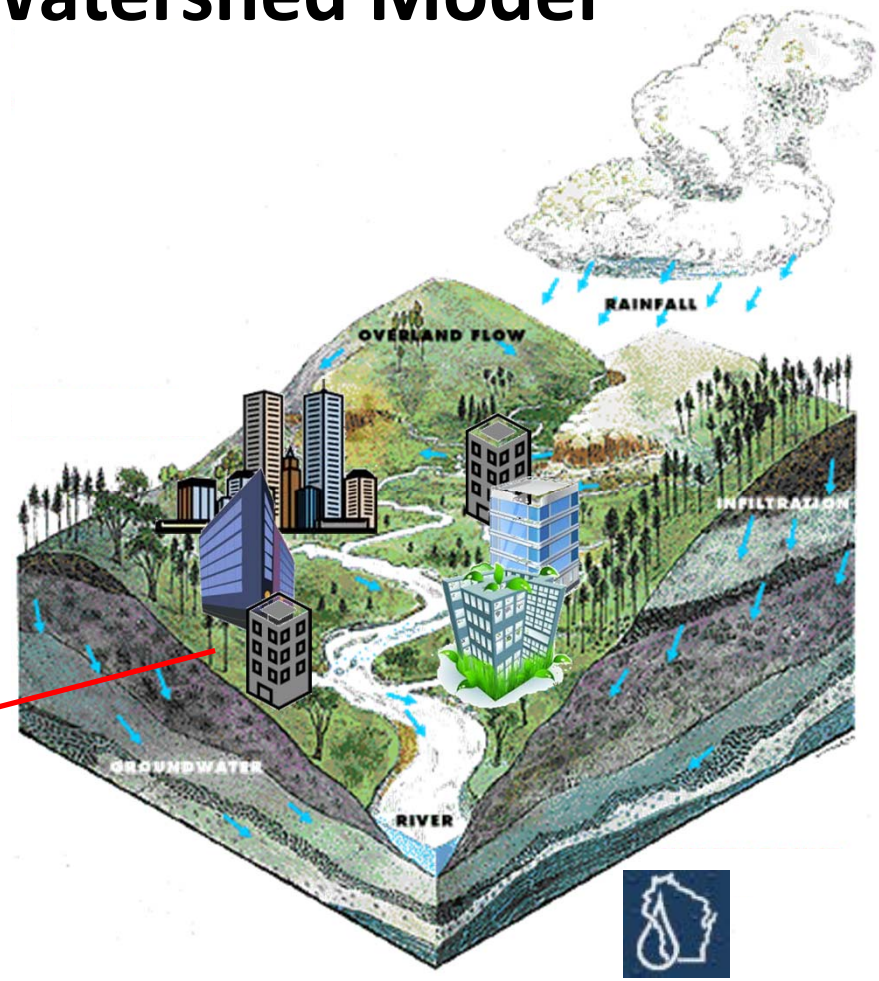
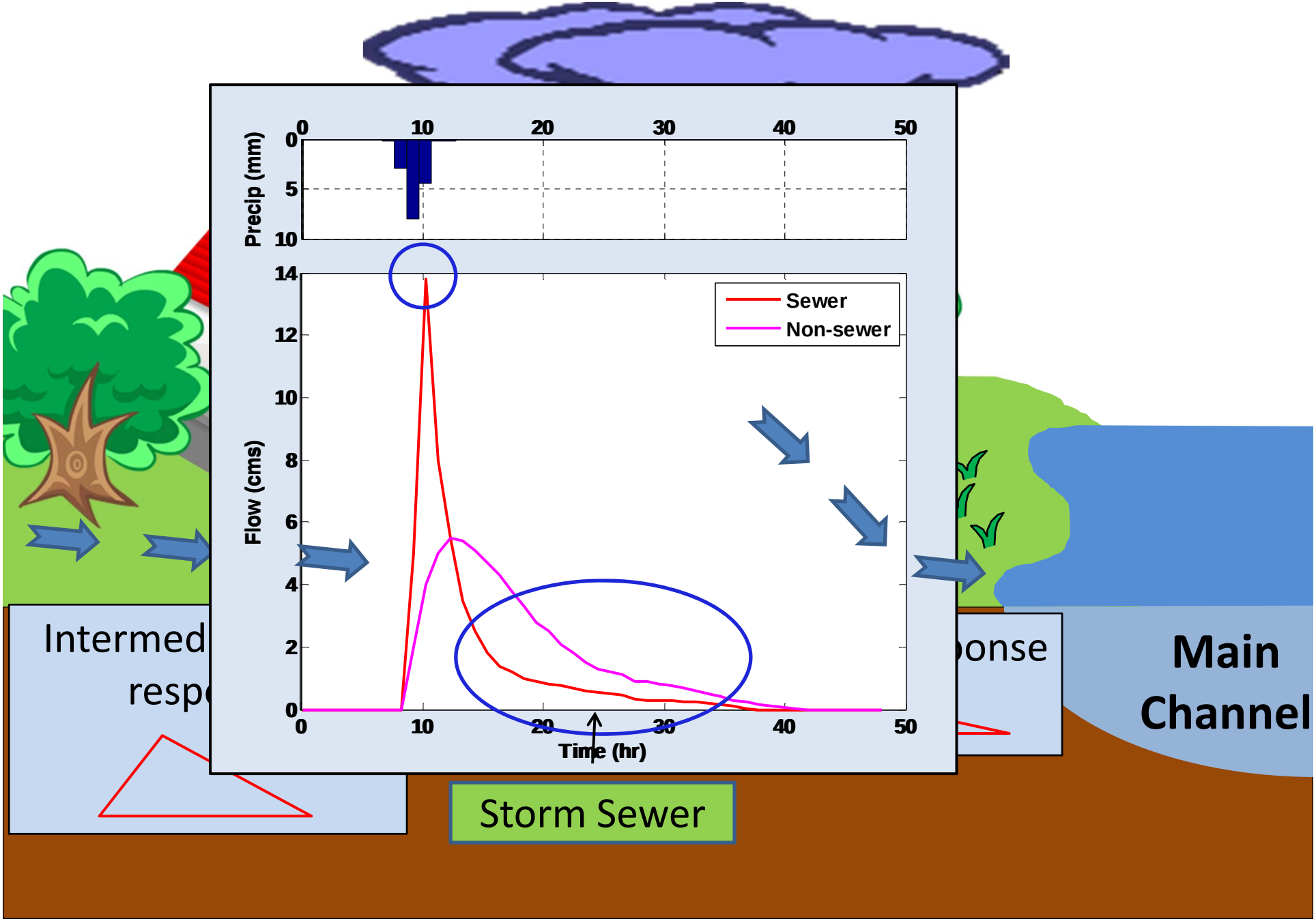
Development and Application of Urban Storm Sewer within a Watershed Model



