MONASH University

UNIVERSIDADE FEDERAL DE SANTA CATARINA

Engineering

Desempenho de infraestrutura de WSUD: a influência da variabilidade em projeções de precipitação de alta resolução

Felipe Fischmann (UFSC) / **Dra. Cintia B. S. Dotto** (Monash University)

X Encontro Nacional de Águas Urbanas

São Paulo/SP

13/11/14

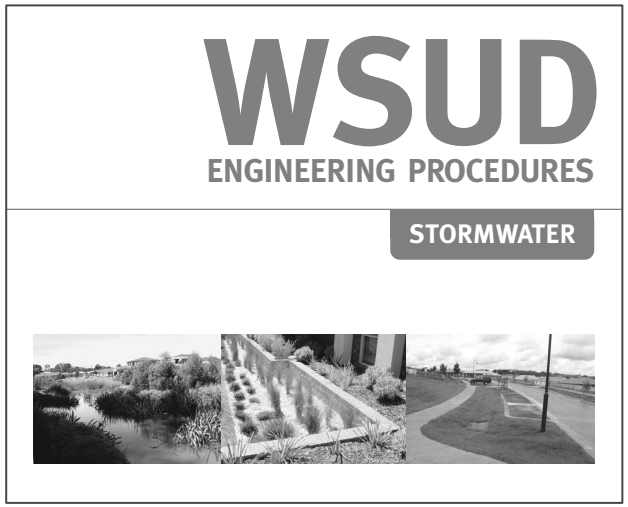
Introdução

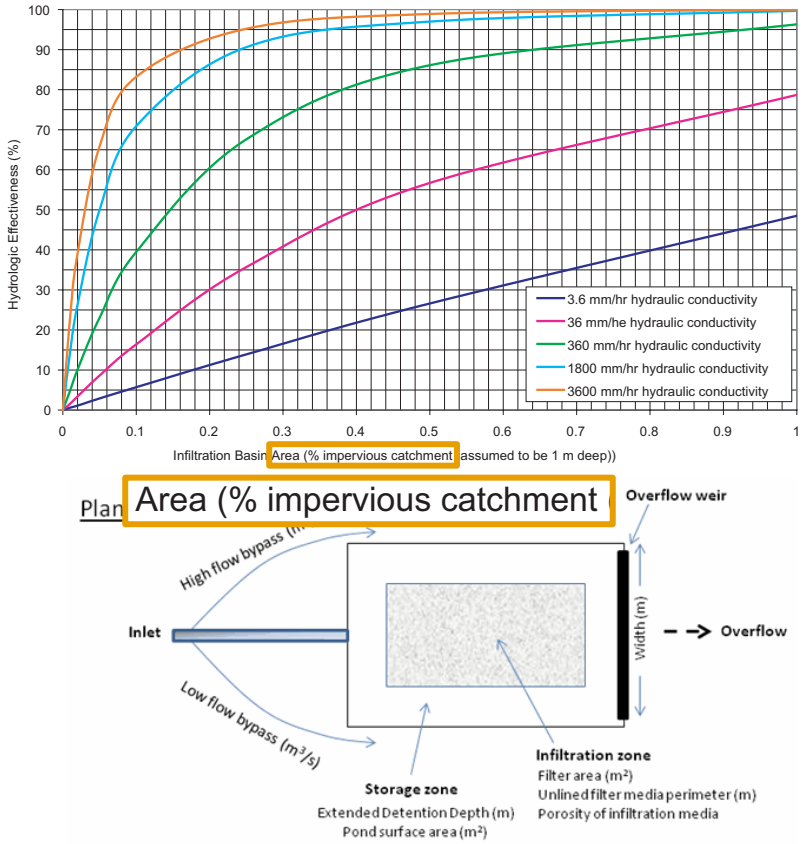
- WSUD = Water Sensitive Urban Design (≈ LID) (≥SuDS)

Diretrizes de projeto

music BY eWater

Curvas de desempenho





Melbourne Water (2005)

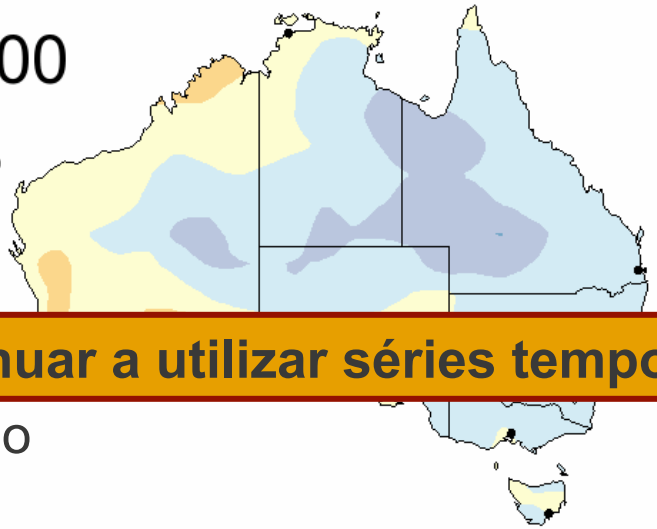
Introdução

- WSUD = Wat

Diretrizes de projeto

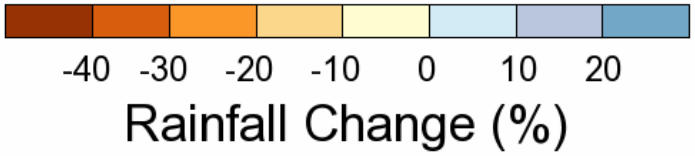
music BY

2000

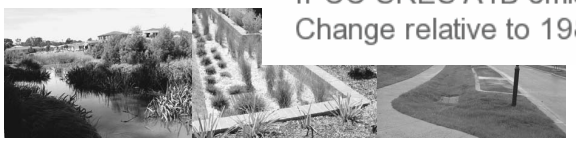


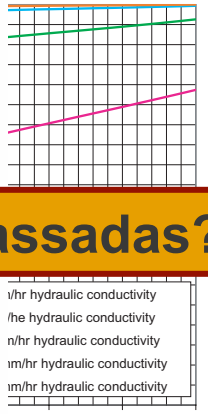
Faz sentido continuar a utilizar séries temporais passadas?

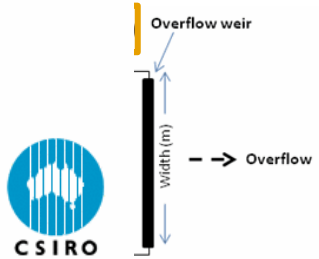
Curvas de desempenho

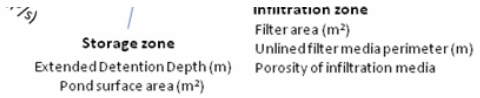


CSIRO Mark 3.5 climate model
IPCC SRES A1B emission scenario
Change relative to 1980-1999 average









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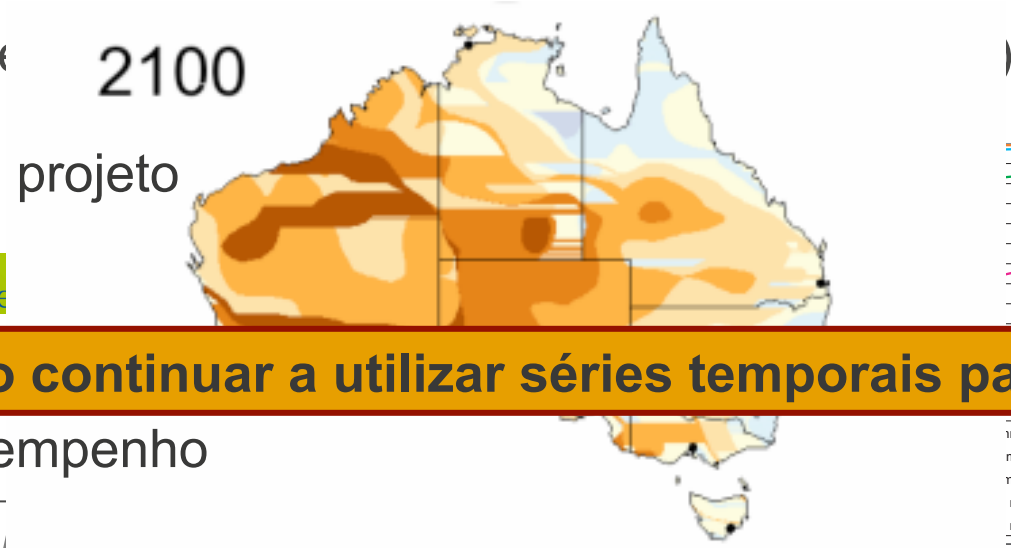

