

A Generic Interface for Resource Network Models

Bridging the Gaps First Year Review

9 July 2009

Julien Harou

University College London

UCL Research Challenges



Collaborators

BTG funding (OpenIRAS):

Lazaros Papageorgiou, Eric Fraga

UCL Research Challenge funding (HydroPlatform):

Muki Haklay, Eric Fraga, Sarah Bell, Michael Batty, Tim Swanson

HydroPlatform Design team (alphabetical order):

Kristiana Hansen, Beaudry Kock, Josue Medellin, Didrik Pinte, Manuel Pulido-Velazquez, Arnaud Reynaux, David Rosenberg, Amaury Tilmant, Sebastian Vicuna, Tingju Zhu

Sustainable City ...

Sustainable Resource Network



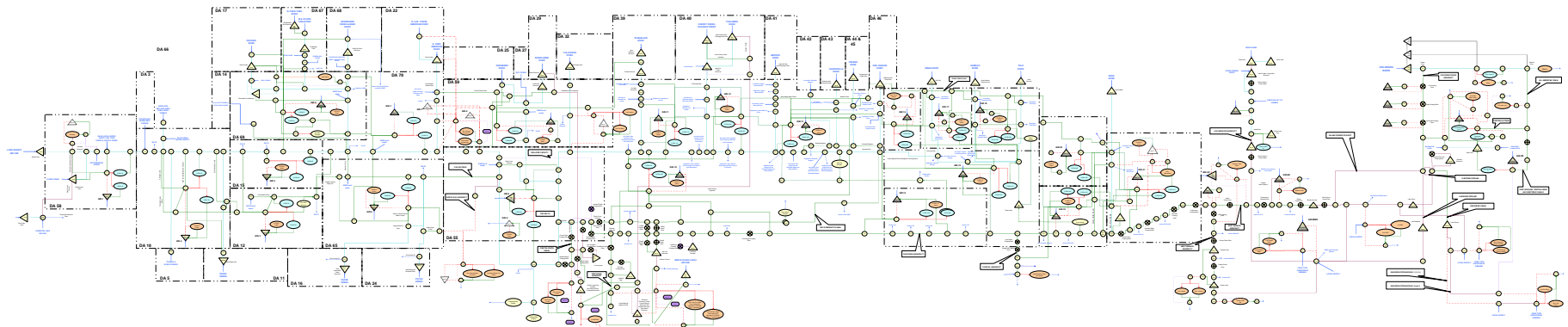
Water Resources, Energy, Food,
Transport, Trade, ...

Resource Management Models

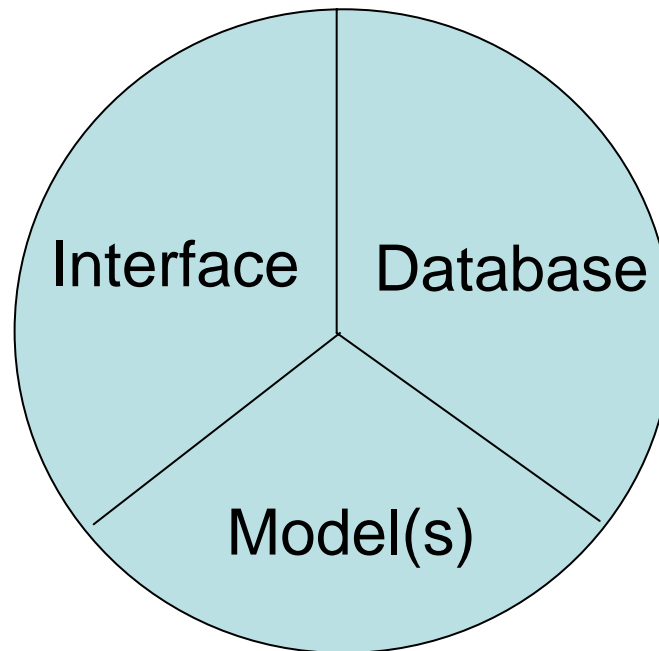
- Consider resource system as a network (nodes - links)
- Represent physics, investigate policy implications
- Use simulation, optimisation
- Support decisions, collaborative planning

In Practice ...

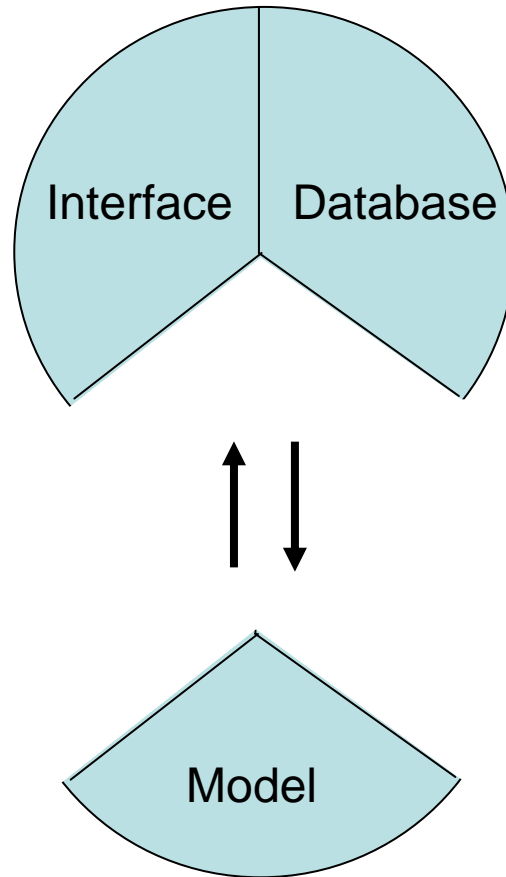
- The need for ease of use, visualisation, & data management encourages use of professional software packages
- Hard for research models to compete
- Researchers could benefit from a generic
 - Graphical User Interface (GUI)
 - Data Management System



