On storm-runoff transformations in a urban and a florested subtropical basin: seeking perspectives to peakflow reduction.

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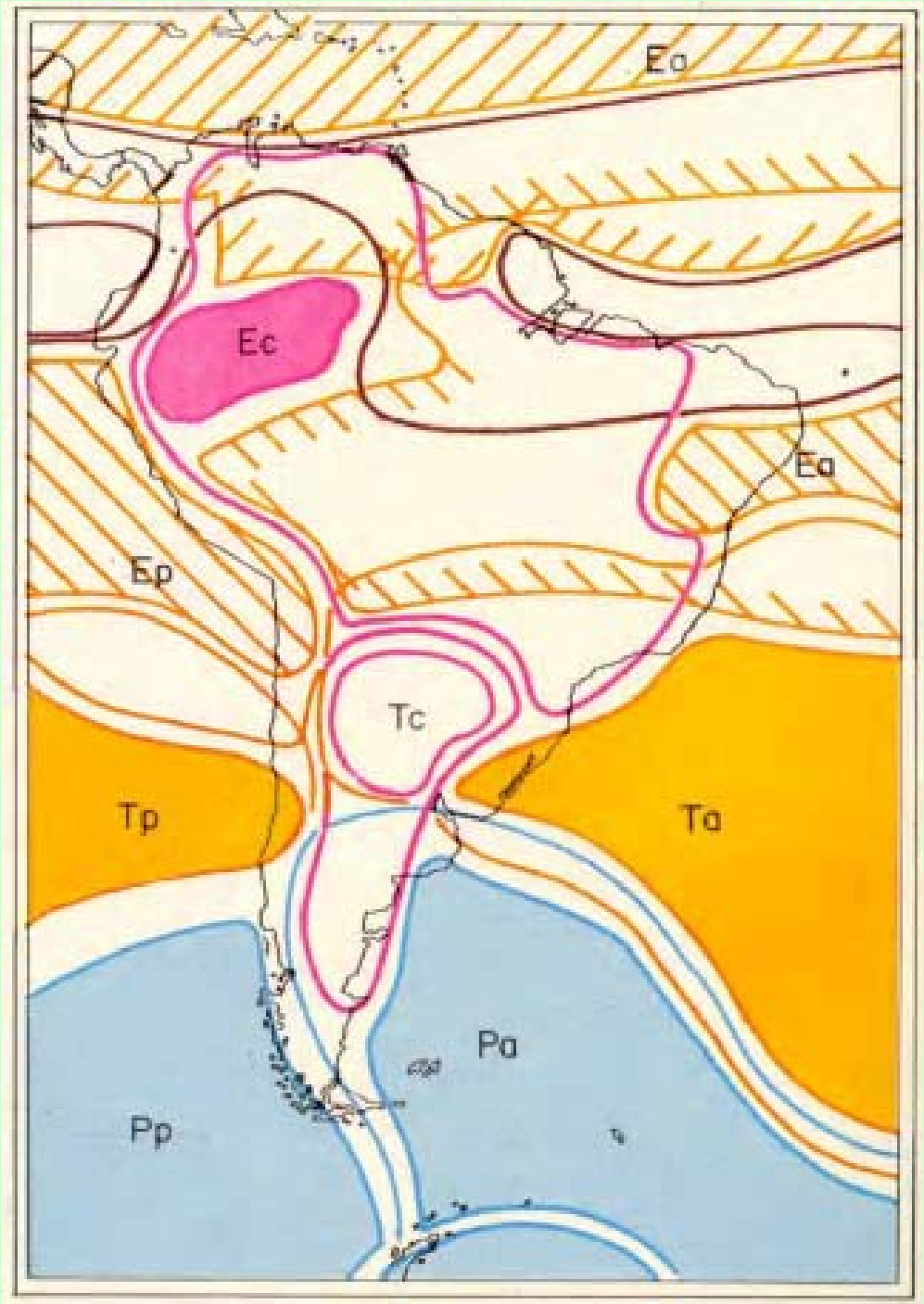
Ea
Ec
Ea
Ep
Tc
Tp
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Forest Hydrology and Urban Hydrology

Problem statement:

soil water processes determine runoff

quantifying these fluxes requires both spatial and temporal data

Forest Hydrology: zero-tension lysimeters or tensiometers plus hydrometric methods: water budgets

Urban Hydrology: precipitation and discharge data and land parameters calibration

