Multi-Resolution Flood Hazard and Exposure Assessment in the Upper Narmada Basin

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Flood hazard zone assessment

The hydraulic variables, such as depth and velocity, are used to ascertain the flood hazard vulnerability classes, as shown in Table S1 (Smith et al., 2014). The specific thresholds mentioned in Table S1 provide a general flood vulnerability classification for people, buildings and vehicles. For example, let us consider a pixel that has maximum depth (D) within 0.3 m, velocity (V) within 2 m/s and their product within 0.3 m^2/s. According to Table S2, the pixel then falls under the H1 category. The description of each hazard class is summarized in Table S2.

Table S1. Flood hazard zone assessment thresholds.

Hazard class	Maximum depth threshold - D (m)	Maximum velocity threshold -V (m/s)	Classification limits
H1	0.3	2	$D*V \leq 0.3$
H2	0.5	2	$D*V \leq 0.6$
H3	1.2	2	$D*V \leq 0.6$
H4	2	2	$D*V \leq 1$
H5	4	4	$D*V \leq 4$
H6	-	-	$D*V \leq 4$

Table S2. Description of the characteristics of different hazard zones (Smith et al., 2014).

Hazard class	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings are vulnerable to structural damage. Some less robust buildings are subject to failure.
H6	Unsafe for vehicles and people. All building types are considered vulnerable to failure.

Table S3 Hydraulic model performance indices for flood event 2022

Model resolution	**30m**	**140m**	**280m**
Manning's	0.02,0.09	0.03,0.03	0.02,0.09
NSE	0.82	0.81	0.69
RRMSE	0.39	0.41	0.53