



# Comparison of hydrologic simulations using regionalised and catchment-calibrated parameter sets for three catchments in England

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# Overview

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- Objective of the paper
- CRASH - principles
- Regional CRASH
- Study catchments
- Results
- Conclusions

# Objective

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- To assess the performance of the regional CRASH model in catchments treated as ungauged
  1. Comparison between the regional and catchment-specifically calibrated CRASH in 3 catchments in England.
  2. Comparison with results from another rainfall-runoff model in 1 of the 3 catchments.

# Objective

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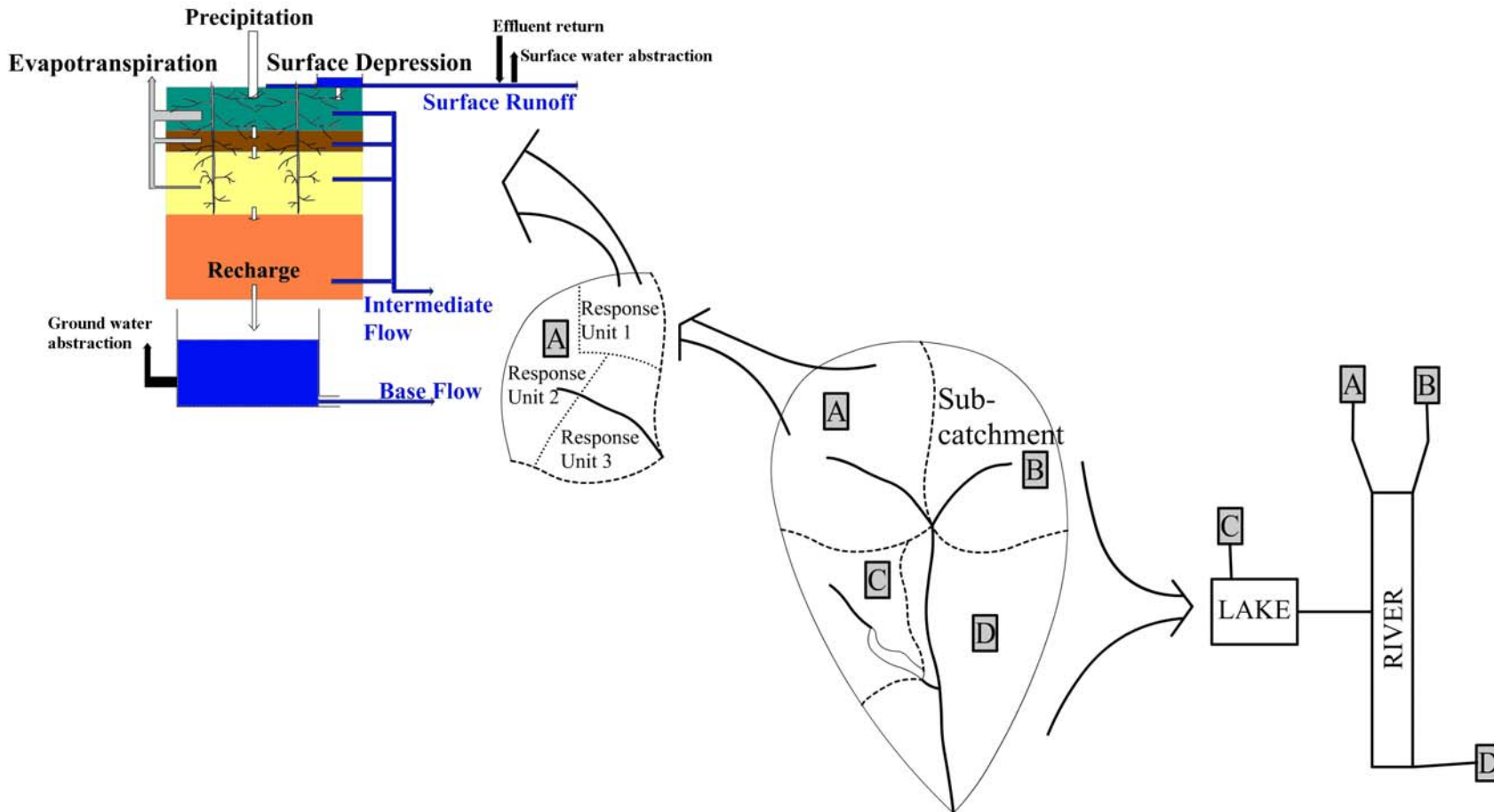
3. Comparison with similar studies in a wide variety of climate conditions.
4. Parameter uncertainty analysis.

