Urban Water – London case

Too much, too little, too late?

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WAGENINGEN UR
For quality of life

Too much

Too much

Too much

Too much

Too little

Too little

Too little

Too little

Too late?

Too late?

Urban water management

- Safety first
- Economy second
- Safety third
- Economy 4th

- Quality of life is next
- Most of the urban water cycle is not visible
- Surface water is used for drainage and storage
- Visibility of water can be an amenity

Urban water management

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- Economy second
- Safety third
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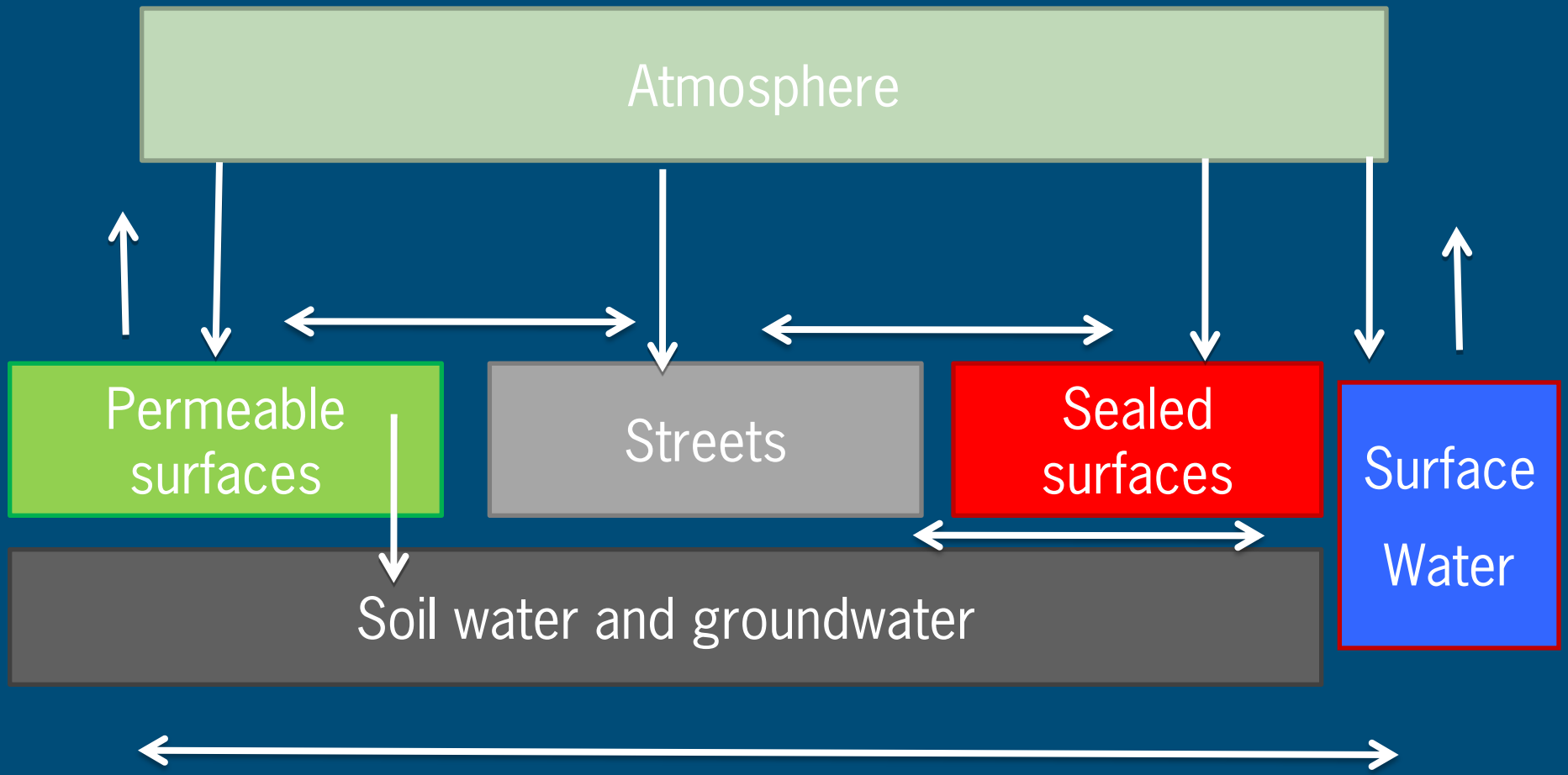
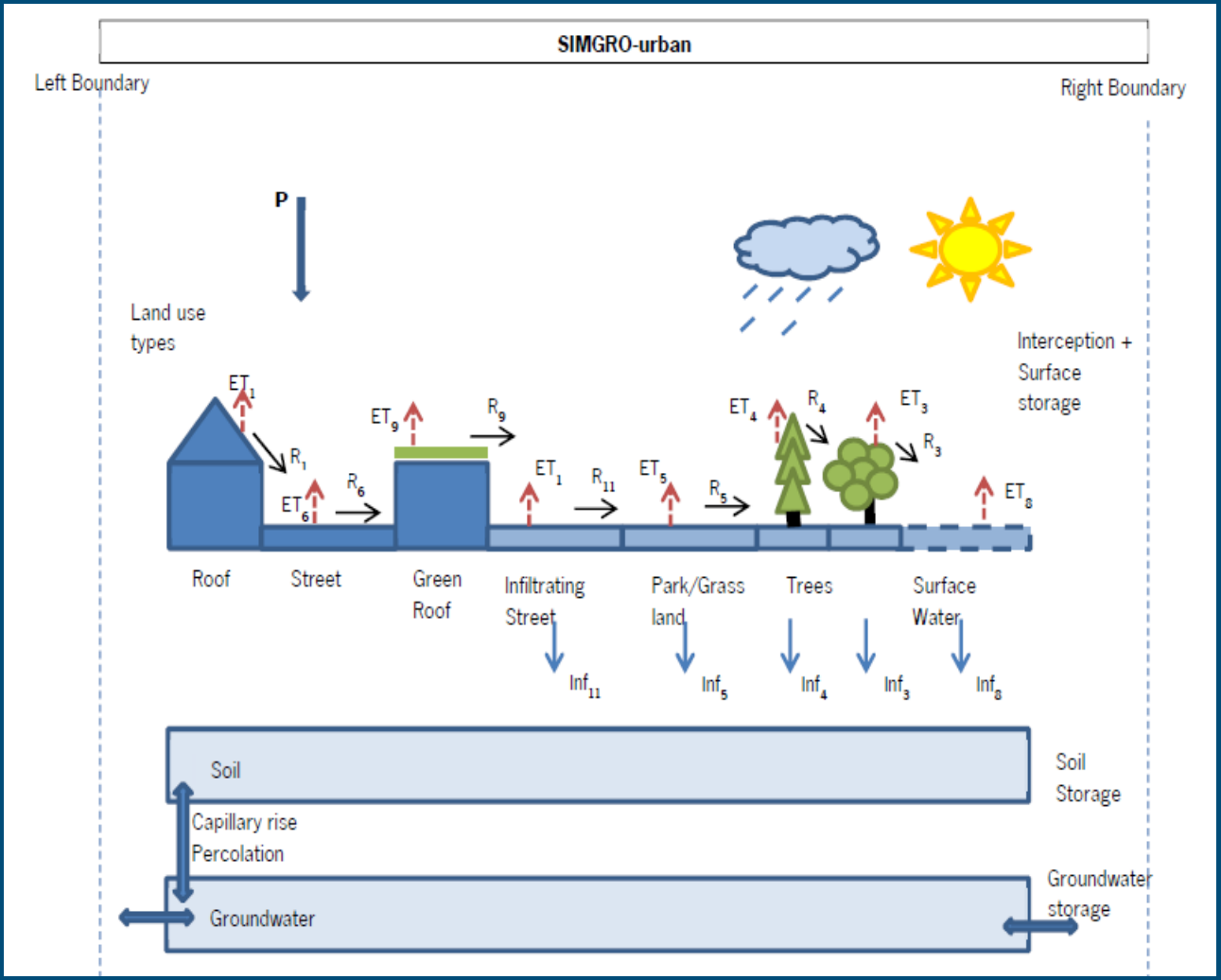
- Most of the urban water cycle is not visible
- Surface water is used for drainage and storage
- Visibility of water can be an amenity