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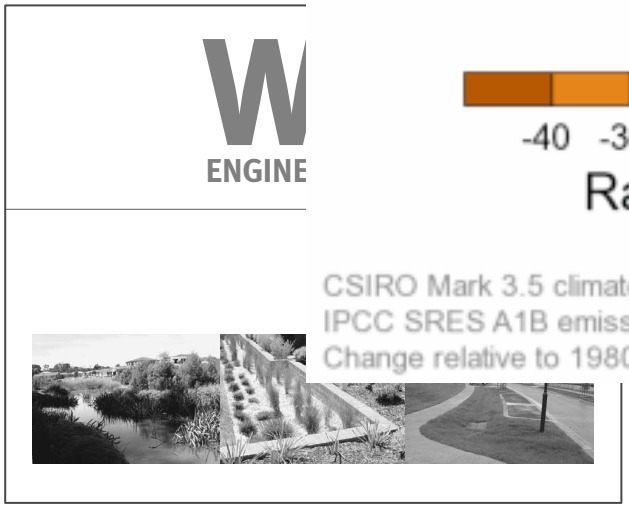
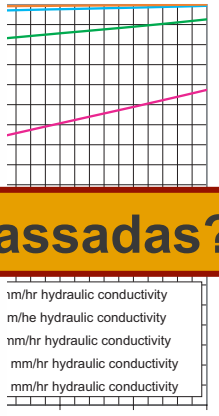
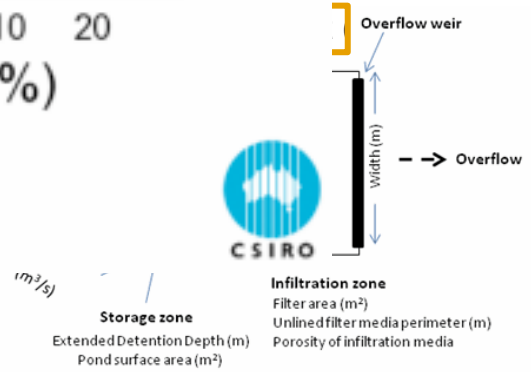






Melbourne Water (2005)

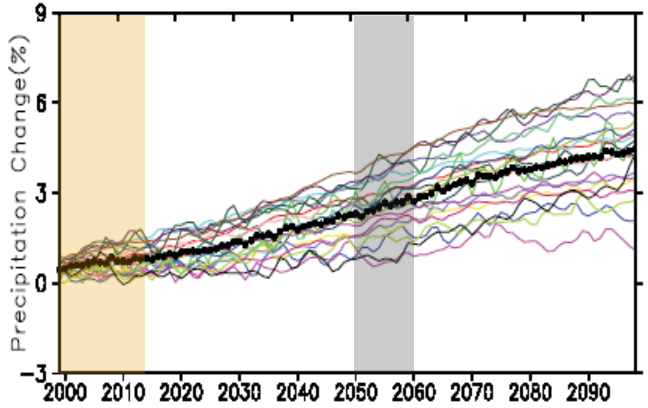
Objetivos

- Realizar um **exercício de modelagem** para avaliar a sensibilidade de curvas de desempenho a variações entre:

Precipitação presente e futura projetada

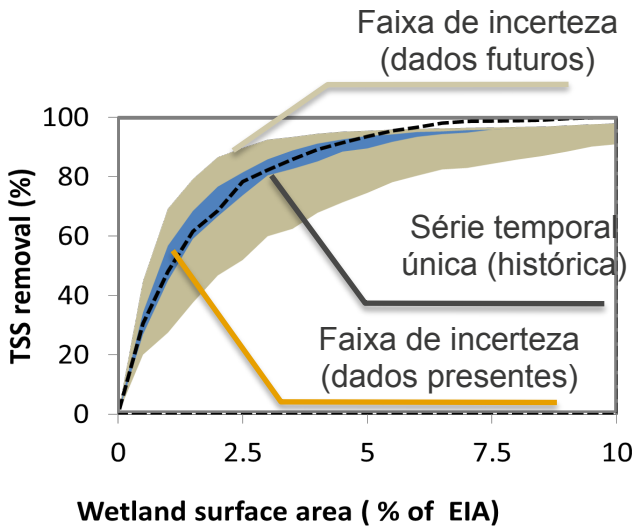
Dados presentes simulados e incerteza

Projeções futuras e incerteza

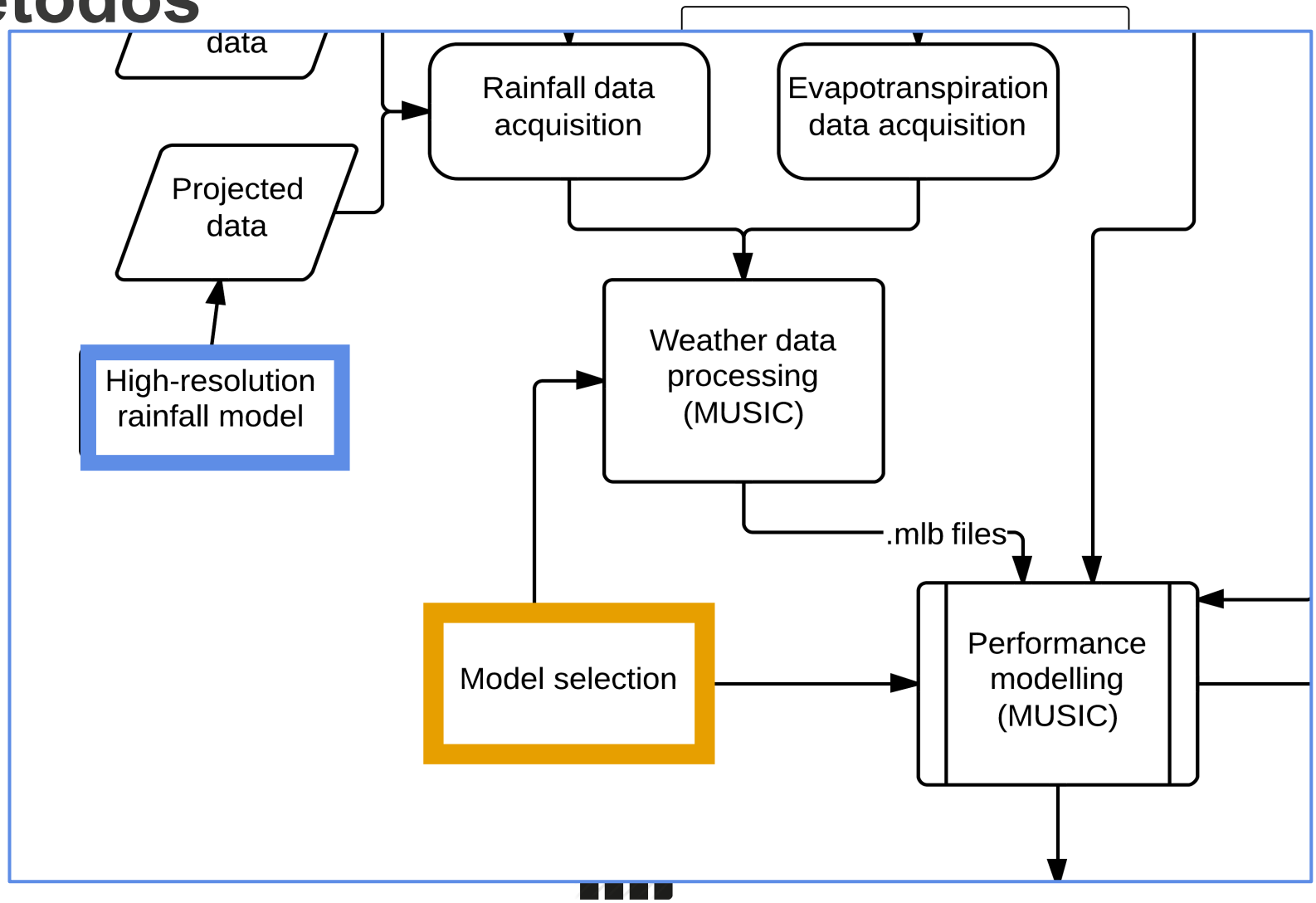


music by eWater

Curvas de desempenho: atenuação de vazão e remoção de poluentes

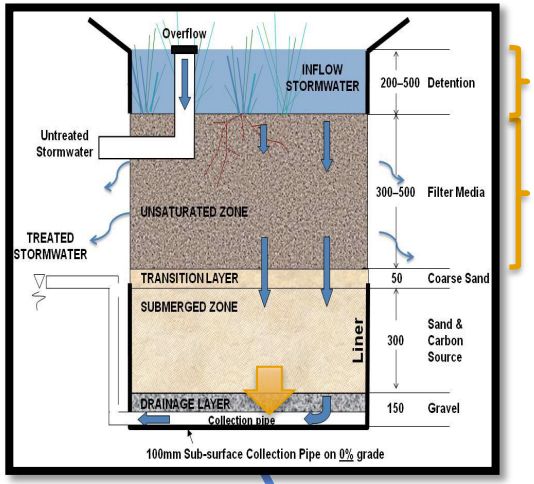


Métodos

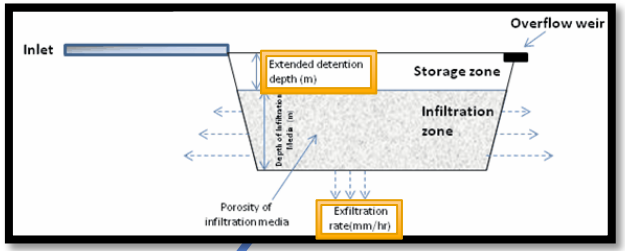

data
Rainfall data acquisition
Evapotranspiration data acquisition
Projected data
High-resolution rainfall model
Weather data processing (MUSIC)
.mlb files
Model selection
Performance modelling (MUSIC)

Métodos

Melbourne Water (2005)



FAWB (2009)



