



*Supplement of*

## **Flood forecasting with machine learning models in an operational framework**

**Sella Nevo et al.**

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**Table S1.** Target gauge table

Country	Target gauge name	Stage forecast model	Maximal lead time [hours]	Inundation model	Estimated drainage area (km <sup>2</sup> )*	Approximated AOI area (km <sup>2</sup> )	Population**
Bangladesh	Aricha	LSTM	36	Manifold	N.A	593	567,284
Bangladesh	B. Baria	LSTM	24	Manifold	N.A	1,410	2,034,543
Bangladesh	Badarganj	None		Thresholding	N.A	2,342	2,327,125
Bangladesh	Baghabari	LSTM	24	Manifold	14,677	1,844	1,976,199
Bangladesh	Bahadurabad	LSTM	24	Manifold	514,366	1,411	1,262,166
Bangladesh	Ballah	None		Thresholding	1,261	438	267,013
Bangladesh	Bandarban	None		Thresholding	2,284	511	111,177
Bangladesh	Bhagyakul	LSTM	48	Manifold	1,485,848	599	567,687
Bangladesh	Bhairabbazar	None		Manifold	64,644	1,568	2,115,689
Bangladesh	Bhusirbandar	LSTM	12	Thresholding	2,128	799	809,088
Bangladesh	Bogra	LSTM	12	None	N.A	1,807	2,319,232
Bangladesh	C-Nawabganj	LSTM	36	Thresholding	11,518	498	599,141
Bangladesh	Chakrahimpur	LSTM	24	Thresholding	2,940	1,649	1,526,251
Bangladesh	Chandpur	LSTM	18	Thresholding	N.A	2,182	2,477,365
Bangladesh	Chilmari	LSTM	24	Manifold	499,595	1,661	1,233,007
Bangladesh	Chiringa	None		Thresholding	1,399	616	503,680
Bangladesh	Chuadanga	LSTM	24	None	N.A	1,826	1,552,235
Bangladesh	Comilla	LSTM	12	Thresholding	2,399	1,542	2,991,986
Bangladesh	Dalia	None		Thresholding	N.A	1,280	1,172,841
Bangladesh	Demra	LSTM	24	Thresholding	5,827	586	5,439,661
Bangladesh	Derai	Linear	18	Manifold	N.A	782	485,990
Bangladesh	Dinajpur	LSTM	18	Thresholding	N.A	1,030	956,292
Bangladesh	Dohazari	None		Thresholding	2,595	763	903,966
Bangladesh	Durgapur	None		Thresholding	2,359	601	427,028
Bangladesh	Goalondo	LSTM	40	Manifold	1,485,065	1,305	699,836
Bangladesh	Gorai-RB	LSTM	36	Thresholding	N.A	999	1,110,208
Bangladesh	Habiganj	None		Thresholding	N.A	1,688	1,430,582
Bangladesh	Hardinge-RB	LSTM	36	Manifold	943,286	3,160	2,798,374
Bangladesh	Hatboalia	LSTM	36	None	N.A	751	680,854
Bangladesh	Jagir	LSTM	24	Thresholding	N.A	176	230,449
Bangladesh	Jamalpur	LSTM	24	Manifold	N.A	1,161	1,262,725
Bangladesh	Jariajanjail	LSTM	18	Thresholding	5,866	1,432	1,205,846
Bangladesh	Jhikargacha	LSTM	24	Thresholding	N.A	3,703	3,591,774
Bangladesh	Kamalganj	None		None	999	209	108,361
Bangladesh	Kamarkhali	LSTM	36	Thresholding	N.A	1,427	1,123,444
Bangladesh	Kanaighat	LSTM	18	Thresholding	1,132	581	535,291
Bangladesh	Kaunia	LSTM	12	Thresholding	11,815	1,394	1,819,088
Bangladesh	Kazipur	LSTM	36	Manifold	N.A	1,123	703,653
Bangladesh	Khaliajuri	Linear	18	Manifold	12,853	2,601	1,759,885
Bangladesh	Kurigram	LSTM	18	Manifold	5,698	981	955,712
Bangladesh	Lakhpur	None		Thresholding	4,415	1,252	1,659,968
Bangladesh	Lama	None		Thresholding	1,014	328	60,326
Bangladesh	Lourergorh	None		Manifold	2,651	779	455,890
Bangladesh	Madaripur	LSTM	18	Thresholding	N.A	2,098	1,912,853
Bangladesh	Manu-RB	None		Thresholding	2,417	362	259,571
Bangladesh	Markuli	LSTM	24	Thresholding	36,397	636	148,373