# Catchment Resources and Soil Hydrology model

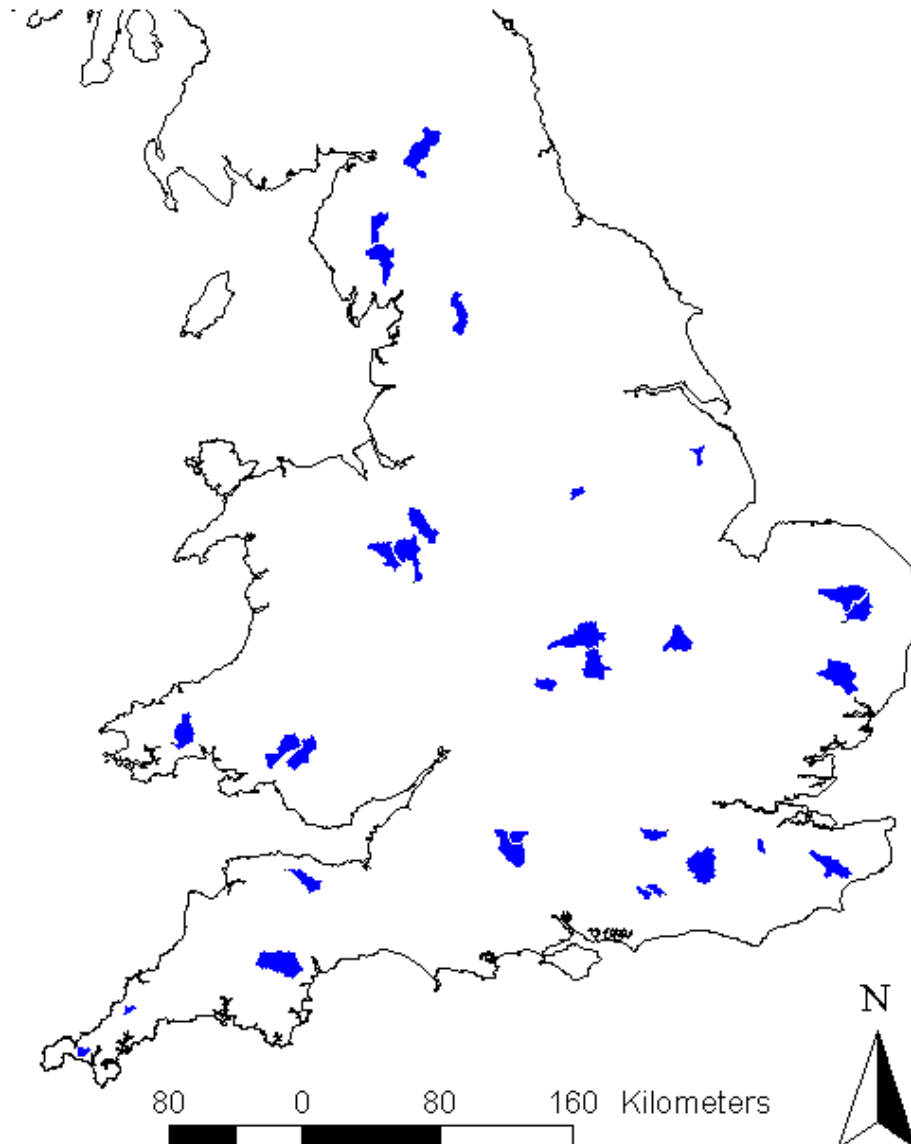
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- Ultimately aimed at being regionalised
- CRASH was developed from the assumption that the transformation of rainfall into river discharge at the catchment scale in the UK is driven by soil and land use properties.
- CRASH was built to be used exclusively with existing data sets.