Urban hydrology features

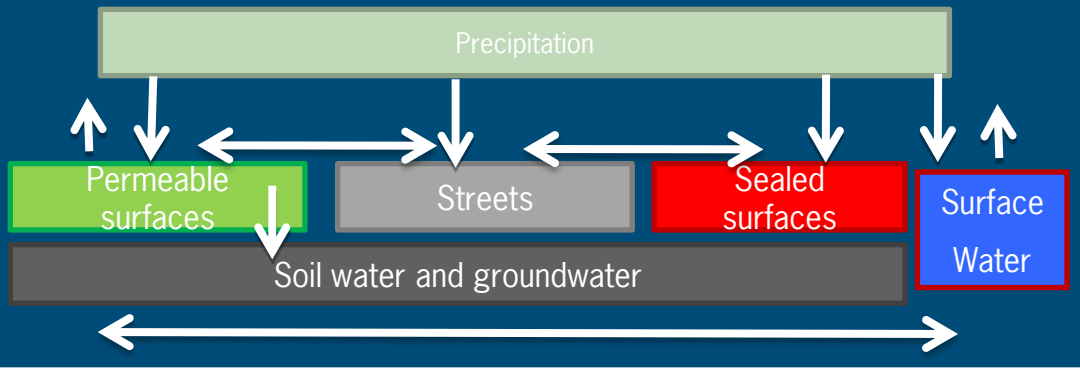


The ways of the water



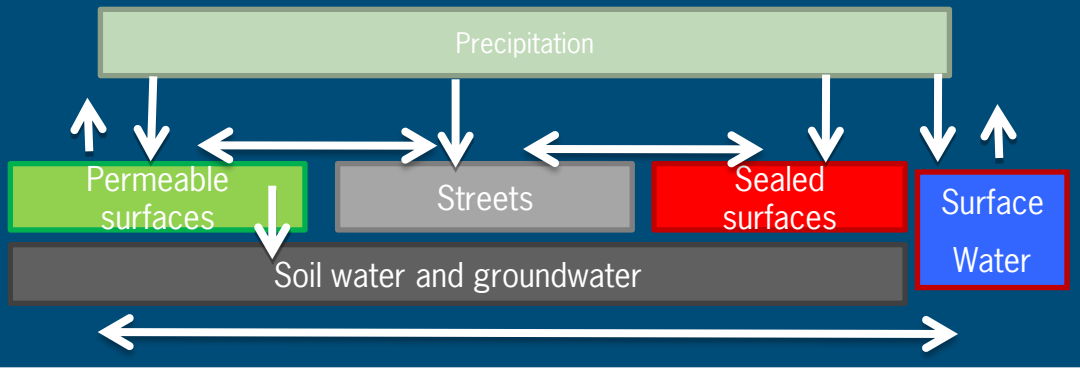
Movement of water

- Precipitation



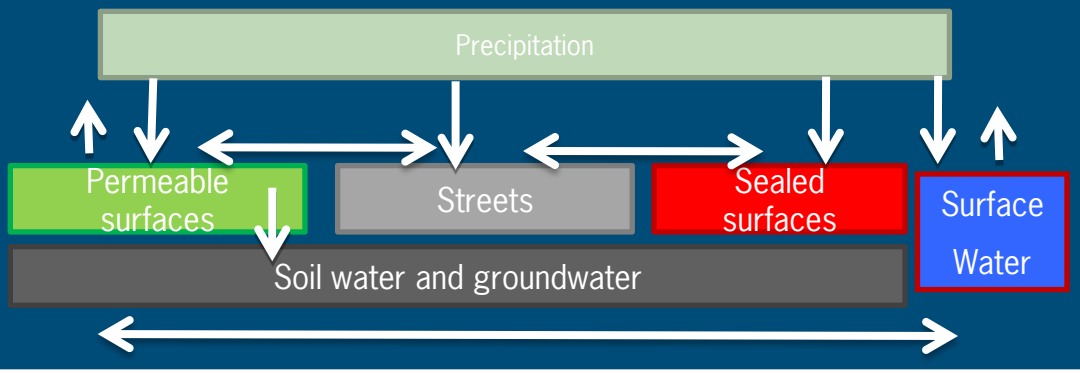
Movement of water

- Precipitation
- Evapotranspiration



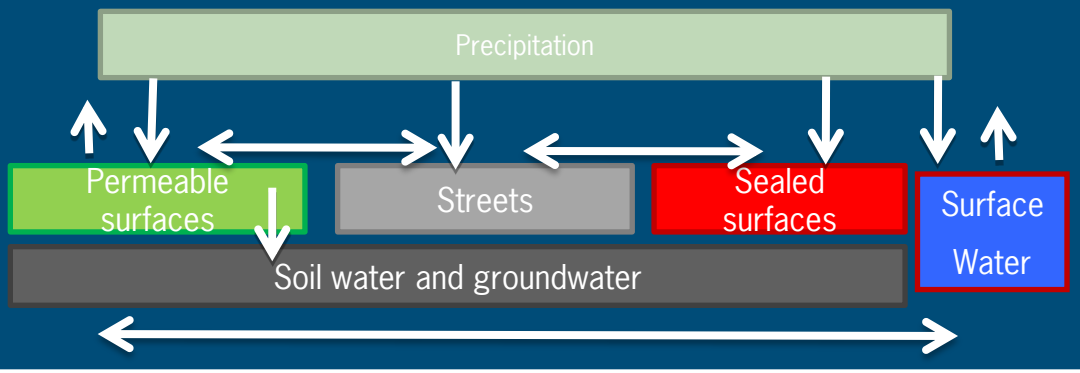
Movement of water

- Precipitation
- Evapotranspiration
- Runoff



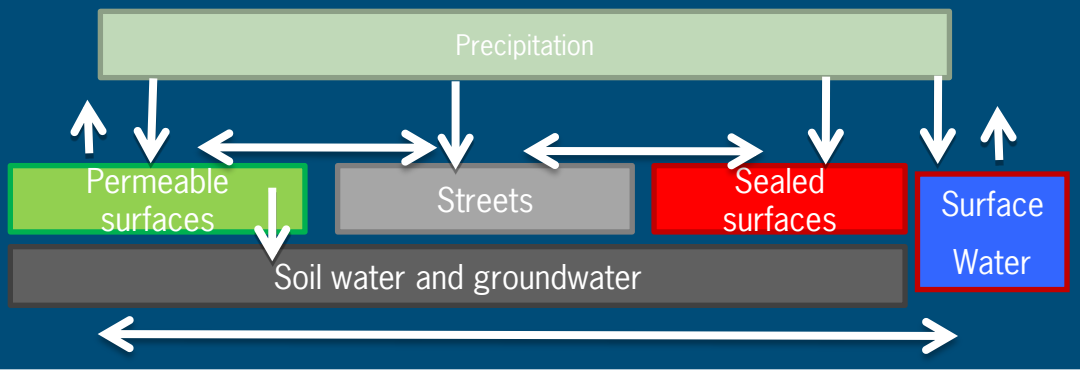
Movement of water

- Precipitation
- Evapotranspiration
- Runoff
- Infiltration



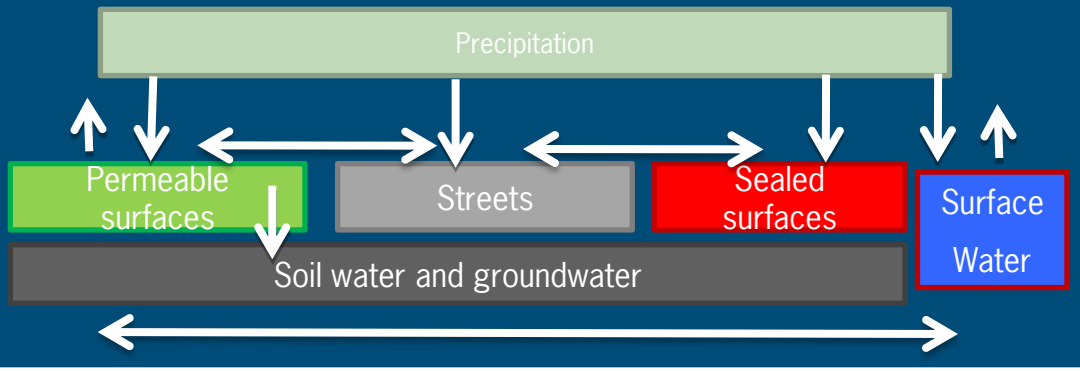
Movement of water

- Precipitation
- Evapotranspiration
- Runoff
- Infiltration
- Groundwater flow



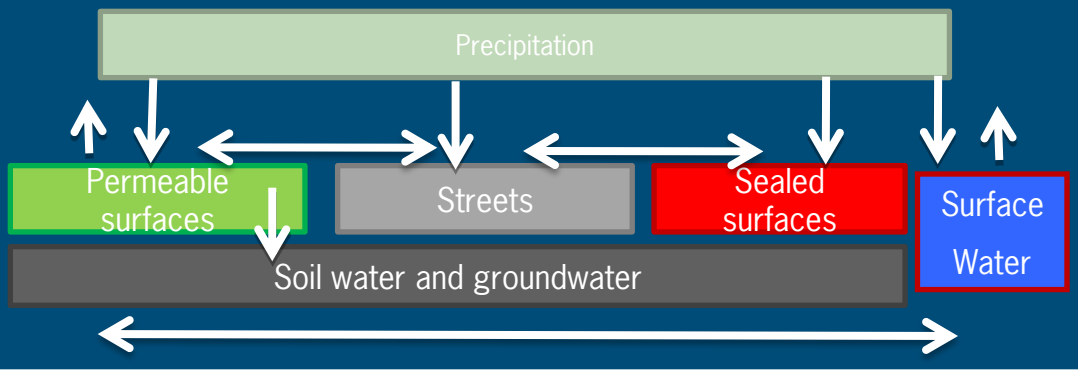
Movement of water

- Precipitation
- Evapotranspiration
- Runoff
- Infiltration
- Groundwater flow
- Surface water flow