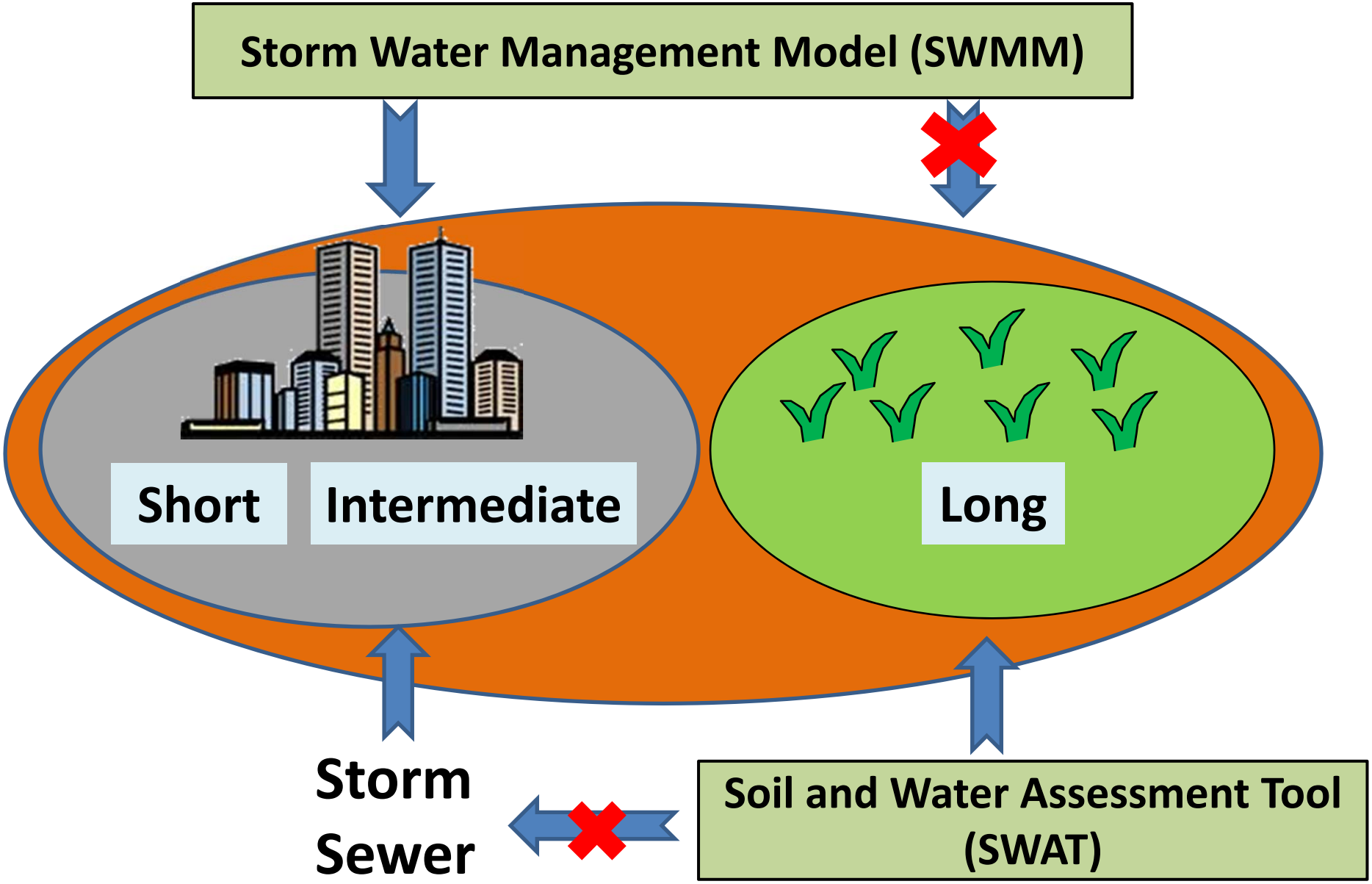
37th Annual Meeting American Water Resources Associations Wisconsin Section

Chaohe Guo, Chin H. Wu, John R. Reimer

University of Wisconsin - Madison

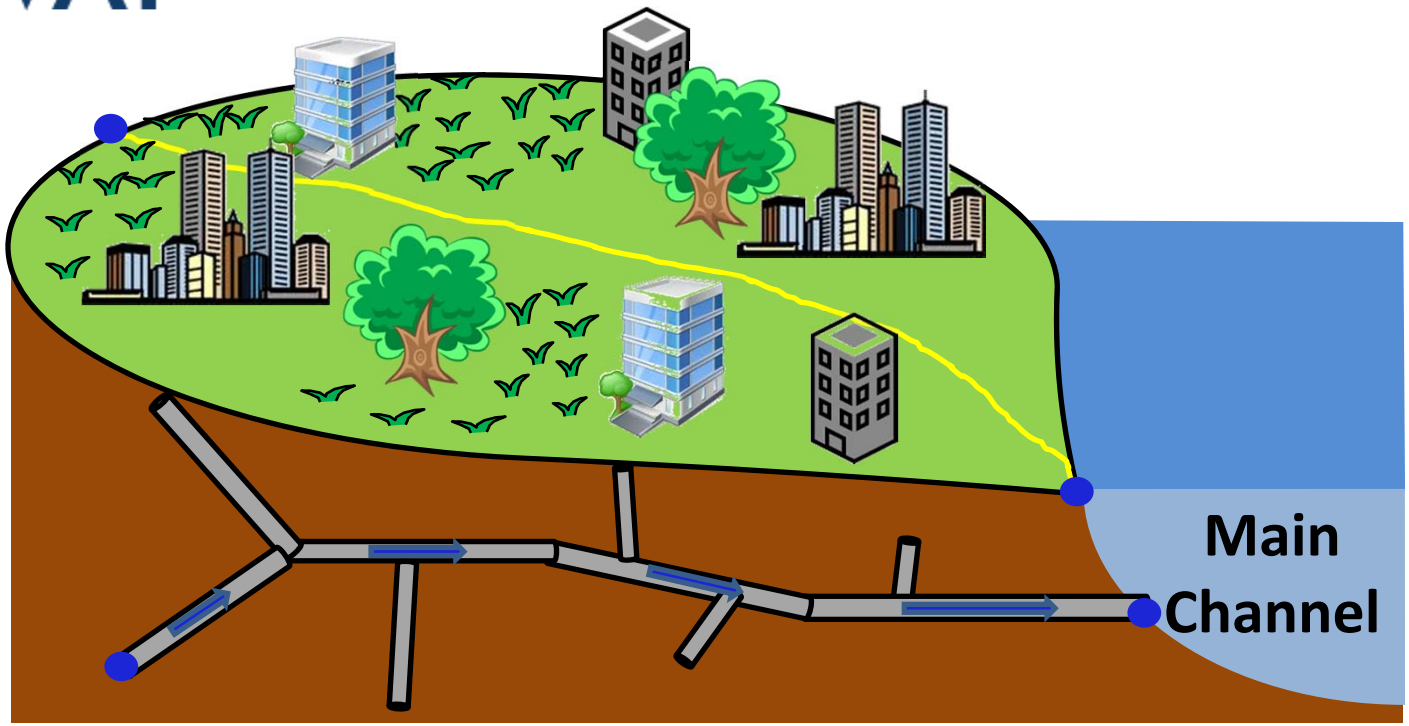

Precip (mm)
0
5
10
0
10
20
30
40
50
Flow (cms)
14
12
10
8
6
4
2
0
Sewer
Non-sewer
Time (hr)
Intermed
resp
onse
Main
Channel
Storm Sewer