# CRASH - principles

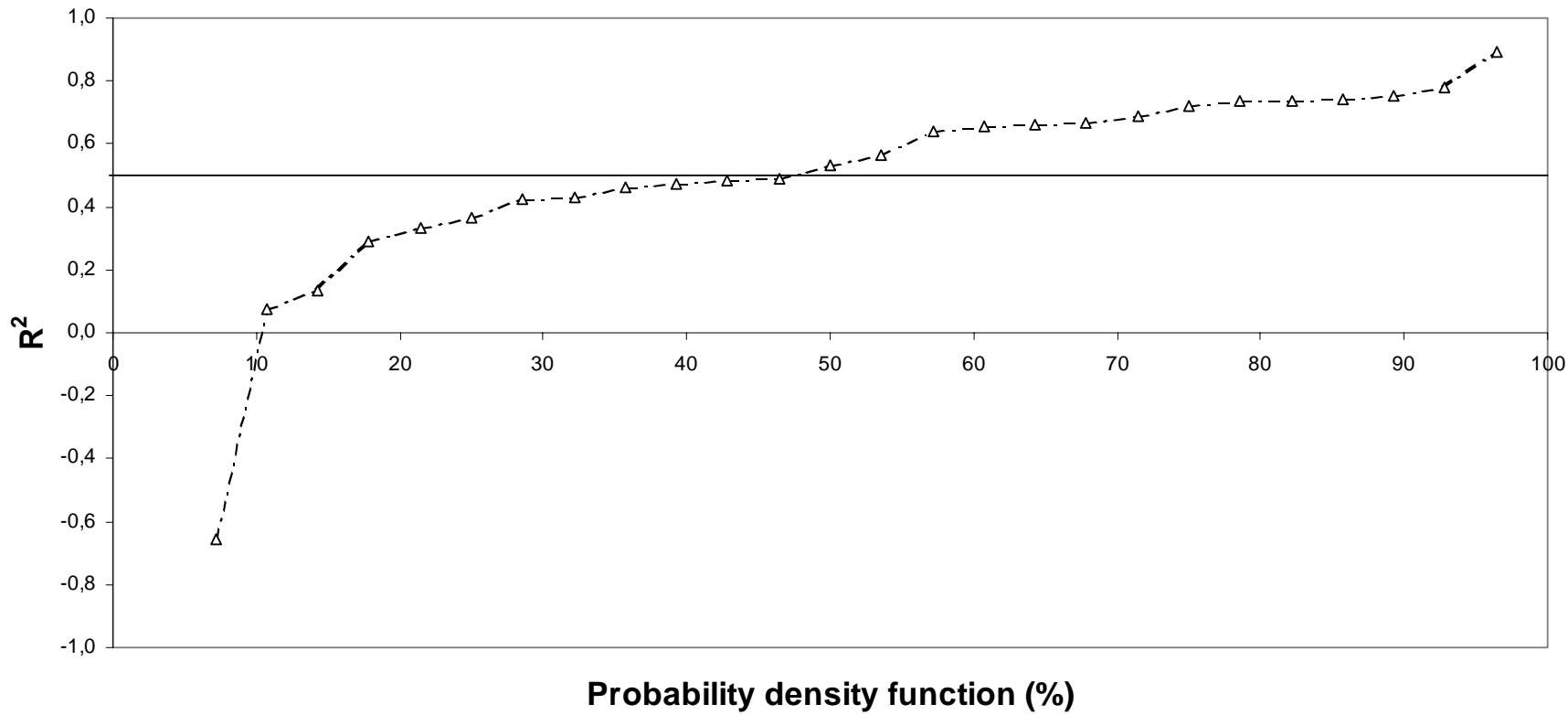


# Regional CRASH

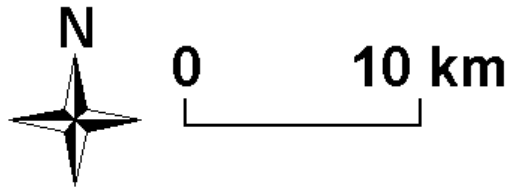


# Regional CRASH

Evaluation period - regional model



# Study catchments



● Gauging Stations