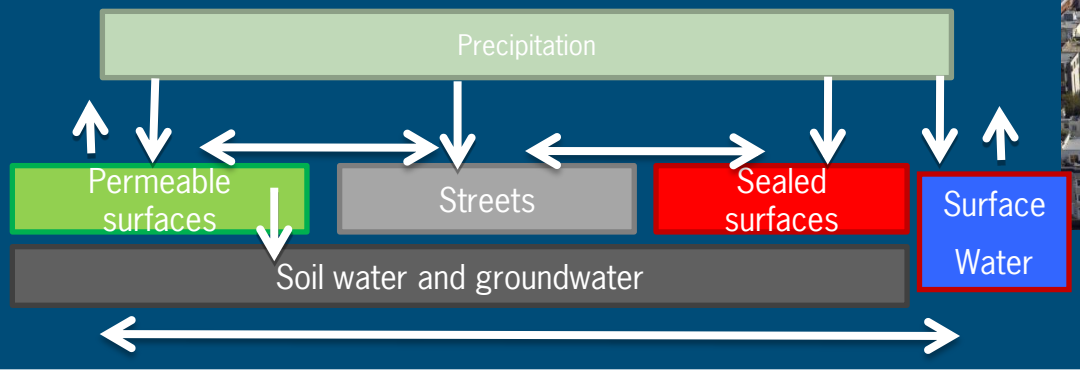
Storage of water

- Surface water



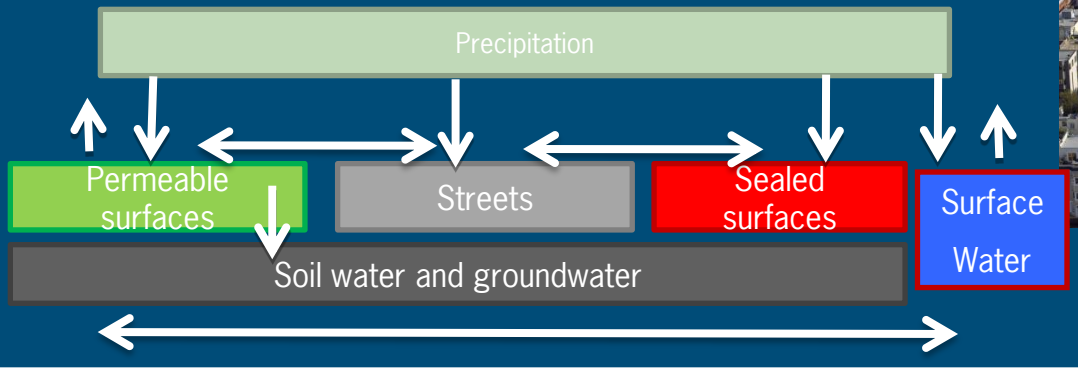
Storage of water

- Surface water
- Roofs



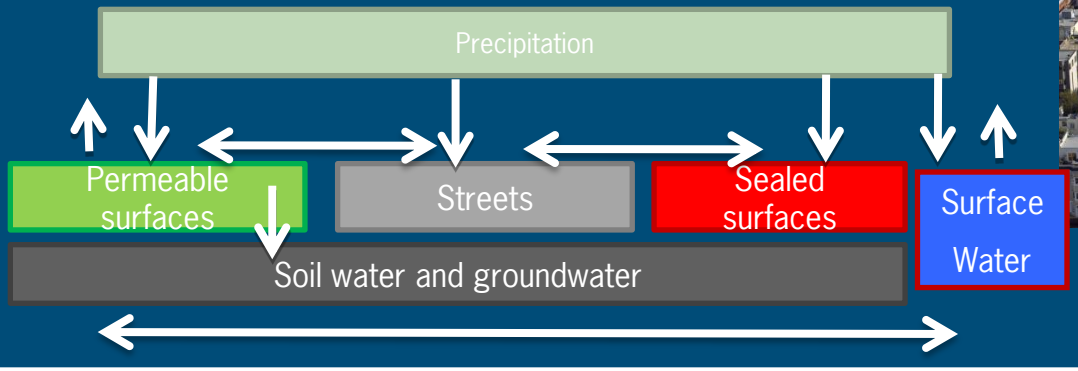
Storage of water

- Surface water
- Roofs
- Permeable surfaces



Storage of water

- Surface water
- Roofs
- Permeable surfaces
- Streets



Storage of water

- Surface water
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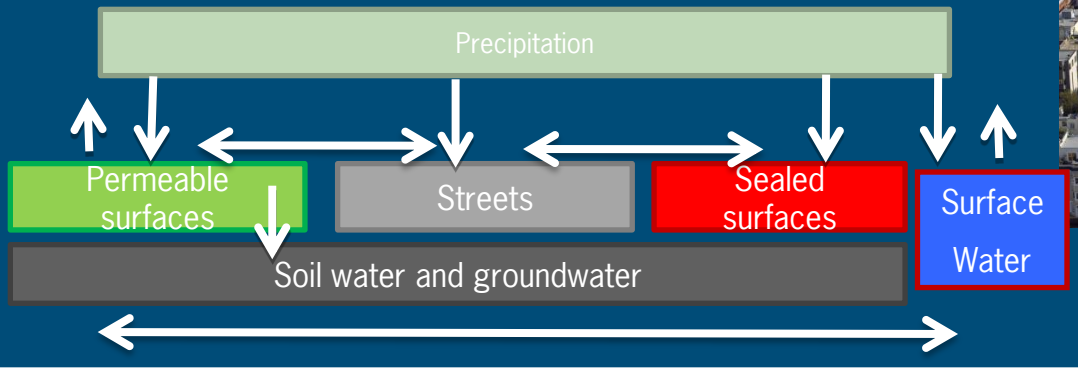
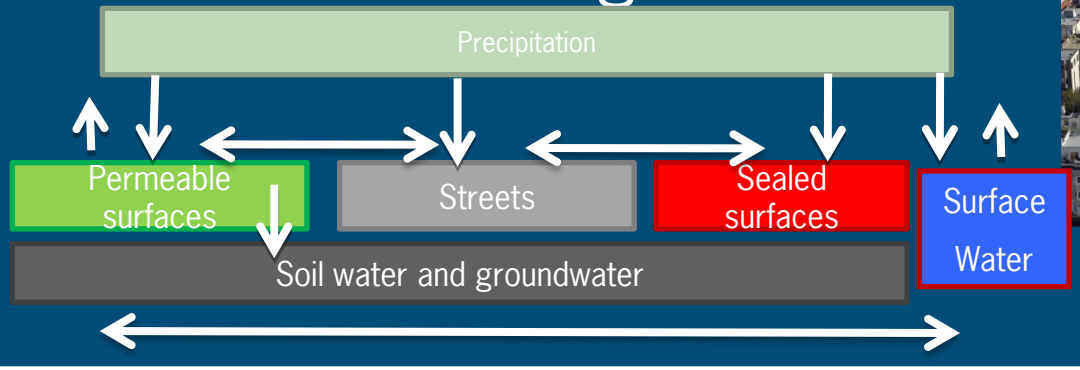
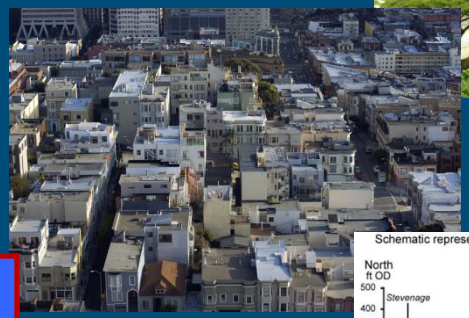
- Permeable surfaces
- Streets
- Sealed surfaces

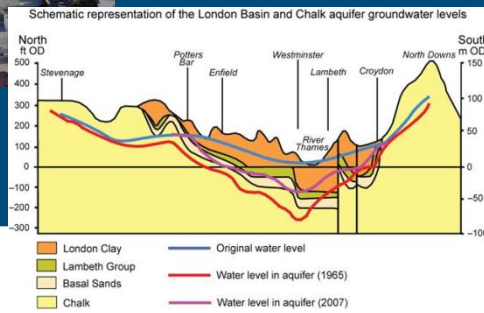


Storage of water

- Surface water
- Roofs
- Permeable surfaces
- Streets
- Sealed surfaces
- Soil water and groundwater







Adaptation to climate change

- If you consider the “right” time frame there is no too much too little
- Nevertheless London experiences both shortages and excess
- This may increase as a result of climate change
- Solution?
- The key is in the storages

Storage of water

- Storage is needed to mitigate problems because excess rainfall
- Storage is needed to bridge periods of drought
- “win-win” combines both types of storage
- A few more wins may include improvement of the “quality of life”

The importance of being earnest about storage

Which storages can be considered serious?

