ilwis 4
INTEGRATED LAND AND WATER INFORMATION SYSTEM
THE NEXT GENERATION TOOL FRAMEWORK
FOR GIS AND REMOTE SENSING
ITC
52north
exploring horizons

GeoBuzz OSGeo.nl 22 Nov 2017

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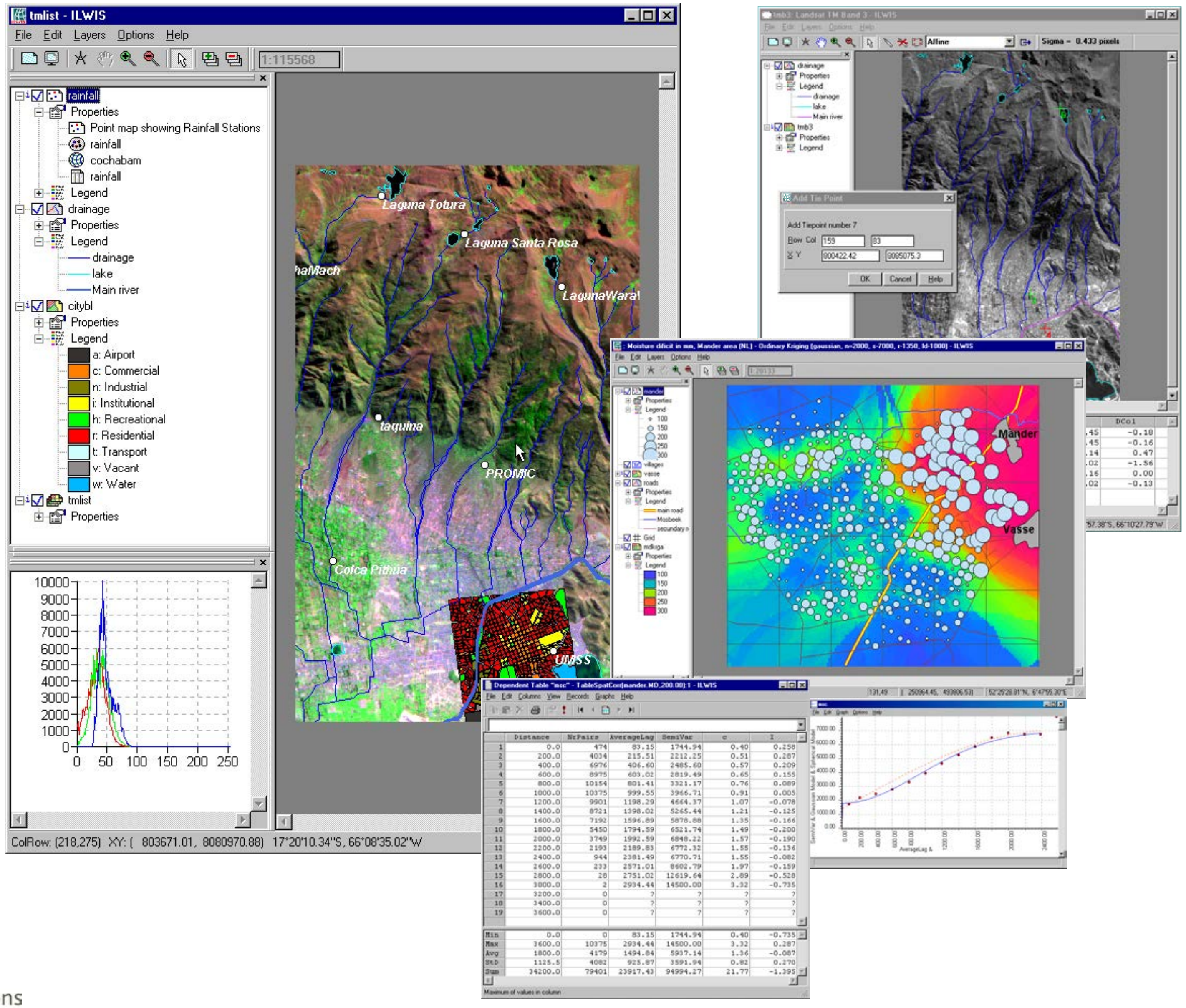
Martin Schouwenburg
Bas Retsios

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



ColRow: (218,275) XY: (803671.01, 8080970.88) 17°20'10.34"S, 66°08'35.02"W

Add Tiepoint number 7

Row Col 159 83

X Y 800422.42 8085075.3

Dependent Table "msc" - TableSpatCorr(mander.MD,200.00):1 - ILWIS

	Distance	NrPairs	AverageLag	SemiVar	c	I
1	0.0	474	83.15	1744.94	0.40	0.258
2	200.0	4034	215.51	2212.25	0.51	0.287
3	400.0	6976	406.60	2485.60	0.57	0.209
4	600.0	8975	603.02	2819.49	0.65	0.155
5	800.0	10154	801.41	3321.17	0.76	0.089
6	1000.0	10375	999.55	3966.71	0.91	0.005
7	1200.0	9901	1198.29	4664.37	1.07	-0.078
8	1400.0	8721	1398.02	5265.44	1.21	-0.125
9	1600.0	7192	1596.89	5878.88	1.35	-0.166
10	1800.0	5450	1794.59	6521.74	1.49	-0.200
11	2000.0	3749	1992.59	6848.22	1.57	-0.190
12	2200.0	2193	2189.83	6772.32	1.55	-0.136
13	2400.0	944	2381.49	6770.71	1.55	-0.082
14	2600.0	233	2571.01	8602.79	1.97	-0.159
15	2800.0	28	2751.02	12619.64	2.89	-0.528
16	3000.0	2	2934.44	14500.00	3.32	-0.735
17	3200.0	0	?	?	?	?
18	3400.0	0	?	?	?	?
19	3600.0	0	?	?	?	?
Min	0.0	0	83.15	1744.94	0.40	-0.735
Max	3600.0	10375	2934.44	14500.00	3.32	0.287
Avg	1800.0	4179	1494.84	5937.14	1.36	-0.087
StD	1125.5	4082	925.87	3591.94	0.82	0.270
Sum	34200.0	79401	23917.43	94994.27	21.77	-1.395

Maximum of values in column

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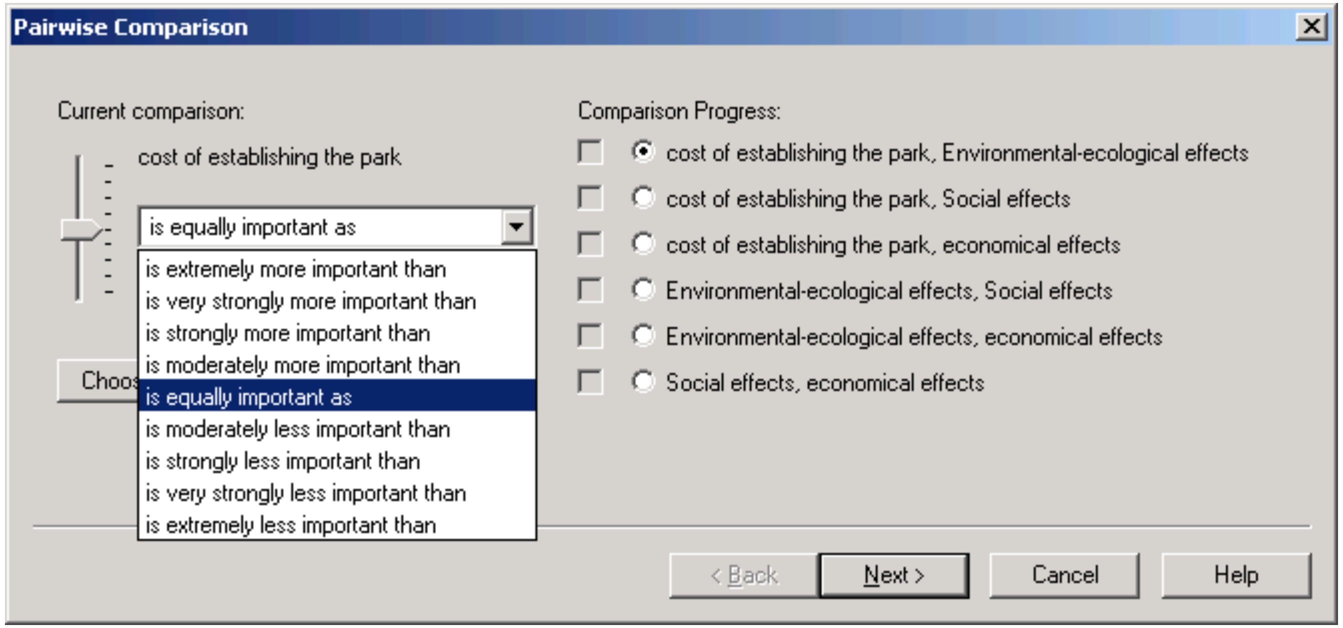
Spatial Decision Support System