Bangladesh	Mawa	LSTM	48	Thresholding	1,487,929	725	723,767
Bangladesh	Meghna-Br	None		Manifold	69,871	1,019	667,495
Bangladesh	Mirpur	LSTM	12	Thresholding	3,717	317	4,245,300
Bangladesh	Mohadevpur	LSTM	12	Thresholding	3,602	2,358	1,564,246
Bangladesh	Moulvibazar	None		Thresholding	3,548	140	144,055
Bangladesh	Mymensingh	LSTM	24	Manifold	N.A	2,772	1,526,419
Bangladesh	Nakuagaon	None		Thresholding	N.A	919	763,365
Bangladesh	Naogaon	LSTM	18	Thresholding	2,804	1,406	1,185,363
Bangladesh	Narayanhat	None		Thresholding	N.A	531	304,368
Bangladesh	Narsingdi	LSTM	18	Thresholding	69,147	1,017	2,010,874
Bangladesh	Nayarhat	LSTM	36	Thresholding	N.A	1,464	2,667,422
Bangladesh	Noonkhawa	LSTM	18	None	N.A	698	619,363
Bangladesh	Panchagarh	None		None	N.A	885	661,449
Bangladesh	Panchpukuria	None		Thresholding	N.A	542	974,246
Bangladesh	Pankha	LSTM	24	None	928,961	645	571,576
Bangladesh	Parshuram	None		Thresholding	N.A	394	643,409
Bangladesh	Phulbari	LSTM	18	Thresholding	1,997	1,129	988,645
Bangladesh	Rajshahi	LSTM	24	Thresholding	942,110	1,430	1,713,405
Bangladesh	Ramgarh	LSTM	12	Thresholding	941	556	514,524
Bangladesh	Rekabi-Bazar	LSTM	18	Thresholding	5,883	98	298,223
Bangladesh	Rohanpur	LSTM	36	Thresholding	2,640	1,364	920,436
Bangladesh	Sariakandi	LSTM	36	Manifold	4,998	738	185,334
Bangladesh	Sarighat	LSTM	12	Manifold	913	692	474,234
Bangladesh	Serajganj	LSTM	48	Manifold	N.A	1,638	1,220,822
Bangladesh	Sheola	LSTM	36	Manifold	28,273	1,148	1,063,558
Bangladesh	Sherpur-Sylhet	LSTM	24	Manifold	35,440	1,186	587,419
Bangladesh	Singra	LSTM	24	Thresholding	8,843	3,301	2,737,382
Bangladesh	Sunamganj	LSTM	18	Manifold	6,837	974	837,524
Bangladesh	Sureshswar	LSTM	18	Thresholding	1,488,507	837	758,470
Bangladesh	Sylhet	LSTM	24	Thresholding	1,782	693	1,482,513
Bangladesh	Thakurgaon	None		None	N.A	1,246	938,490
Bangladesh	Tongi	LSTM	24	Thresholding	N.A	708	1,554,189
India	Abu Road	None		Thresholding	1,600	42	55,888
India	Addoor	None		None	855	179	595,258
India	Adkasthala	None		None	350	99	43,360
India	Agra (J.B.)	LSTM	30	None	49,052	1,285	2,751,465
India	Ahirwalia (Seasonal)	LSTM	16	Manifold	8,030	772	1,222,210
India	Akhuapada	None		Thresholding	10,385	1,398	947,603
India	Alipingal	None		None	141,230	1,412	922,657
India	Anandapur	LSTM	12	None	8,631	676	213,857
India	Ankinghat	LSTM	30	Manifold	82,579	993	453,122
India	Anna Purna Ghat	LSTM	18	Manifold	19,181	252	322,594
India	Arangaly	None		None	1,407	492	334,144
India	Araria (seasonal)	LSTM	24	Thresholding	1,839	795	968,353
India	Arjunwad (Seasonal)	LSTM	18	Thresholding	12,717	1,043	1,048,360
India	Ashramam	None		Thresholding	412	180	394,423
India	Auralya	LSTM	42	Manifold	261,331	3,447	1,576,142
India	Avanigadda	None		Thresholding	258,544	1,323	516,331
India	Avershe	None		Thresholding	N.A	329	74,526