- 1 Pavement?

Not really

The importance of being earnest about storage

Which storages can be considered serious?

- 1 Pavement?

Not really

- 2 Surface water?

Maybe

The importance of being earnest about storage

Which storages can be considered serious?

- 1 Pavement?

Not really

- 2 Surface water?

Maybe

- 3 Soil?

Yes

The importance of being earnest about storage

Which storages can be considered serious?

- 1 Pavement?

Not really

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Maybe

- 3 Soil?

Yes

- 4 Roofs?

Yes, if…

The importance of being earnest about storage

Which storages can be considered serious?

- 1 Pavement?

Not really

- 2 Surface water?

Maybe

- 3 Soil?

Yes

- 4 Roofs?

Yes, if…

- 5 Streets?

Maybe

So what we need?

- We have to respect that water needs storage and that storage needs space
- To manage urban water requires spatial planning
- So spatial planning should involve water
- The DSS should therefore link spatial planning and water
- For that, we have developed several UMT's to model the relation between land use and water

Input of the model

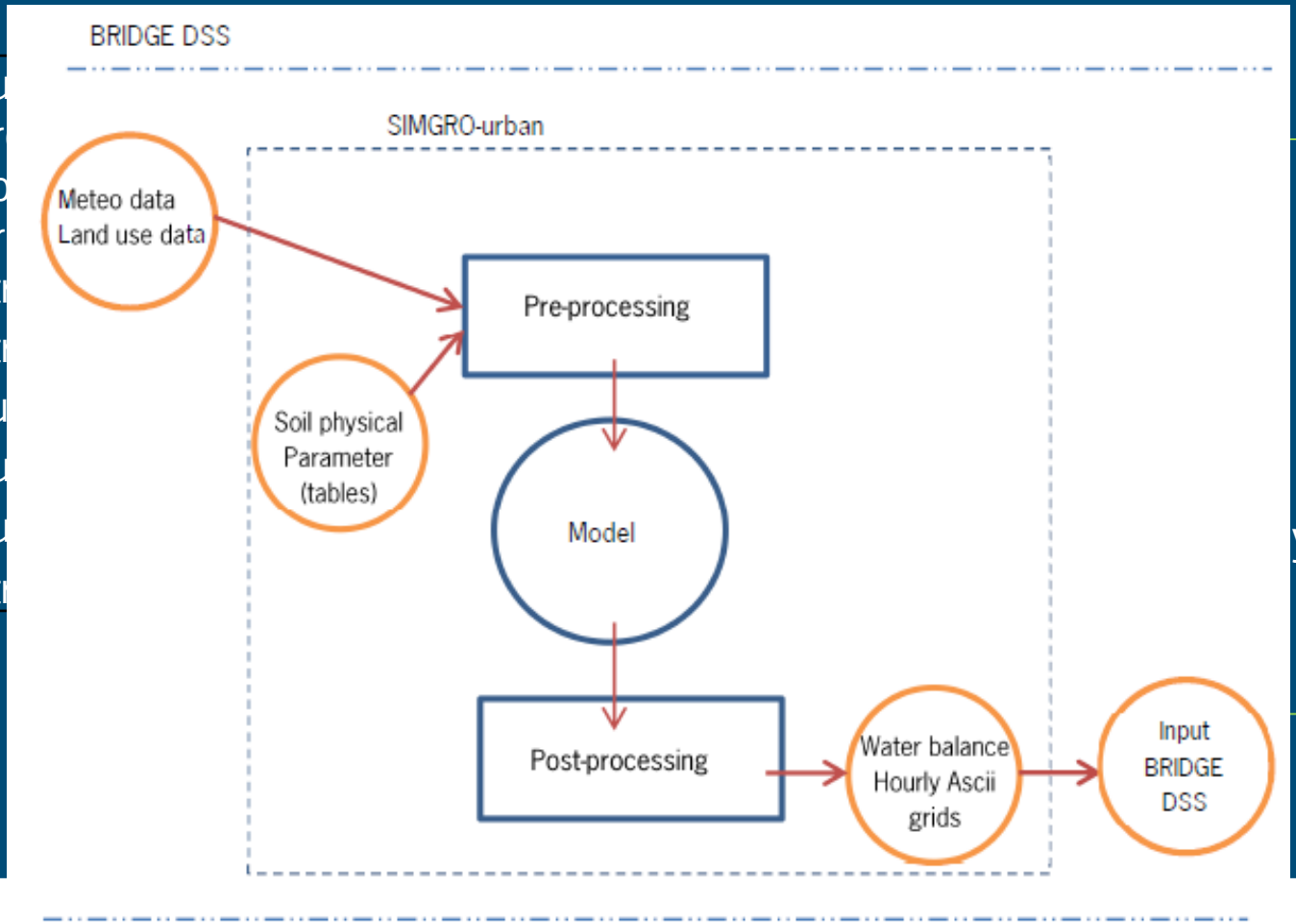
UMT index	Name of UMT
1	building
3	broadleaved
4	conifer
5	grassland
6	street
7	street with vegetation
8	surface water
9	building Green roof
10	building gravel roof
11	street with infiltration

UMT= Urban Morphological Type

Input of the model

UMT= Urban Morphological Type

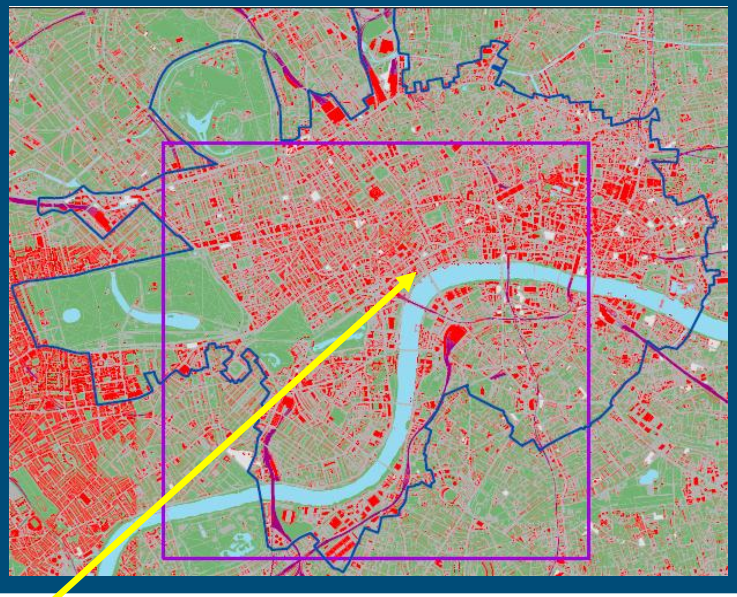
UMT index	Name of UMT
1	bu
3	br
4	co
5	gr
6	st
7	st
8	su
9	bu
10	bu
11	st