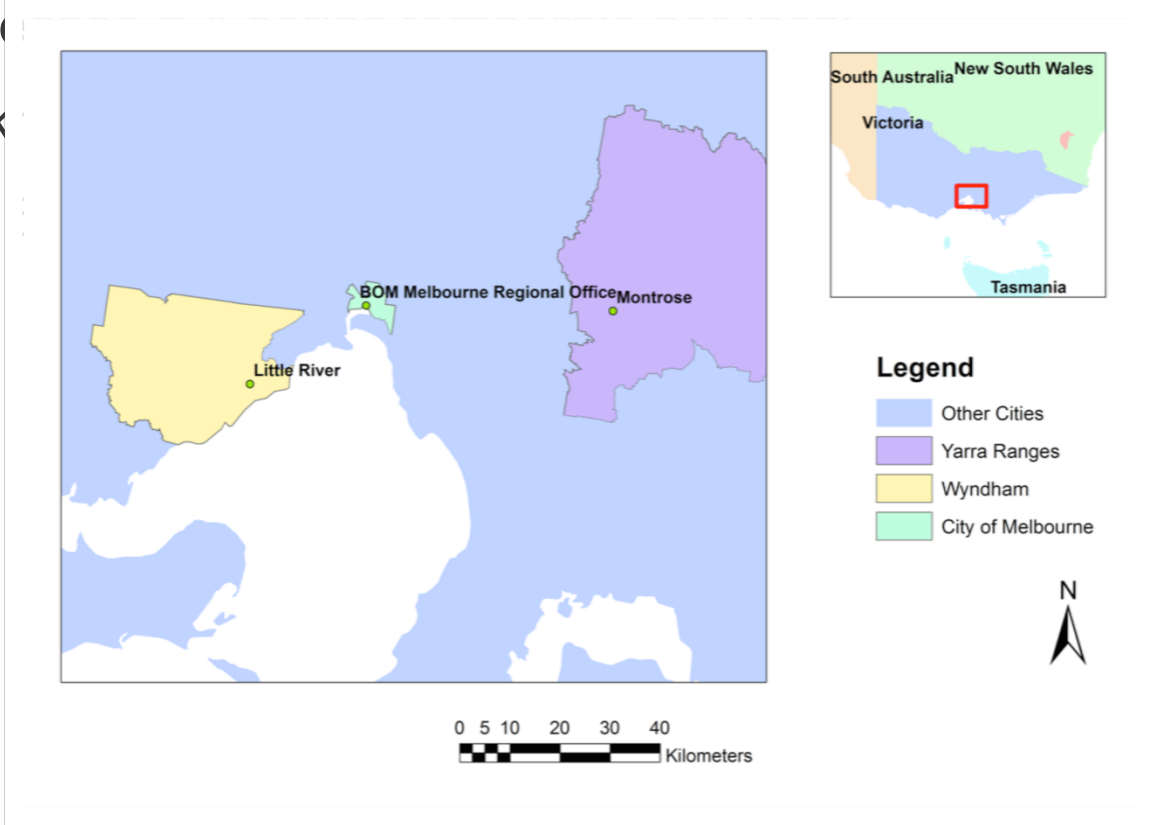
Melbourne Water (2005)

	Wetlands	Biofilters	Infiltration systems
Hydrologic effectiveness	✓	-	✓
TSS removal	✓	✓	✗
TN removal	✓	✓	✗
TP removal	✓	✓	✗

Métodos

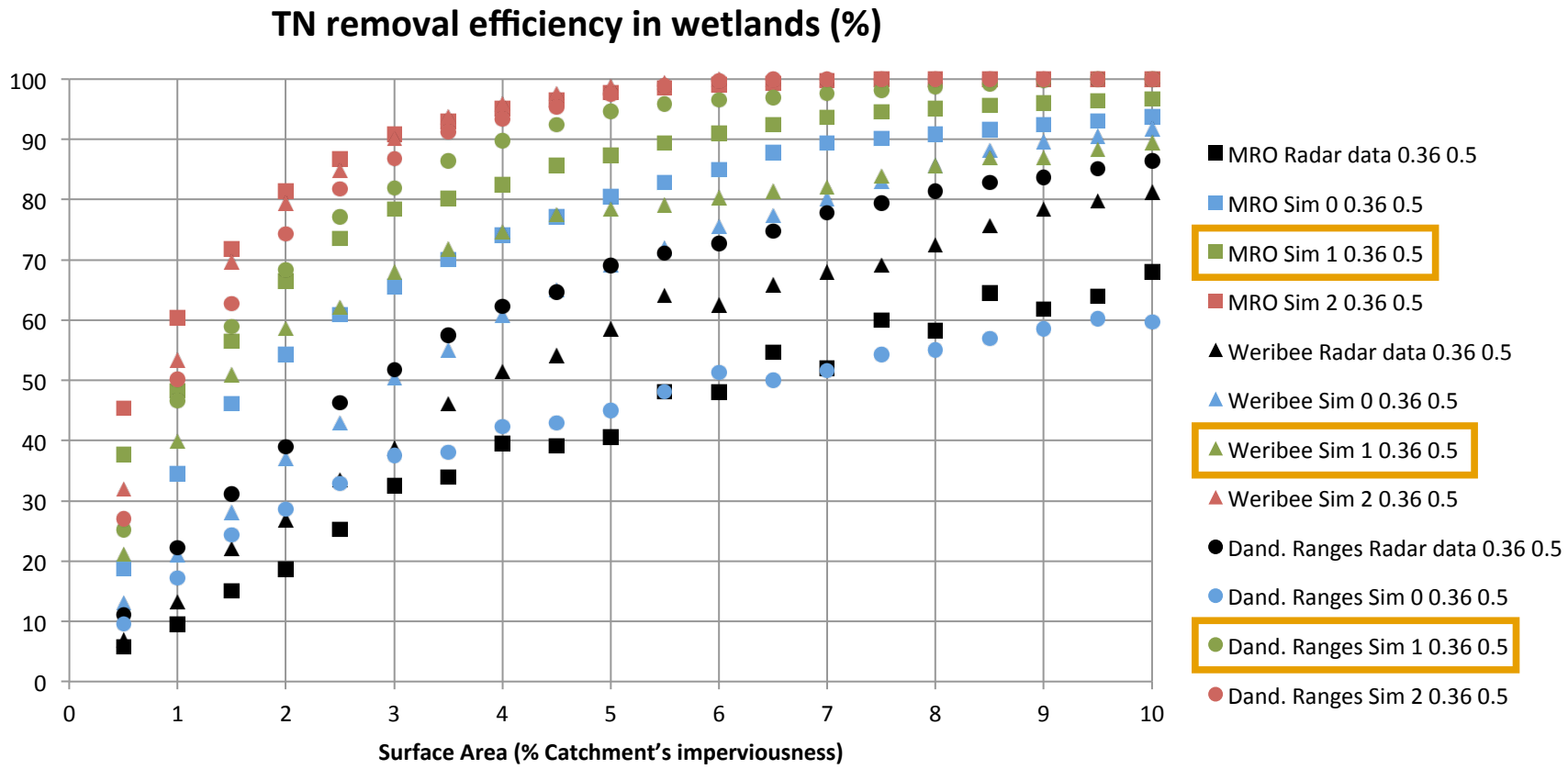
- 2008 – 2009
- Dados de radar + 3 proj
- Resolução temporal: 1 k
- Discretização temporal:
- 3 locais

10.320 estimativas de desempenho



Resultados preliminares

- Locais distintos
- Mesma projeção
- Mesmos parâmetros



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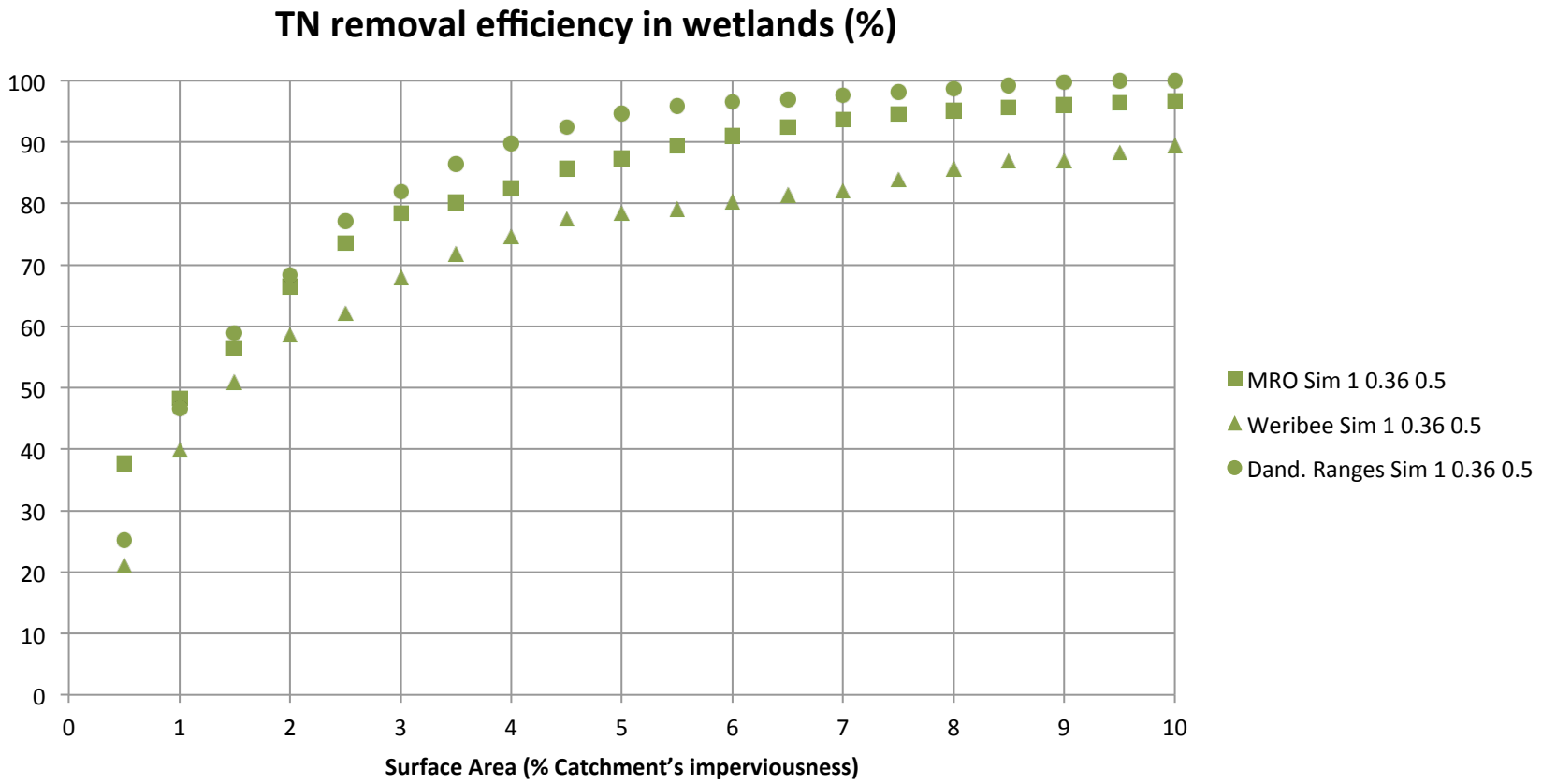