India	Ayilam	None		None	576	279	385,195
India	Ayodhya	LSTM	30	Manifold	87,830	2,323	1,260,512
India	B.K. Ghat	None		None	51,845	2,013	870,221
India	Badar Pur Ghat	LSTM	18	Manifold	25,622	386	337,858
India	Badatighat	LSTM	12	Manifold	33,953	543	219,958
India	Badlapur	None		None	986	747	841,877
India	Ballia	LSTM	42	Manifold	544,355	1,598	868,091
India	Balrampur	LSTM	18	Thresholding	8,541	964	843,789
India	Baltara	LSTM	8	Manifold	88,480	1,854	2,195,598
India	Bamni	None		None	46,464	574	170,417
India	Banda	LSTM	24	None	27,616	945	406,134
India	Bani	LSTM	12	Thresholding	3,139	1,615	1,216,452
India	Bansi	LSTM	18	Thresholding	9,709	2,043	2,199,467
India	Bantwal	None		Thresholding	3,394	561	435,586
India	Bareilly	LSTM	24	None	18,805	2,712	3,096,414
India	Baripada	None		None	1,803	611	310,998
India	Basti	LSTM	24	Thresholding	3,009	1,863	1,910,436
India	Basua	LSTM	12	Thresholding	61,900	1,836	1,381,831
India	Batpurwaghat	LSTM	12	None	7,741	828	599,725
India	Beki Road bridge	None		Thresholding	29,101	590	455,676
India	Belonia	None		None	840	17	16,880
India	Benibad	None		Thresholding	6,160	524	913,103
India	Bhadrachalam	None		None	280,505	250	88,427
India	Bhagalpur	LSTM	40	Thresholding	939,250	939	817,889
India	Bhandara	None		None	20,938	829	259,860
India	Bharuch	None		Thresholding	98,796	2,024	889,619
India	Bhikiasen	None		None	1,841	628	90,132
India	Bihubar	None		Thresholding	3,134	42	16,156
India	Birdghat	LSTM	24	Thresholding	21,892	1,379	2,055,849
India	Burhanpur	None		None	9,075	2,262	682,655
India	Buxar	LSTM	42	Manifold	604,630	1,306	470,586
India	Byaladahalli	None		None	2,565	2,456	1,070,623
India	Chandradeepghat	LSTM	18	Thresholding	N.A	1,359	1,149,095
India	Chatia	LSTM	24	Thresholding	41,520	1,987	1,752,525
India	Chenimari	LSTM	24	Thresholding	5,383	673	255,124
India	Chhapra (Seasonal)	LSTM	18	Manifold	654,562	654	419,824
India	Chhatang Allahabad	LSTM	24	None	463,971	881	1,082,257
India	Chillaghat	LSTM	16	Thresholding	356,642	4,115	2,880,671
India	Chinturu	None		None	20,466	449	30,285
India	Cholachguda	None		None	9,904	4,833	944,648
India	Chopan	None		Thresholding	46,596	3,763	1,285,529
India	Chouldhowaghat	None		None	26,546	1,067	330,515
India	Colonelganj	None		None	2,114	1,191	1,092,992
India	Dabri	LSTM	20	Thresholding	24,542	894	287,516
India	Dalmau	LSTM	30	Thresholding	91,431	3,132	2,404,068
India	Daltenganj	None		Thresholding	8,210	2,448	836,918
India	Darauli	LSTM	42	Manifold	127,542	814	349,346
India	Delhi Rly Bridge	LSTM	24	Thresholding	36,990	705	9,855,478
India	Deongaon Bridge	None		None	52,845	4,608	900,227

