Supplement of Nat. Hazards Earth Syst. Sci., 20, 2647–2663, 2020
https://doi.org/10.5194/nhess-20-2647-2020-supplement

Natural Hazards and Earth System Sciences
Open Access

Supplement of

Building hazard maps with differentiated risk perception for flood impact assessment

Punit K. Bhola et al.

Correspondence to: Punit K. Bhola (punit.bhola@tum.de)

Table S1. Parameters of the LARSIM water balance model including initially calibrated ranges (Data source: Based on Haag et al., 2016). Eight sensitive parameters (in bold) identified in Beg et al. (2018) were used in this study to generate discharge ensemble forecasts.

Parameter	Unit	Description	Ranges (L-U)
		External forcing	
KG	[-]	Correction factor for the areal precipitation	0.9 – 1.1
KWD	[-]	Correction factor for the available amount of water including snowmelt	0.9 – 1.1
Nkor	[-]	Correction factor for rainfall measurements error	0.9 – 1.1
		Snow storage	
T_Gr	[°C]	Mean temperature of the transition zone from snowfall to rain	-3 – 2
ScRa	[mm/h]	Soil heat flow as potential melting rate	0.01 – 0.05
Abso	[-]	Absorption coefficient of the snowpack for short-wave radiation	0.02 – 0.25
A0	[W/m^2 ºC]	Heat exchange at the snow line, independent of the wind	0.5 – 3.5
A1	[J/m^3 ºC]	Heat exchange at the snow line, dependent on the wind	0.8 – 2.5
SRet	[%]	Coefficient for the retention of liquid water in the snow pack	5.0 – 47.0
		Soil storage and runoff generation	
A2	[mm/h]	Threshold value for fast and slow surface runoff	0.5 – 4.0
BSF	[-]	Exponent of the soil moisture saturation area function	0.01 – 0.5
Dmax	[-]	Calibration factor for lateral drainage to the interflow storage at saturated conditions	0 – 10
Dmin	[-]	Calibration factor for lateral drainage to the interflow storage at field capacity	0 – 5
β	[1/d]	Drainage index for deep percolation from the lower soil storage	0.000002 – 0.1
WZPf	[-]	Threshold value for the lower soil storage as a fraction of the total soil storage	0.25 – 0.75
WZBo	[-]	Threshold value for the middle soil storage as a fraction of the total soil storage	0.35 – 1.05
Mauf	[mm/d]	Maximum rate of capillary rise	0.9 – 1.1
KFeld	[-]	Correction factor for the field capacity	1.0 – 1.4
		Runoff concentration	
EQD2	[-]	Calibration variable for the retention constant of the fast surface runoff storage	10 – 1000
EQD	[-]	Calibration variable for the retention constant of the slow runoff storage	50 – 5000
EQI	[-]	Calibration variable for the retaining constant of the interflow storage	200 – 15000
EQB	[-]	Gauging size for the retaining constant of the basis discharge storage	5000 – 100000
		Flood routing	
EKM	[-]	Calibration factor for the roughness coefficient in the main river bed	0.3 – 3.0
EKL / EKR	[-]	Calibration factors for the roughness coefficients on the flood plains	0.3 – 3.0

Table S2. 2D hydrodynamic model properties and roughness. Data source: Bhola et al (2018a) and Bhola et al. (2018b).

Data	Value
HD model properties	
Model area	11.5 km^2
Total number of cells	430,485
Δt	20 s
Minimum cell area	6.8 m^2
Maximum cell area	59.8 m^2
Average cell area	24.8 m^2
Downstream boundary condition slope	0.0096
HD model roughness [s/m$^{(1/3)}$]	
Water bodies	0.022
Agriculture	0.043
Forest	0.189
Transportation	0.014
Urban	0.074