Status of Urban Storm Sewer Simulation



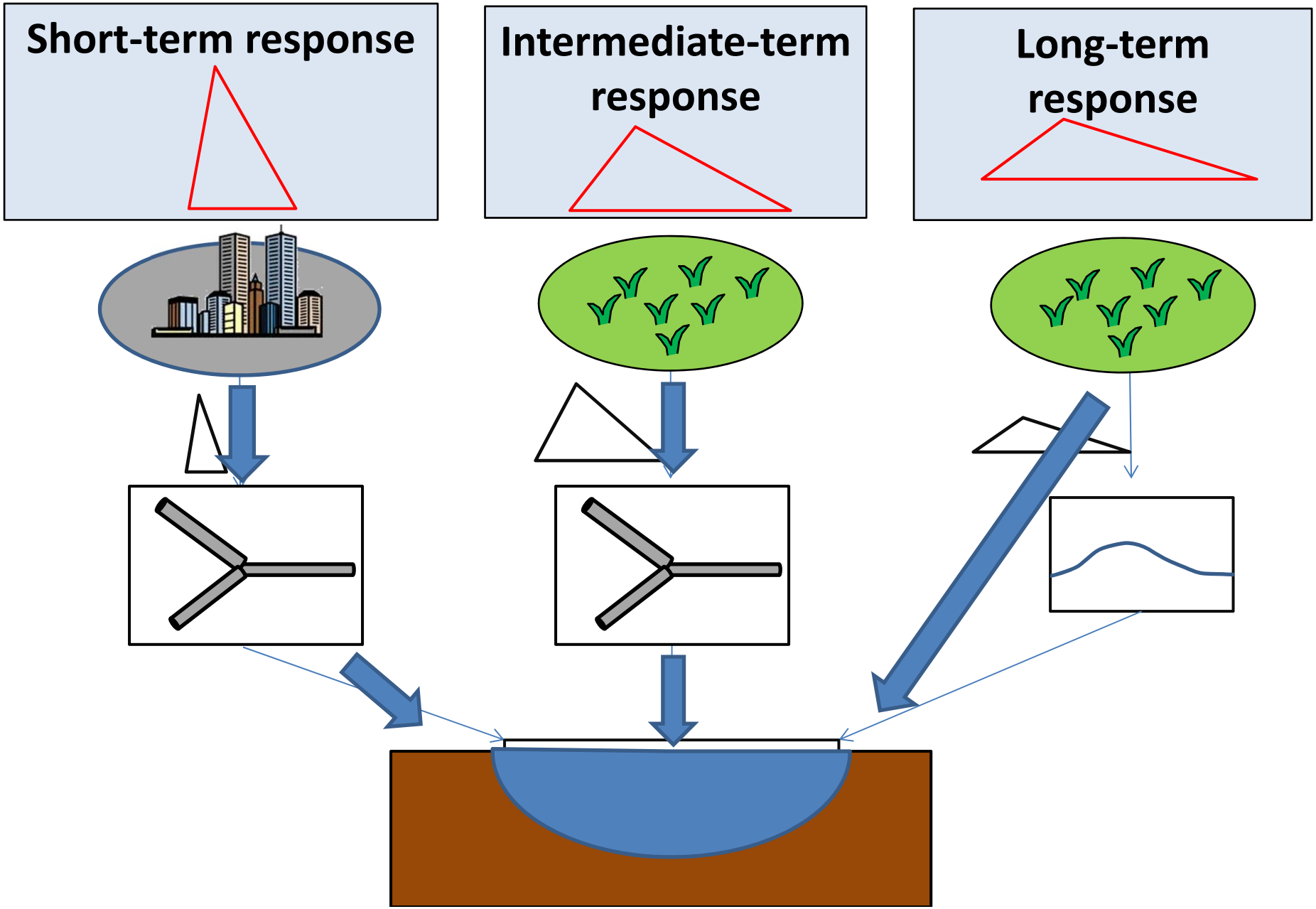
Research Objectives

- Develop a **lumped storm sewer** component within SWAT

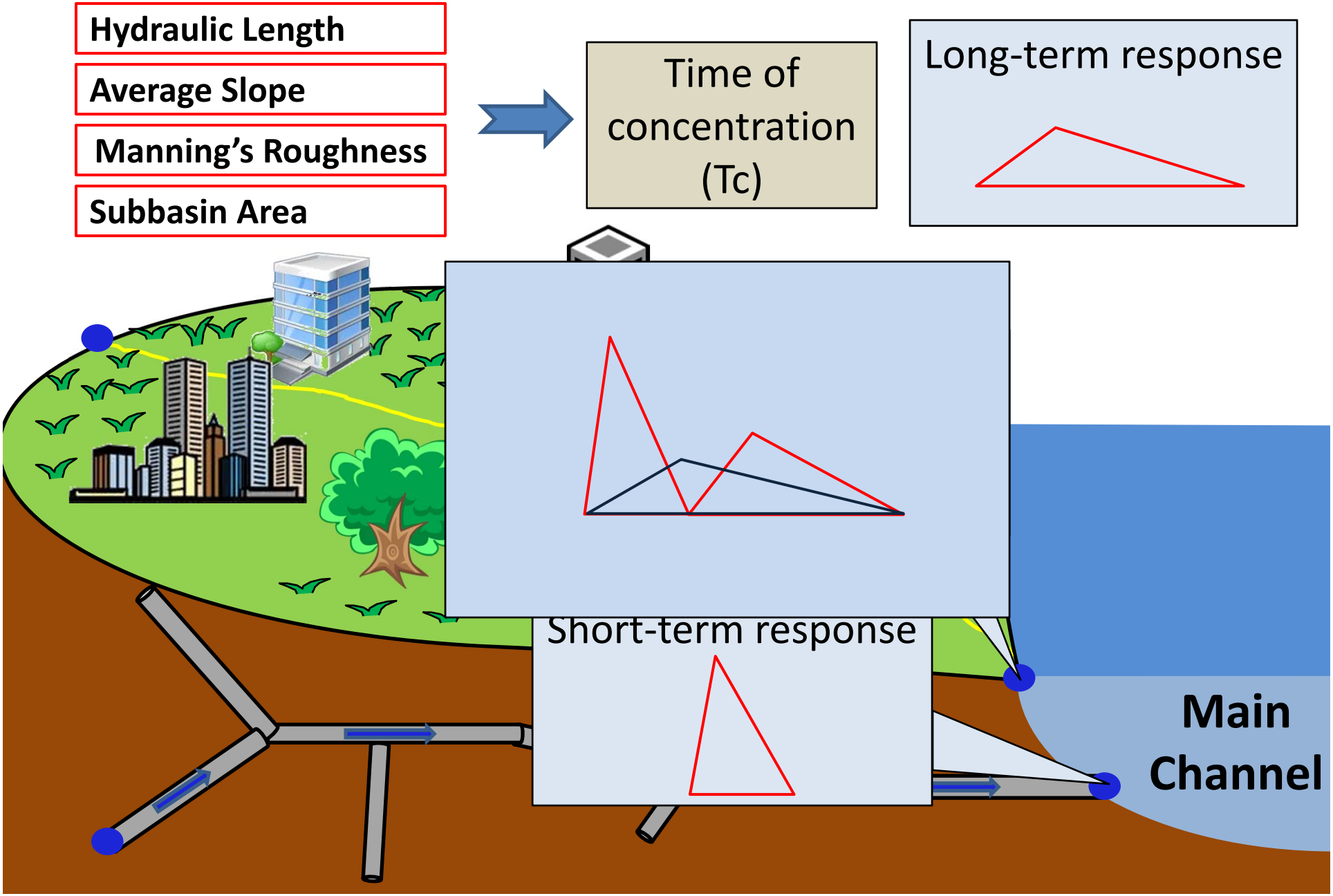


- Apply **SWAT-SS** model to evaluate ***land use change***

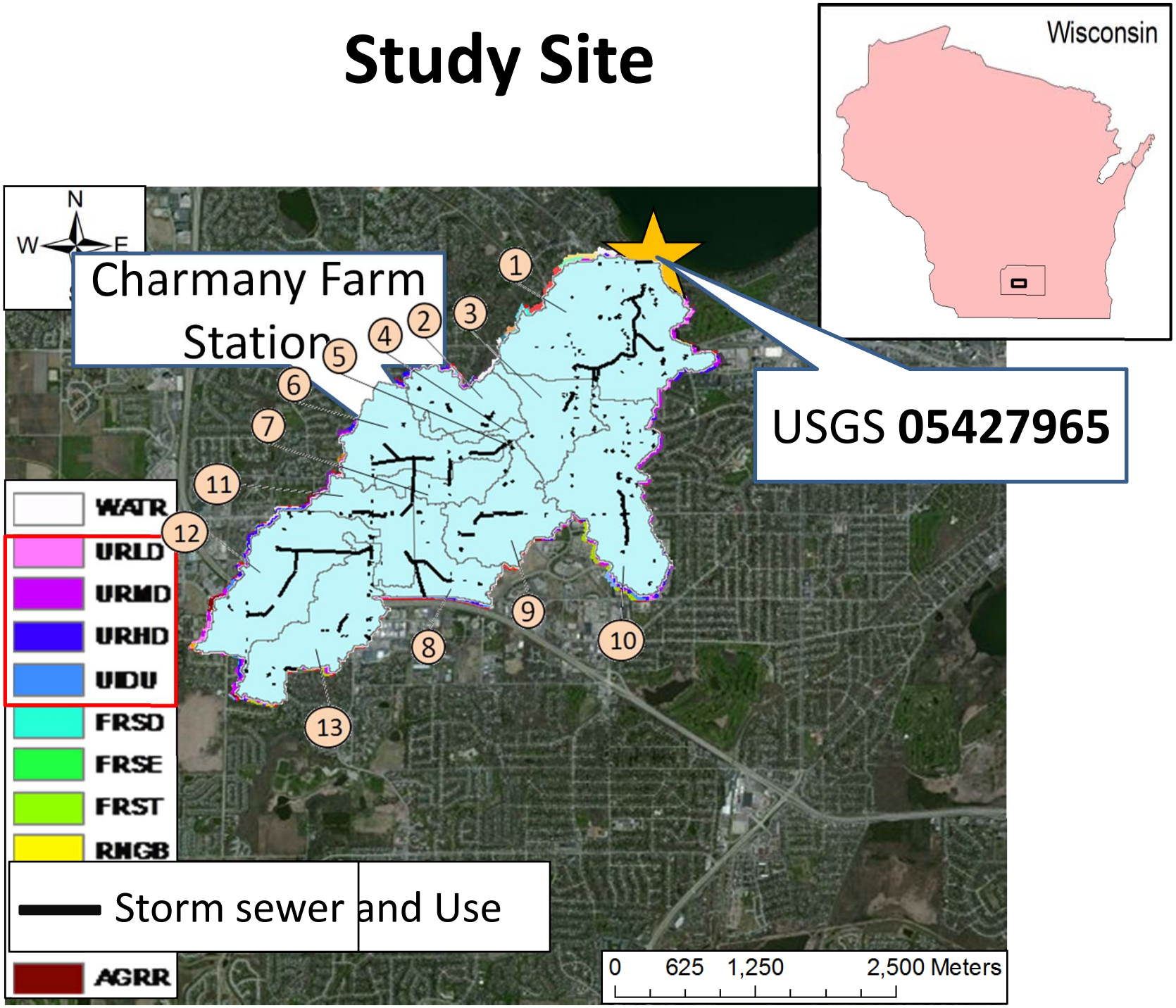
Multi-timescale Approach

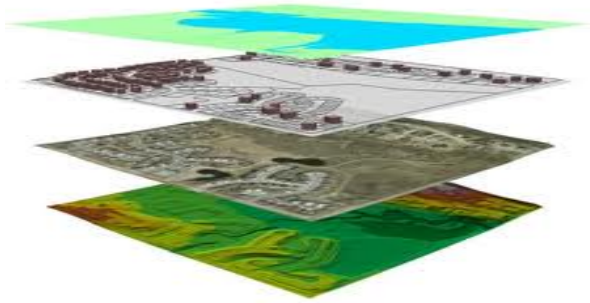


Multi-timescale Approach



Study Site


Wisconsin
N
W
E
Charmany Farm Station
USGS **05427965**
1
2
3
4
5
6
7
8
9
10
11
12
13
WATR
URLD
URMD
URHD
UIDU
FRSD
FRSE
FRST
RMGB
AGRR
Storm sewer
and Use
0
625
1,250
2,500 Meters