Pairwise Comparison

Current comparison:

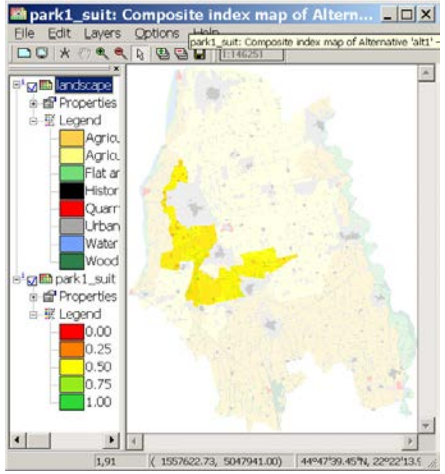
cost of establishing the park

is equally important as

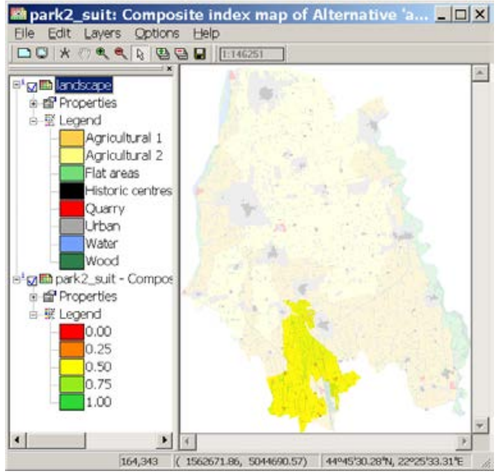
- is extremely more important than
- is very strongly more important than
- is strongly more important than
- is moderately more important than
- is equally important as
- is moderately less important than
- is strongly less important than
- is very strongly less important than
- is extremely less important than

Comparison Progress:

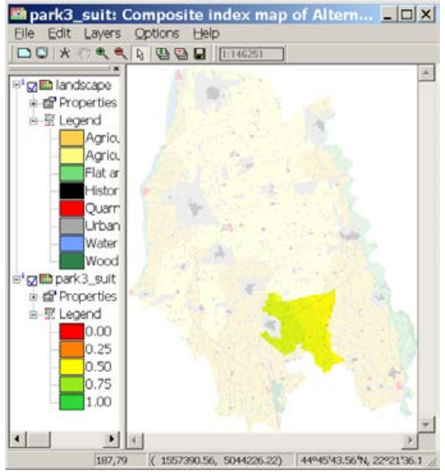
- □ ● cost of establishing the park, Environmental-ecological effects
- □ ○ cost of establishing the park, Social effects
- □ ○ cost of establishing the park, economical effects
- □ ○ Environmental-ecological effects, Social effects
- □ ○ Environmental-ecological effects, economical effects
- □ ○ Social effects, economical effects



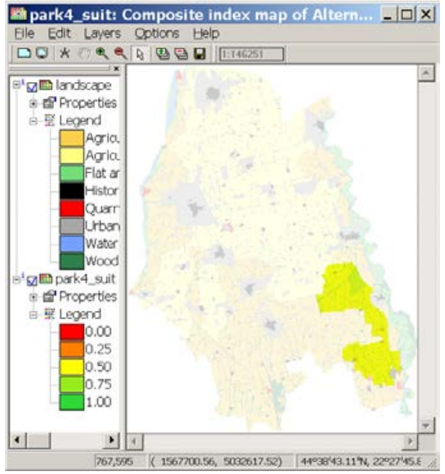
park1_suit: Composite index map of Altern...



park2_suit: Composite index map of Alternative 'a...

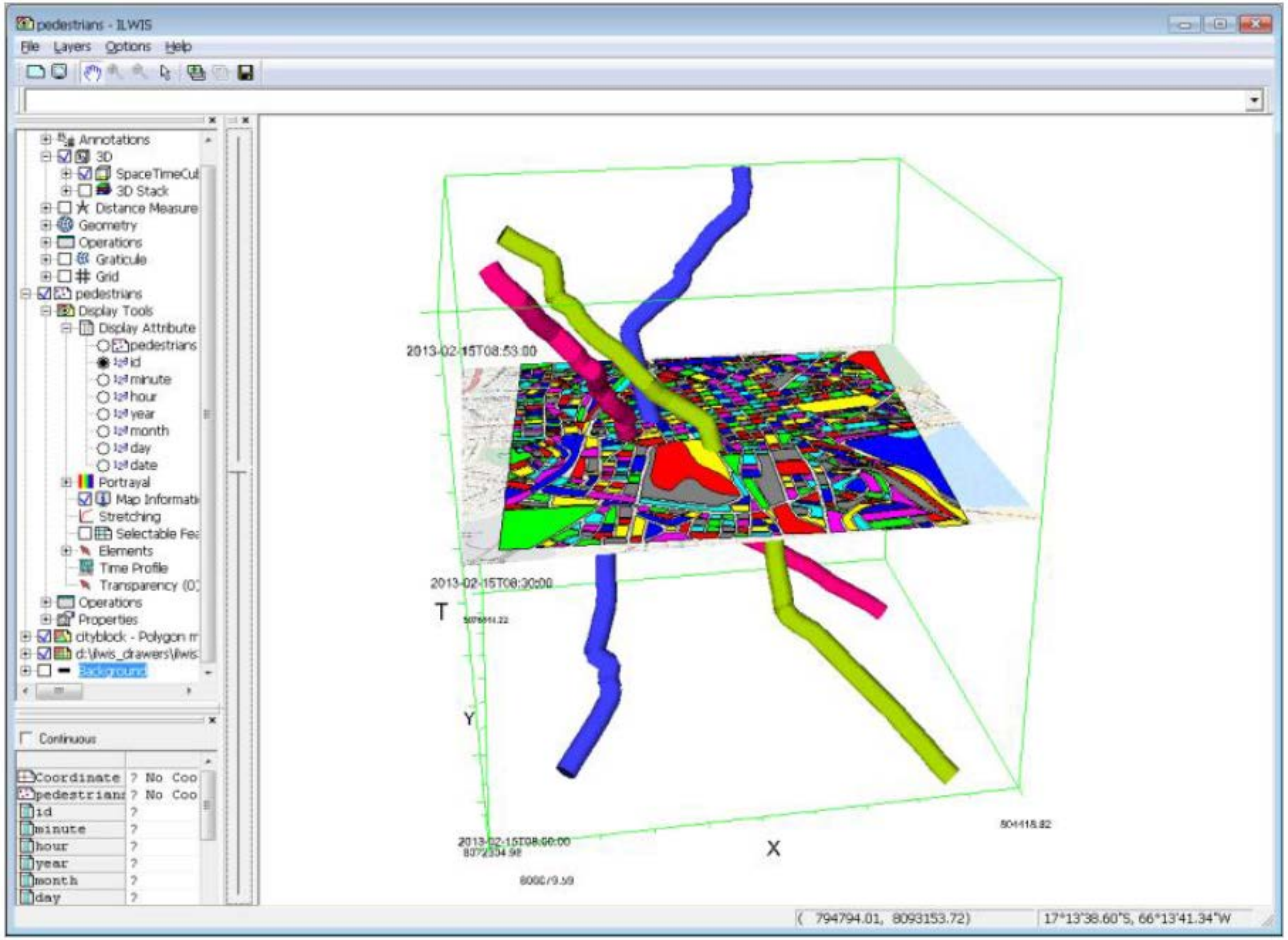


park3_suit: Composite index map of Altern...