Study area and instrumentation

Valinhos 3km
Campinas 9km

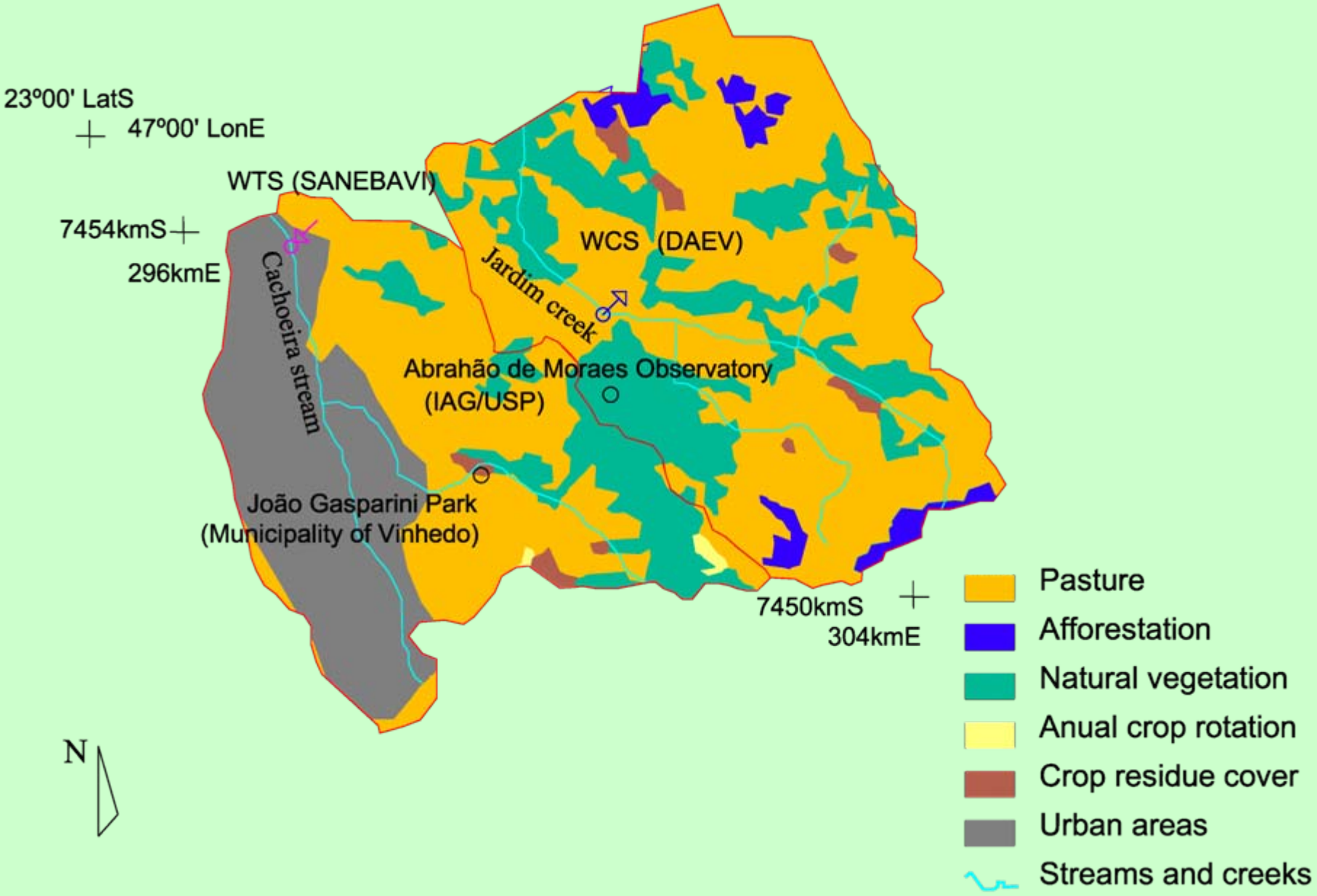
LOCATION OF PIRACICABA,
CAPIVARI AND JUNDIAÍ RIVER BASINS

São Paulo 52km

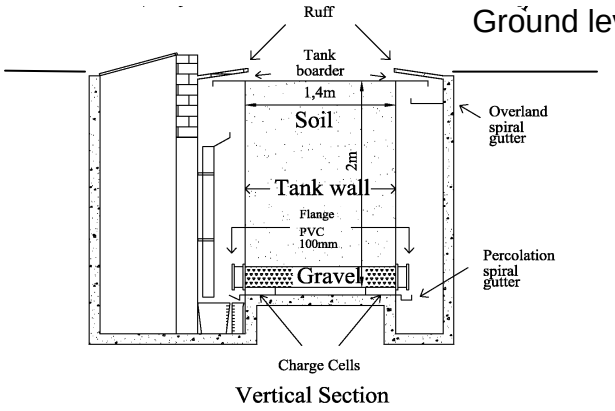
PIRACICABA, CAPIVARI AND JUNDIAÍ
RIVER SUB-BASINS

PART IN SÃO PAULO
PART IN MINAS GERAIS
STUDY AREA

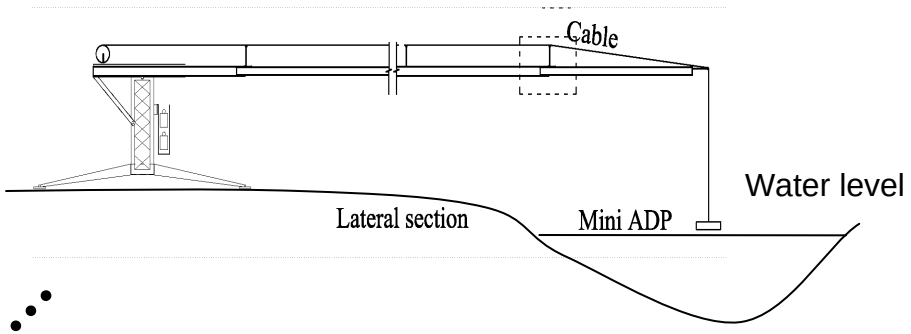
1.1 - Piracicaba River Basin
1.2 - Corumbataí River Basin
1.3 - Jaguarí River Basin
1.4 - Camanducaia River Basin
1.5 - Atibaia River Basin
2 - Capivari River Basin
3 - Jundiaí River Basin