India	Deoprayag (B)	None		None	7,646	273	33,057
India	Deoprayag (G)	None		None	18,777	540	55,197
India	Dhansa	None		None	15,369	252	2,451,917
India	Dharamtul	LSTM	24	Thresholding	16,197	203	90,133
India	Dheng Bridge	None		Thresholding	3,790	826	1,183,570
India	Dhengraghat	LSTM	24	Thresholding	10,160	680	718,193
India	Dholabazar	None		Thresholding	27,678	3,744	699,645
India	Dholpur	LSTM	30	None	138,123	904	297,924
India	Dhond	None		None	11,660	3,082	759,942
India	Dhubri	LSTM	36	Manifold	476,560	2,145	1,397,412
India	Dibrugarh	LSTM	24	Thresholding	344,000	1,970	577,427
India	Dighaghat (Seasonal)	LSTM	32	Manifold	844,020	916	642,069
India	Dillighat	None		None	1,330	144	48,221
India	Domohani	None		Thresholding	9,734	1,036	867,822
India	Dowlaiswaram	None		Thresholding	311,150	3,096	2,650,115
India	Dumariaghat	LSTM	24	Thresholding	41,164	1,430	1,818,890
India	Dummugudem	LSTM	12	None	279,745	568	128,091
India	Ekmighat	LSTM	36	Thresholding	9,014	1,426	2,777,031
India	Elginbridge	LSTM	24	Thresholding	81,873	3,107	2,142,534
India	Erinjipuzha	None		None	957	300	260,293
India	Etawah	LSTM	36	Thresholding	98,715	1,927	1,418,882
India	Eturunagaram	None		None	270,600	946	54,583
India	Fatehgarh	LSTM	24	Manifold	40,096	1,727	1,208,749
India	Gajaraia	None		Thresholding	412	136	84,858
India	Gandhighat	LSTM	32	Manifold	848,000	1,246	2,373,882
India	Ganga Nagar	None		None	1,349	55	23,026
India	Gangahed W/L Station	None		None	33,934	2,058	522,569
India	Gangpur Siswan (Seasonal)	LSTM	30	Thresholding	129,132	1,253	1,466,395
India	Garhamukteshwar	None		Thresholding	29,709	2,777	1,787,526
India	Garrauli	None		None	6,291	5,140	1,189,707
India	Garudeshwar	None		Thresholding	87,892	2,256	549,753
India	Gaya	None		None	3,250	3,129	4,065,934
India	Ghaighat	None		Thresholding	4,735	1,144	787,481
India	Ghazipur	LSTM	36	Manifold	524,023	1,743	1,013,486
India	Gheropara	None		None	5,969	4,679	3,743,603
India	Ghugumari	None		Thresholding	4,542	669	680,287
India	Gidhade	None		None	54,750	2,195	569,969
India	Goalpara	LSTM	36	Manifold	463,220	4,809	1,936,844
India	Gokak Falls	None		Thresholding	2,832	1,046	488,384
India	Golaghat	LSTM	18	Thresholding	8,499	450	180,929
India	Golokganj	LSTM	12	Thresholding	11,077	381	243,295
India	Govindapur	None		Thresholding	4,564	867	544,829
India	Gunupur	None		None	6,999	705	142,913
India	Guwahati	LSTM	32	Thresholding	416,990	3,558	2,269,648
India	Hajipur (Seasonal)	LSTM	24	Thresholding	44,830	481	932,758
India	Haladi	None		None	632	214	115,823
India	Hamirpur	LSTM	18	Thresholding	276,789	394	158,585
India	Haora	None		None	515	329	601,912
India	Haralahalli	None		Thresholding	14,647	4,258	1,080,379