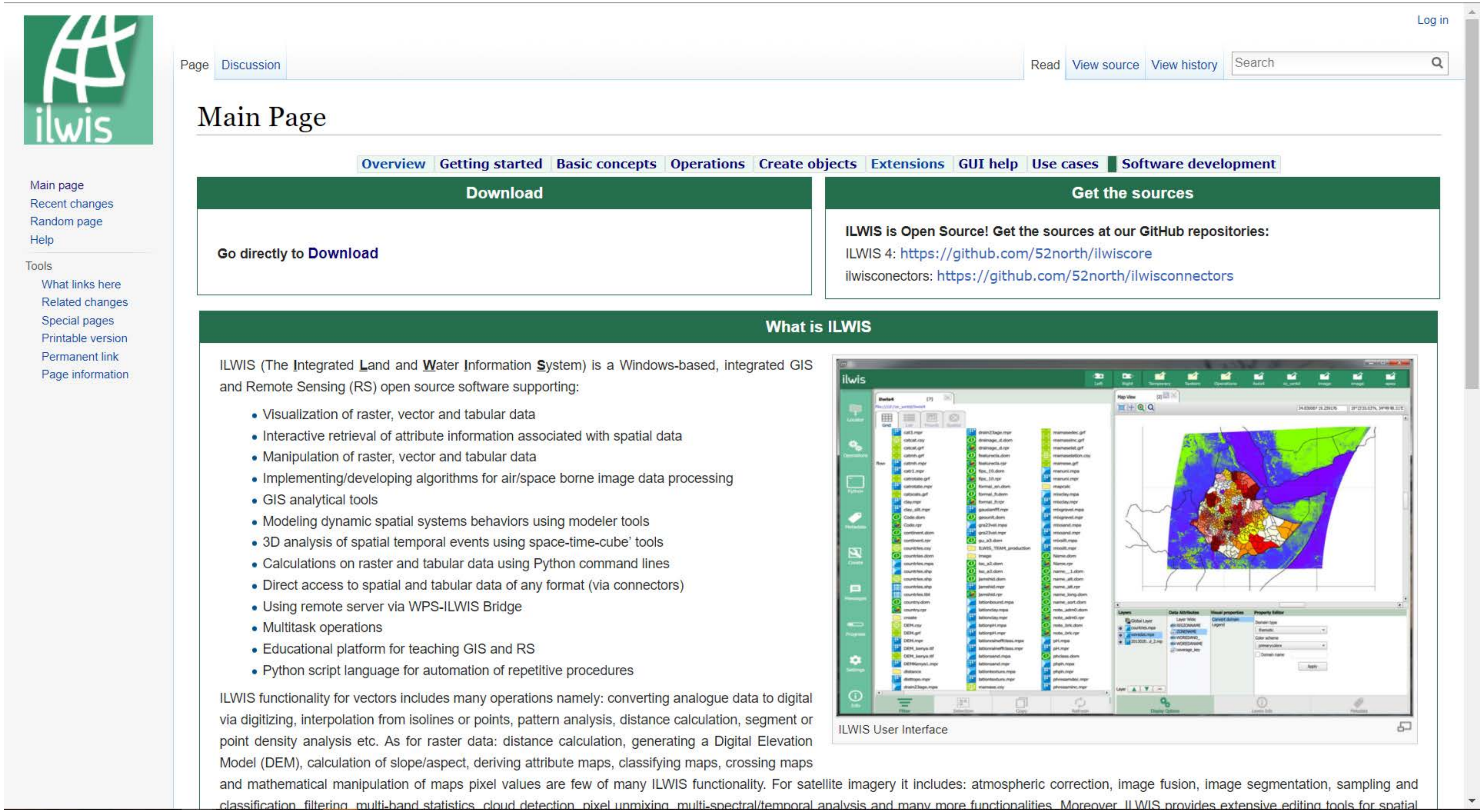
park4_suit: Composite index map of Altern...

Space-Time Cube



Coordinate	? No Coo
pedestrians	? No Coo
id	?
minute	?
hour	?
year	?
month	?
day	?

http://ilwis.itc.utwente.nl



Main Page

Overview | Getting started | Basic concepts | Operations | Create objects | Extensions | GUI help | Use cases | Software development

Download

Go directly to **Download**

Get the sources

ILWIS is Open Source! Get the sources at our GitHub repositories:

ILWIS 4: https://github.com/52north/ilwiscore

ilwisconectors: https://github.com/52north/ilwisconnectors

What is ILWIS

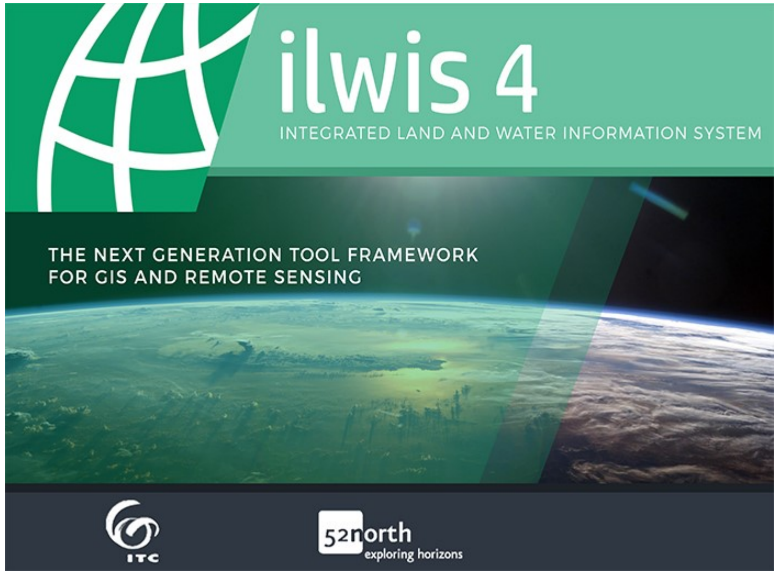
ILWIS (The Integrated Land and Water Information System) is a Windows-based, integrated GIS and Remote Sensing (RS) open source software supporting:

- Visualization of raster, vector and tabular data
- Interactive retrieval of attribute information associated with spatial data
- Manipulation of raster, vector and tabular data
- Implementing/developing algorithms for air/space borne image data processing
- GIS analytical tools
- Modeling dynamic spatial systems behaviors using modeler tools
- 3D analysis of spatial temporal events using space-time-cube' tools
- Calculations on raster and tabular data using Python command lines
- Direct access to spatial and tabular data of any format (via connectors)
- Using remote server via WPS-ILWIS Bridge
- Multitask operations
- Educational platform for teaching GIS and RS
- Python script language for automation of repetitive procedures