Data

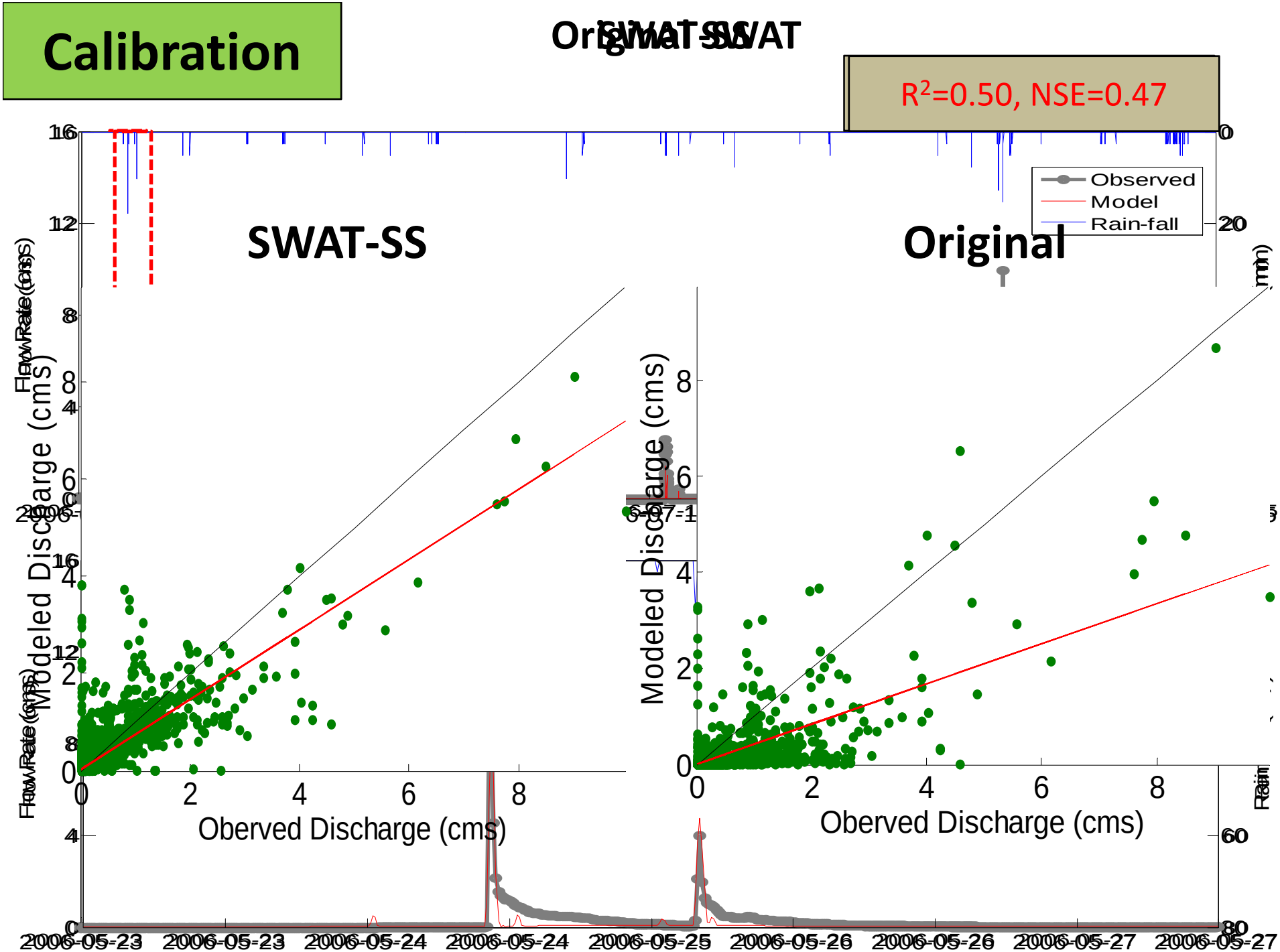
1992	1996	2000	2004	2006

Evaluation of Validation Development Calibration

SWAT-SS

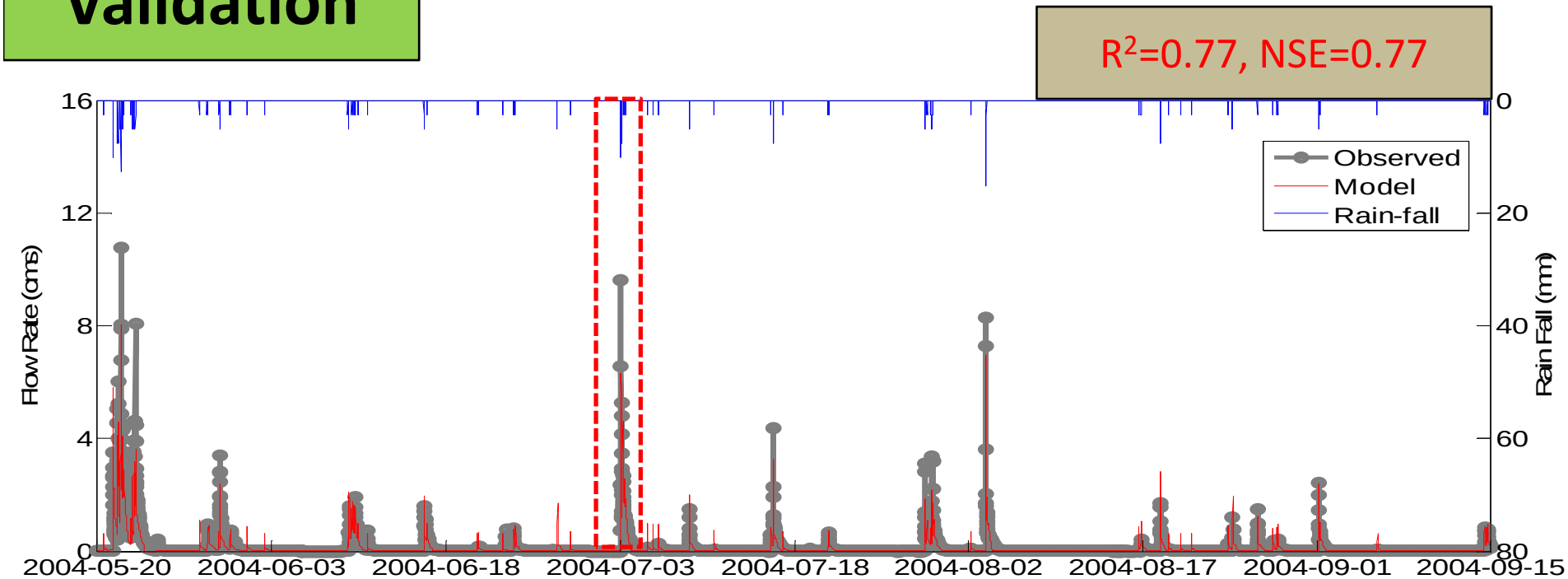