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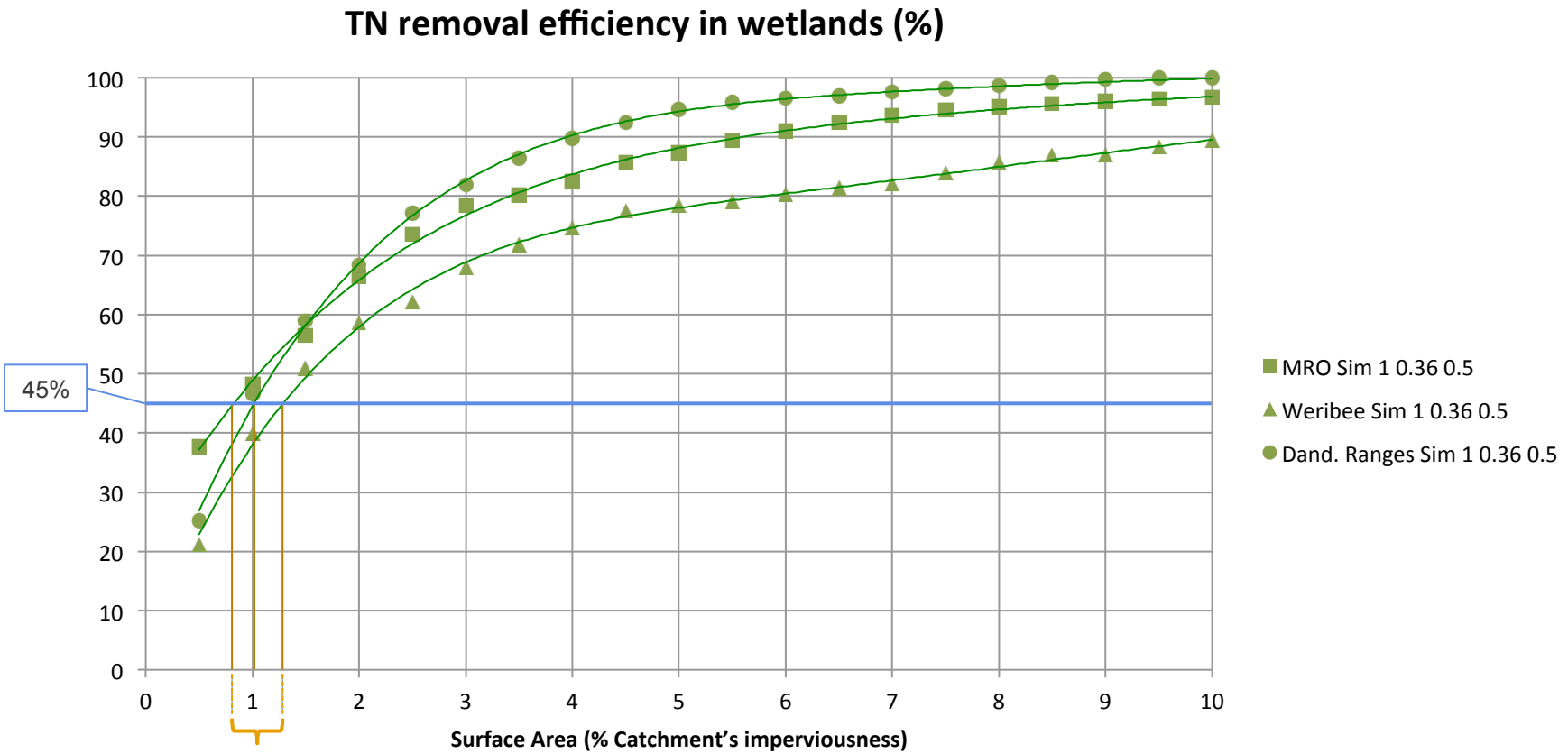
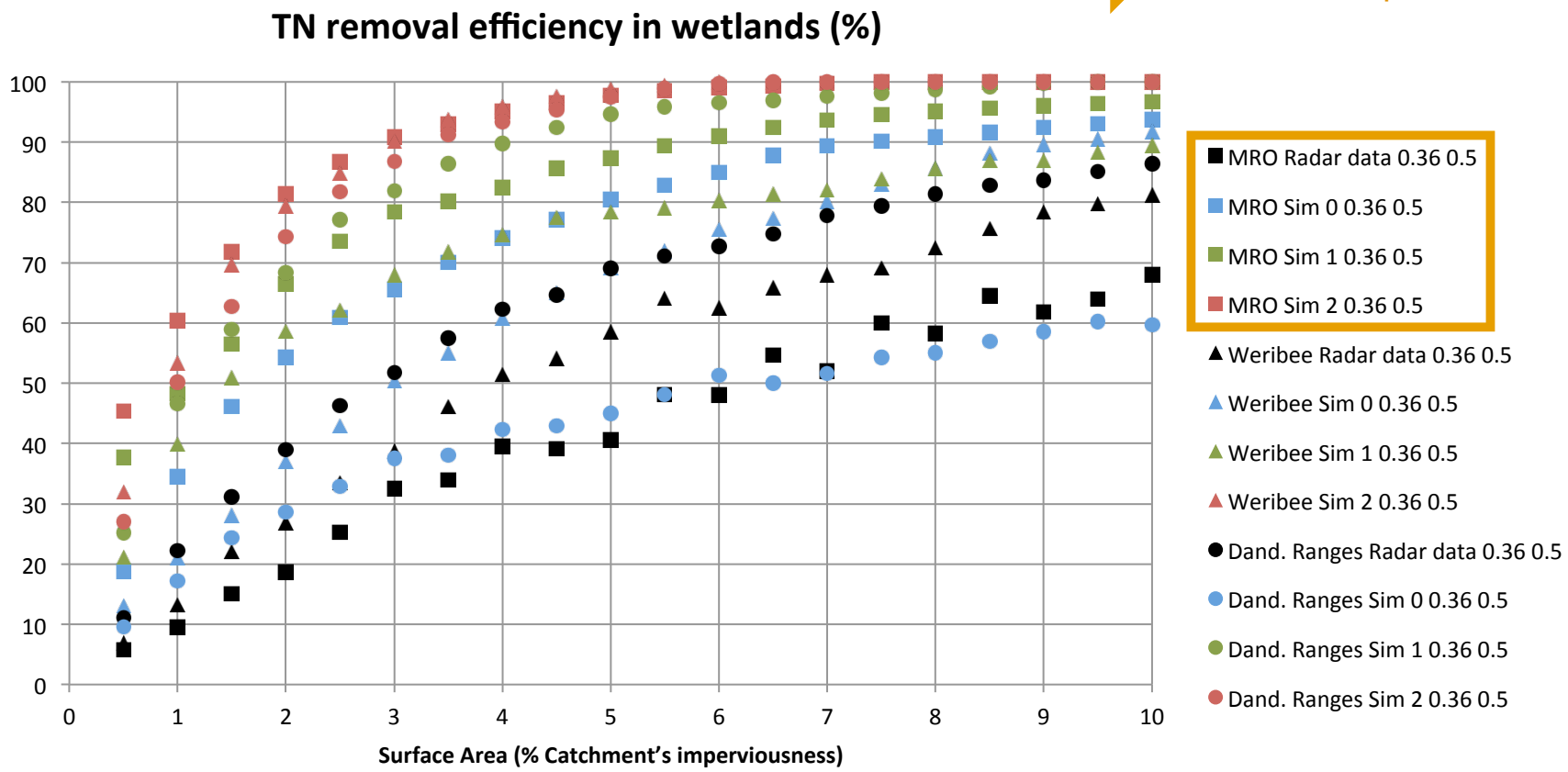