ILWIS User Interface

ILWIS functionality for vectors includes many operations namely: converting analogue data to digital via digitizing, interpolation from isolines or points, pattern analysis, distance calculation, segment or point density analysis etc. As for raster data: distance calculation, generating a Digital Elevation Model (DEM), calculation of slope/aspect, deriving attribute maps, classifying maps, crossing maps and mathematical manipulation of maps pixel values are few of many ILWIS functionality. For satellite imagery it includes: atmospheric correction, image fusion, image segmentation, sampling and classification, filtering, multi-band statistics, cloud detection, pixel unmixing, multi-spectral/temporal analysis and many more functionalities. Moreover, ILWIS provides extensive editing tools for spatial

ILWIS 4 objective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A framework to make ILWIS fit for the future –

support a wider spectrum of use, users and developers

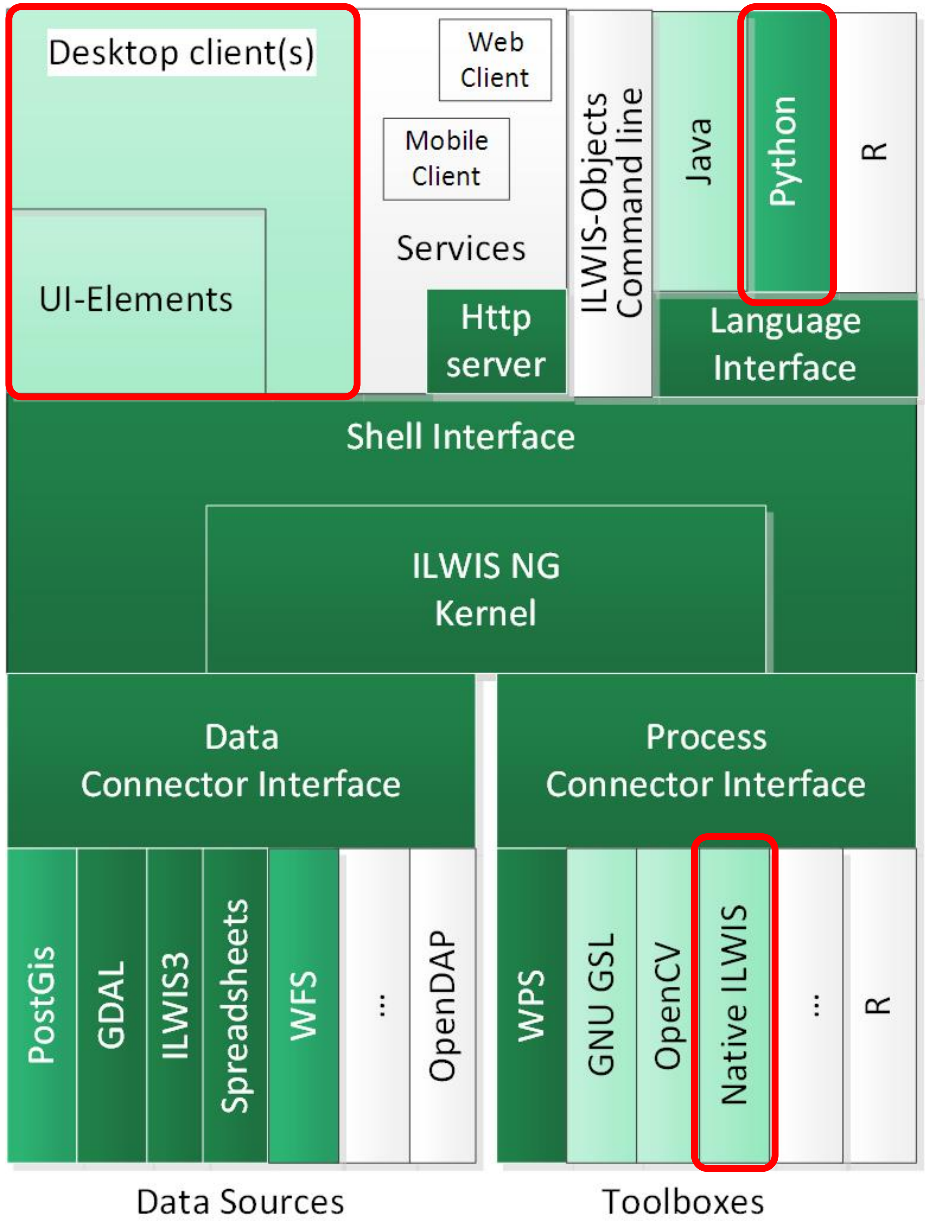
Easily implement, store and share scientific and project methods via software

ILWIS Architecture

Features:

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

Workflow builder



Additional operations

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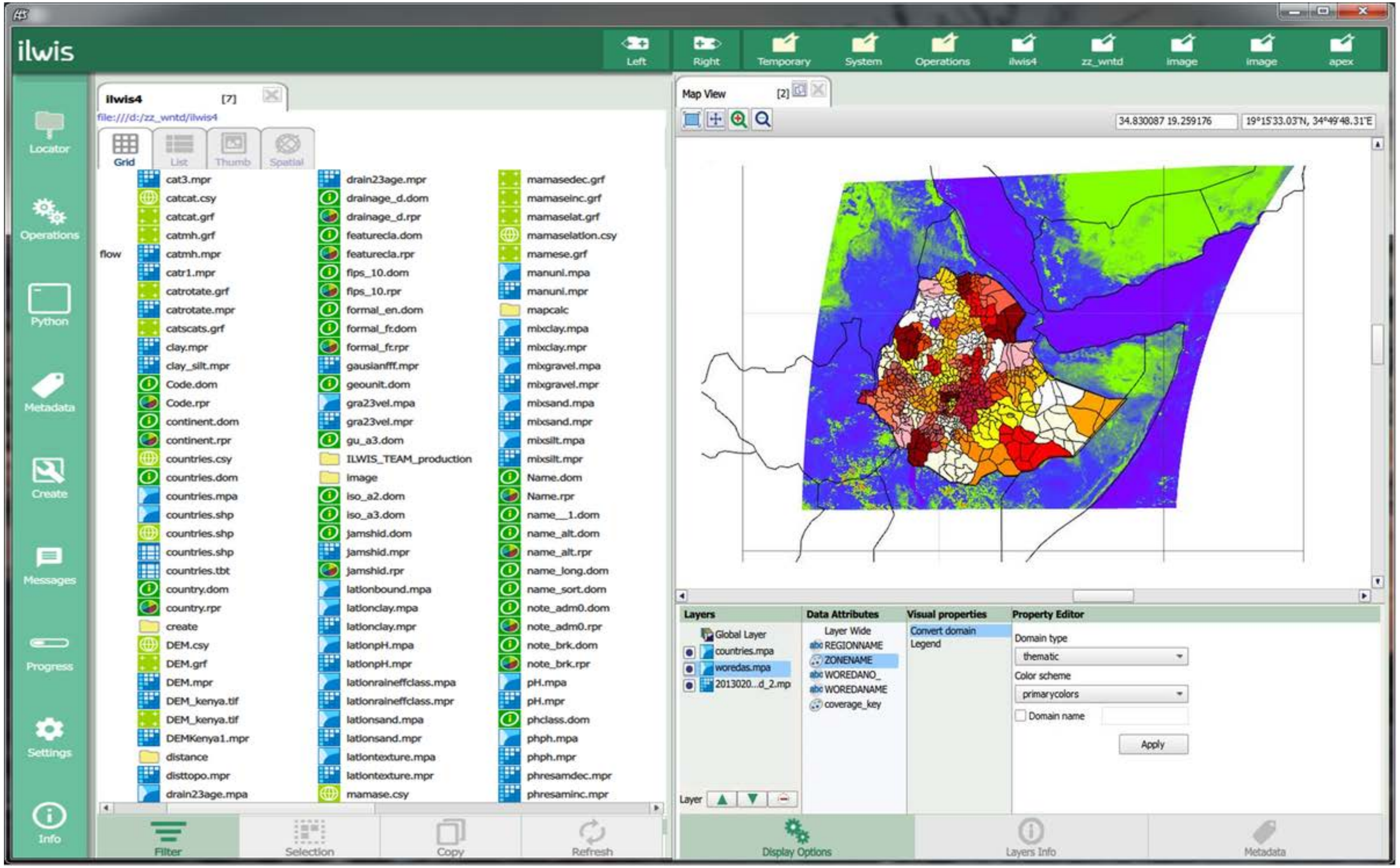
ILWIS GUI