Result

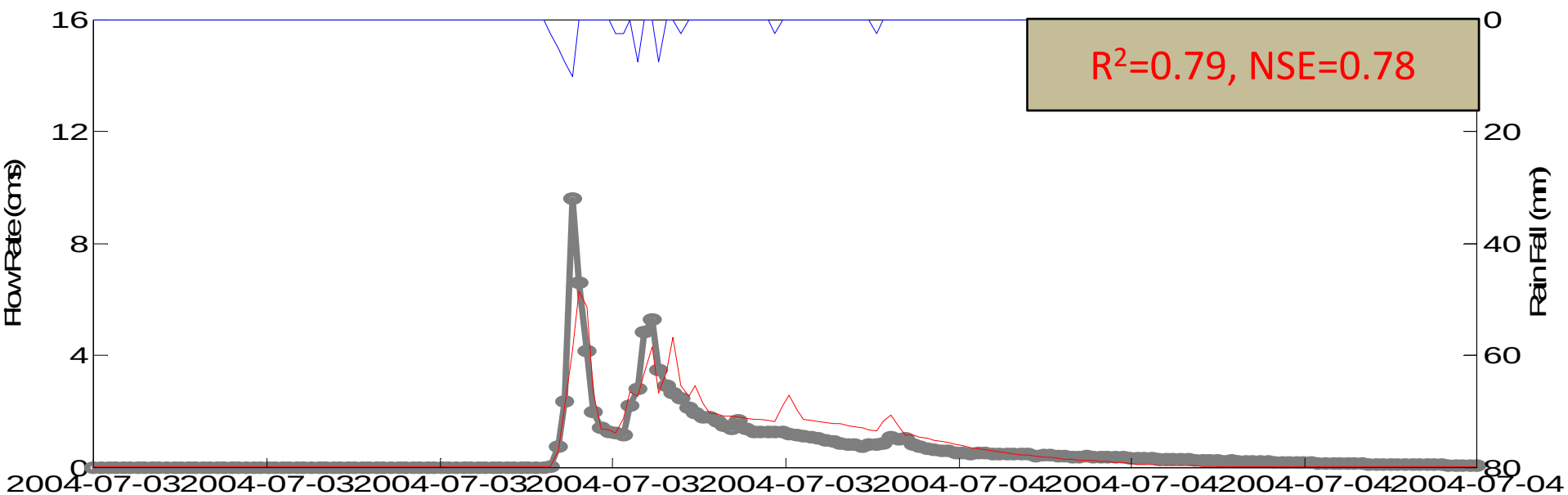
Calibration



Validation

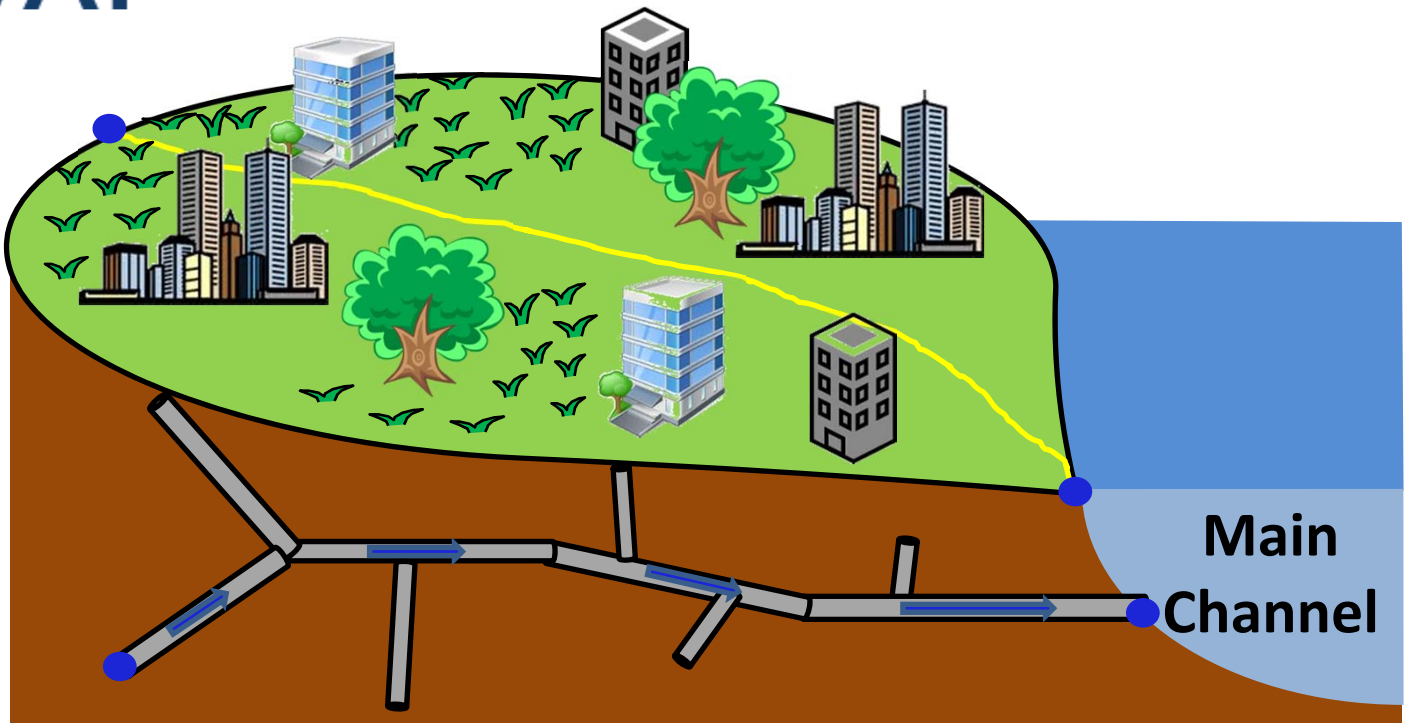
SWAT-SS