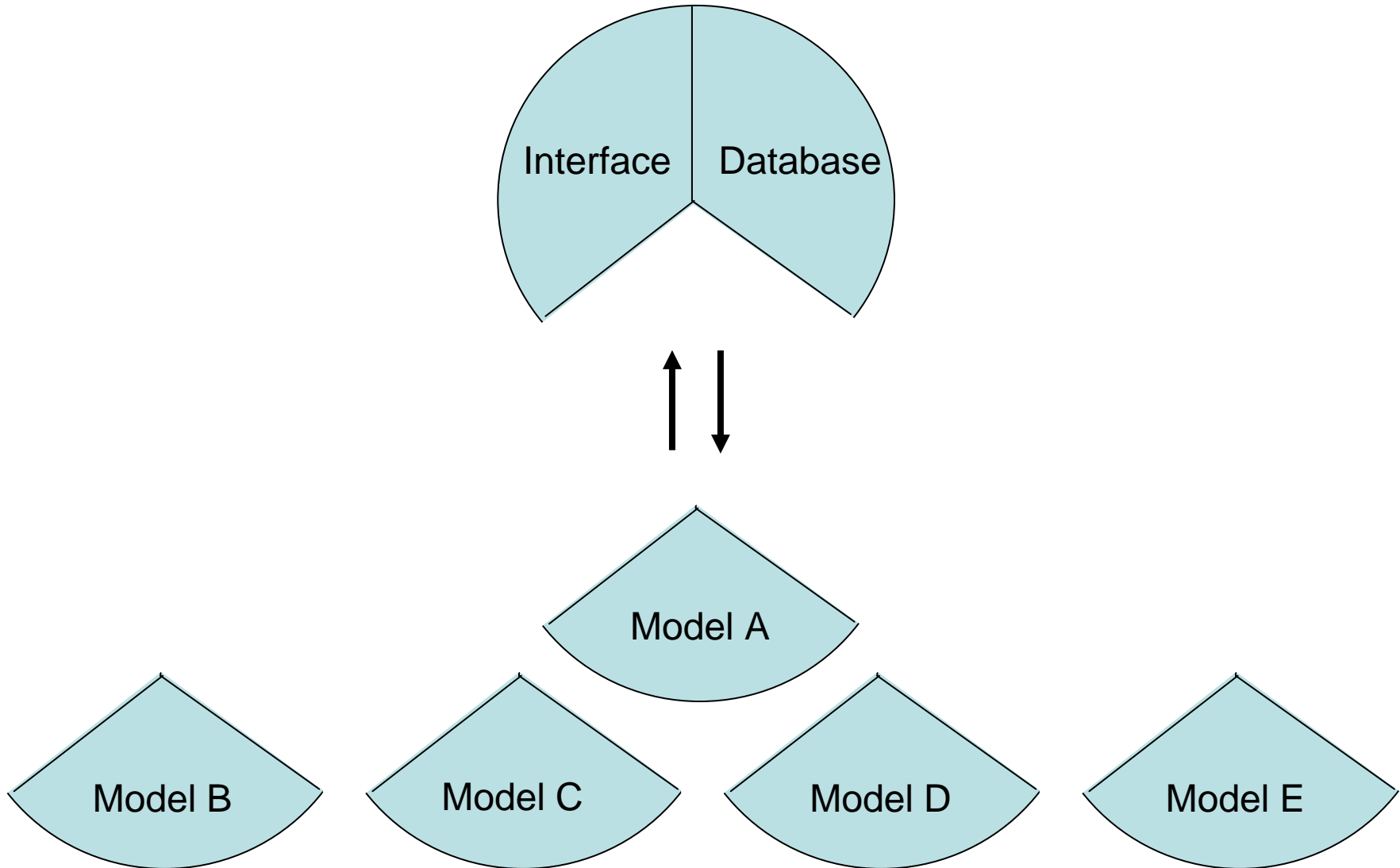
Modeling Software Packages



Model Platform



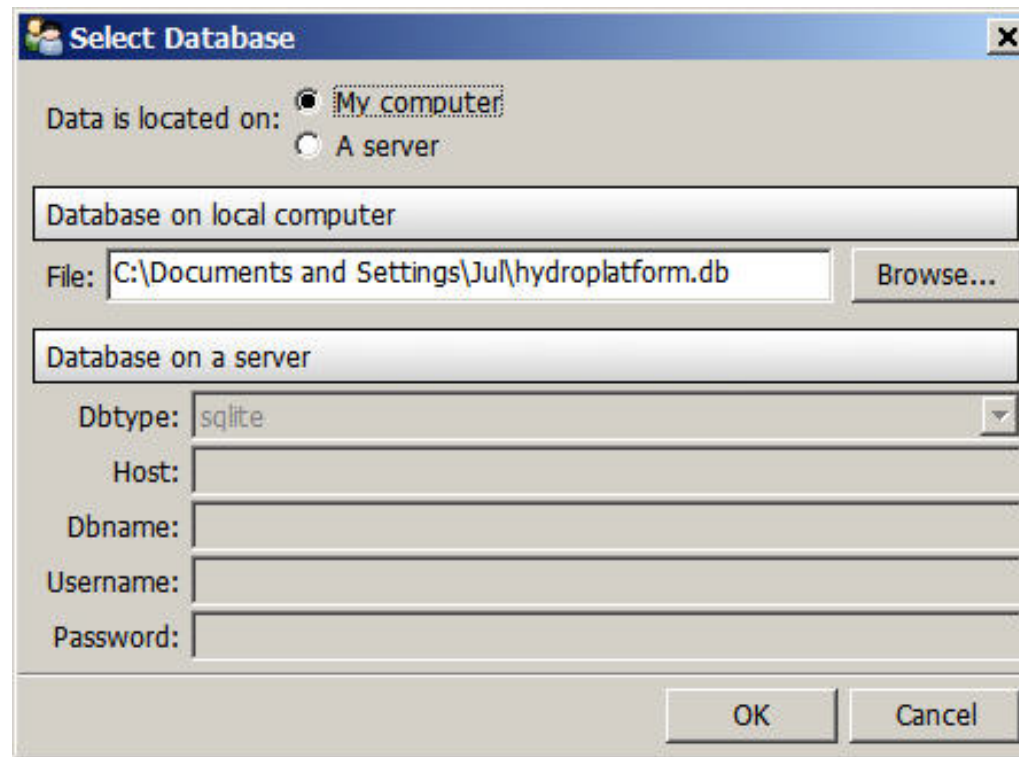
Model Platform



HydroPlatform

- Open-source software platform for water resource management models
- Works with network (node-link) models in any field (transport, energy, trade, ...)
- Manages and displays model inputs and outputs
- Loosely (export functions) or tightly (**add-ins**) coupled with models

Allows for Individual or Group Projects



The screenshot shows a dialog box titled "Select Database" with a close button (X) in the top right corner. The dialog is divided into two main sections: "Database on local computer" and "Database on a server".

Data is located on:

- My computer:
- A server

Database on local computer

File:

Database on a server

DbType:

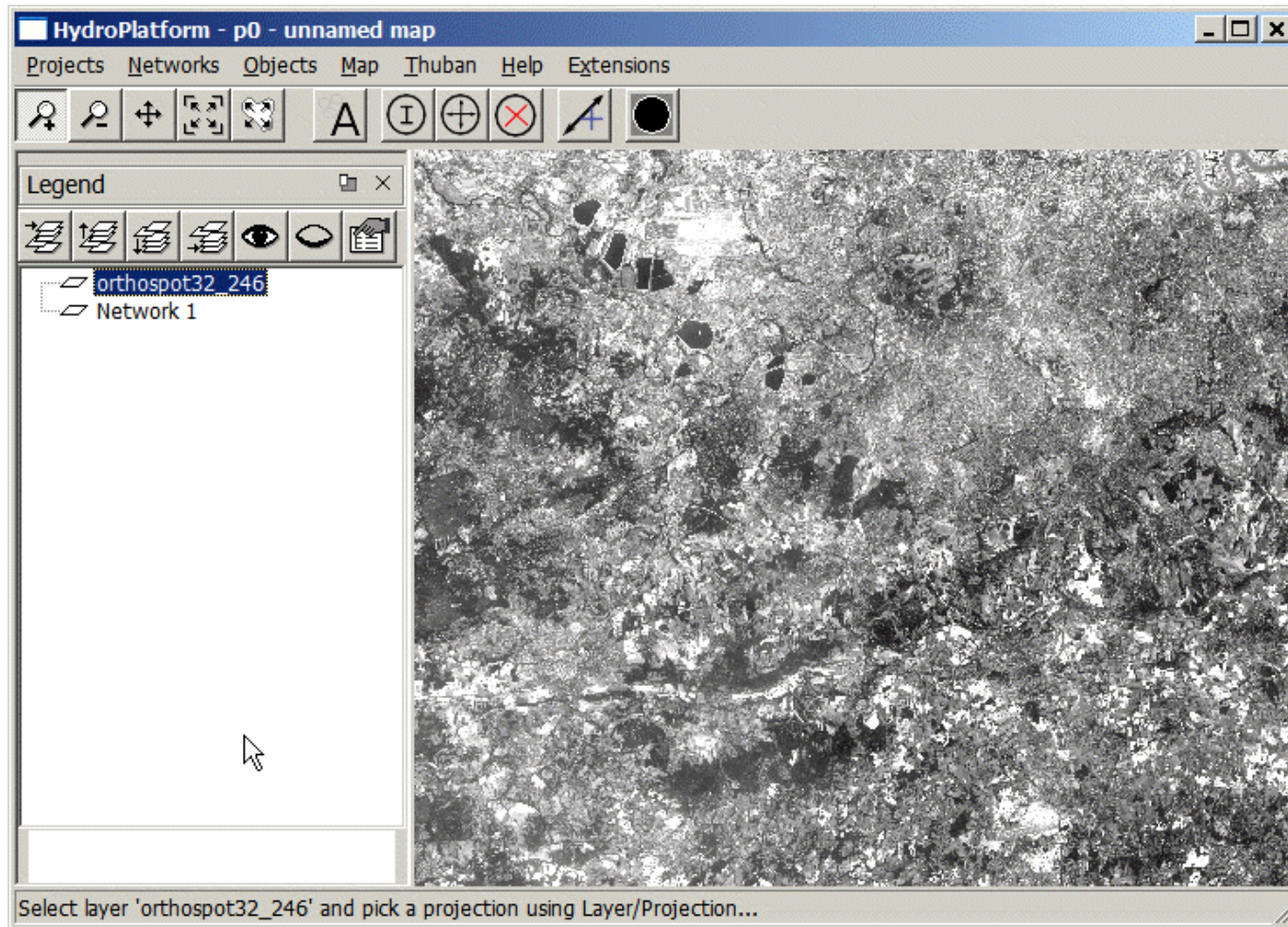
Host:

Dbname:

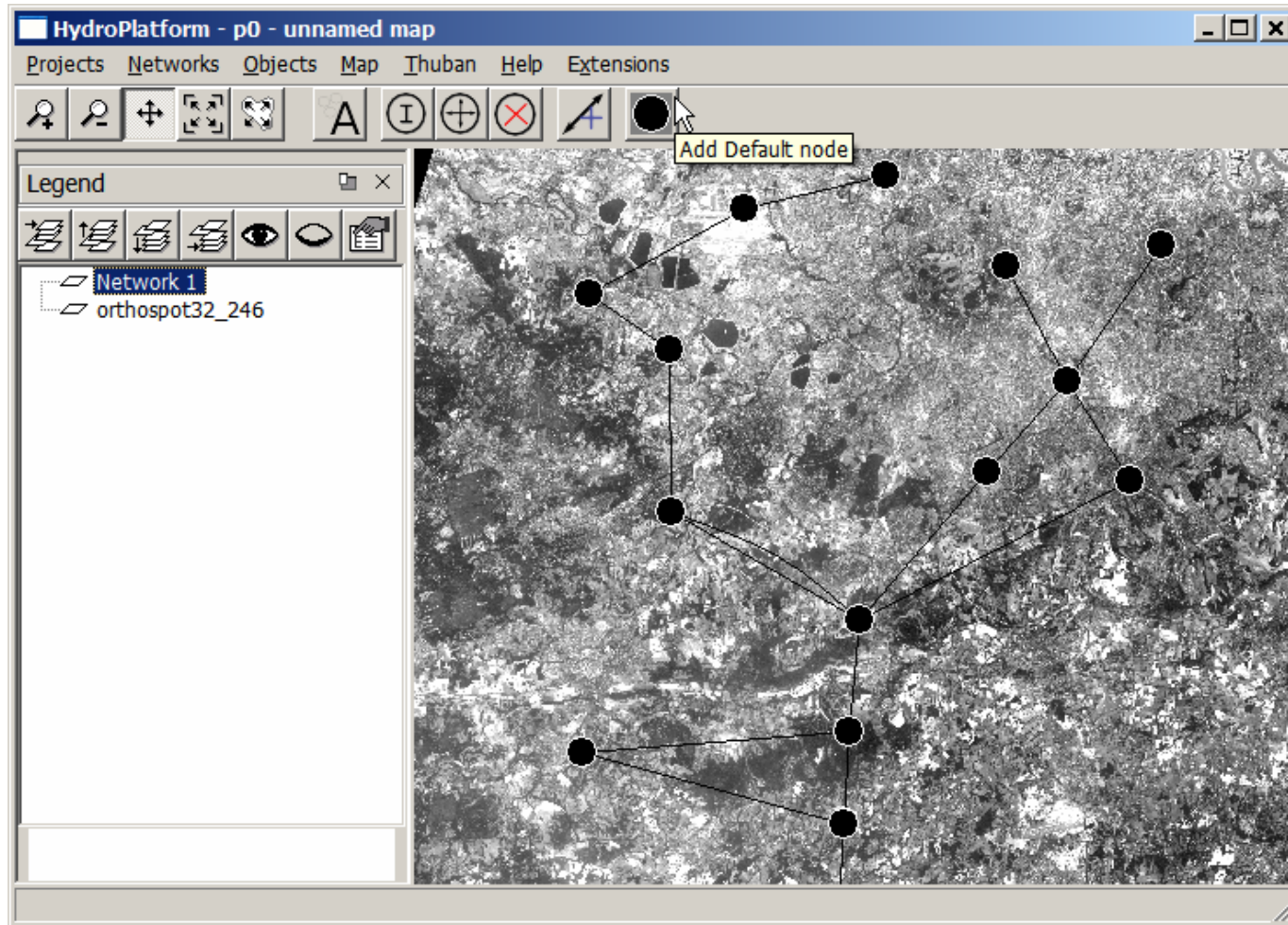
Username:

Password:

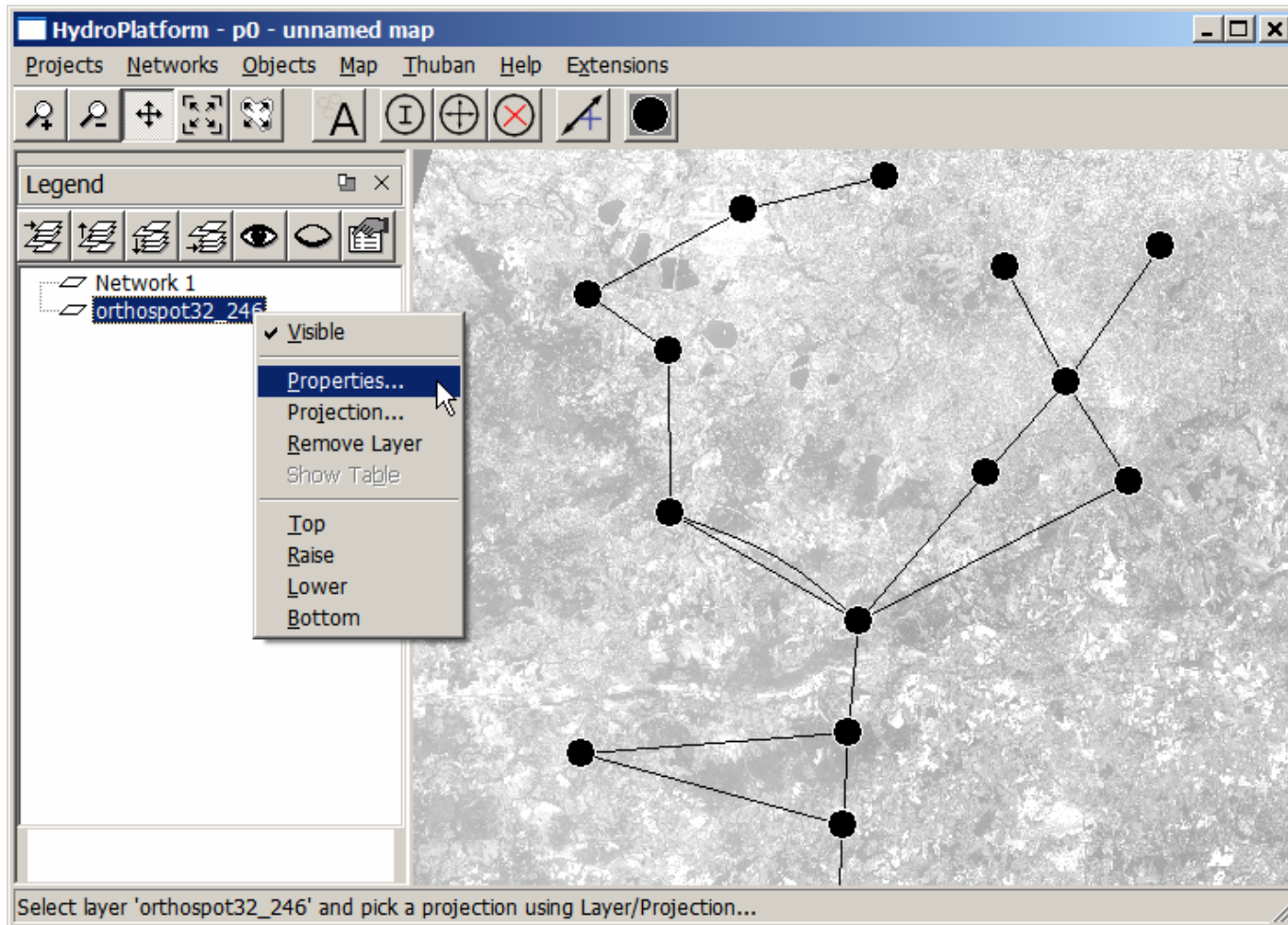
GIS or Image Background



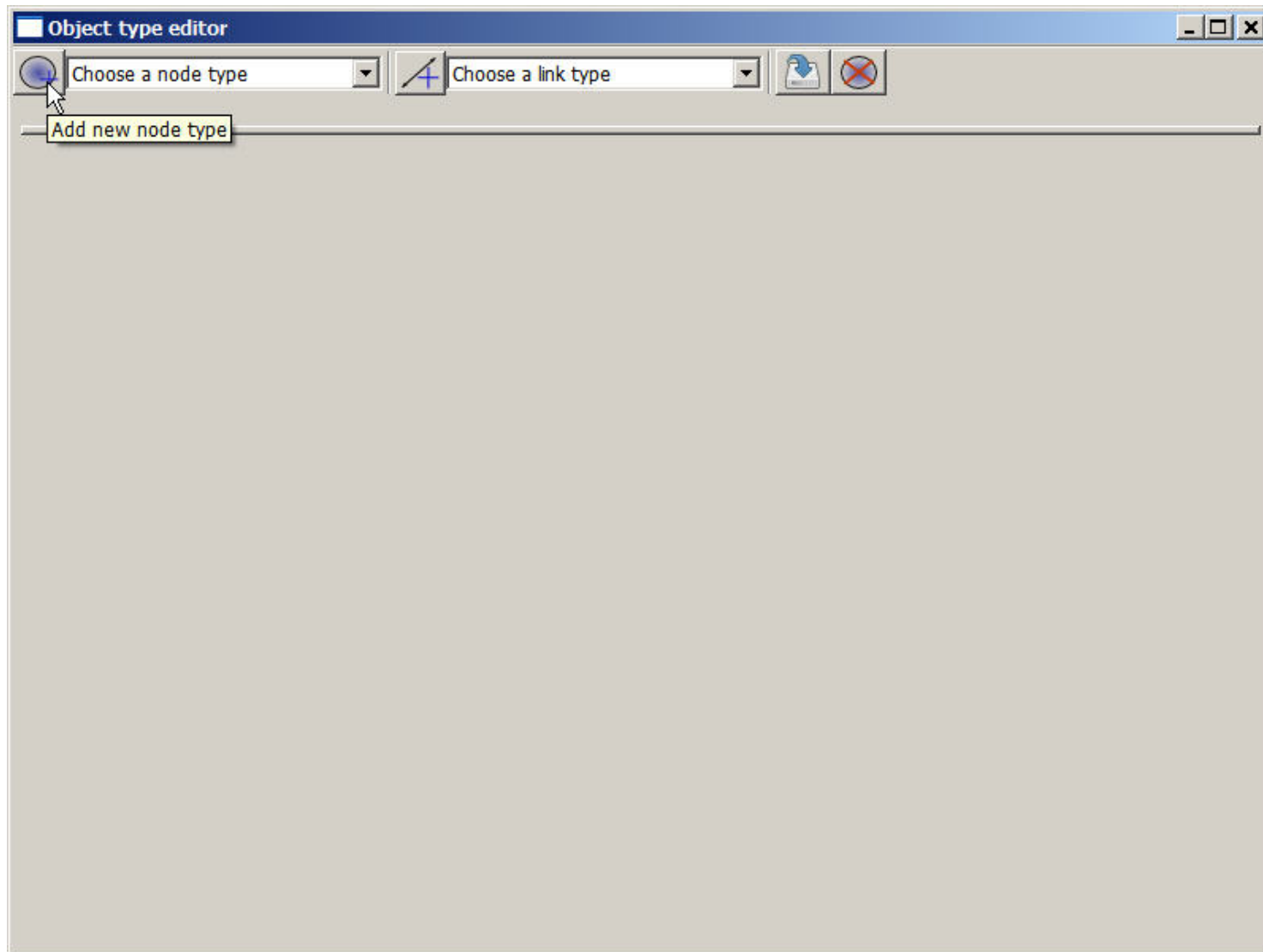
Build a Network



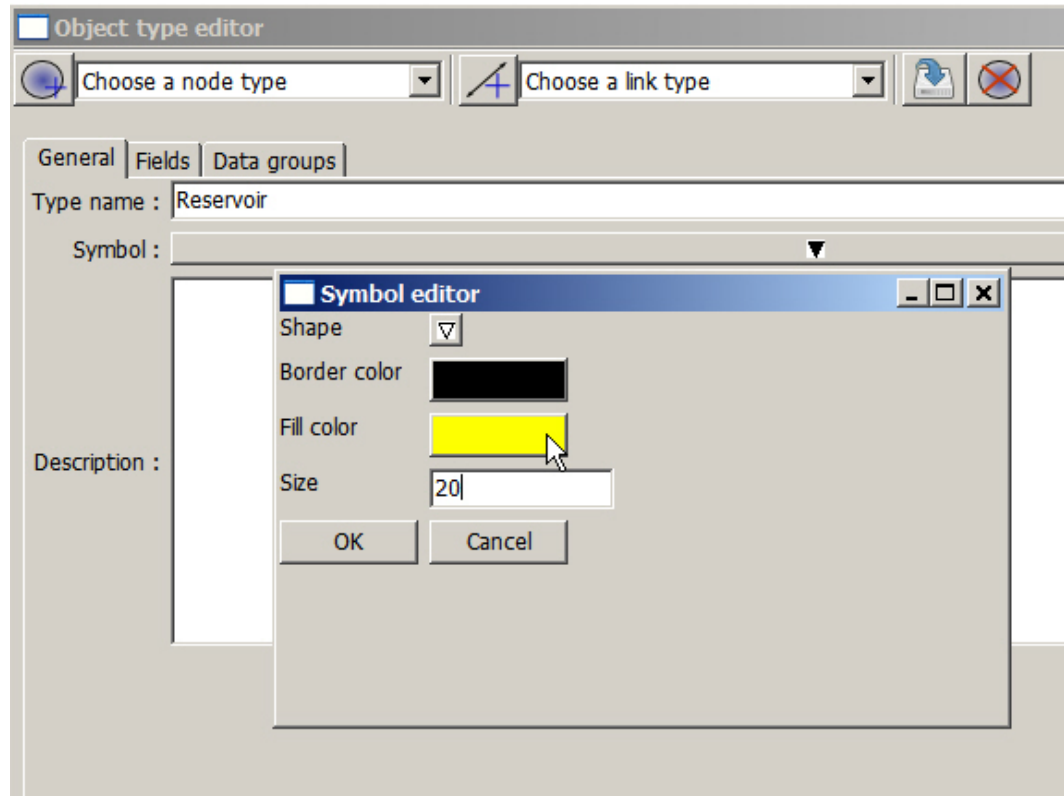
Lighten Background



Build Object Types (Classes)



Building a 'Reservoir' Object Type



Adding Data Fields

Object type editor

SR Choose a link type

General Fields Data groups

Name	Field type	Group
Max Storage	Parameter	Default
StorStage	Table	Default
Max Release	Parameter	Default
Benefits	Seasonal Parameter	Default
BC	Time-Series	Default
IC	Time-Series	Default

Fields:

Parameters Time horizon

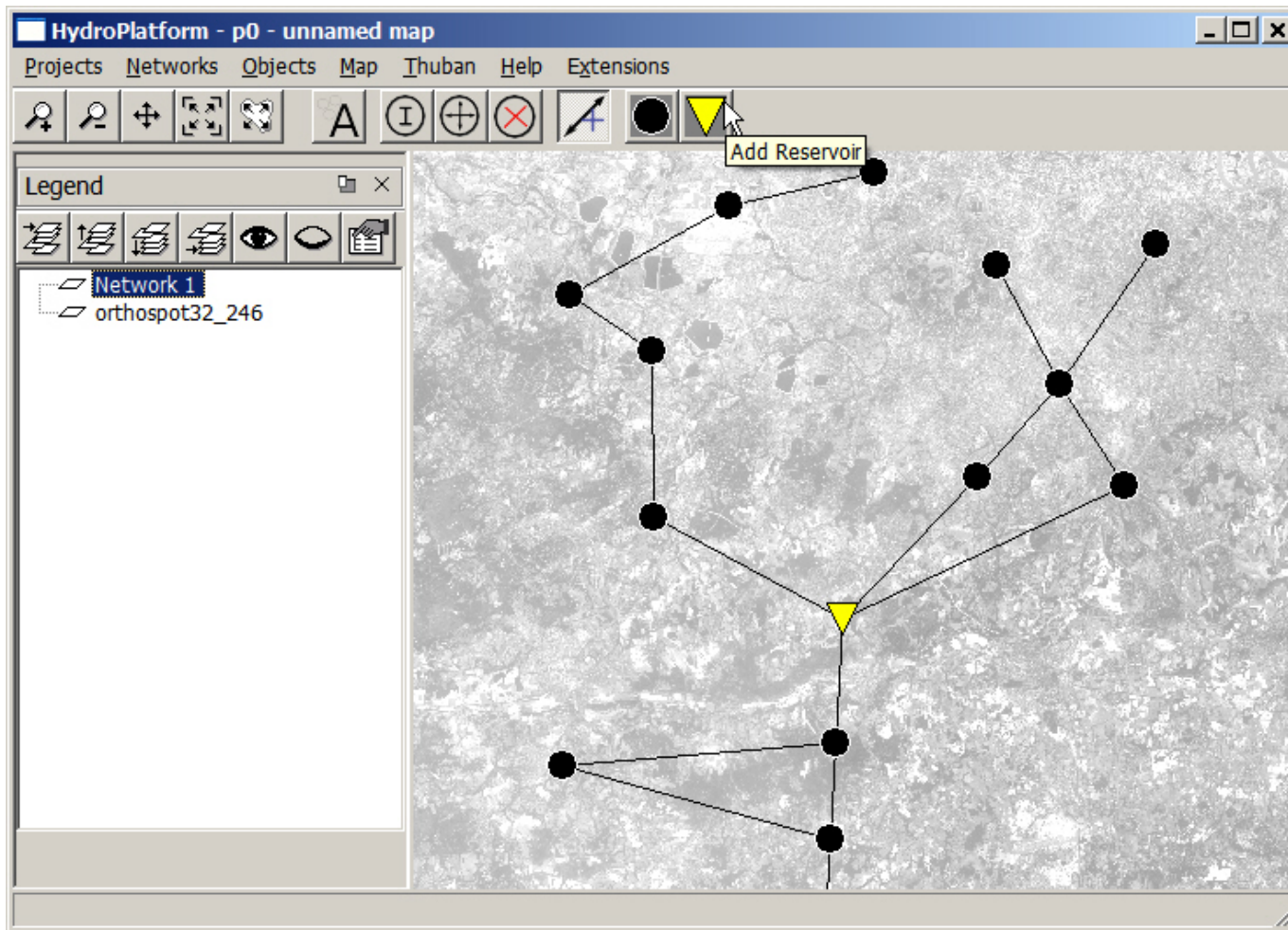
Name: IC

Unit: hm3

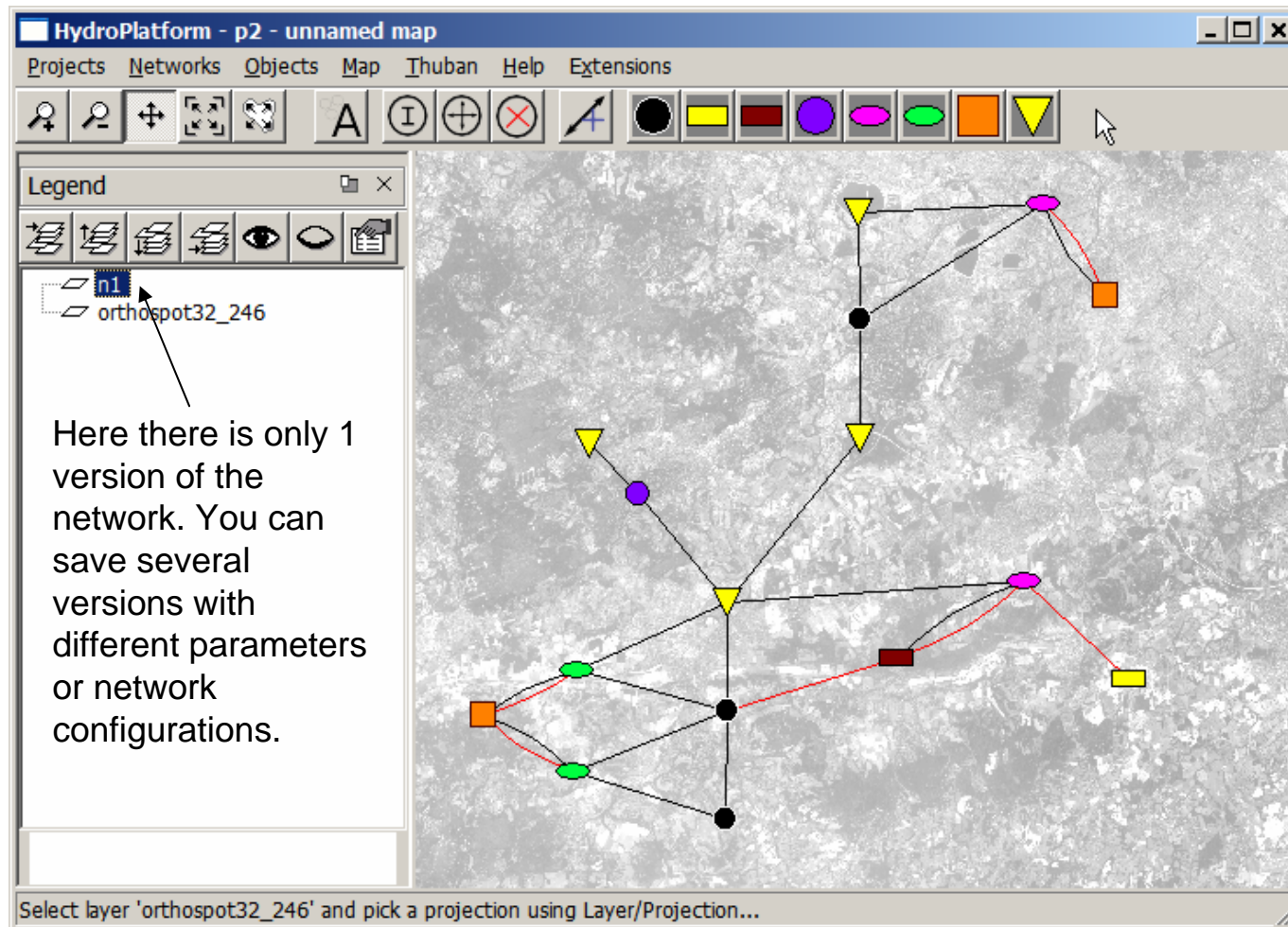
Type: float

Shared:

Network with 2 Object Types

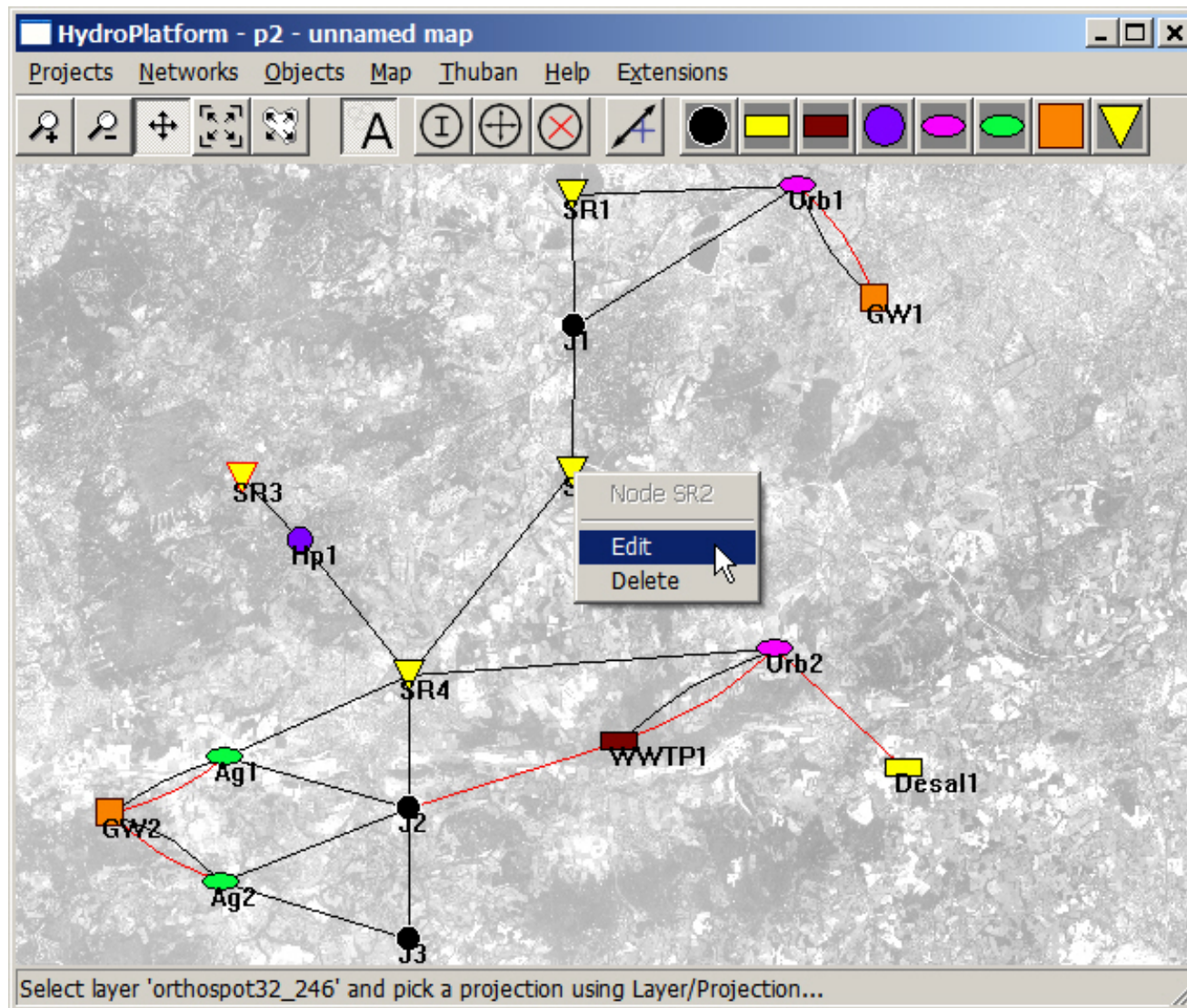


Water Resource Network

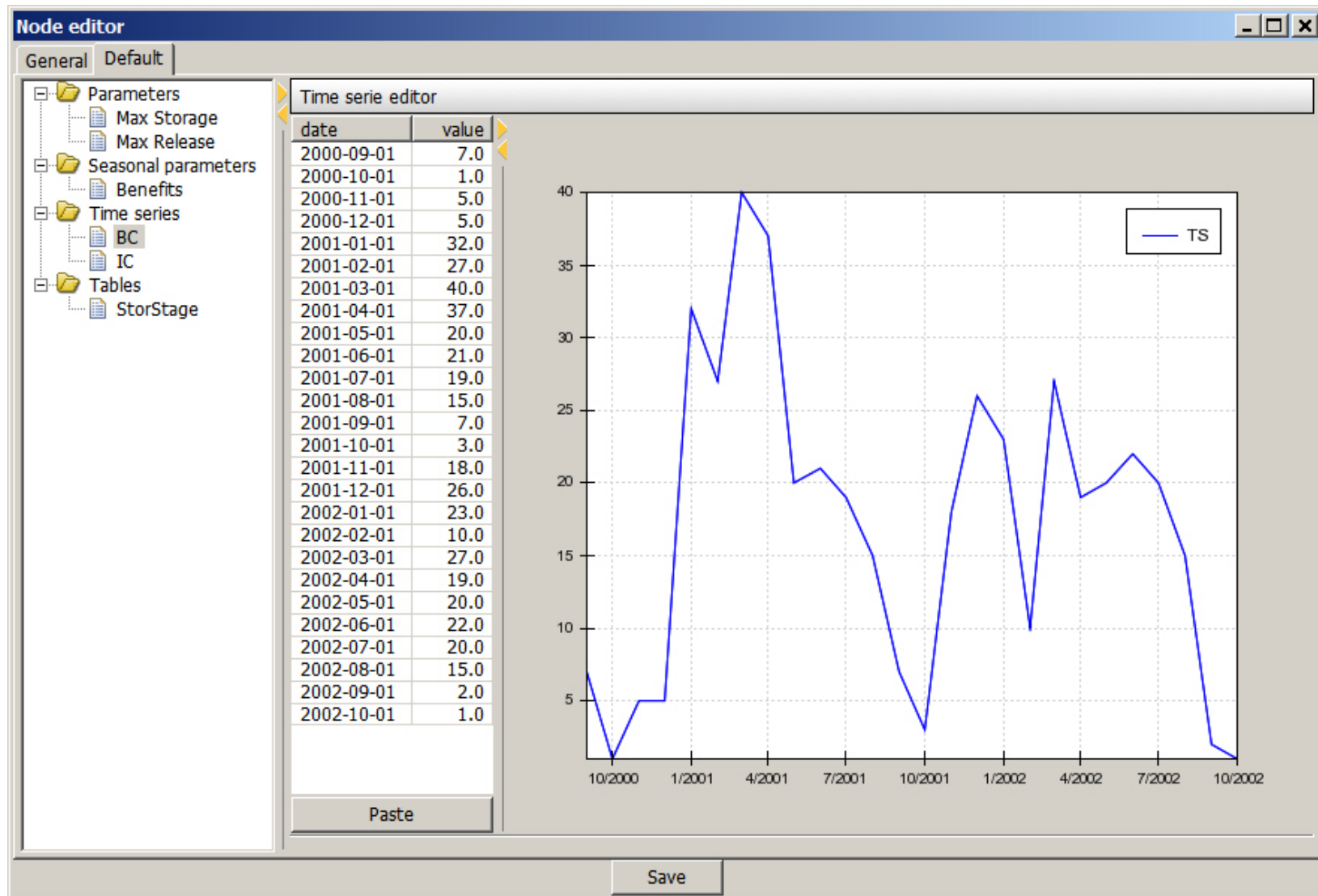


Network object types created here include: reservoir, aquifer, junction, urban demand, agricultural demand, hydropower plant, waste-water treatment plant, desalination plant