India	Hardwar	None		Thresholding	23,362	1,953	1,388,142
India	Harinkhola	None		None	22,252	398	434,991
India	Hasimara	None		None	3,958	539	291,688
India	Hathidah	LSTM	36	Manifold	904,130	2,485	2,029,665
India	Hayaghat	LSTM	16	Thresholding	12,973	574	798,224
India	Hetimpur	None		None	794	736	939,763
India	Hoshangabad	None		None	45,083	4,699	977,415
India	Indrapuri	None		None	66,910	2,836	2,589,271
India	Jagdapur	LSTM	18	Thresholding	7,384	2,672	592,651
India	Jagibhakatgaon	None		Manifold	17,874	666	311,737
India	Jai Nagar	None		Thresholding	2,131	311	336,240
India	Jamshedpur	None		None	12,742	2,318	1,801,680
India	Jamsholaghat	LSTM	12	Manifold	16,030	20	7,377
India	Japla	LSTM	18	Thresholding	66,051	681	307,252
India	Jaunpur	LSTM	18	None	18,032	2,601	2,765,957
India	Jaypur	None		None	1,418	372	167,579
India	Jenapur	LSTM	18	Thresholding	36,116	4,164	1,806,299
India	Jhanjharpur	None		Thresholding	3,658	3,020	4,488,994
India	Jhawa (Seasonal)	LSTM	24	Manifold	12,183	732	308,599
India	Jiabharali NT Road X-ing	None		Manifold	12,359	193	85,512
India	Joshimath	None		None	4,508	3,466	131,963
India	Kachlabridge	LSTM	12	Manifold	33,446	1,037	557,146
India	Kadirganj	None		None	1,634	1,110	1,761,508
India	Kahalgaon	LSTM	36	Manifold	942,990	1,168	990,704
India	Kailashahar GDSQ Site	None		Manifold	2,266	207	119,476
India	Kakardhari	None		None	6,571	509	323,110
India	Kalampur	None		Thresholding	405	112	82,055
India	Kalathukadavu	None		None	N.A	306	130,836
India	Kaleswaram	LSTM	24	None	226,970	680	50,973
India	Kallooppara	None		Thresholding	802	206	213,872
India	Kalpi	LSTM	24	Thresholding	264,251	673	239,503
India	Kamalpur GDS Site	None		None	642	158	71,477
India	Kampur	LSTM	24	Thresholding	12,504	3,701	1,637,417
India	Kamtaul	LSTM	12	Thresholding	4,416	1,329	1,829,731
India	Kanpur	LSTM	16	Thresholding	87,650	1,063	2,725,241
India	Karad	None		None	5,602	2,202	933,224
India	Karanprayag	None		None	2,294	555	100,167
India	Karathodu	None		None	898	740	1,346,135
India	Karnal	LSTM	24	None	13,681	680	335,985
India	Kashinagar	LSTM	12	Thresholding	7,957	861	240,042
India	Khadda	None		Thresholding	38,945	293	105,338
India	Khagaria	LSTM	30	Thresholding	12,985	321	504,280
India	Khowai	None		Thresholding	1,310	268	131,506
India	Kidangoor	None		Thresholding	744	312	417,394
India	Kinjer (Seasonal)	LSTM	12	Thresholding	4,578	1,834	2,110,899
India	Kodumudi	None		Thresholding	53,233	670	389,345
India	Koelwar	LSTM	24	Thresholding	71,000	862	1,067,508
India	Kokrajhar	None		Thresholding	815	557	276,646
India	Kondazhy	None		Thresholding	N.A	280	230,329

India	Kopergaon	None		None	7,151	5,022	1,450,834
India	Kota City	None		None	27,366	4,485	1,799,150
India	Koteshwar	None		None	7,483	215	47,691
India	Kottatharpa	None		Thresholding	N.A	217	36,224
India	Kuldah Bridge	None		None	23,384	8,650	2,905,985
India	Kumbidi	None		Thresholding	5,908	699	887,233
India	Kunavaram	LSTM	18	Manifold	284,880	1,315	120,232
India	Kuniyil	None		None	2,019	593	725,653
India	Kurnool	None		None	67,318	564	318,819
India	Kursela	LSTM	20	Manifold	100,864	1,202	652,674
India	Kuttyadi	None		None	354	353	469,754
India	Kuzhithurai	None		Thresholding	841	83	233,892
India	Lakhisarai	None		Manifold	2,628	177	261,234
India	Lalbegiaghat	LSTM	24	Manifold	6,900	4,013	1,212,281
India	Lucknow	None		None	10,503	625	2,325,756
India	Mahad	None		None	N.A	2,110	397,389
India	Malakkara	None		None	1,713	234	250,857
India	Manakkad	None		None	N.A	218	160,705
India	Manas NH Crossing	None		Thresholding	34,160	190	144,700
India	Mandla	None		None	13,059	2,595	416,398
India	Maner (Seasonal)	LSTM	16	Manifold	71,265	179	200,669
India	Manikal	None		None	N.A	295	64,848
India	Mankara	None		None	2,783	285	213,123
India	Mantralayam	None		Thresholding	64,868	278	80,264
India	Mathabhanga	LSTM	12	Thresholding	3,660	1,160	1,005,857
India	Mathanguri	None		None	28,684	156	45,561
India	Mathani Road Bridge	None		Thresholding	1,340	693	348,983
India	Mathura (Prayagghat)	None		Thresholding	47,360	2,819	2,287,737
India	Matizuri	LSTM	12	Manifold	7,770	818	477,288
India	Mawi	LSTM	24	Thresholding	16,127	756	614,825
India	Mekhliganj	LSTM	12	Thresholding	10,205	367	300,254
India	Melli	None		None	5,555	20	6,674
India	Mirzapur	LSTM	42	None	485,277	1,635	2,072,428
India	Mohammad Ganj	None		None	11,216	1,090	635,008
India	Mohanpur	None		None	5,777	1,680	1,159,486
India	Moradabad	LSTM	12	Thresholding	6,914	1,773	2,545,136
India	Munger	LSTM	36	Manifold	934,390	2,152	2,310,015
India	Musiri	None		None	69,746	4,492	3,096,599
India	Naharkatia	LSTM	12	Thresholding	4,450	1,373	531,278
India	Nallammaranpatty	None		None	9,080	2,728	1,000,217
India	Namsai	None		None	3,301	689	138,724
India	Nanded	None		None	52,038	1,798	1,199,700
India	Nandkeshri	None		None	N.A	2,838	10,506
India	Nanglamoraghat	LSTM	20	Thresholding	2,965	1,613	704,622
India	Nanipalson	None		None	862	103	14,810
India	Naraj	LSTM	24	Thresholding	133,230	5,295	4,301,525
India	Narasingpur	None		None	22,856	3,394	890,991
India	Narayanpur (Seasonal)	None		None	9,085	2,028	1,944,257
India	Nasik	None		None	N.A	1,976	2,126,086

