Water Scarcity and Drought
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Supplementary Materials

Underlying Dimensions and Determinants of Technological Drought in Relatively Uplifted Regions of Bangladesh

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How To Cite: Mondol, M.A.H.; Logna, H.R.; Akter, S.; et al. Underlying Dimensions and Determinants of Technological Drought in Relatively Uplifted Regions of Bangladesh. *Water Scarcity and Drought* **2026**, *1*(1), 5.

Supp. Box S1: Statements and variables related to technological drought perception

- ⇒ Nowadays water availability is depending on irrigation facility rather than depending on rainfall (X1)
- ⇒ New technology (such as irrigation pumps) creates an opportunity to remove drought severity of an area (X2)
- ⇒ Irrigation systems are controlled by its owner or cooperative society members (X3)
- ⇒ Owner or cooperative society members take advantage of being the first to sow the seeds or cultivate the crops plants (X4)
- ⇒ Farmers (normal members) have to wait for about 7-10 days for their irrigation (X5)
- ⇒ People often face difficulties in making water drainage line to use surface water for their land over neighbour's farm as most of the agricultural areas of Bangladesh are small pieces of land with multiple owners (X6)
- ⇒ The current drought is the result of the lack of electricity and low diesel supply (X7)
- ⇒ It takes time to renew the connection of electricity every year for pumps in irrigation purpose (X8)
- ⇒ Frequent load-shedding worsens technological drought (X9)
- ⇒ The high price of diesel hampers emergency irrigation during short term drought (X10)
- ⇒ Inadequate supply of fuel (diesel) to run power pumps can intensify technological drought (X11)
- ⇒ Because of the high price of diesel, people try to avoid using diesel engine for irrigation (X12)

⇒ Technological drought depends on the income category, land use, and land types of the farmer's community (X13)

⇒ Affordability of fuel is dependent on one's financial condition; therefore, it can be said that socio-economic conditions also influence technological drought (X14)

⇒ The higher the technological drought, the higher is the severity of the socio-economic drought (X15)

⇒ People are now self-sufficient, and their economic conditions have improved (X16)

⇒ Years of farming experience, household size, years of education, access to credit facilities, access to extension services, and off-farm income are among the significant determinants of adopting climate change adaptation measures (X17)

⇒ Many local crop species are extinct due to technological drought management (X18)

⇒ The construction of dam in the upper stream decreases the water and silt flow in the downstream, which hampers groundwater recharge and irrigation (X19)

⇒ Rivers presently carries a very poor discharge of water because of char land (a tract of land surrounded by water), which imposes significant negative impacts on the agricultural sector (X20)

⇒ The rivers are dying because the upstream country does not share the optimum amount of water (especially in dry seasons) (X21)

⇒ Water withdrawal is the politics among water administrations (India and Bangladesh) (X22)

⇒ If upstream water flow increases in the dry period, the production will increase (X23)

⇒ People now can mitigate technological drought (better than before) and use HYV crops and fertilizers (X24)

⇒ Technological drought mitigation allows the right time sowing and harvesting date (X25)

⇒ If agricultural input increases, the production will increase (X26)

⇒ If modern agricultural equipment facility increases, the production will increase (X27)

⇒ The technological drought here is often the result of poor management and mitigation problem of irrigation and water system (X28)

⇒ If agricultural weather forecasting makes prior announcements about drought and flood, the production will increase (X29)

⇒ If proper management exists, the production will increase (X30)

⇒ Depending on rainfall means agriculture is in a defined period (X31)