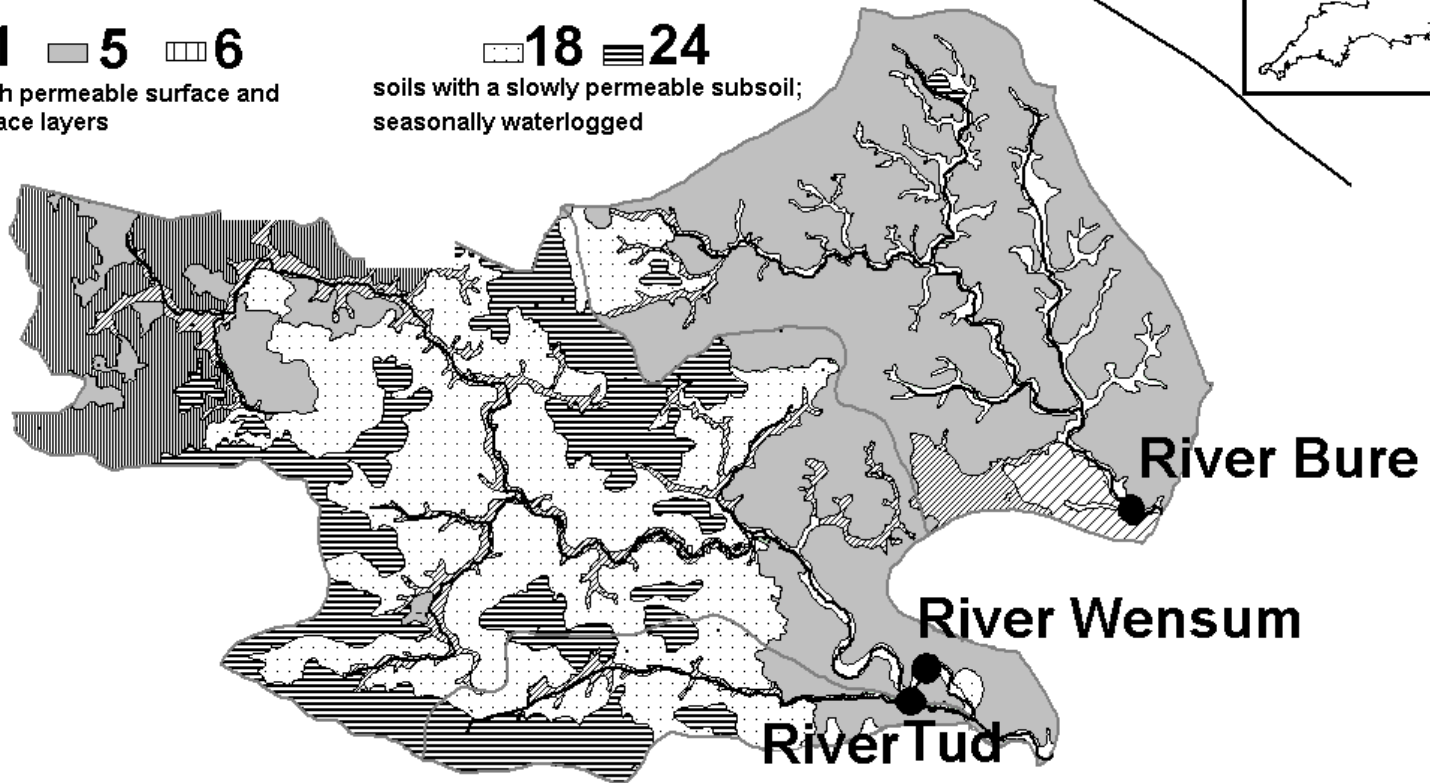
## Dominant HOST Class

■ 1 ■ 5 ■ 6

soils with permeable surface and subsurface layers

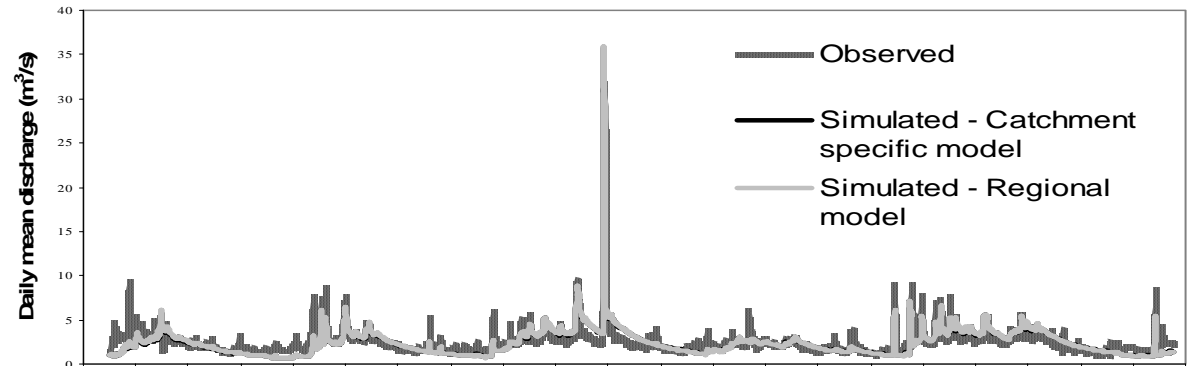
■ 18 ■ 24