- New setup
- Built using Qt-QML
- Still quite alpha



file:///d:/zz_wntd/ilwis4

cat3.mpr
catcat.csy
catcat.grf
catmh.grf
catmh.mpr
catr1.mpr
catrotate.grf
catrotate.mpr
catscats.grf
clay.mpr
clay_silt.mpr
Code.dom
Code.rpr
continent.dom
continent.rpr
countries.csy
countries.dom
countries.mpa
countries.shp
countries.shp
countries.shp
countries.tbt
country.dom
country.rpr
create
DEM.csy
DEM.grf
DEM.mpr
DEM_kenya.tif
DEM_kenya.tif
DEMKenya1.mpr
distance
disttopo.mpr
drain23age.mpa
drain23age.mpr
drainage_d.dom
drainage_d.rpr
featurecla.dom
featurecla.rpr
fips_10.dom
fips_10.rpr
formal_en.dom
formal_fr.dom
formal_fr.rpr
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geounit.dom
gra23vel.mpa
gra23vel.mpr
gu_a3.dom
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iso_a3.dom
jamshid.dom
jamshid.mpr
jamshid.rpr
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latlonclay.mpa
latlonclay.mpr
latlonpH.mpa
latlonpH.mpr
latlonraineffclass.mpa
latlonraineffclass.mpr
latlonsand.mpa
latlonsand.mpr
latlontexture.mpa
latlontexture.mpr
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mamasedec.grf
mamaseinc.grf
mamaselat.grf
mamaselation.csy
mamese.grf
manuni.mpa
manuni.mpr
mapcalc
mixclay.mpa
mixclay.mpr
mixgravel.mpa
mixgravel.mpr
mixsand.mpa
mixsand.mpr
mixsilt.mpa
mixsilt.mpr
Name.dom
Name.rpr
name__1.dom
name_alt.dom
name_alt.rpr
name_long.dom
name_sort.dom
note_adm0.dom
note_adm0.rpr
note_brk.dom
note_brk.rpr
pH.mpa
pH.mpr
phclass.dom
phph.mpa
phph.mpr
phresamdec.mpr
phresaminc.mpr

34.830087 19.259176 | 19°15'33.03"N, 34°49'48.31"E

Layers: Global Layer, countries.mpa, woredas.mpa, 2013020...d_2.mp

Data Attributes: Layer Wide, REGIONNAME, ZONENAME, WOREDANO_, WOREDANAME, coverage_key

Visual properties: Convert domain, Legend

Domain type: thematic
Color scheme: primarycolors
□ Domain name
Apply

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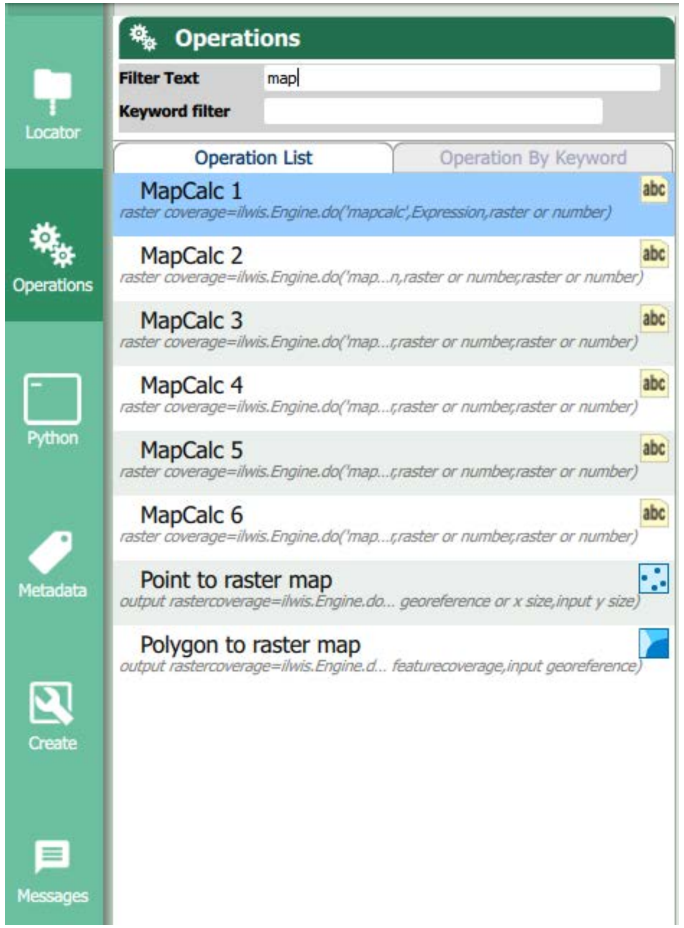
Workflow builder