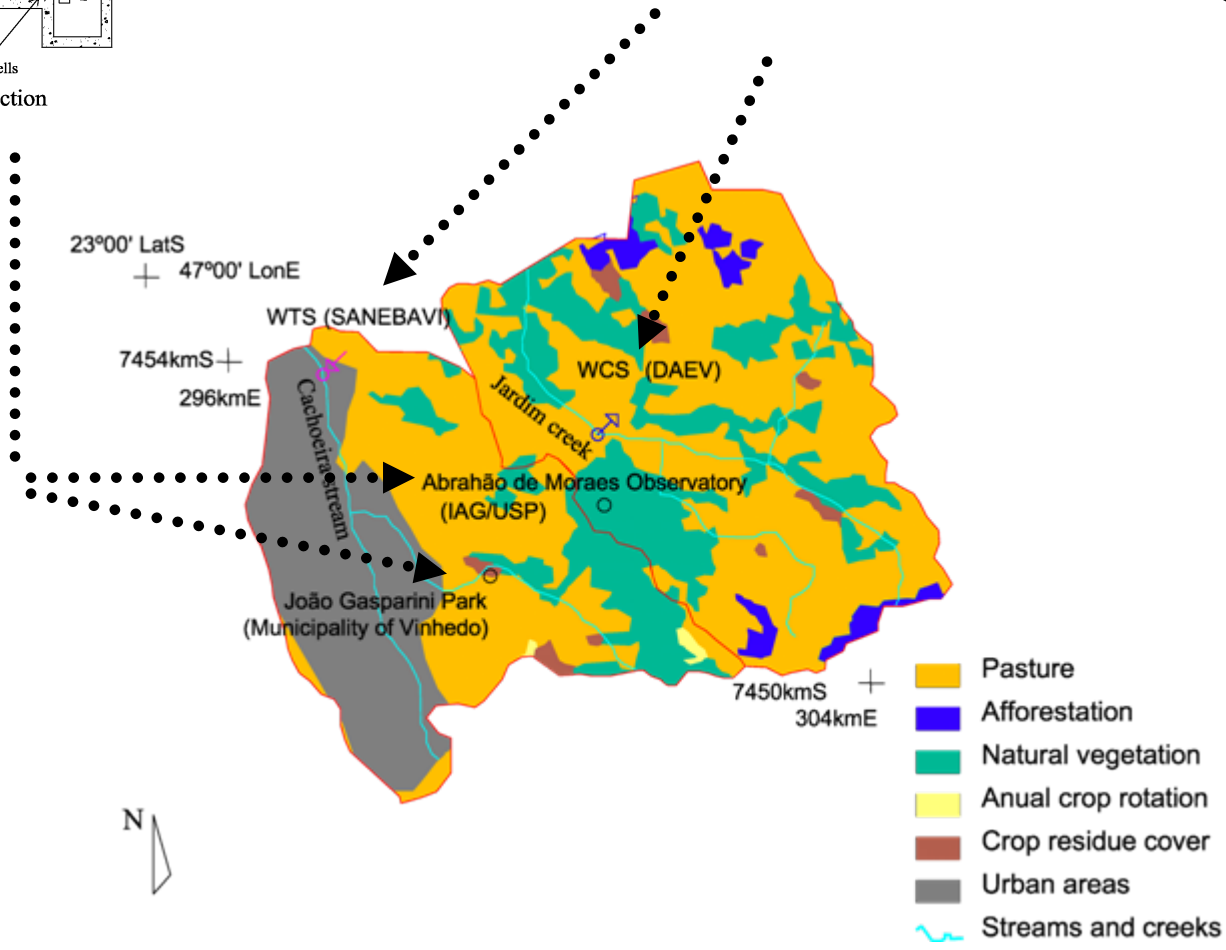

23º00' LatS
47º00' LonE
WTS (SANEBAVI)
7454kmS
296kmE
Cachoeira stream
Jardim creek
WCS (DAEV)
Abrahão de Moraes Observatory
(IAG/USP)
João Gasparini Park
(Municipality of Vinhedo)
7450kmS
304kmE
N
Pasture
Afforestation
Natural vegetation
Anual crop rotation