India	Nautghat	None		None	26,286	2,064	696,111
India	Neamatighat	LSTM	24	Thresholding	359,500	3,908	452,803
India	Neeleswaram	None		None	4,261	333	270,616
India	Neemsar	None		None	4,330	1,281	820,037
India	Nellore Anicut	None		None	54,777	423	618,317
India	NH-31	None		Thresholding	1,590	985	670,574
India	Nimapara	None		None	141,230	323	216,598
India	Nivali	None		None	454	273	53,877
India	Numaligarh	LSTM	18	Thresholding	10,192	344	114,091
India	Nutanbazar	None		Thresholding	N.A	1,048	340,584
India	Odendurai	None		Thresholding	N.A	456	265,479
India	Ozerkheda	None		None	695	536	110,780
India	Pagladiya N.T.Road X-Ing	None		Thresholding	853	704	550,562
India	Palakadavu	None		Thresholding	N.A	444	498,415
India	Paliakalan	LSTM	12	Thresholding	17,676	1,545	566,451
India	Pallipady	None		None	N.A	297	228,424
India	Paonata	None		None	10,965	842	470,523
India	Passighat	None		Thresholding	305,000	588	27,725
India	Pattazhy	None		None	1,258	714	1,124,416
India	Pauni	None		None	36,060	2,421	478,971
India	Pen	None		None	N.A	179	48,556
India	Perumannu	None		None	1,159	812	785,241
India	Peruvampadam	None		None	1,440	48	13,591
India	Phaphamau	LSTM	12	None	96,704	565	1,480,879
India	Pudur	None		None	1,313	367	284,972
India	Pulamanthole	None		None	1,031	356	385,577
India	Pullakkayar	None		None	N.A	529	270,812
India	Purushottampu	LSTM	12	None	7,112	978	612,429
India	Puthimari N.H X-Ing	None		Thresholding	1,473	1,066	456,962
India	Raibareli	LSTM	12	None	7,530	1,488	494,080
India	Rajghat	LSTM	18	Thresholding	18,615	825	591,800
India	Ram Munshi Bagh	None		Thresholding	5,514	427	797,376
India	Ramamangala	None		Thresholding	1,240	519	396,065
India	Ranganadi NT-Road Crossing	None		Thresholding	2,700	219	95,646
India	Rewaghat	LSTM	24	Thresholding	42,180	817	406,006
India	Rishikesh	None		Thresholding	21,893	180	247,120
India	Rosera	LSTM	40	Thresholding	9,580	588	791,294
India	Rothak	None		None	1,472	307	92,669
India	Runisaidpur	None		Thresholding	6,116	659	1,239,913
India	Safapora	None		None	9,249	177	98,301
India	Sahibganj (Seasonal)	LSTM	36	Manifold	1,045,250	2,074	1,874,395
India	Sakleshpur	None		Thresholding	N.A	1,074	176,936
India	Sakra	LSTM	24	Thresholding	N.A	1,412	2,838,375
India	Salempur	None		None	3,343	526	579,988
India	Samastipur	LSTM	36	Thresholding	9,110	459	776,158
India	Samdoli (Seasonal)	None		None	2,020	409	308,426
India	Sangam	None		Thresholding	4,168	233	188,249
India	Sanoor	None		Thresholding	N.A	481	216,756
India	Santeguli	None		Thresholding	1,096	620	143,118