Resultados preliminares

- Mesmo local
- Mesmos parâmetros
- Séries temporais distintas



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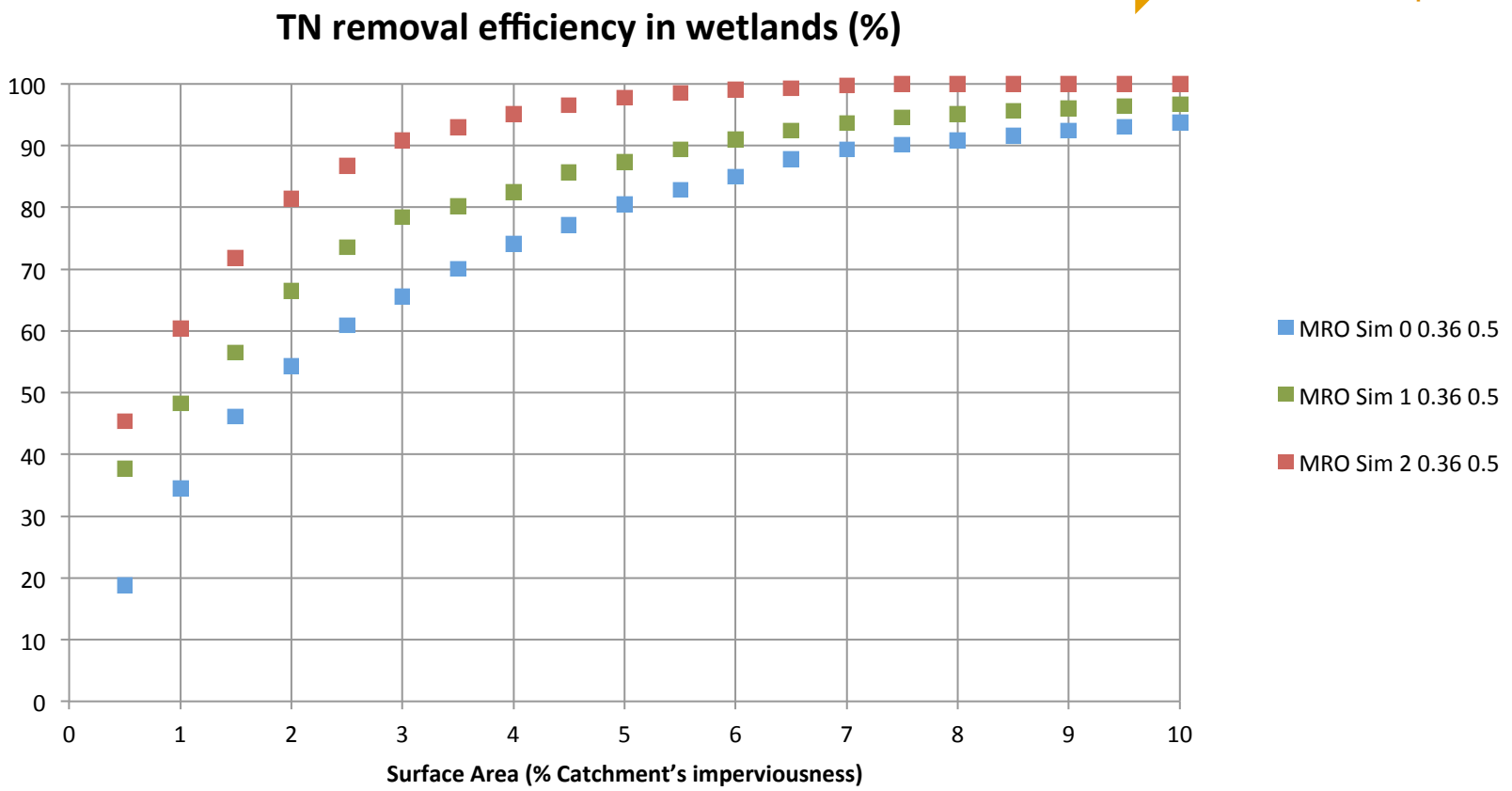

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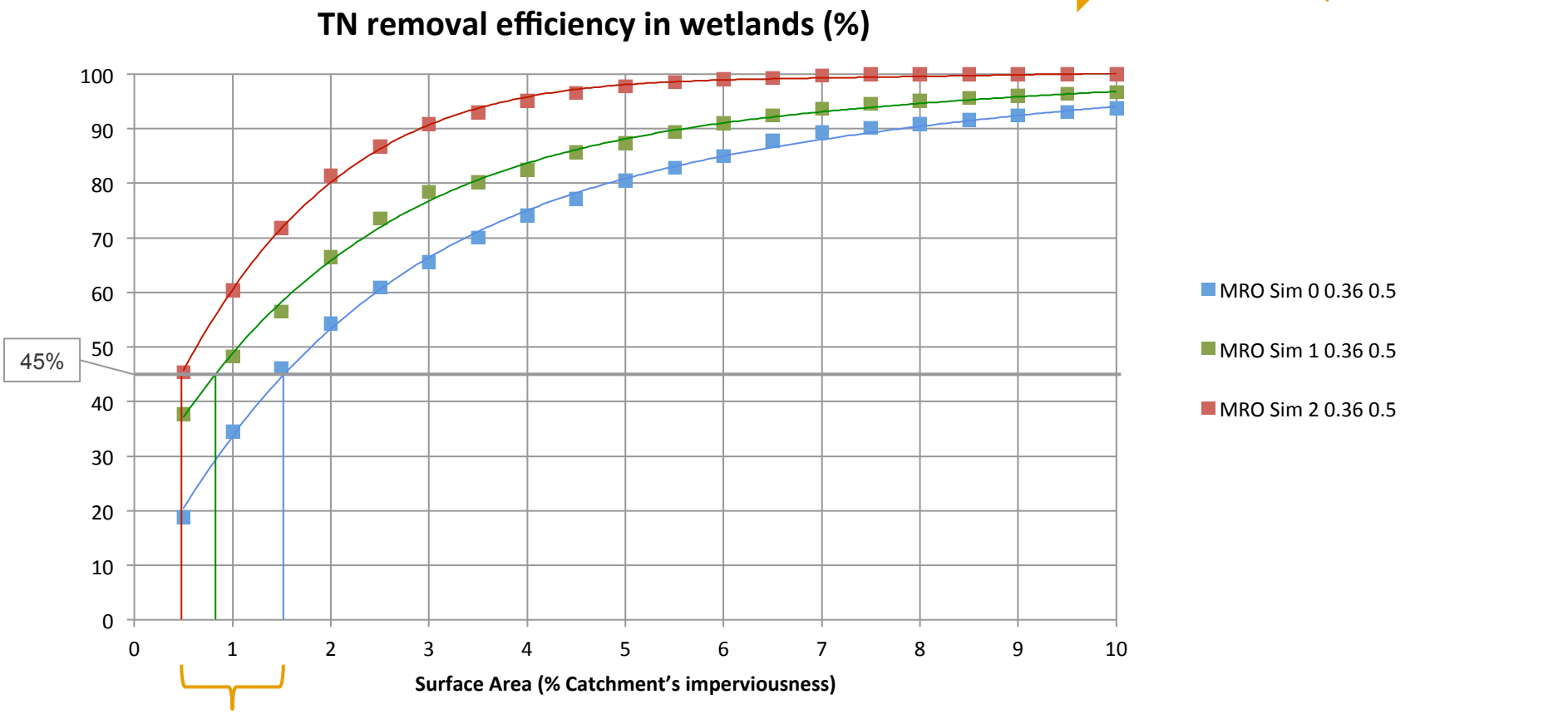

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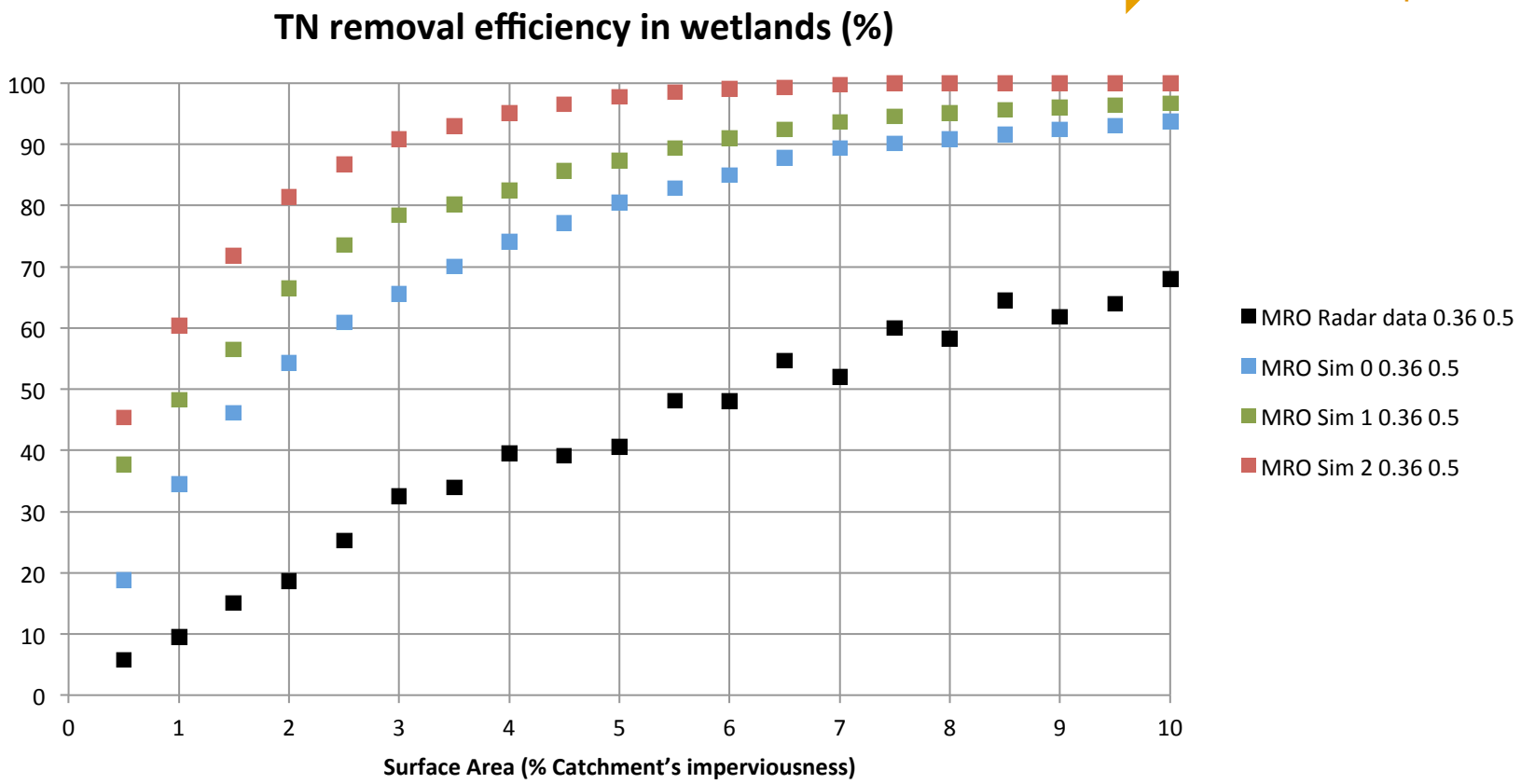