Operations

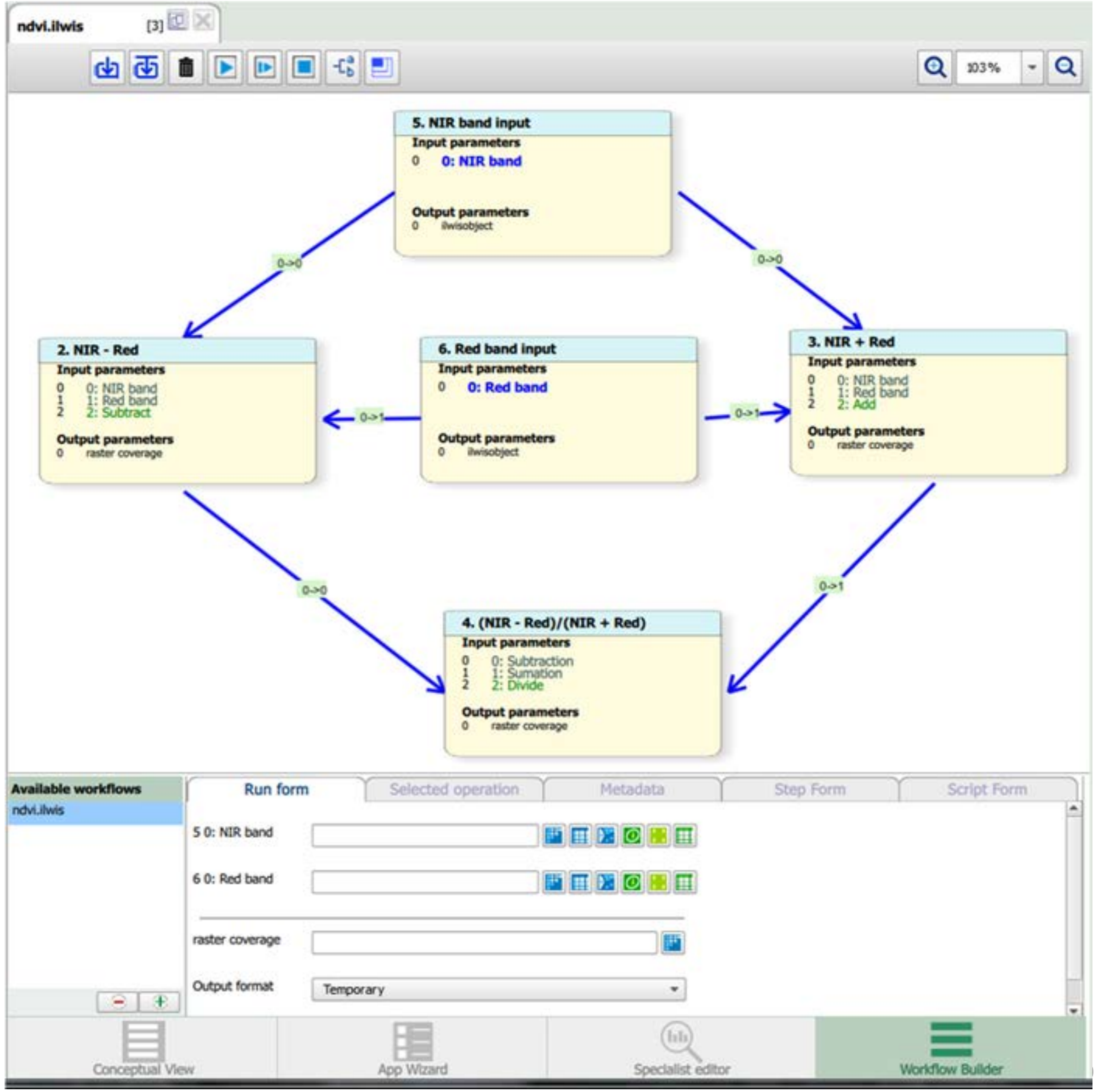
Filter Text: map

Keyword filter:

Operation List | Operation By Keyword

- MapCalc 1 — raster coverage=ilwis.Engine.do('mapcalc',Expression,raster or number)
- MapCalc 2 — raster coverage=ilwis.Engine.do('map...n,raster or number,raster or number)
- MapCalc 3 — raster coverage=ilwis.Engine.do('map...r,raster or number,raster or number)
- MapCalc 4 — raster coverage=ilwis.Engine.do('map...r,raster or number,raster or number)
- MapCalc 5 — raster coverage=ilwis.Engine.do('map...r,raster or number,raster or number)
- MapCalc 6 — raster coverage=ilwis.Engine.do('map...r,raster or number,raster or number)
- Point to raster map — output rastercoverage=ilwis.Engine.do... georeference or x size,input y size)
- Polygon to raster map — output rastercoverage=ilwis.Engine.d... featurecoverage,input georeference)

NDVI = (NIR-Red) / (NIR+Red)



5. NIR band input
Input parameters
0 0: NIR band
Output parameters
0 ilwisobject

2. NIR - Red
Input parameters
0 0: NIR band
1 1: Red band
2 2: Subtract
Output parameters
0 raster coverage

6. Red band input
Input parameters
0 0: Red band
Output parameters
0 ilwisobject

3. NIR + Red
Input parameters
0 0: NIR band
1 1: Red band
2 2: Add
Output parameters
0 raster coverage

4. (NIR - Red)/(NIR + Red)
Input parameters
0 0: Subtraction
1 1: Sumation
2 2: Divide
Output parameters
0 raster coverage

Available workflows: ndvi.ilwis

5 0: NIR band

6 0: Red band

raster coverage

Output format: Temporary

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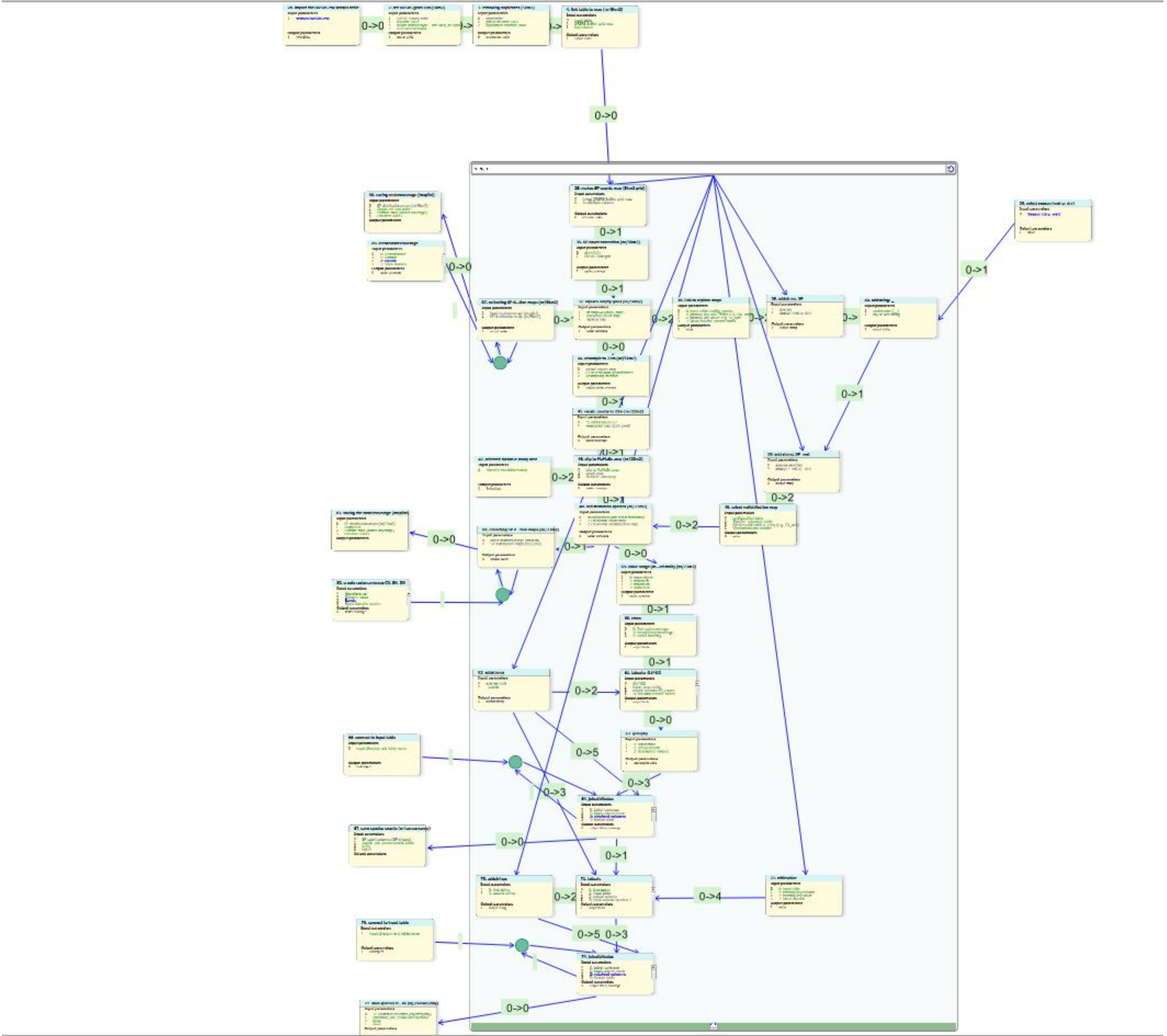
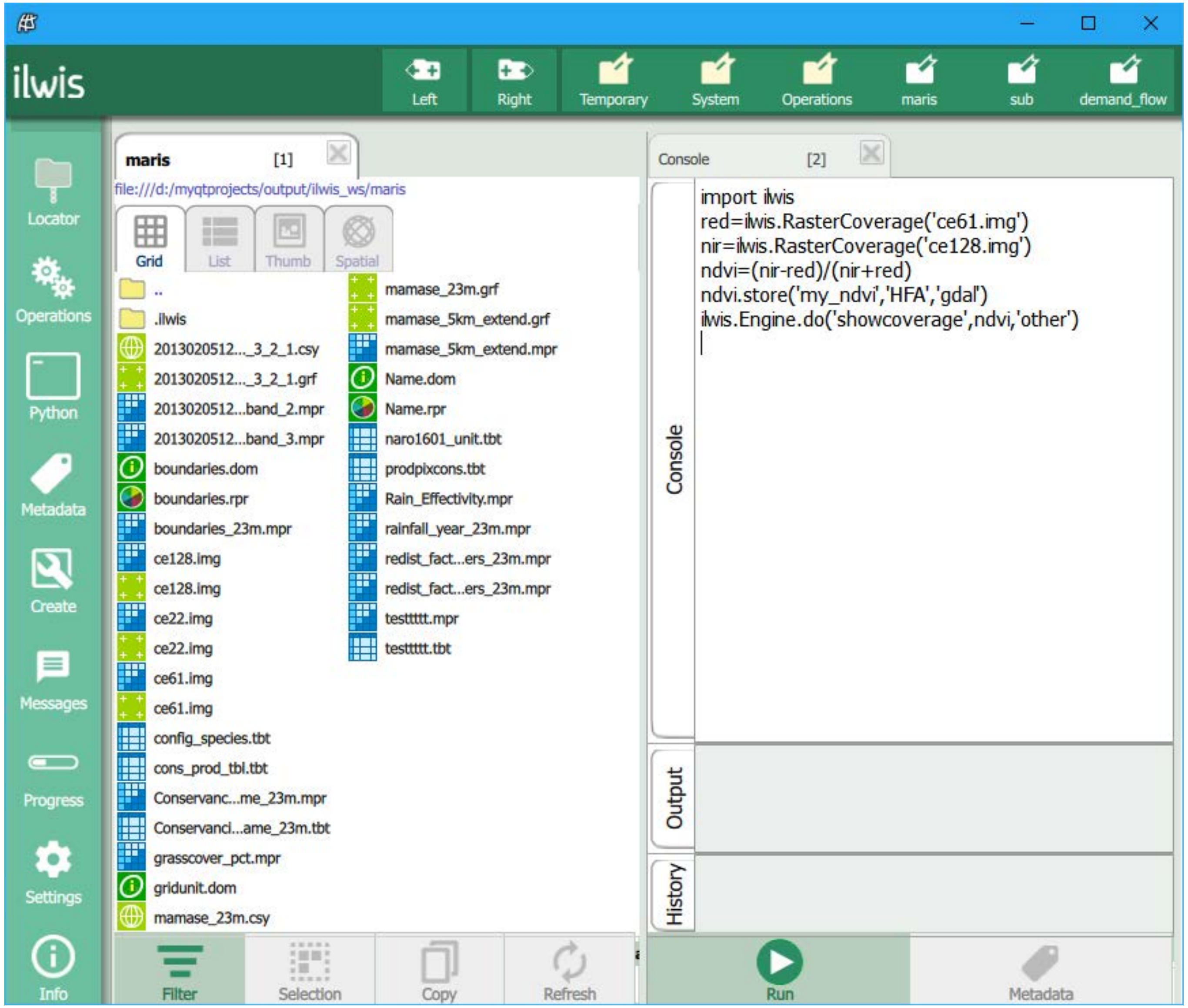
Workflow builder