- ⇒ Anti-episodic rainfall or no rainfall in a single irrigation episode can maximize the adverse impact of technological drought (X32)
- ⇒ Delay in sowing because of not sufficiently supply of water due to a smaller number of irrigation equipment (X33)
- ⇒ Technological drought can happen due to a lack of emergency water supply in monsoon periods (X34)
- ⇒ Technological drought can happen due to lack of proper water management during monsoon arrival and withdrawal (X35)
- ⇒ Technological drought can happen due to lack of modern technology (e.g., Sprinkle and drifting irrigation, precipitation augmentation) (X36)
- ⇒ Technological solutions can effectively mitigate the impacts of drought on farming operations (X37)
- ⇒ I perceive technological solutions as essential for optimizing water usage and irrigation practices during drought periods (X38)
- ⇒ I believe that remote sensing technologies can provide valuable insights into soil moisture levels and crop health during drought conditions (X39)
- ⇒ Precision agriculture technologies are effective in conserving water and optimizing crop yields during droughts (X40)
- ⇒ I have faced technical issues or breakdowns with the technological equipment or systems used for drought monitoring or mitigation on my farm (X41)
- ⇒ I have experienced improvements in crop yields or farm productivity as a result of implementing technological solutions for drought management (X42)
- ⇒ Technological advancements can help diversify income streams and enhance the resilience of farming communities during droughts (X43)
- ⇒ Investing in on-farm renewable energy technologies can enhance the sustainability and resilience of farming operations during droughts (X44)
- ⇒ Investing in climate-smart agricultural technologies can help farmers adapt to changing climatic conditions, including droughts (X45)
- ⇒ I have encountered challenges or limitations in accessing and adopting technological solutions for drought resilience in my farming practices (X46)

- ⇒ I have participated in training programs or workshops focused on utilizing technology for drought management in agriculture (X47)
- ⇒ I am satisfied with the user-friendliness and accessibility of technological tools available for drought management in agriculture (X48)
- ⇒ I have participated in farmer cooperatives or collective initiatives aimed at pooling resources for investing in technological solutions for drought resilience (X49)
- ⇒ Integrating traditional farming knowledge with modern technological solutions for effective drought management is important (X50)
- ⇒ Incorporating farmer feedback and input in the design and development of technological solutions for drought management is important (X51)
- ⇒ Government incentives or subsidies should be provided to encourage farmers to adopt technological solutions for drought resilience (X52)
- ⇒ Investing in research and development of new technological solutions tailored to address drought challenges in agriculture is important (X53)
- ⇒ Collaborative efforts between farmers, researchers, and technology developers are essential for advancing drought-resilient agricultural practices (X54)
- ⇒ Government policies and regulations play a supportive role in promoting the adoption of technological solutions for drought resilience in agriculture (X55)

Supp. Table S1: Rotated Component Matrix

Rotated Component Matrix										
Variable's name	Component									
	1	2	3	4	5	6	7	8	9	10
X34	0.69									
X35	0.67									
X36	0.64									
X32	0.61									
X38	0.61						0.34			
X28	0.61		0.35							
X31	0.60		0.32							
X33	0.59									
X29	0.59		0.46							
X24	0.57		0.33							
X37	0.56						0.45			
X25	0.54		0.39							
X14	0.52			0.41						
X15	0.50			0.46						
X17	0.50			0.42						
X40	0.50	0.31					0.49			
X13	0.50			0.39						
X16	0.46			0.44						
X55	0.45	0.32							0.35	
X53		0.72								
X51		0.69								
X54	0.37	0.69								
X52		0.64								
X50	0.39	0.61								

Rotated Component Matrix										
Variable's name	Component									
	1	2	3	4	5	6	7	8	9	10
X27	0.31		0.74							
X26			0.72							
X30	0.38		0.60							
X23			0.53	0.31		0.35				
X9			0.39	0.39					0.33	
X12				0.63						
X10			0.34	0.61						
X8				0.50						
X11	0.42			0.46						
X4					0.83					
X5					0.81					
X3					0.79					
X6					0.67					
X20						0.78				
X21						0.75				
X19	0.32					0.68				
X22						0.64				
X39	0.30						0.62		0.32	
X42	0.31						0.53			
X43	0.45						0.53			
X44	0.40						0.45			
X2	0.38						0.42			
X45	0.36	0.36					0.40			
X47								0.83		
X49								0.80		
X48	0.31							0.57		