Crop residue cover
Urban areas
Streams and creeks

Lysimeters



Current meter





Methods and equipments: field

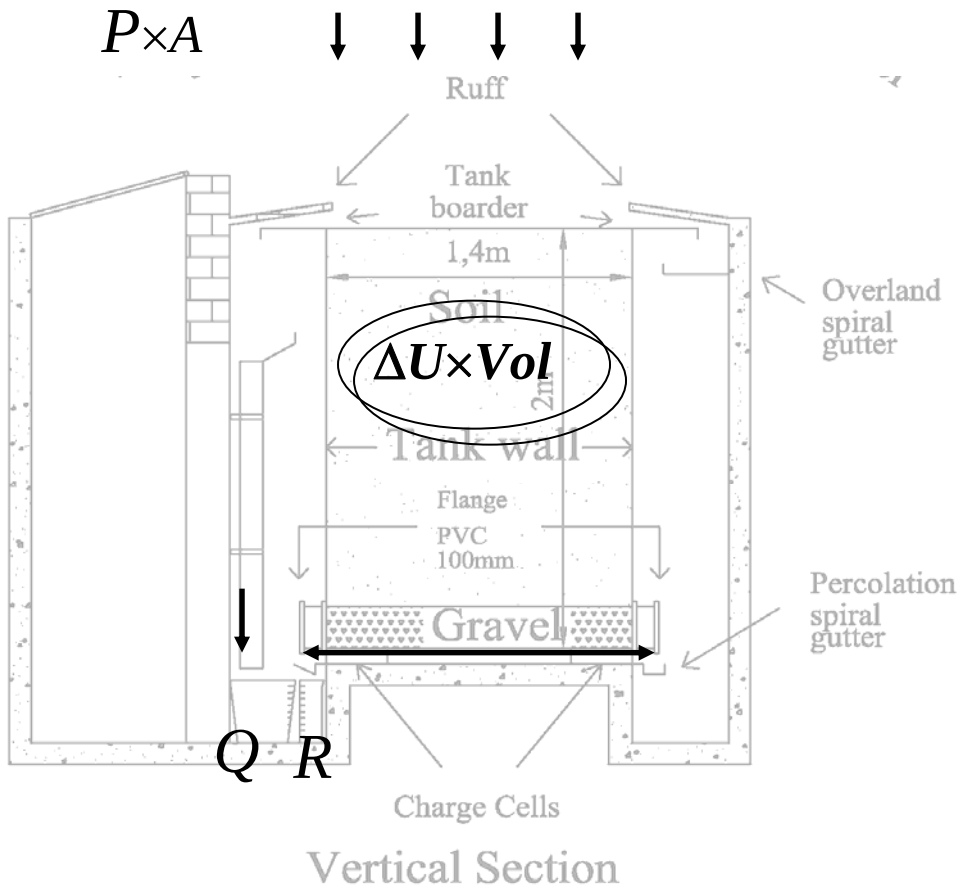
$$\Delta U \times Vol = P \times A - Q - R$$

$\Delta U \times Vol$ is the difference of water volume in the tank from difference of soil moisture in time