India	Sarangkheda	None		None	58,400	3,240	1,152,066
India	Savandapur	None		None	5,776	1,114	565,888
India	Seondha	None		None	16,701	3,480	881,488
India	Shahijina	None		Thresholding	44,185	933	230,444
India	Shardanagar	LSTM	24	Thresholding	18,553	1,992	1,113,116
India	Sikanderpur	LSTM	24	Thresholding	8,510	781	807,004
India	Silvassa	None		None	2,357	129	272,373
India	Sirpur	None		None	47,702	1,069	95,185
India	Sivasagar	LSTM	12	Thresholding	3,425	666	343,765
India	Sonamura (II)	None		None	2,399	84	51,736
India	Sonbarsha	None		Thresholding	N.A	852	1,226,897
India	Sorada	None		None	1,777	556	202,395
India	Srikakulam	None		Thresholding	9,500	577	405,924
India	Srinagar	None		None	11,332	149	59,301
India	Sripalpur	LSTM	24	None	11,975	627	431,731
India	Subhash Bridge	None		None	10,674	1,624	6,727,449
India	Surat(Seasonal)	None		None	64,336	1,207	3,542,243
India	Taibpur	None		Thresholding	1,681	759	712,146
India	Terwad (Seasonal)	None		Thresholding	2,520	198	295,149
India	Tezpur	LSTM	30	Manifold	385,072	2,958	1,229,469
India	Thimmanahalli	None		None	N.A	1,638	495,209
India	Thumpamon	None		None	891	664	848,504
India	Trimohinighat	LSTM	12	Thresholding	2,355	941	877,797
India	Triveni	None		None	37,845	418	194,304
India	Tufanganj	LSTM	12	Thresholding	5,093	743	309,478
India	Turtipar	LSTM	36	Thresholding	123,551	3,000	2,749,257
India	Uskabazar	LSTM	12	Thresholding	2,432	737	621,876
India	Uttarkashi	None		None	4,824	1,372	248,190
India	Vandiperiyar	None		None	802	491	59,600
India	Vapi	None		None	2,357	66	73,022
India	Varanasi	LSTM	42	Manifold	489,087	2,492	3,729,185
India	Wanakbori	None		None	30,665	1,621	727,066
India	Warunji	None		None	1,891	968	281,286
India	Yennehole	None		Thresholding	N.A	730	319,060
India	Yerli	None		None	16,517	2,476	714,312
India	Yingkiang (Km65)	None		None	298,000	1,353	16,286

\* Estimated drainage area: computed from HydroSHEDS (Lehner et al., 2008) based on gauge location, i.e., for each gauge the closest watershed in the dataset is chosen. N.A. indicates points that were unable to be associated to any watershed in the dataset.