soils with a slowly permeable subsoil; seasonally waterlogged

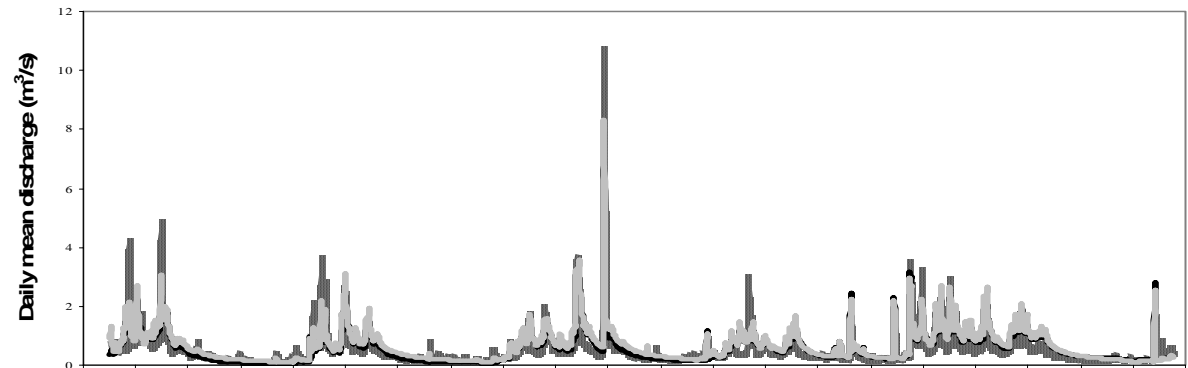


# Results

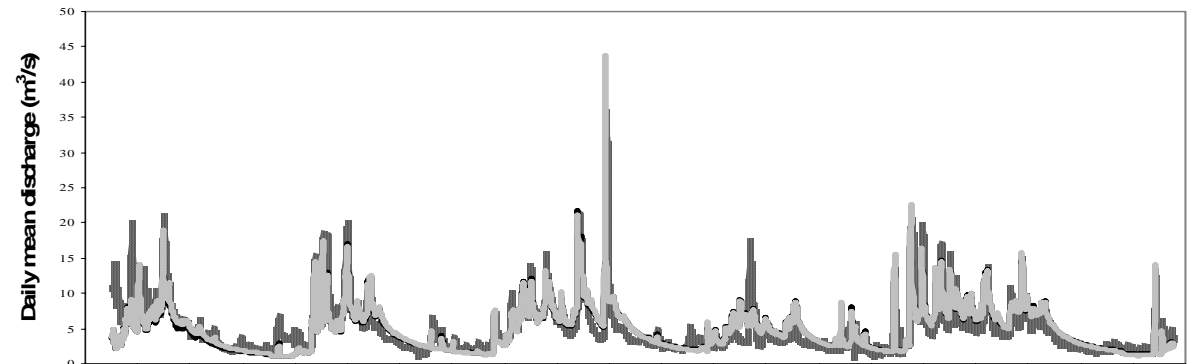
Bure



Tud



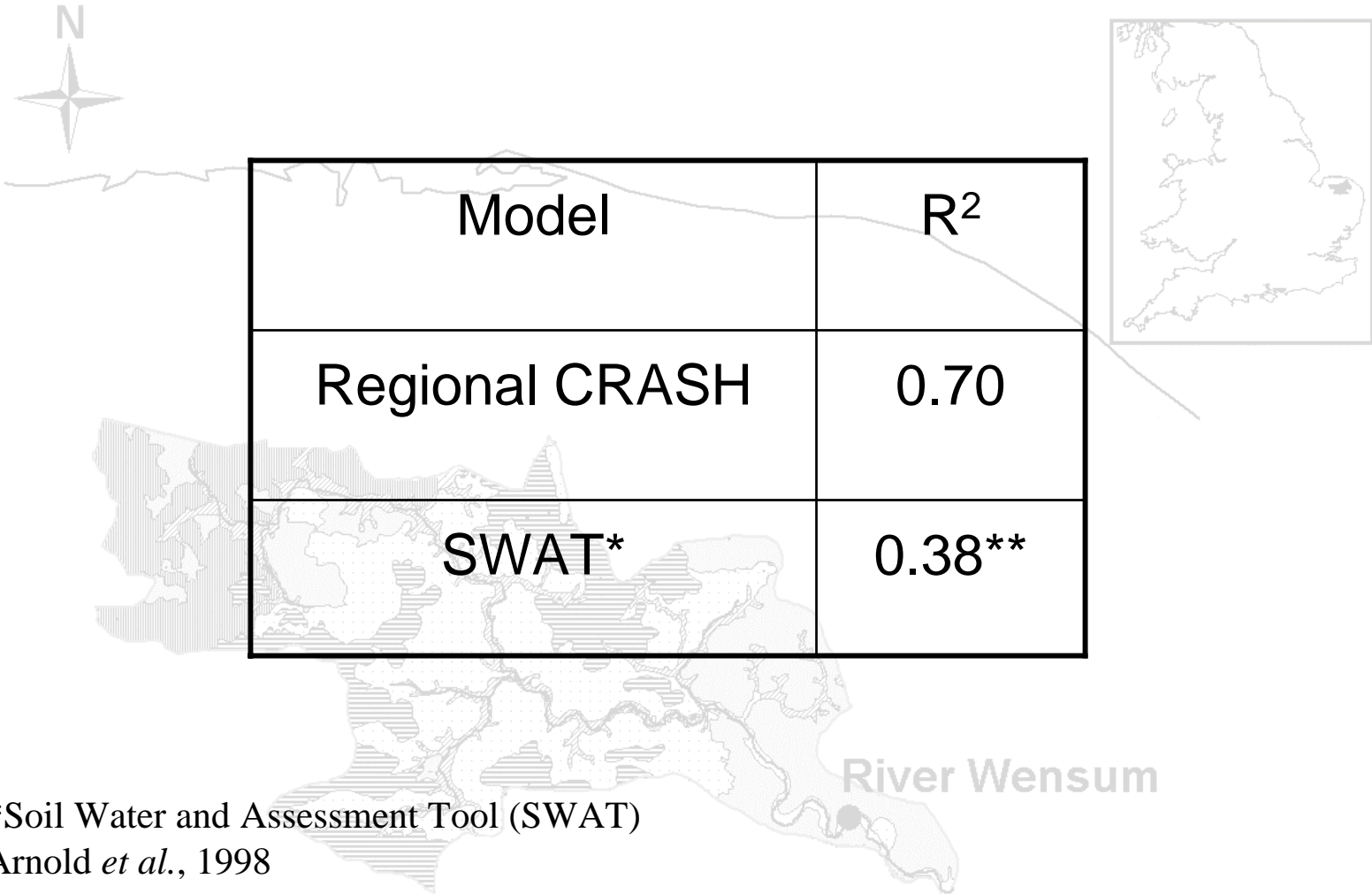
Wensum



# Results

Catchment		R <sup>2</sup>	PBIAS (%)	FMOF
Bure	Specific	0.63	-2.5	0.30
	Regional	0.56	-2.3	0.32
Tud	Specific	0.58	18.4	0.55
	Regional	0.48	36.6	0.62
Wensum	Specific	0.71	0.1	0.21
	Regional	0.70	0.7	0.25