$P \times A$ is the rainfall height times the top area of the lysimeter

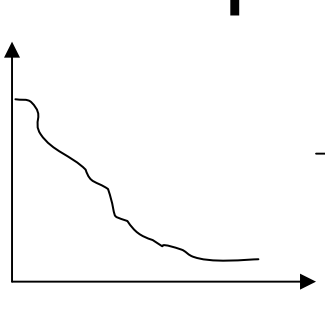
Q is the overland flow rate

R is the percolation rate or the recharge rate



Methods and equipments: laboratory

Field hietograph

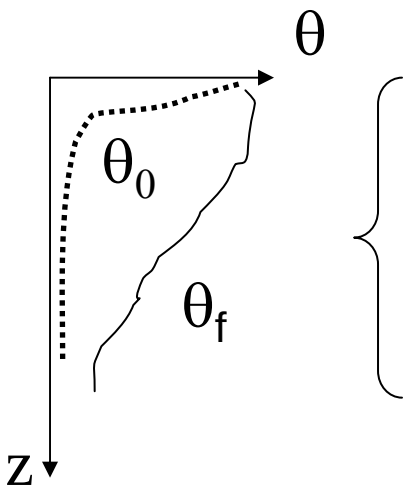


→ Pumping rate from tank1

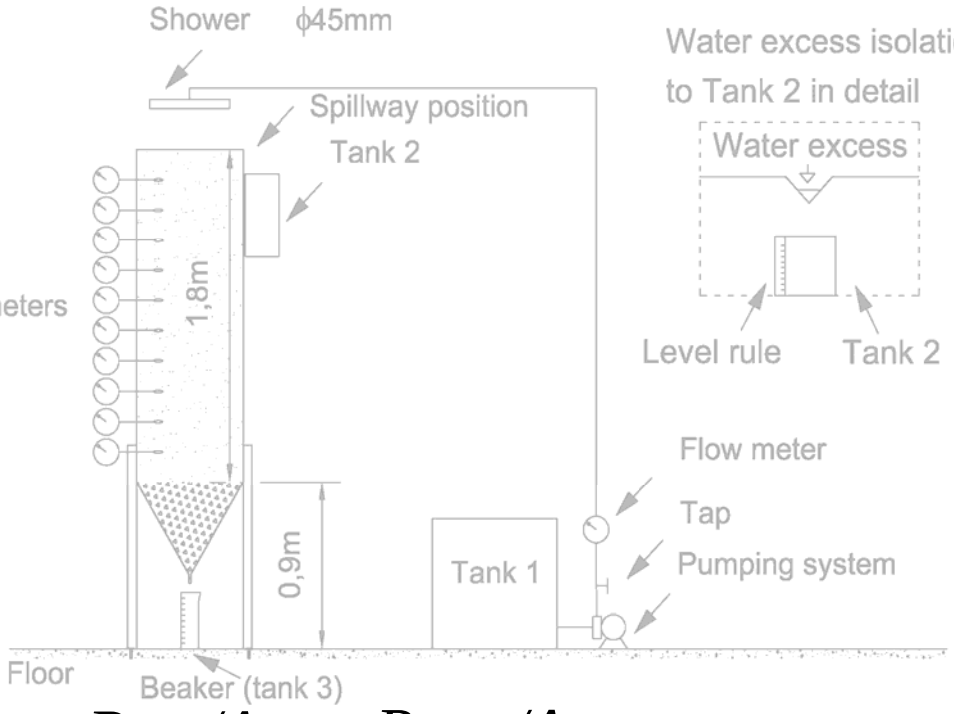
Q/A tank2 ↔ Q/A field

C_d, R_h

n, S, R_h



Tensiometers



$\Delta U_{field} \rightarrow \Delta\theta_{tensiometers}$

$R_{field}/A \rightarrow R_{tank3}/A$

General results

- an evaluation of the water retention in two subtropical urban and forested stream basins;
- an evaluation of the soil infiltration capacity restoration in the Cachoeira stream basin and Jardim creek basin;
- an evaluation of the peakflows in the Cachoeira stream and in the Jardim creek;
- an evaluation of the storm water volume reduction in the Cachoeira stream basin.

Preliminar results

- the runoff generation isolation and measurement in a subtropical field lysimeter alongside rainfall events;
- peakflow measures in two subtropical urban and forested basins;
- a soil water infiltration simulation with synthetic rainfall rates in a standpipe lysimeter.

Discussions

- Soil column experiments have already been elaborated however not studying the overland flow generation and field runoff generation was performed without either separate runoff or measure soil water.
- The amount of overland water in the two subtropical basins will be given by flow measurement and soil water measurement. The standpipe lysimeter may fit field data by simulating rainfall rates in the topsoil to both several soil moisture profile and several topsoil outflow cross-section.
- Future studies will evaluate technical viability to monitor soil temperatures and atmospheric physical variables as interfering factors in floods and simulating evaporation rates eventually evapotranspiration rates in standpipe lysimeters.