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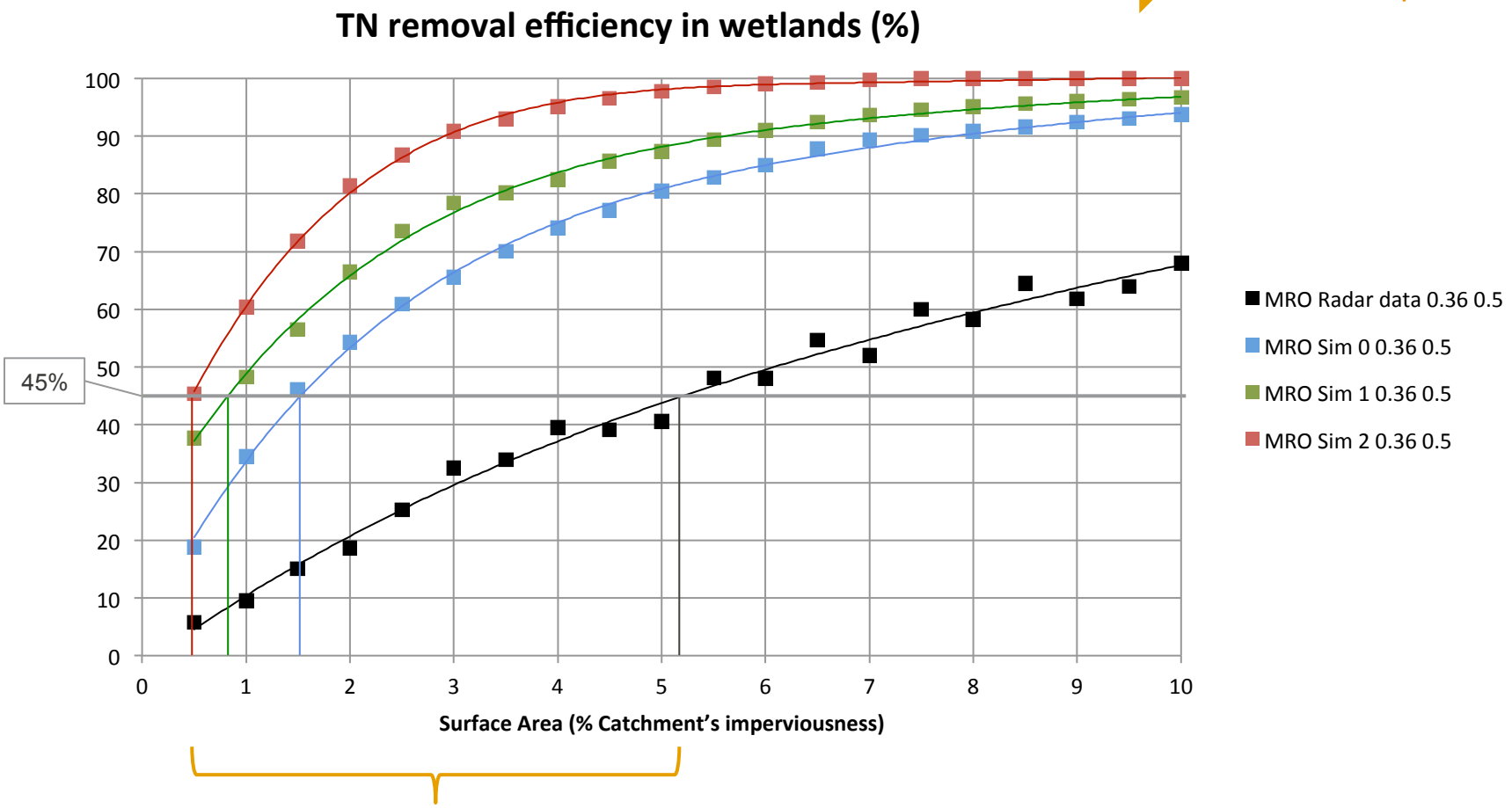

Conclusões e Observações

- Método para a geração de curvas de desempenho para diversas configurações

(= rápida estimativa preliminar da demanda de área)

- Análise e comparação entre:
  - Localizações
  - Projeções
  - Características construtivas, etc.
- Resultados (até agora) demonstraram sensibilidade aos parâmetros escolhidos
- Procedimento / método para a análise estatística dos resultados
- Aplicação a outros sistemas e configurações
- Adaptação ao Brasil (?)
- Necessidade de dados apropriados:
  - Alta resolução temporal
  - Séries temporais mais longas

Referências

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- _____. **Design, Construction & Maintenance of WSUD**. 2010
- Wong, T., et al., **MUSIC Version 5.0**, Software, 213 pp, MUSIC Development Team, CRC for Catchment Hydrology, Melbourne. 2005

Agradecimentos

- Profa. Dra. Nádia B. Bonumá
- Prof. Dr. César Augusto Pompêo
- Profa. Dra. Ana Deletic

CRC for Water Sensitive Cities

CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

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Obrigado

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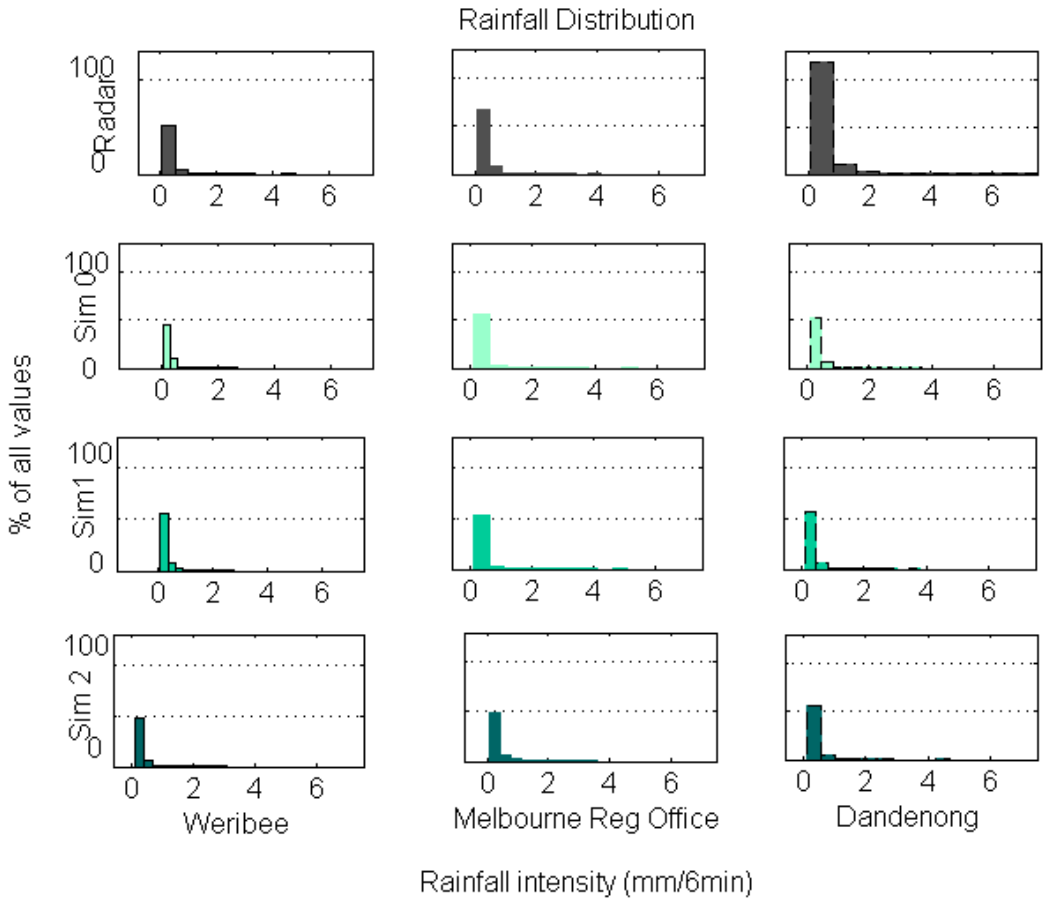
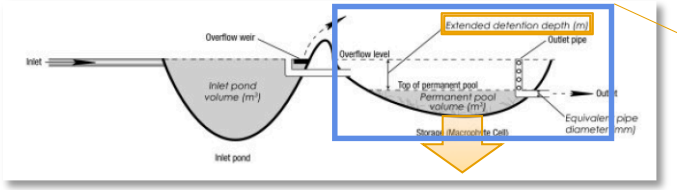
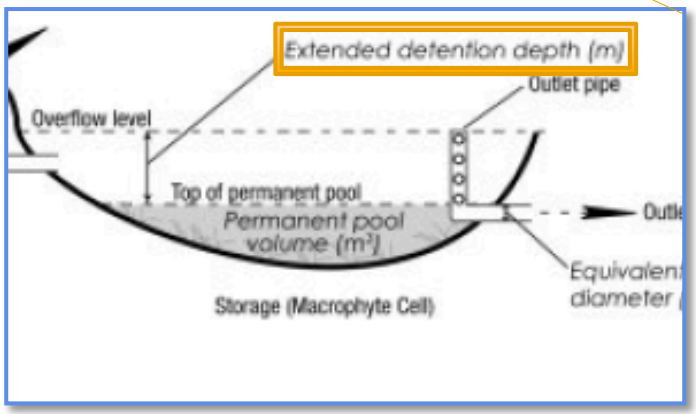
Slides adicionais