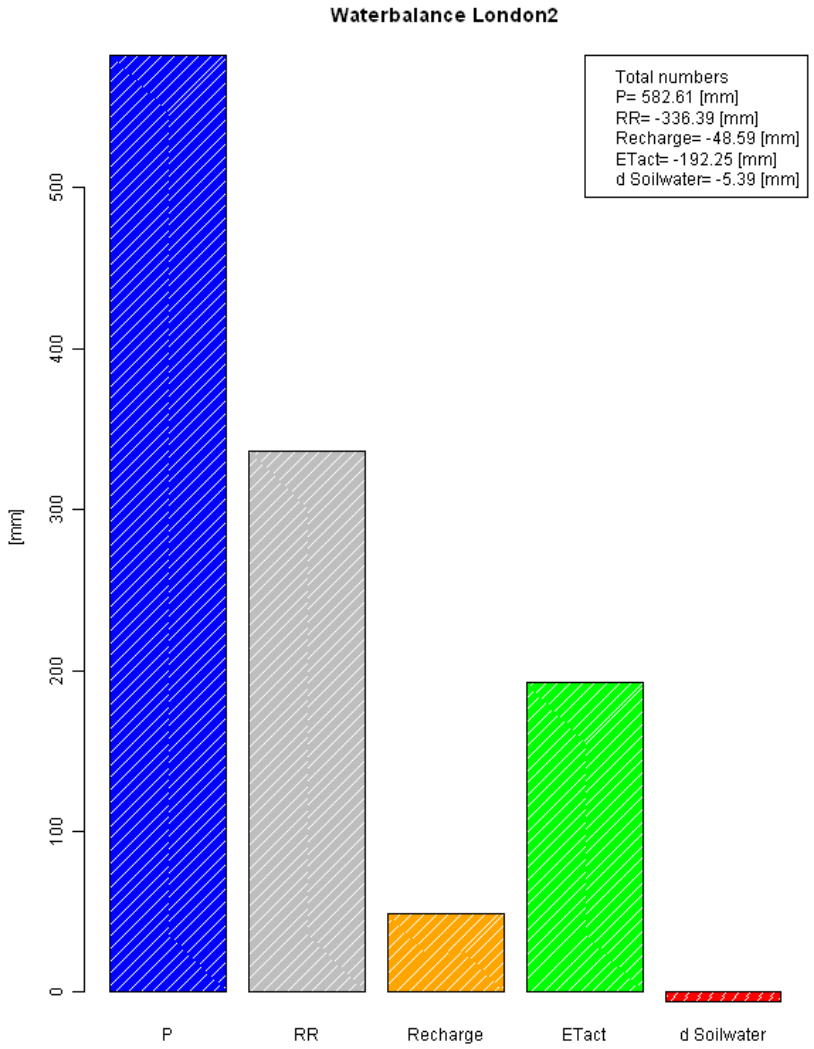
ystem

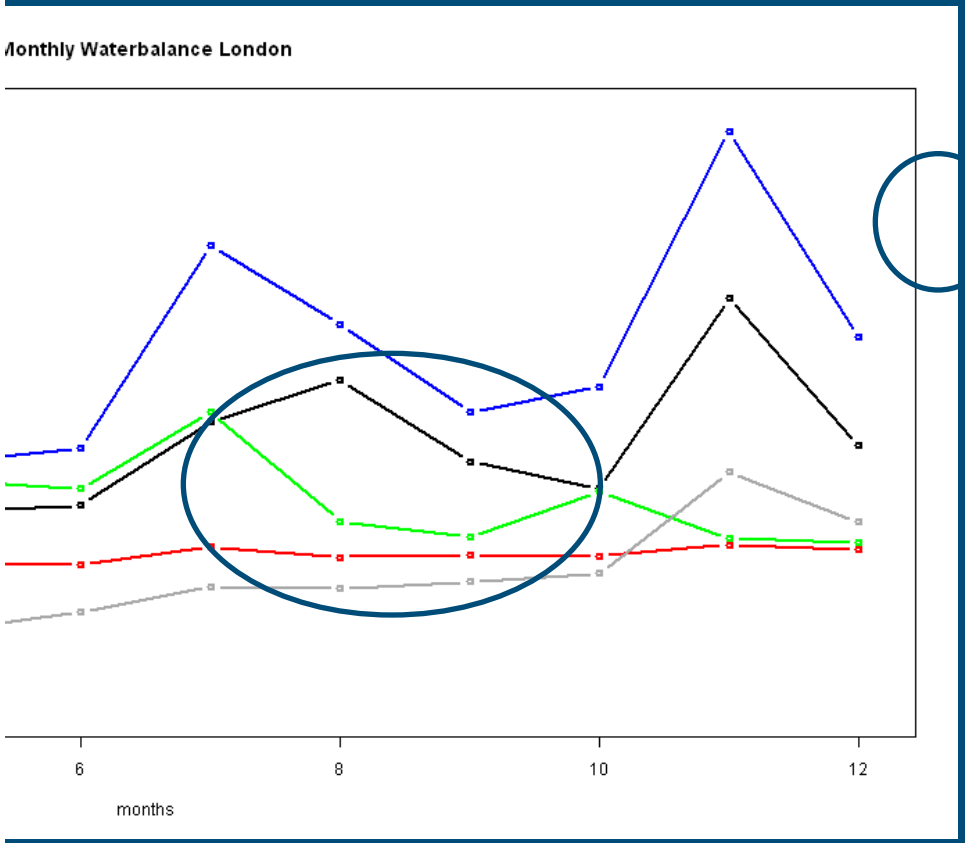
Case study London

- Meteorological Input: KCL 2009
  - Precipitation
  - Incoming shortwave radiation
  - Temperature
  - 1 Meteo station
- Land use
  - 200m*200m, 27*27 cells