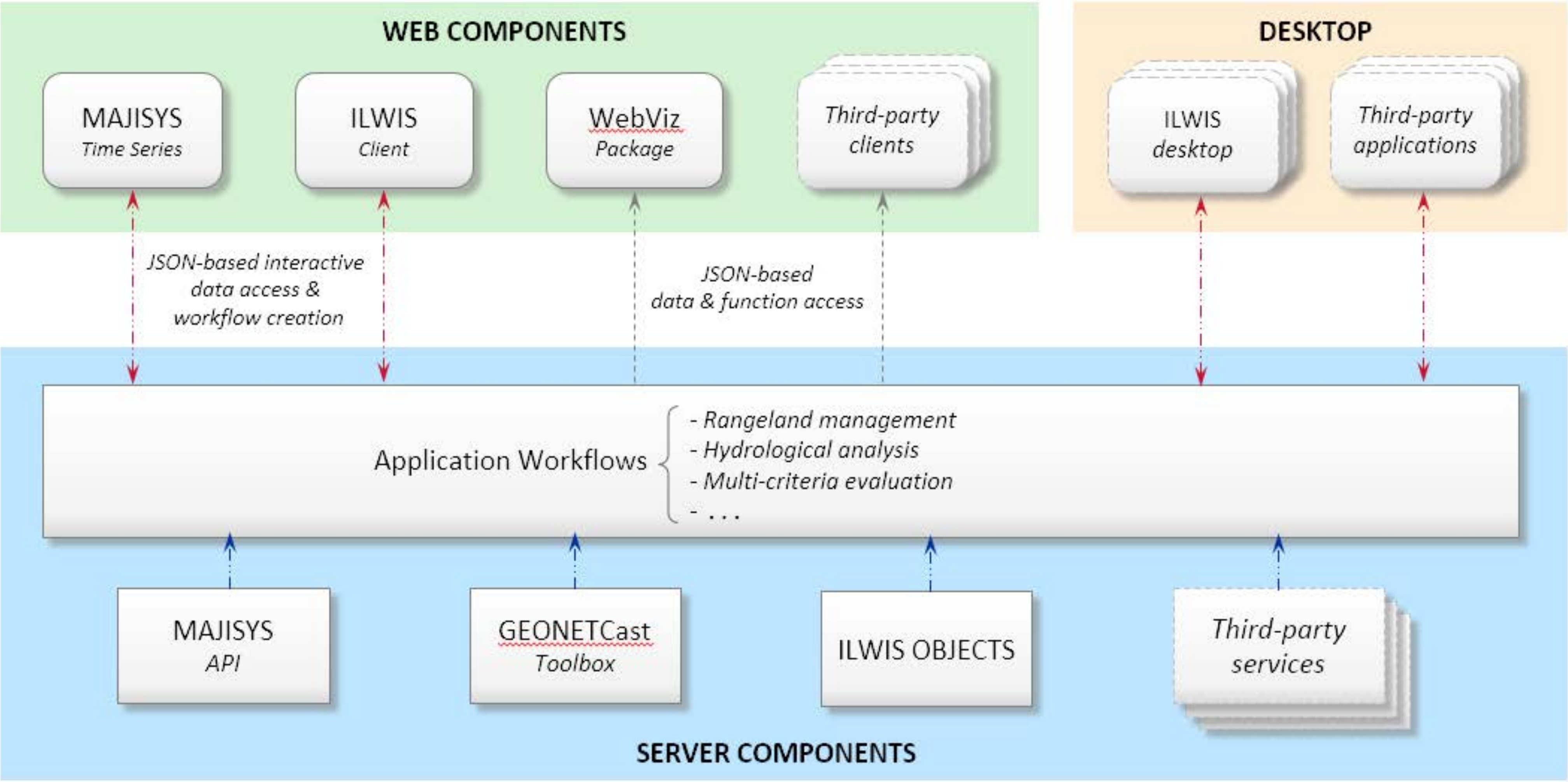
Python API

- All ILWIS functionality accessible through Python
- Alternative way to build workflows
- Python 3.x



```
import ilwis
red=ilwis.RasterCoverage('ce61.img')
nir=ilwis.RasterCoverage('ce128.img')
ndvi=(nir-red)/(nir+red)
ndvi.store('my_ndvi','HFA','gdal')
ilwis.Engine.do('showcoverage',ndvi,'other')
```