# Results – Wensum catchment



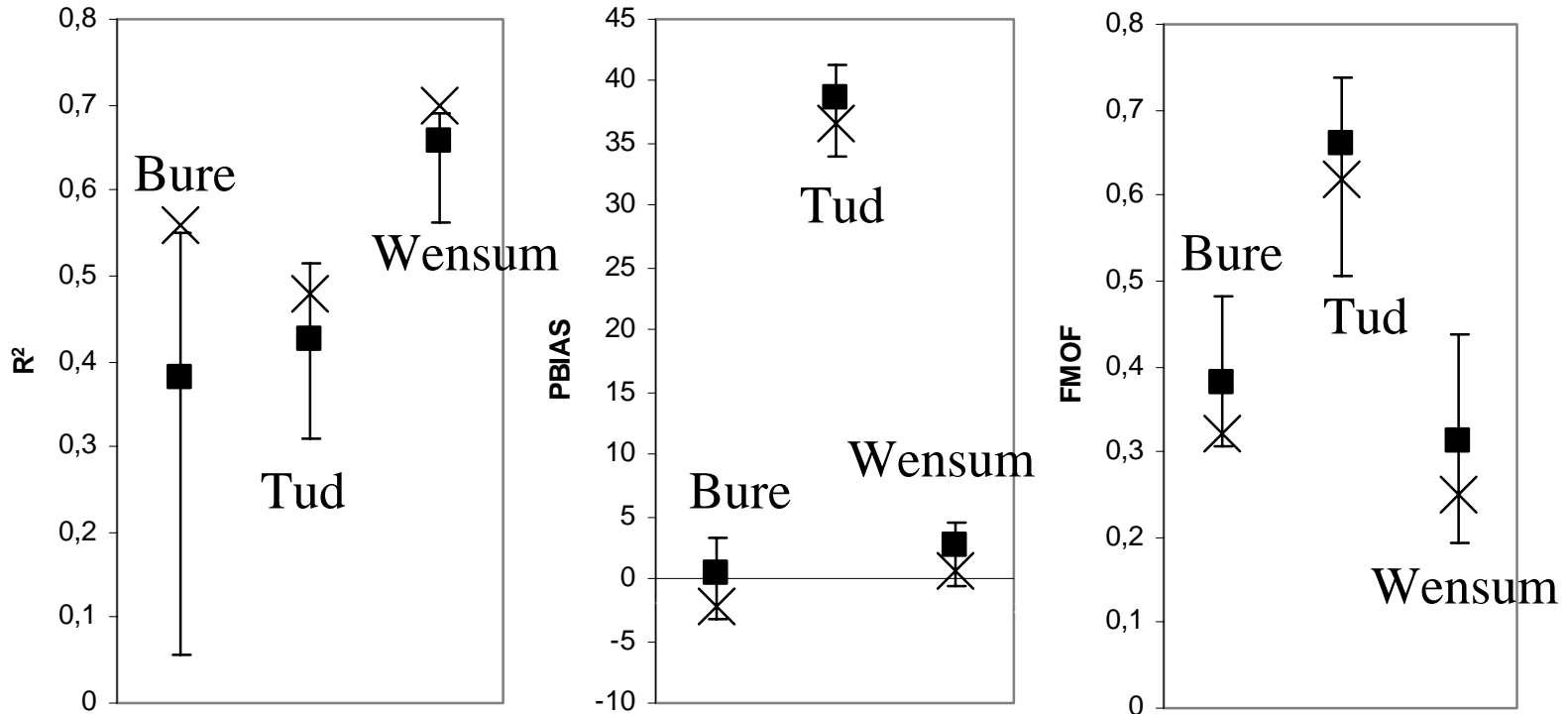
\*Soil Water and Assessment Tool (SWAT)  
Arnold *et al.*, 1998

\*\*N. Kannan – *pers. comm.*

# Results

Study	Location	Number of catchments	R <sup>2</sup>
CRASH	England	3	0.70-0.56- 0.48
Sefton and Howarth [1998]	England	2	0.61-0.53
Post and Jakeman [1999]	Australia	16	-1.53 < < 0.71
Van der Linden and Woo [2003]	Canada	3	0.6 < < 0.8
Beldring et al. [2003]	Norway	41	Above 0.5 in 60% of cases

# Results – Uncertainty analysis



× Regional model

■ Median result from the uncertainty simulations with its 90% probability limits

# Conclusions

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- Good overall performance of the model in the 3 catchments despite an overprediction in the Tud catchment.
- Reasonable confidence in the regional model.
- Restricted uncertainty on PBIAS.

# Conclusions

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- Restricted deterioration between catchment-specific and regional model in 2 catchments.
- More significant deterioration in the third catchment.
- $R^2$  values within the range of results from similar studies in various climates.