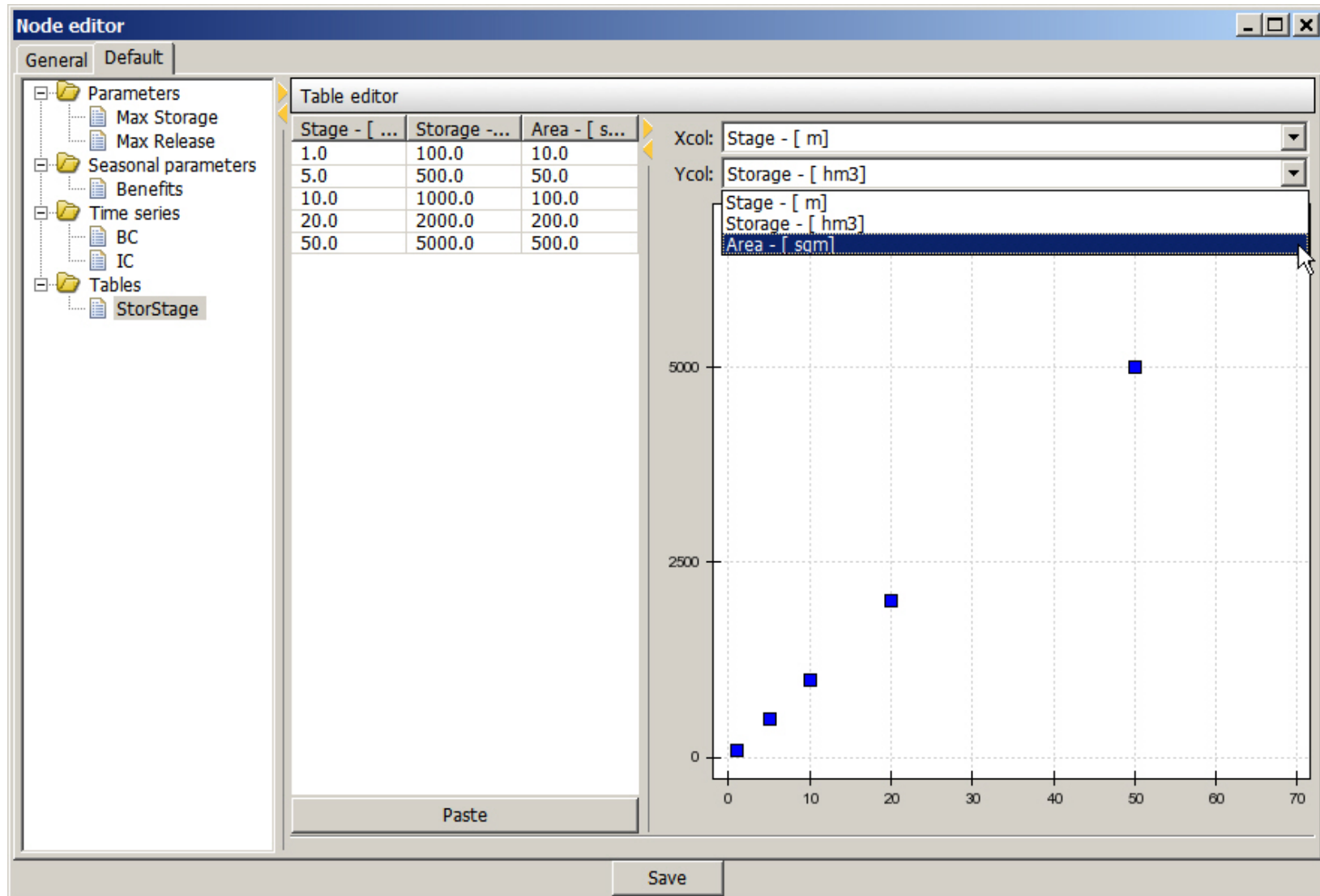
Adding Data to an Object



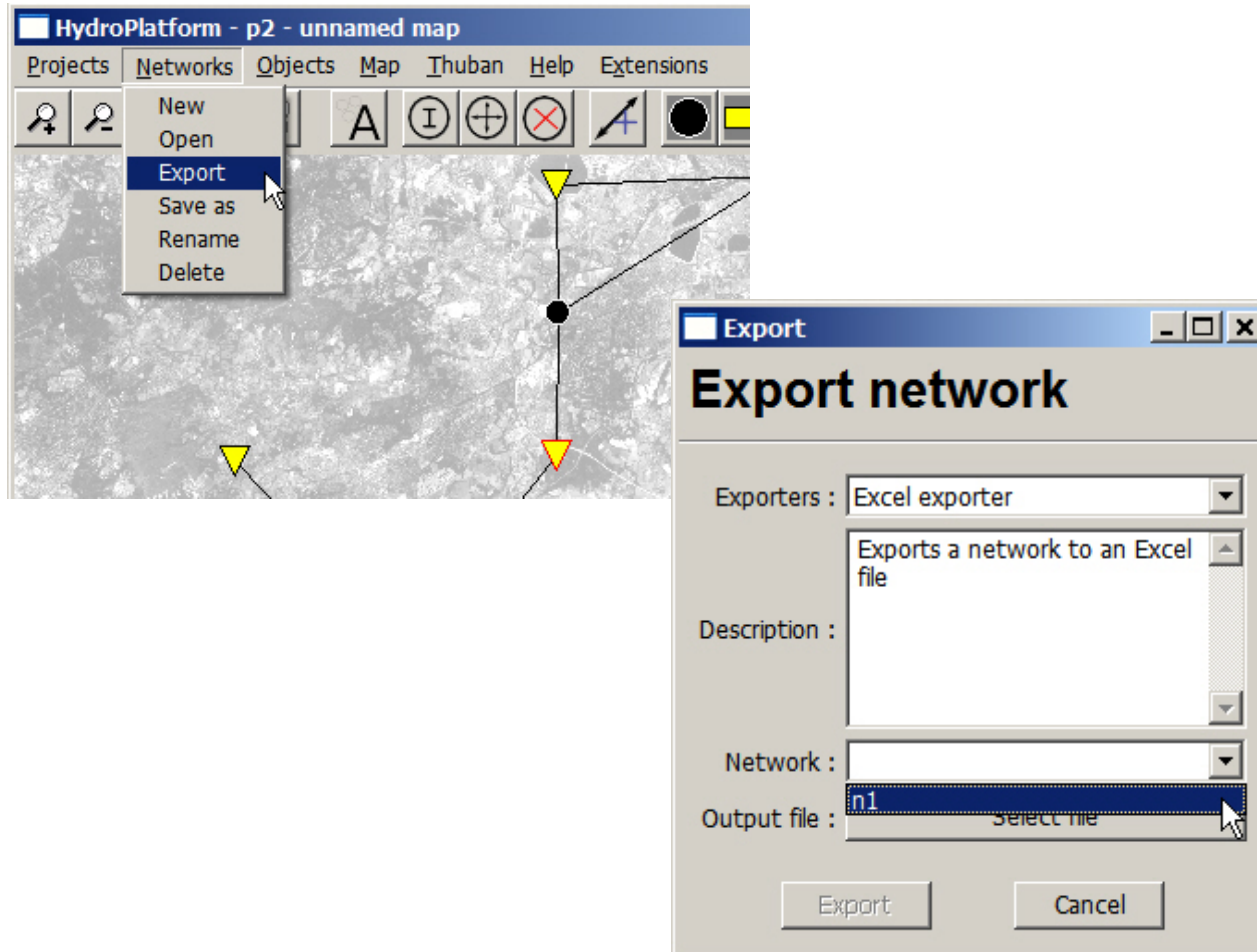
Enter & Edit Data



Enter & Edit Data



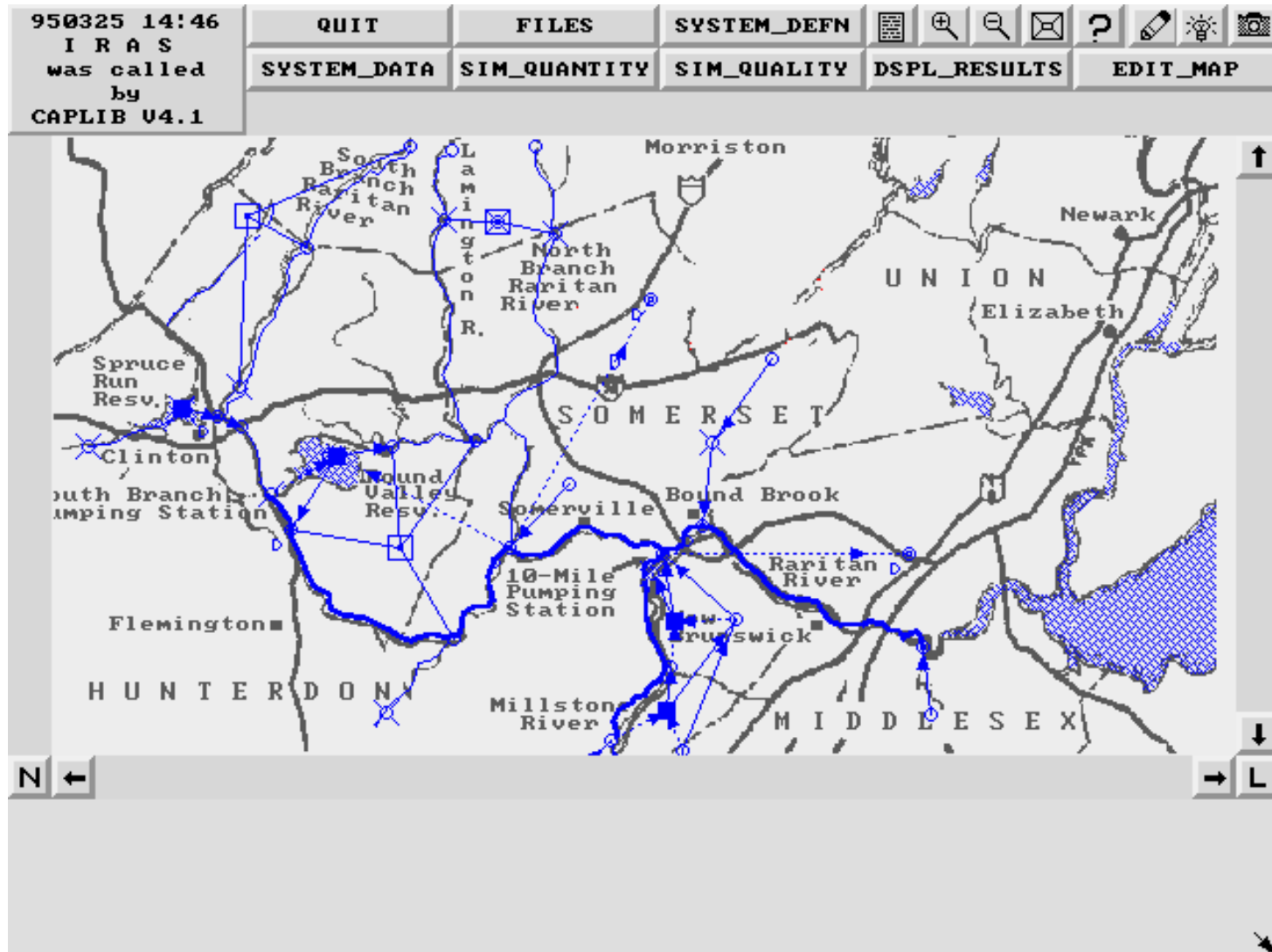
Export Data to External Model



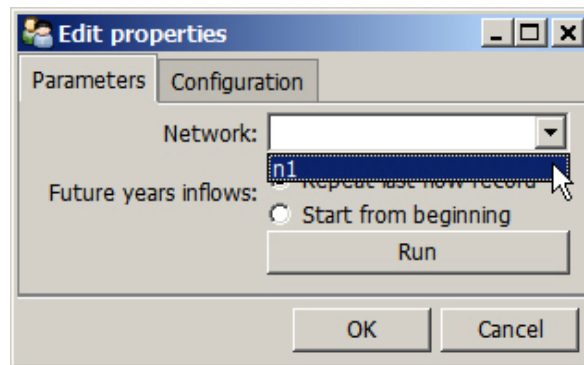
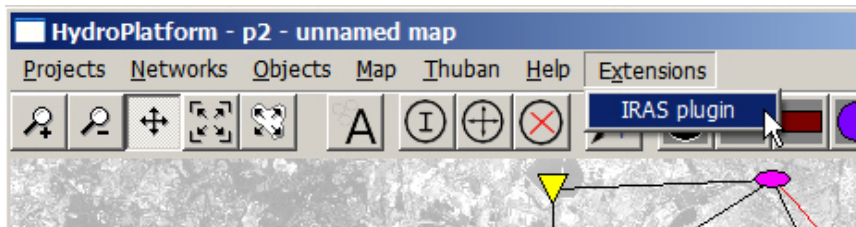
Connecting Models to HydroPlatform

- Export functions (to spreadsheets, text files): for loose coupling with external models, modelling systems
- Add-ins: Tight coupling of model with HydroPlatform constitutes a Decision Support System (DSS)
- BTG funding: build an IRAS Add-in for HydroPlatform

