goat medium (condition



Total livestock traded

Number of goats traded

200



Traders

Traders destinations

- Another market
- Back to farm
- Slaughter

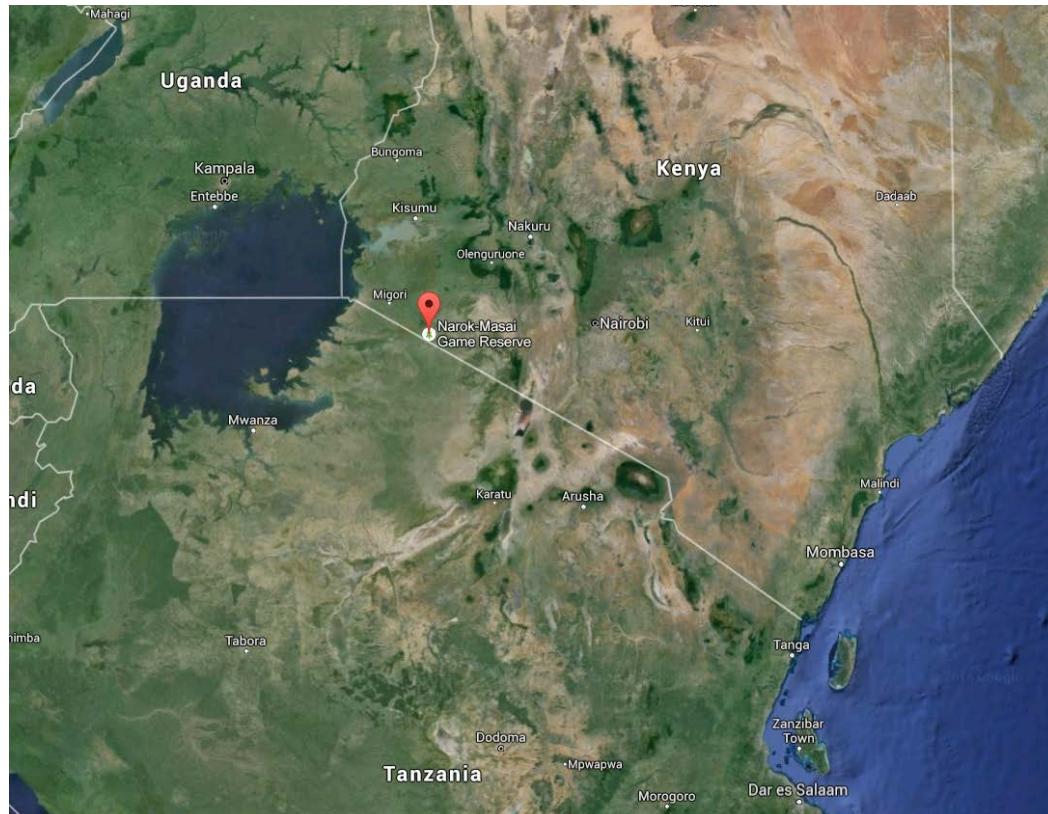


The **Maasai Mara National Reserve** is a large game reserve in Narok County, Kenya; contiguous with the Serengeti National Park in Mara Region, Tanzania.



It is named in honor of the Maasai people (the ancestral inhabitants of the area) and their description of the area when looked at from afar: "Mara," which is Maa (Maasai language) for "spotted," an apt description for the circles of trees, scrub, savanna, and cloud shadows that mark the area.

It is globally famous for its exceptional population of Masai lions, African leopards and Tanzanian cheetahs, and the annual migration of zebra, Thomson's gazelle, and wildebeest to and from the Serengeti every year from July to October, known as the Great Migration.



Installing Python3.4 and libraries

- Python 3.4 32bit
- Numpy
- Matplotlib
- Jupiter
- IJwiseobjects