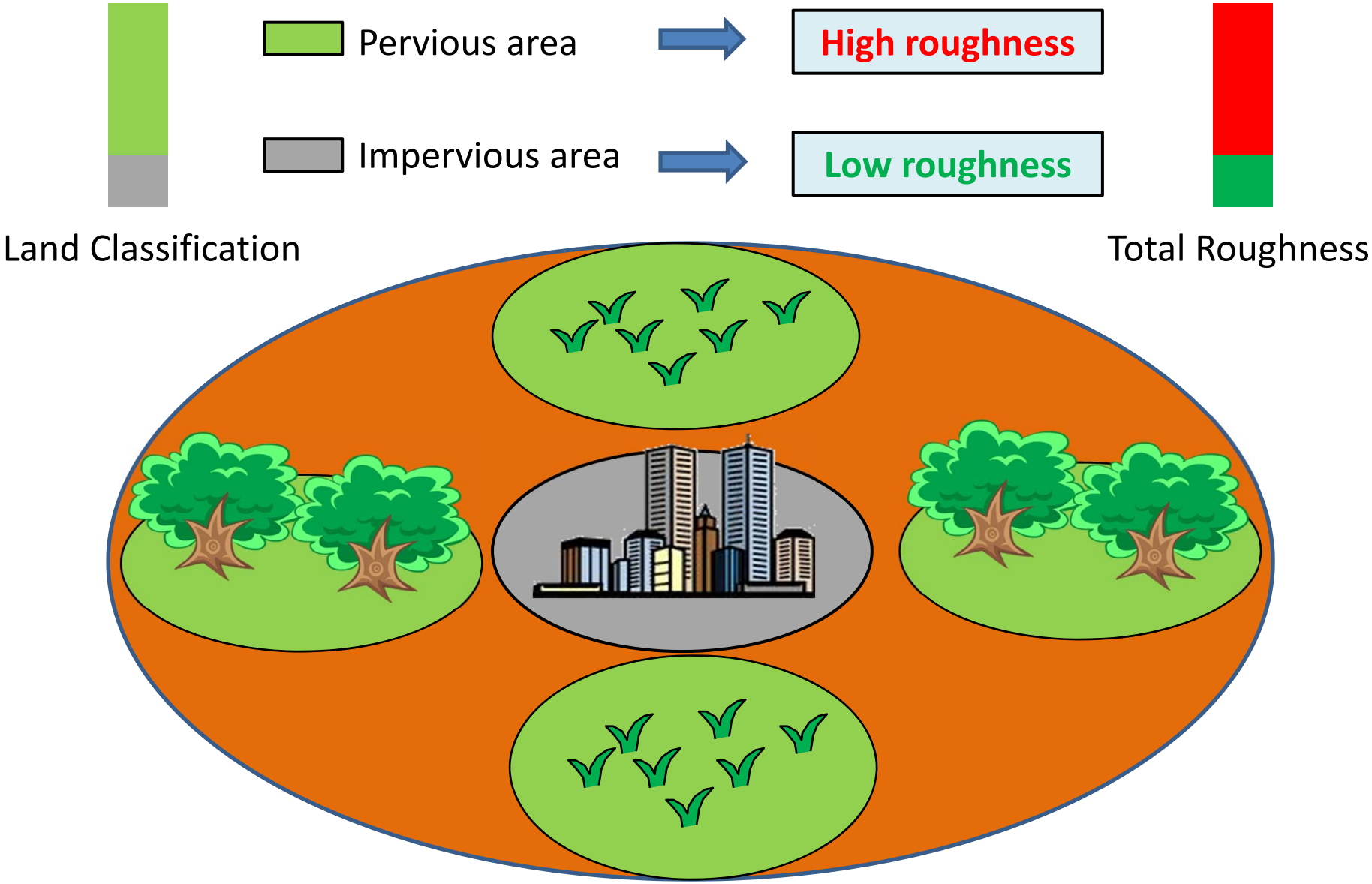
Research Objectives

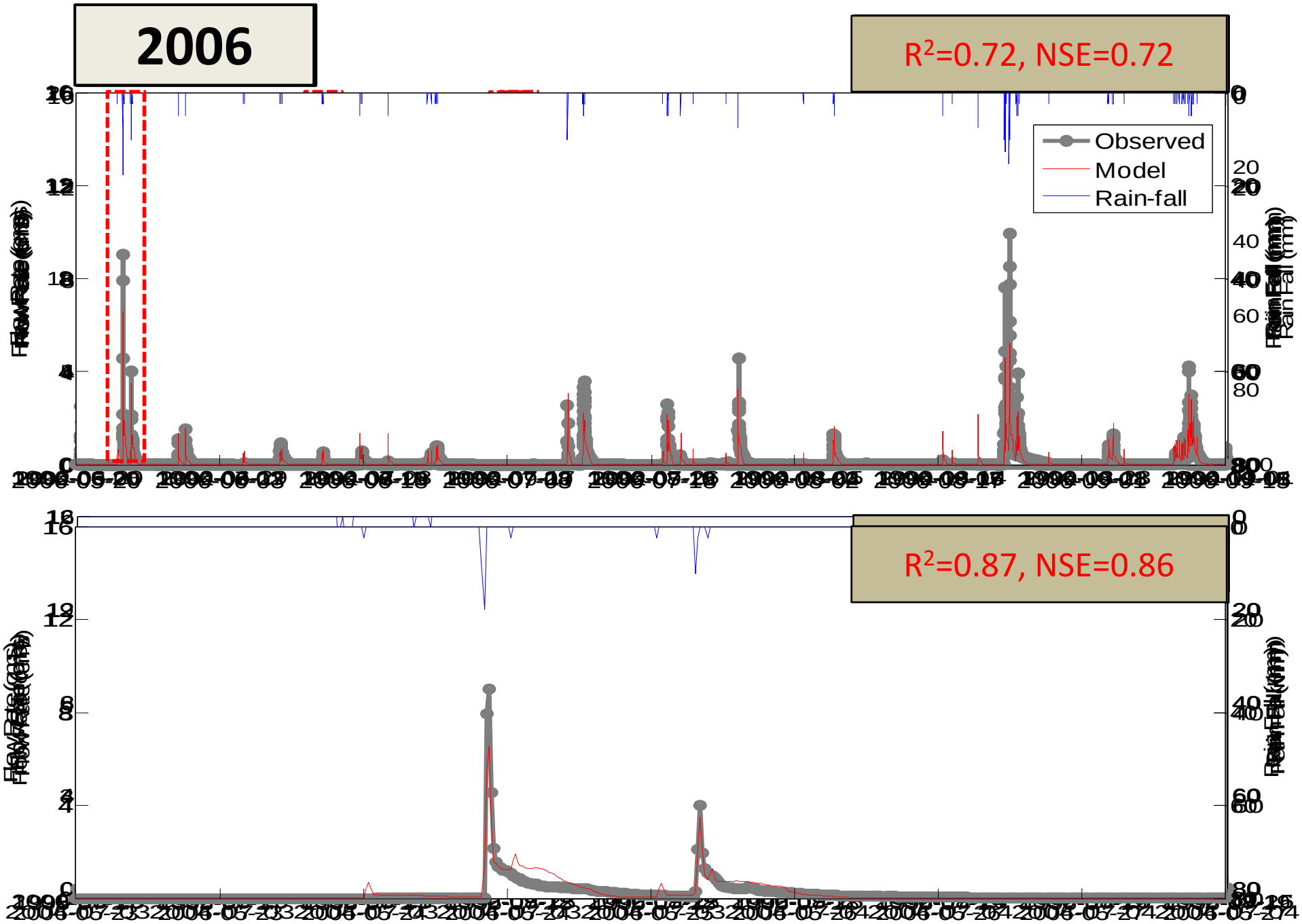
- Develop a **lumped** **storm sewer** component within SWAT