Comparação preliminar de séries temporais




Overflow weir
Inlet
Inlet pond volume (m³)
Inlet pond
Extended detention depth (m)
Outlet pipe
Overflow level
Top of permanent pool
Permanent pool volume (m³)
Outlet
Equivalent pipe diameter (mm)
Storage (Macrophyte Cell)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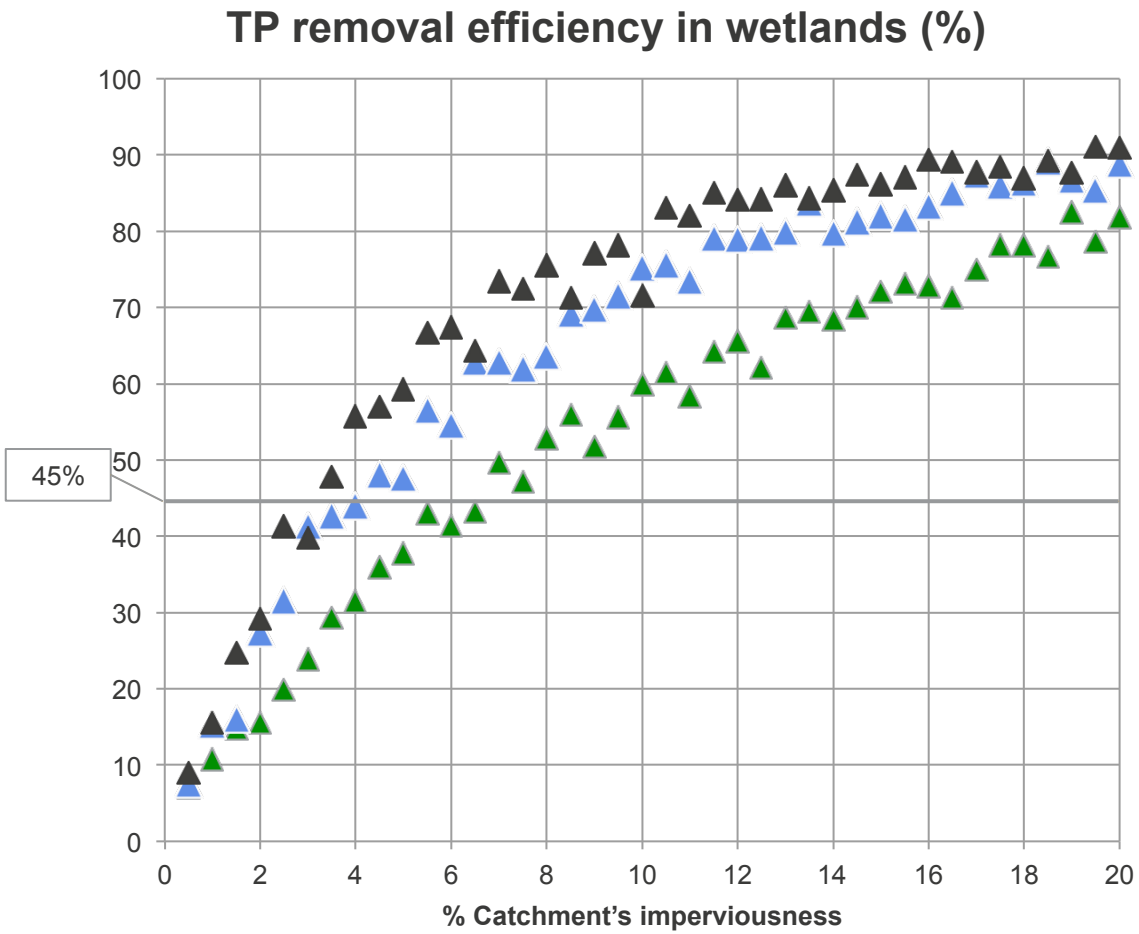
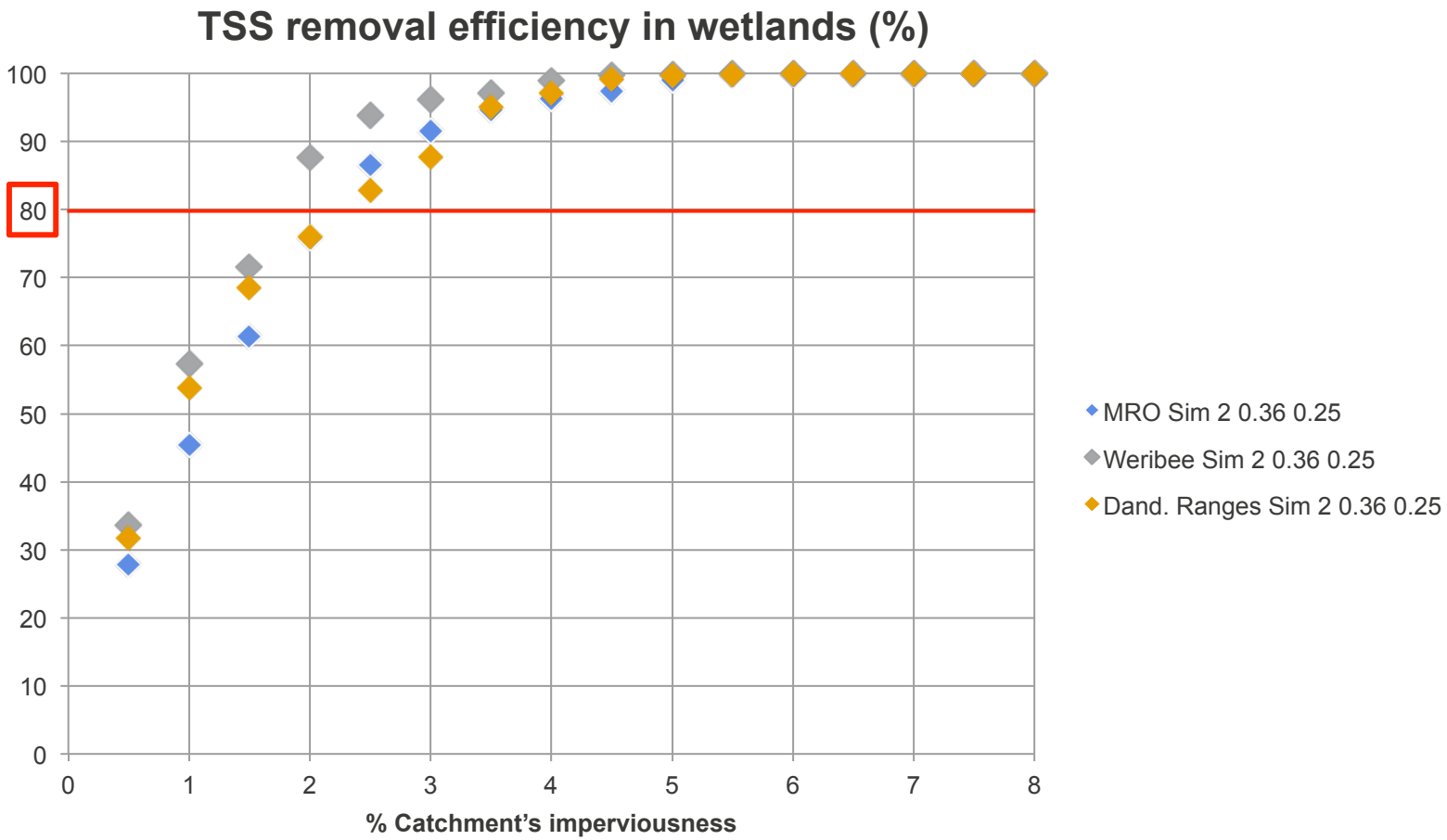

TP removal efficiency in wetlands (%)
100
90
80
70
60
50
40
30
20
10
0
45%
0
2
4
6
8
10
12
14
16
18
20
% Catchment's imperviousness
MRO Radar data 0.036 0.25
MRO Radar data 0.036 0.5
MRO Radar data 0.036 0.75


TSS removal efficiency in wetlands (%)
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
% Catchment's imperviousness
MRO Sim 2 0.36 0.25
Weribee Sim 2 0.36 0.25
Dand. Ranges Sim 2 0.36 0.25