Interactive River-Aquifer Simulation (IRAS) DSS, Cornell University



OpenIRAS DSS = HydroPlatform + IRAS add-in



The IRAS add-in builds the model input file based on the contents of a HydroPlatform network. The model can be run from the HydroPlatform interface.

```

***KeyRule = NodeID, which is used to KEYRULEs of all
***KeyHydropower = Outlink ID; KeyPump = Outlink ID
|
LINKS
1 1 2 0 0 0 0 0 0 0 0 0 Res1-Jct*
13 11 2 0 0 0 0 0 0 0 0 0 Res2-Jct*
2 2 4 0 0 0 0 0 0 0 0 0 Jct_Res3*
3 2 7 100 100 0 0 0 0 1 0 0 Jct_DemA*
4 7 4 100 100 0 0 0 0 0 0 0 DemA_Res3*
7 8 4 0 0 0 0 0 0 0 0 0 GagB-Res3*
8 4 10 0 0 0 0 0 0 0 0 0 Res3-jct2*
10 10 5 0 0 0 0 0 0 0 0 0 jct2-ConsB*
9 5 9 0 0 0 0 0 0 1 0 0 ConsB-Demand*
11 6 10 0 0 0 0 0 0 0 1 0 Aquif-jct2
12 6 7 0 0 0 0 0 0 0 1 0 Aquif-DemA
5 9 3 100 100 0 0 0 0 0 0 0 Dem-lak
END OF LINKS

```

(1)!ID, (2)FromNode, (3)ToNode, (4)Length, (5)MaxFlow(1

```

*****Evaporation*****
----For Links--- (Need to include in output file)
Evaporation: 1 1 2 5 2 1
Evaporation: 1 1 2 9 2 0

```

```

PolicyGrp_ID, Policy_ID, Comp_Type, Comp_ID, Evaporatic
vars: GroupIDRead,PolicyIDRead,Comp_type, IDLinkRead,L:
*** Compute_method = 0: need rating table-flow vs.lc
Compute_method = 1: need rating table-flow vs.w:
Compute_method = 2: need cross section data (ca.
ON LINK IS ENABLED

```

```

----For Nodes---(5)
!lake
Evaporation: 1 1 1 3 2
Evaporation: 1 2 1 3 4
Evaporation: 2 1 1 3 6

```

```

PolicyGrp_ID, Policy_ID, Comp_type, Comp_ID, Node Evapc
!This means that the lake in the first year has 2 diffe
Year two has one season, with an evap rate of 6 mm/day

```

```

*****Rating*****
RATING (14)!Here areas are in hectares
-----Nodes-----
!For Lake
Rating: 1 1 1 3 24 0 0 400 39 0 0 0 0
Rating: 1 1 1 3 28 0 0 800 63 0 0 0 10
Rating: 1 1 1 3 30 0 0 1400 85 0 0 0 15
Rating: 1 1 1 3 31 0 0 2100 100 0 0 0 70

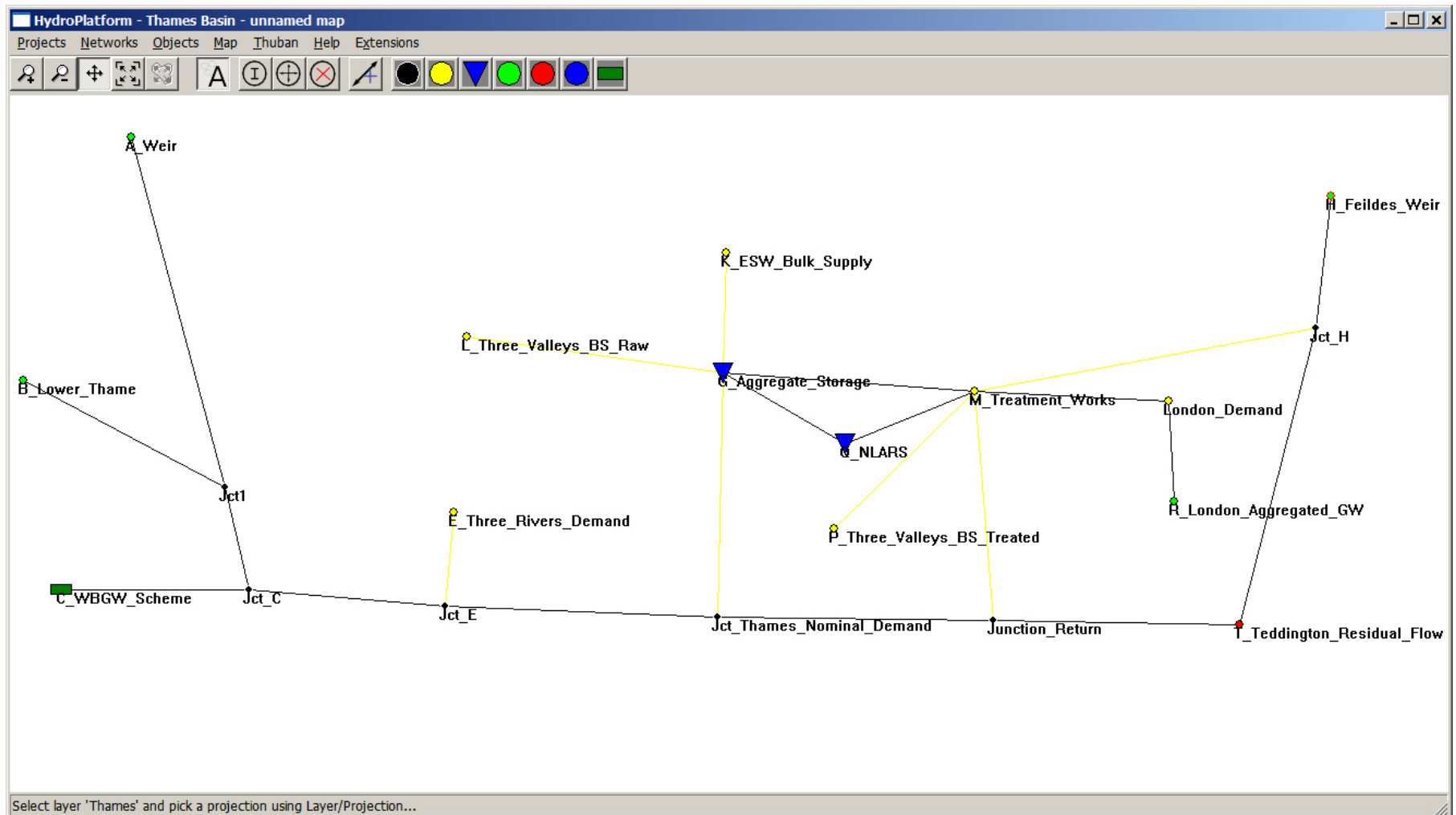
```

```

!For Reservoir 1 (Node 1)
Rating: 1 1 1 1 0 0 0 0 0 0 0 0 0
Rating: 1 1 1 1 1 0 0 0 40 0 0 0 60 0
Rating: 1 1 1 1 1 0 0 0 40 0 0 0 80 0
Rating: 1 1 1 1 2 0 0 0 100 0 0 0 100 0
Rating: 1 1 1 1 3 0 0 0 175 0 0 0 150 0
Rating: 1 1 1 1 4 0 0 0 275 0 0 0 150 0

```

OpenIRAS DSS: Thames Water Resource Network



Next Steps

- HydroPlatform
 - Complete PHASE 1: data input, organisation, and export
 - Offer PHASE 1 beta version download
 - Obtain funding for PHASE 2: import and display model results
 - Make website into a repository for HydroPlatform-compatible models
- EPSRC proposal: stochastic simulation / optimisation Thames water supply infrastructure

www.hydroplatform.org

http://www.hydroplatform.org/ Google

HydroPlatform

a generic open-source interface for water management models

search...

MAIN MENU

- Home
- Downloads
- FAQs
- News Archive

HydroPlatform is an open-source software platform for water resource management models. The tool is general and works with network (node-link) models in any field (transport, energy, trade, ...).

The program manages and displays model inputs and outputs. It can be loosely (export functions) or tightly (add-ins) coupled with models. This allows running models independently or from within the model platform.

Project objectives:

- Make models easier to build, use and share
- Help modelers focus on model development, not data management and visualization
- Facilitate collaboration in model building and use


Software goals:

- Efficiently create, manage, verify and visualize model data
- Intuitive graphical user-interface run by object-oriented code
- Maintain generality and independence from specific models and software
- Use open-source components for maintainability, transparency and to lower costs

[▶ READ MORE...](#)

LATEST NEWS

- [HydroPlatform talk at EuroScipy 09](#)
- [HydroPlatform - release 0.1](#)



Visitor locations

ClustrMaps™ Click to see

NEWSFLASH

Â HydroPlatform version 0.1 beta will be available for download in early Summer 2009.

Thank you