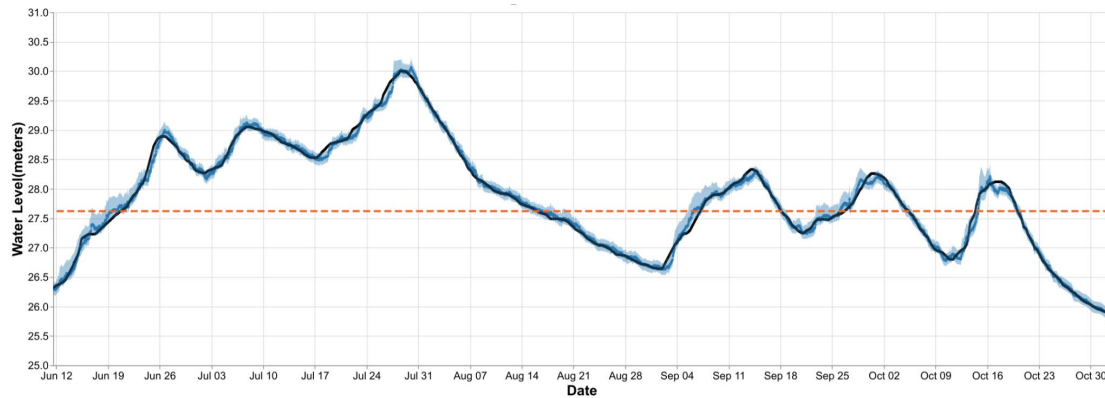
\*\* Population: The population was calculated by the intersection of AOIs with the population layer "WorldPop Global Project Population Data" from Google Earth Engine, provided by <https://www.worldpop.org/>.

#### Reference:

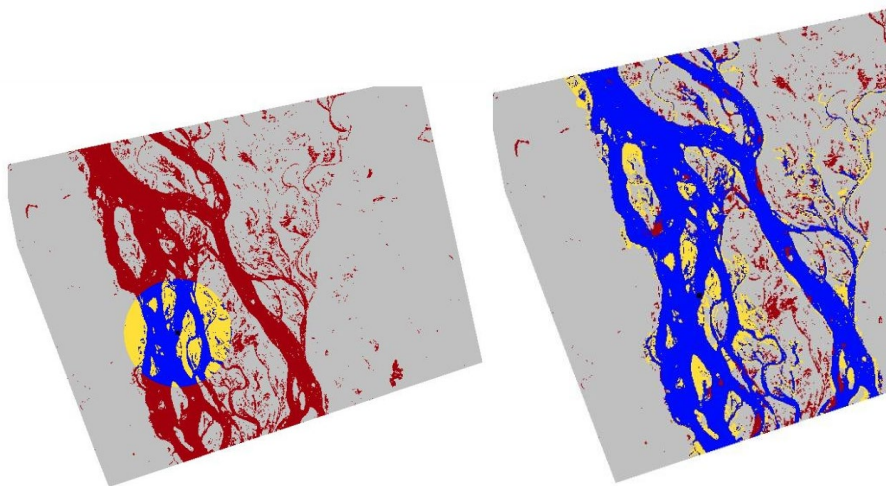
Lehner, B., Verdin, K. and Jarvis, A. New global hydrography derived from spaceborne elevation data. Eos, Transactions American Geophysical Union, 89(10), pp.93-94, 2008.

**Table S2.** LSTM hyperparameters and settings

<b>Hyperparameters and settings</b>	<b>Value</b>
Optimizer	Adam
Batch size	256
Learning rate and rate scheduling parameters	Initial_learning_rate: 1e-3 Learning_rate_drop_factor: 0.5 Learning_rate_epochs_drop: 10
Number of training epochs	50 Each epoch was limited to 1000 batches
Number of ensemble members	3
Layers sizes and activations	Basin_embedding: - Linear, 20 hidden units LSTM: - 128 hidden units for hindcast LSTM - 128 hidden units for forecast LSTM CMAL head: - 100 hidden units, Relu activation, then linear head
Max number of upstream gauges (including the target gauge)	6



**Figure S1.** An example of a forecast stage graph with a 36 hour lead time (dark blue line) with the uncertainty shown as the confidence interval between the 20% and 80% quantiles (light blue shading) and the observed gauge stage (black line). Dash orange line represents the warning level above which an alert will be issued.



**Figure S2.** Demonstration of  $F_1$ -score in flood inundation modeling. The two maps are for the same flood event with two different models. On the left, a trivial “model” simply assumes an inundated circular area, while the model on the right is a result of one of the inundation models. The colors represent true-positive (hits) in blue, false-positive (false-alarm) in yellow, false-negative (miss) in red, and true-negative in gray. The map on the left has: precision=53.8%, recall=16.4%,  $F_1$ =25.1%. The map on the right has: precision=76.3%, recall=85.4%,  $F_1$ =80.6%. Note that the map on the right has some gray area that was cut out, but true-negatives are not included in the computation of the  $F_1$ -score so it does not affect this metric.