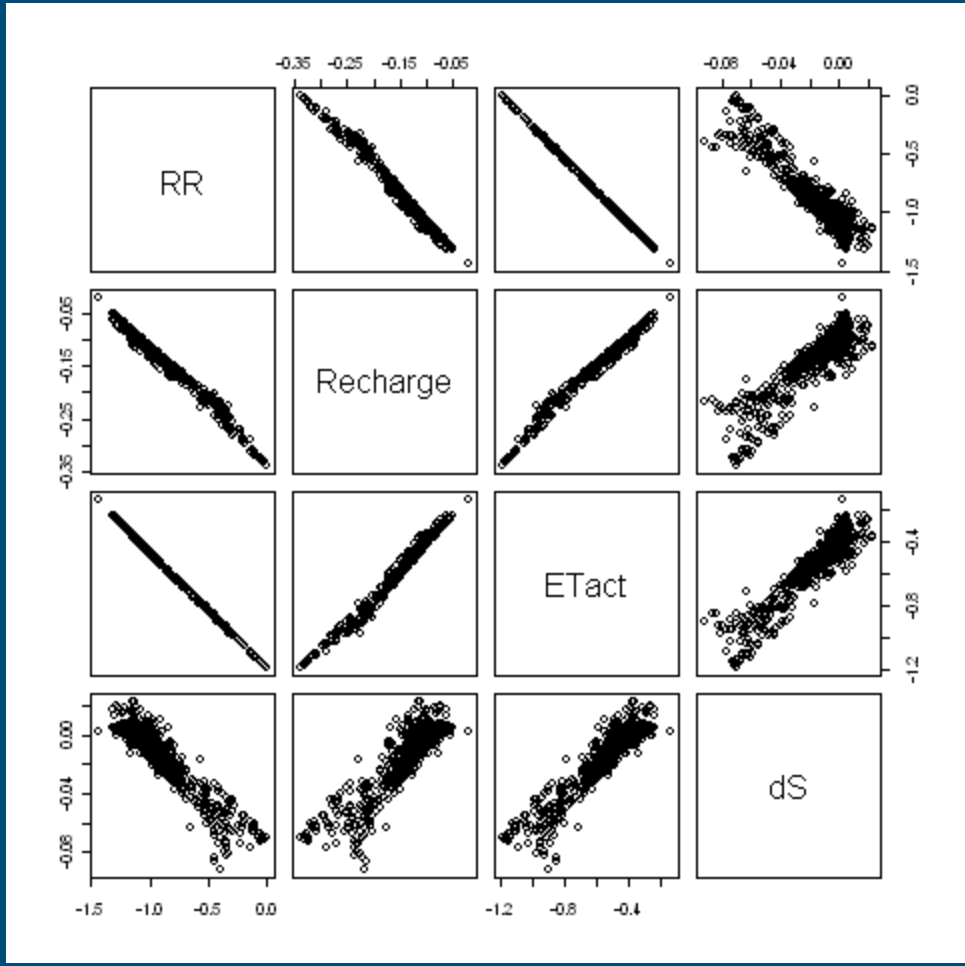


No problem in London?