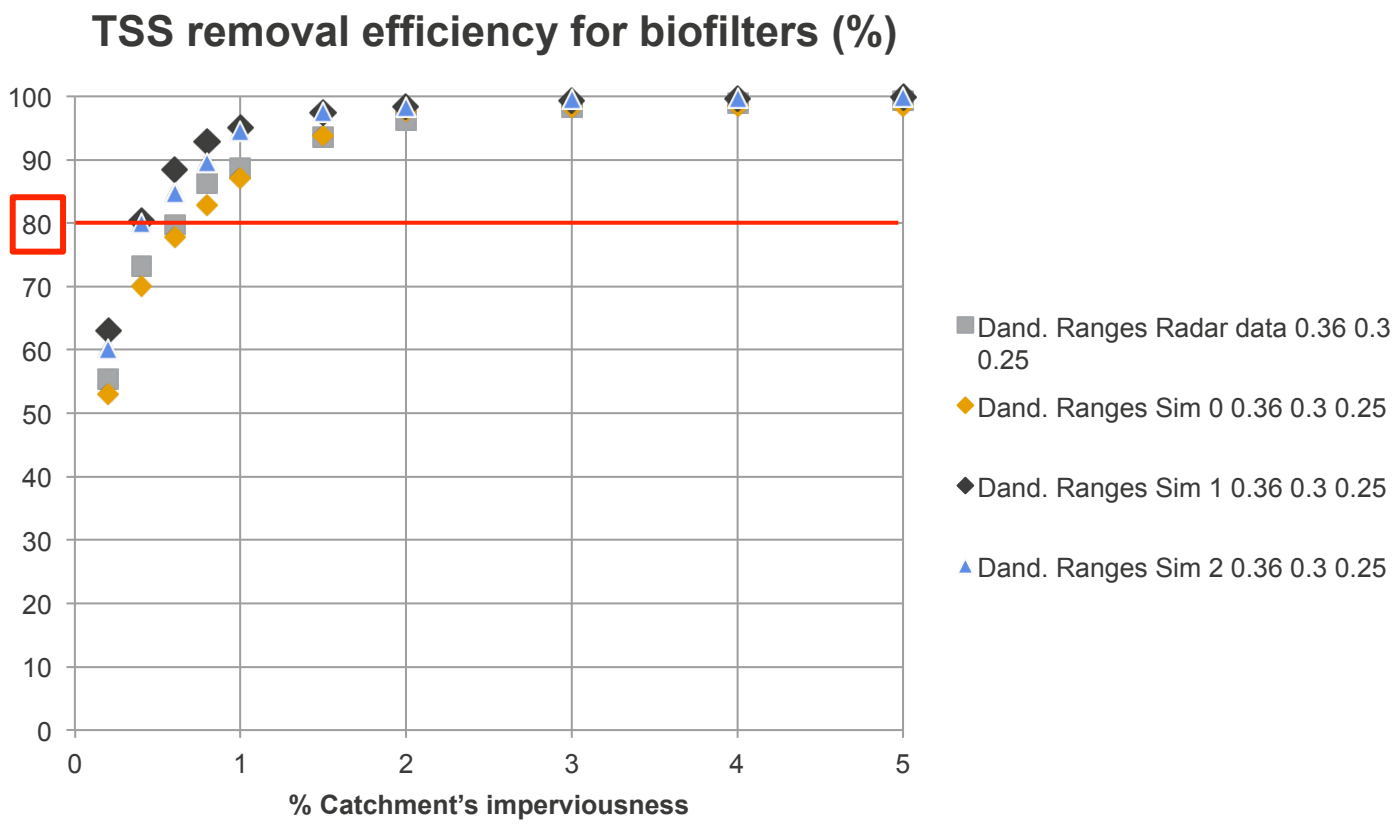
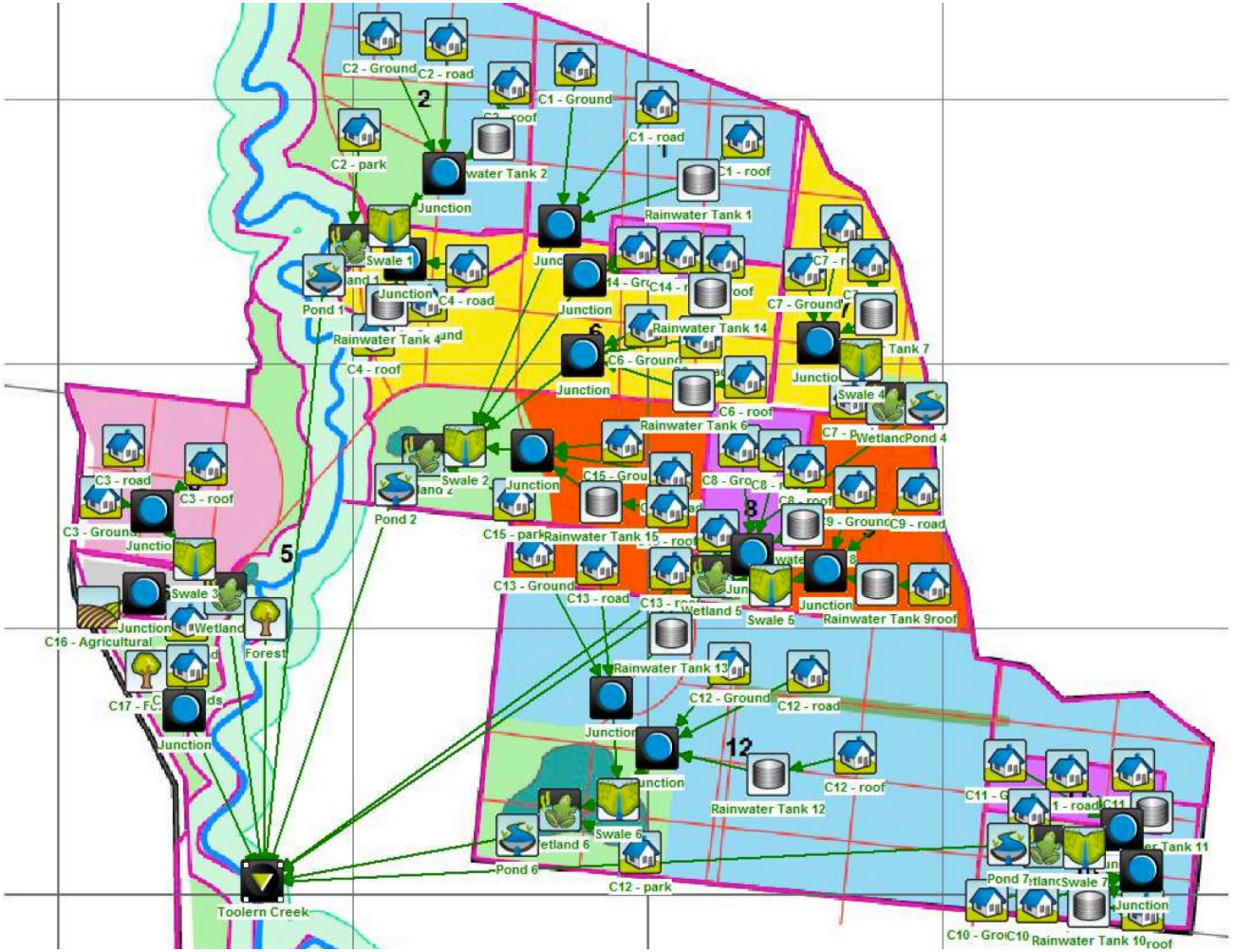
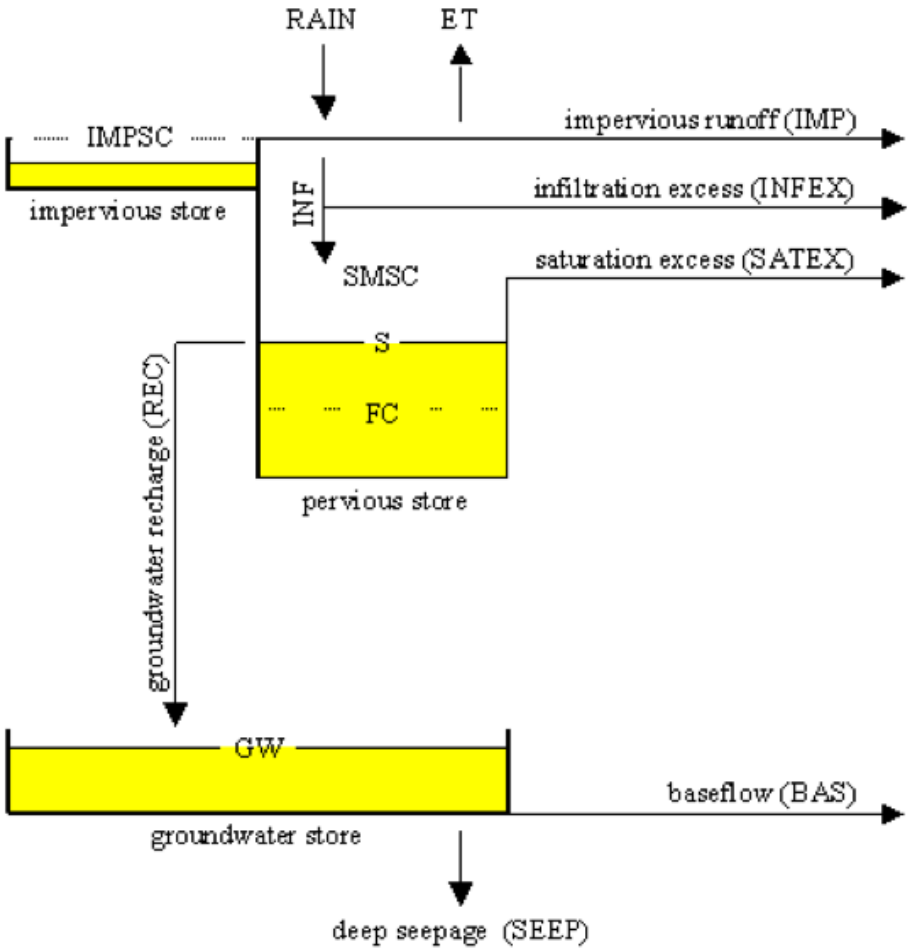

TSS removal efficiency for biofilters (%)
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
% Catchment's imperviousness
Dand. Ranges Radar data 0.36 0.3 0.25
Dand. Ranges Sim 0 0.36 0.3 0.25
Dand. Ranges Sim 1 0.36 0.3 0.25
Dand. Ranges Sim 2 0.36 0.3 0.25

Ilustração do modelo MUSIC



Modelo de chuva-vazão simplificado adotado no MUSIC



Escolha de parâmetros de nó de tratamento no MUSIC