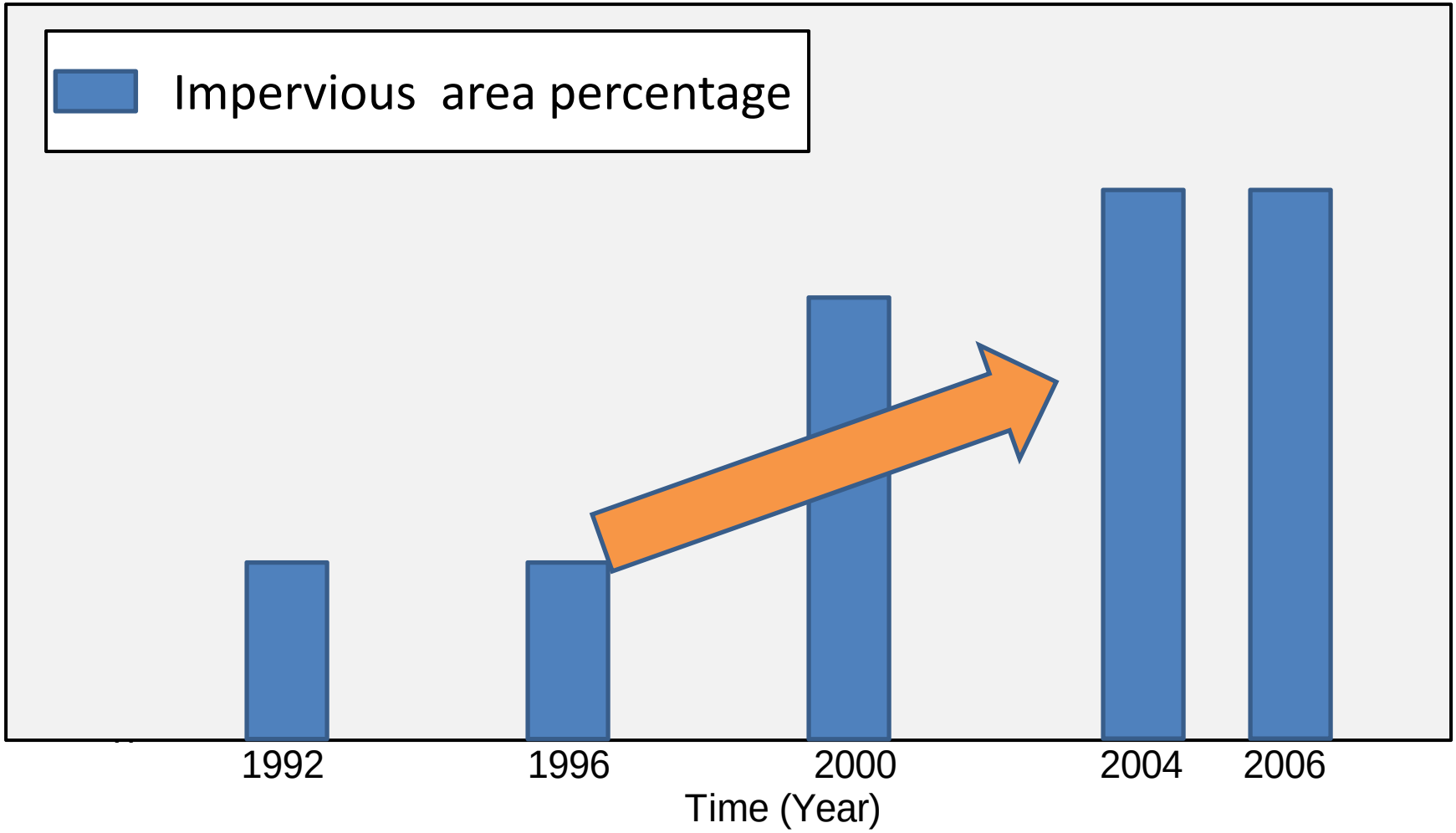
- Apply **SWAT-SS** model to evaluate ***land use change***

Application of SWAT-SS




2006
R2=0.72, NSE=0.72
Observed
Model
Rain-fall
Rain Fall (mm)
R2=0.87, NSE=0.86

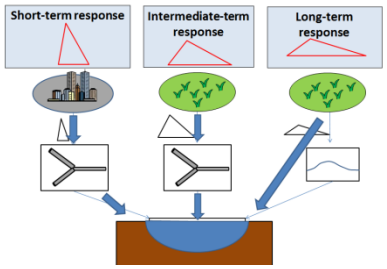
	1992	1996	2000	2004	2006
Overland roughness (n)	0.24	0.24	0.08	0.02	0.02



Summary and Conclusion

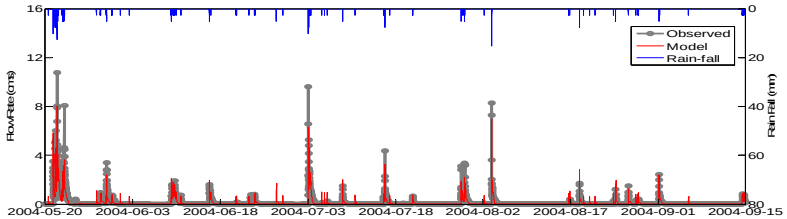
- **Storm sewer** component is added into a Watershed model

SWAT-SS

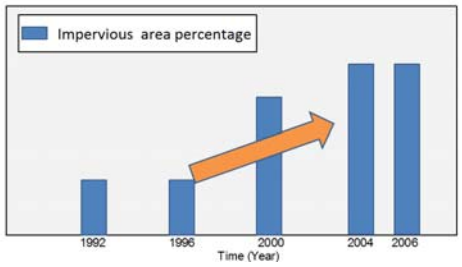


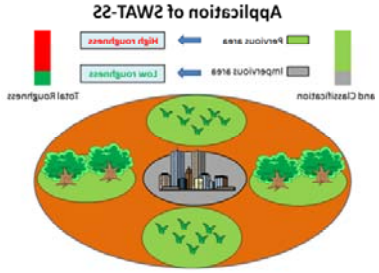
Multi-timescale

- **SWAT-SS** can simulate ***short-term*** ***sub-hourly*** storm response for an urban watershed.



- **Land use development** can be estimated using **SWAT-SS**





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Questions ?