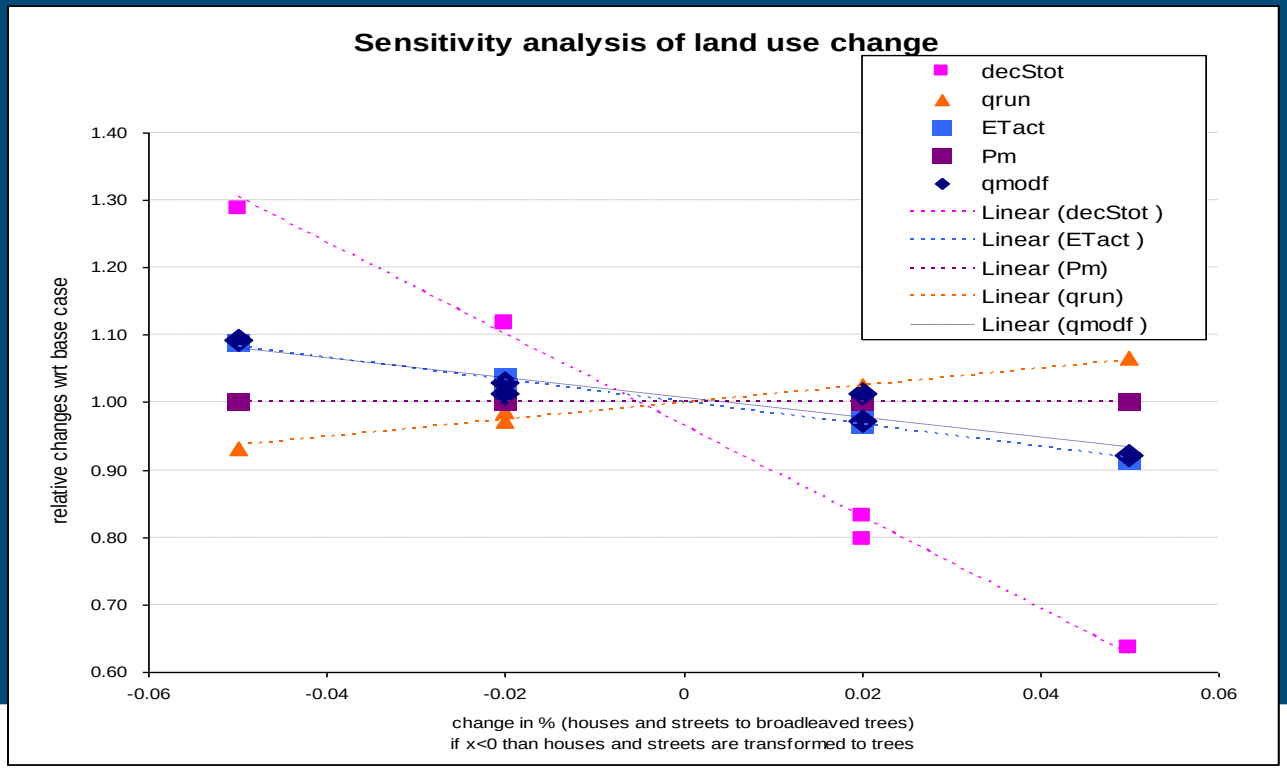


The DSS and hydrology go together well



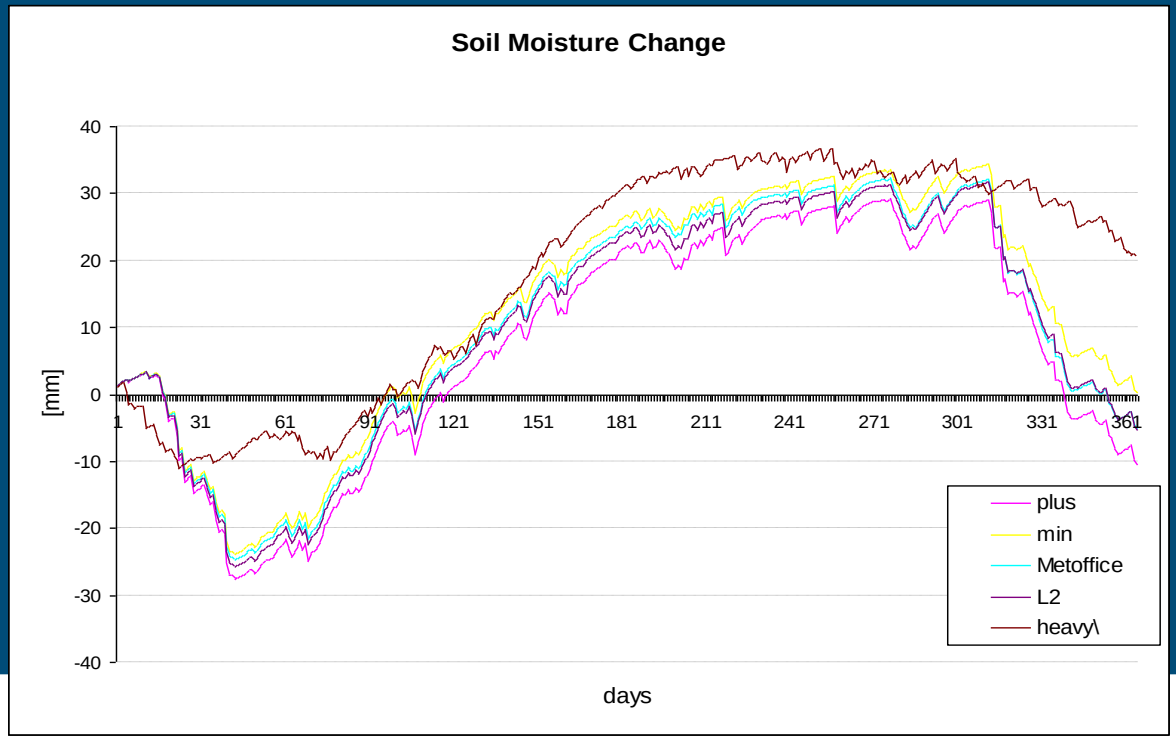
Impact of land use change

- Change Buildings and streets to green areas
  - Different ratio‘s (+/- 2%, +/- 5%)
- Linearity

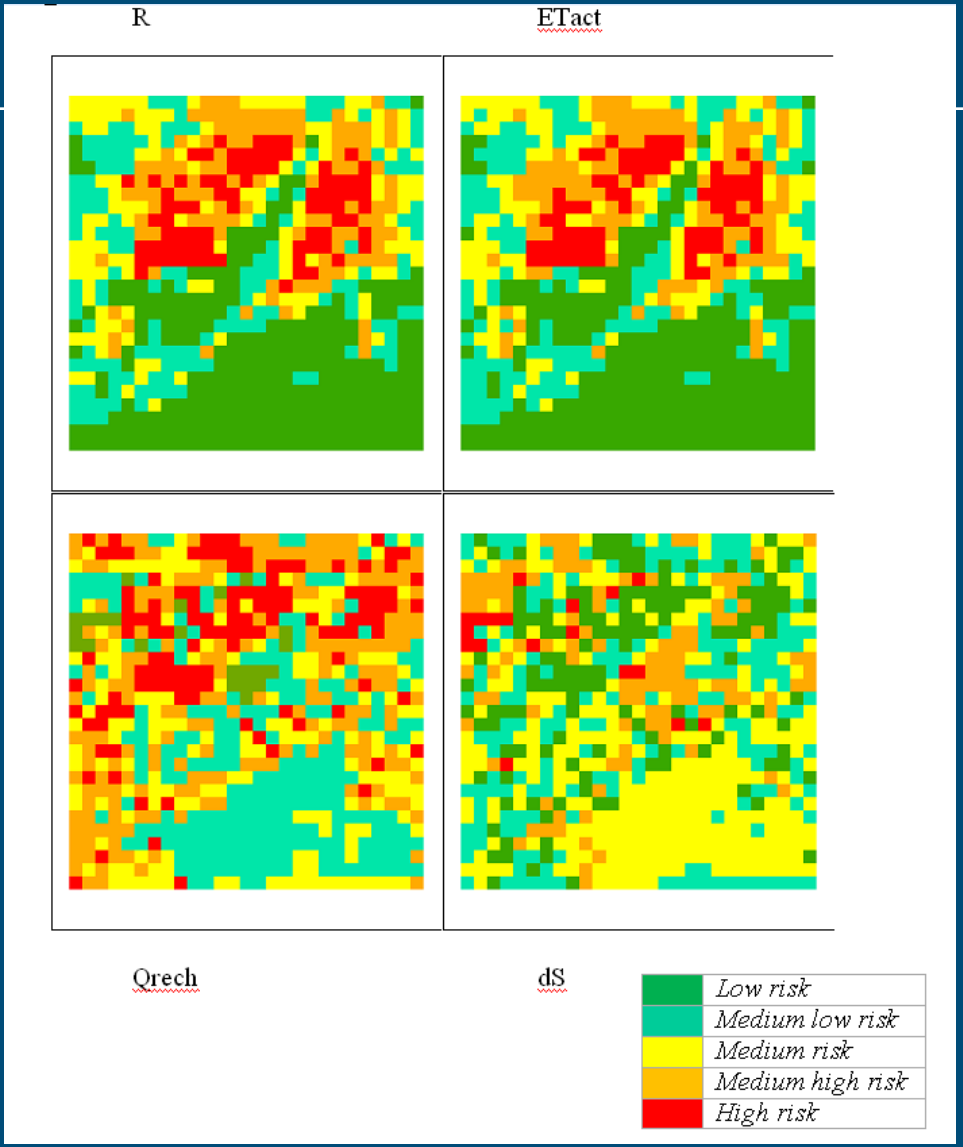


Climate change

- Climate change impacts (more rain in spring, less in summer)
- Increase with 10%
- Decrease with 10%
- Synthetic series



Spatial result



Concluding remarks

- Too much, too little: it is a fact of life

- Storage of water is of the essence to solve water related problems
- Because storage requires space, water issues can only be solved with spatial planning
- Therefore in the DSS the relation between land use and water has been established
- In other words: a user has only to change land use to see the effect on hydrological indicators