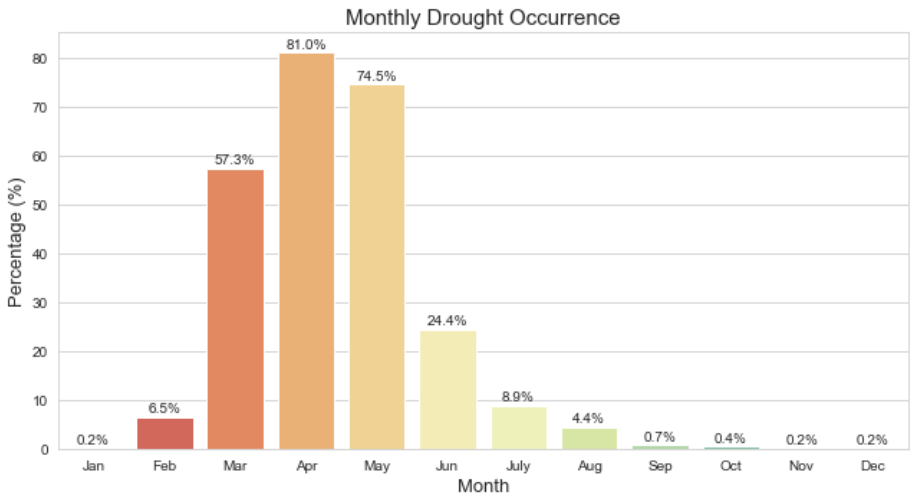
Rotated Component Matrix										
Variable's name	Component									
	1	2	3	4	5	6	7	8	9	10
X46		0.32			0.35			0.51		
X18						0.36			0.56	
X7									0.53	
X41										0.69
X1										-0.45

Supp Table 2: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.362	33.385	33.385	18.362	33.385	33.385	8.579	15.598	15.598
2	3.743	6.806	40.191	3.743	6.806	40.191	4.042	7.348	22.947
3	2.361	4.292	44.484	2.361	4.292	44.484	3.630	6.599	29.546
4	2.198	3.996	48.479	2.198	3.996	48.479	3.260	5.927	35.473
5	1.599	2.907	51.386	1.599	2.907	51.386	3.081	5.602	41.075
6	1.324	2.408	53.794	1.324	2.408	53.794	3.062	5.567	46.642
7	1.260	2.291	56.085	1.260	2.291	56.085	2.829	5.145	51.787
8	1.146	2.084	58.169	1.146	2.084	58.169	2.747	4.994	56.781
9	1.065	1.937	60.105	1.065	1.937	60.105	1.551	2.820	59.602
10	1.002	1.822	61.927	1.002	1.822	61.927	1.279	2.325	61.927
11	.953	1.733	63.660						

12	.923	1.678	65.338						
13	.873	1.587	66.925						
14	.844	1.535	68.460						
15	.779	1.416	69.876						
16	.749	1.361	71.237						
17	.728	1.323	72.560						
18	.713	1.296	73.856						
19	.671	1.220	75.076						
20	.642	1.167	76.243						
21	.622	1.131	77.374						
22	.587	1.067	78.441						
23	.571	1.037	79.479						
24	.564	1.026	80.505						
25	.543	.987	81.492						
26	.538	.978	82.470						
27	.532	.967	83.438						
28	.511	.930	84.367						
29	.501	.911	85.279						
30	.471	.856	86.134						
31	.456	.829	86.964						
32	.438	.796	87.760						
33	.431	.783	88.543						
34	.419	.761	89.304						
35	.416	.756	90.061						
36	.381	.692	90.753						
37	.359	.653	91.406						
38	.352	.640	92.045						
39	.341	.620	92.666						
40	.332	.604	93.270						

41	.324	.589	93.859						
42	.308	.561	94.419						
43	.300	.546	94.965						
44	.287	.521	95.486						
45	.281	.510	95.997						
46	.271	.493	96.490						
47	.261	.474	96.964						
48	.249	.452	97.416						
49	.242	.441	97.857						
50	.230	.419	98.276						
51	.225	.409	98.684						
52	.211	.384	99.068						
53	.192	.350	99.418						
54	.169	.306	99.724						
55	.152	.276	100.000						



Supp. Figure S1: Monthly drought occurrences