New development – an integrated approach



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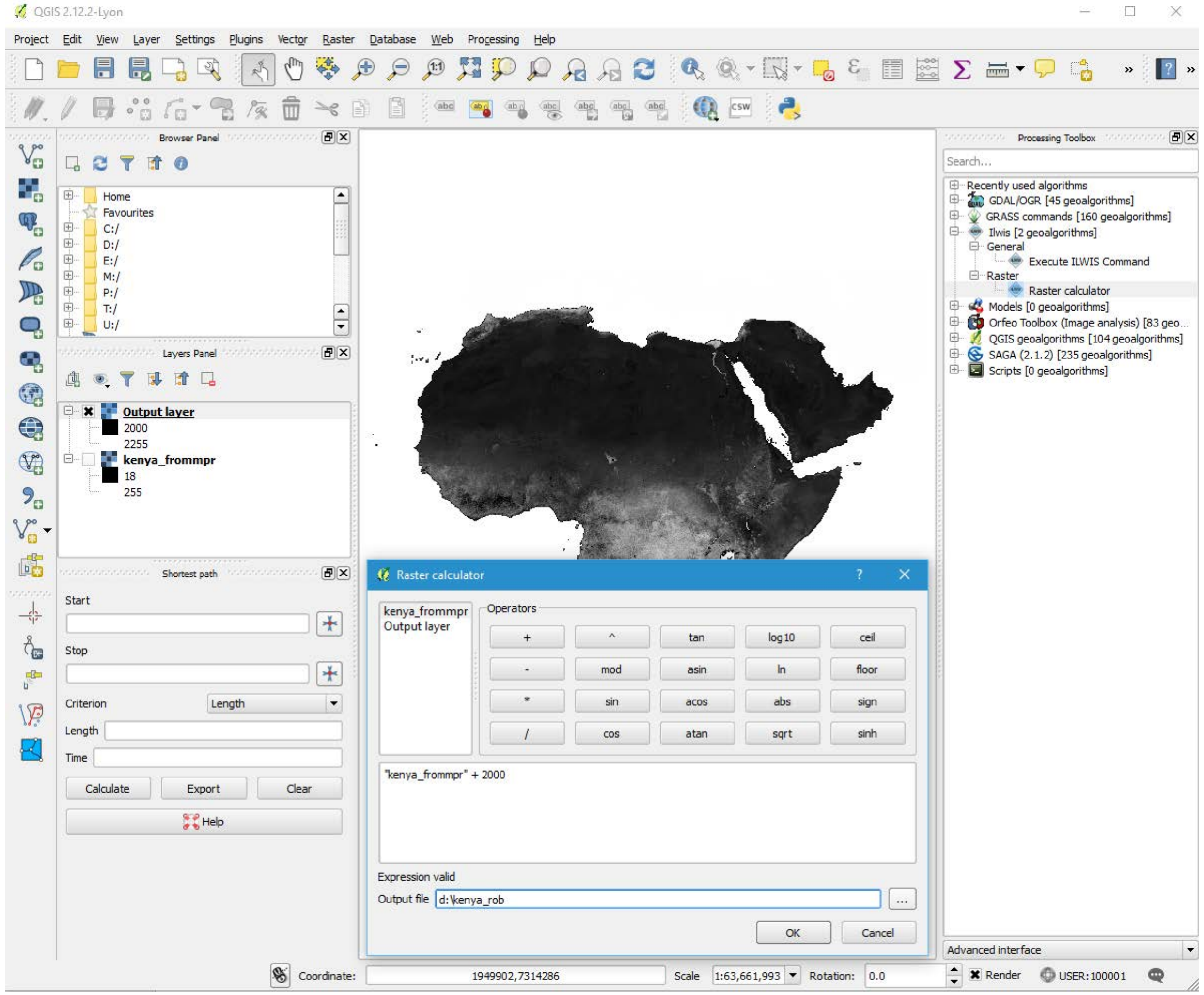
ILWIS processing plugin in QGIS

- (Part of) ILWIS functionality accessible in QGIS
- Through Processing plugin
- Combine and visualise ILWIS results with other data and web resources
- Proof-of-concept worked
- No resources at present for further development ...



"kenya_frommpr" + 2000

Expression valid

Output file d:\kenya_rob

Coordinate: 1949902,7314286 Scale 1:63,661,993 Rotation: 0.0

ILWIS Community

You are invited to try ILWIS and tell us your experiences

We welcome use cases which involve raster image processing:

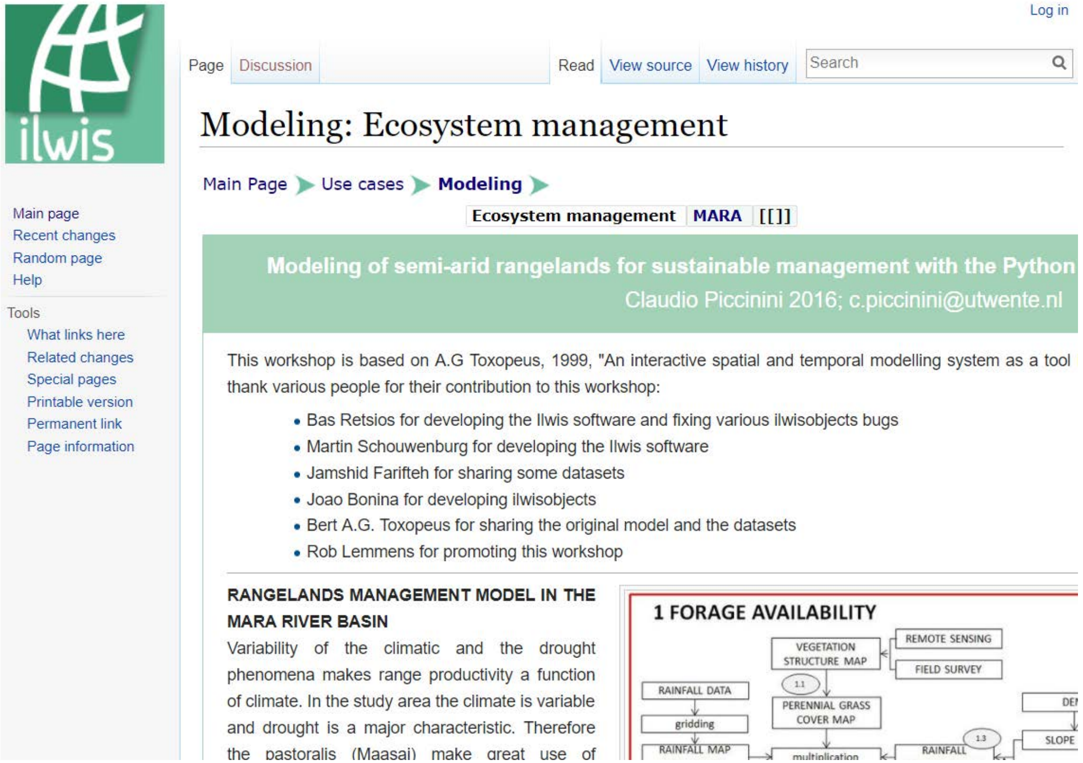
- Workflows represented in Python
- Workflows created with the ILWIS Workflow Builder

Help build the software...?

Contact the ILWIS Community Lead

Rob Lemmens

r.l.g.Lemmens@utwente.nl



Modeling: Ecosystem management

Main Page ➤ Use cases ➤ **Modeling** ➤

Ecosystem management | **MARA** | **[[]]**

Modeling of semi-arid rangelands for sustainable management with the Python

Claudio Piccinini 2016; c.piccinini@utwente.nl

This workshop is based on A.G Toxopeus, 1999, "An interactive spatial and temporal modelling system as a tool thank various people for their contribution to this workshop:

- Bas Retsios for developing the Ilwis software and fixing various ilwisobjects bugs
- Martin Schouwenburg for developing the Ilwis software
- Jamshid Farifteh for sharing some datasets
- Joao Bonina for developing ilwisobjects
- Bert A.G. Toxopeus for sharing the original model and the datasets
- Rob Lemmens for promoting this workshop

RANGELANDS MANAGEMENT MODEL IN THE MARA RIVER BASIN

Variability of the climatic and the drought phenomena makes range productivity a function of climate. In the study area the climate is variable and drought is a major characteristic. Therefore the pastoralis (Maasai) make great use of