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Supplementary information

Climate change literacy in Africa

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Supplemental Information

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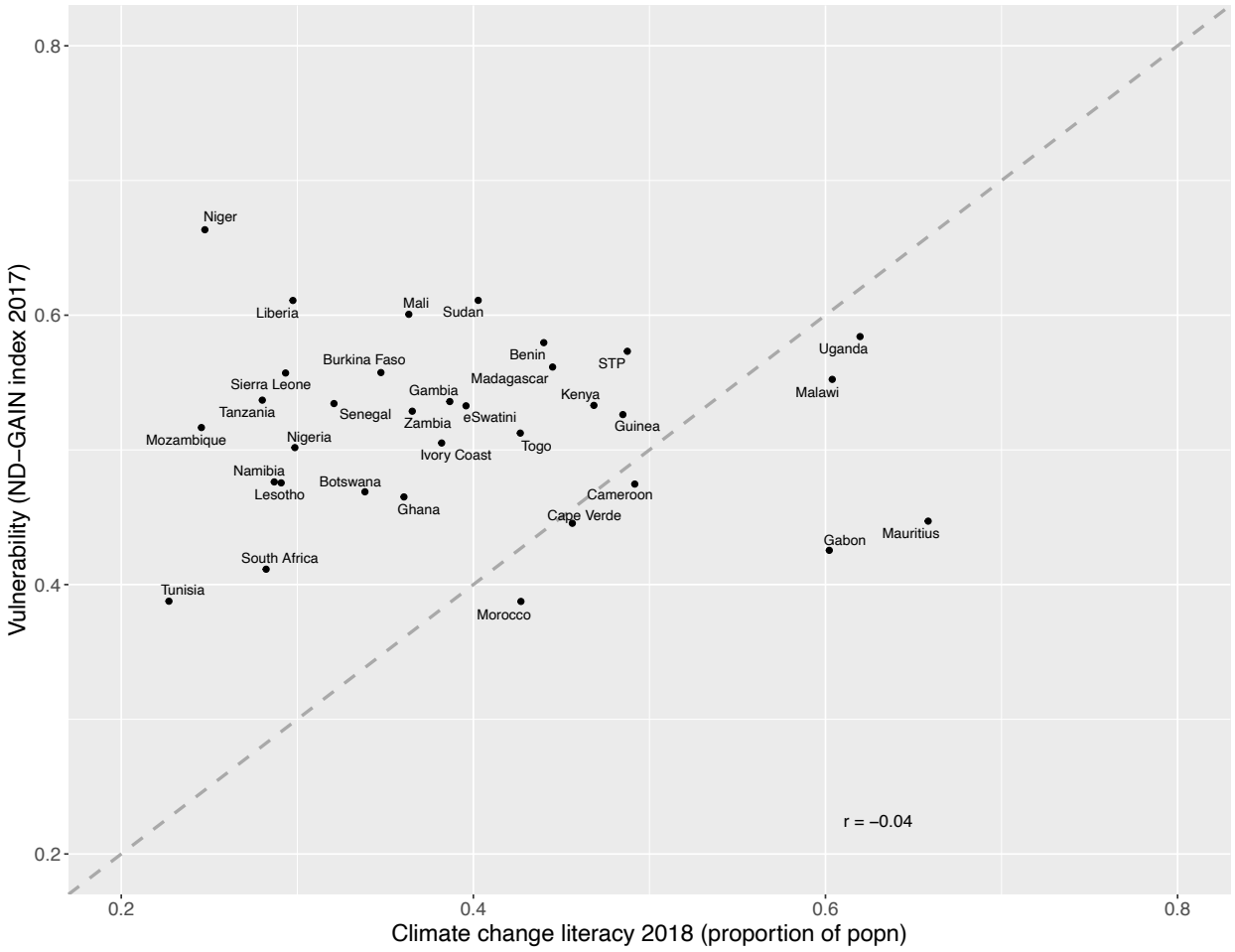
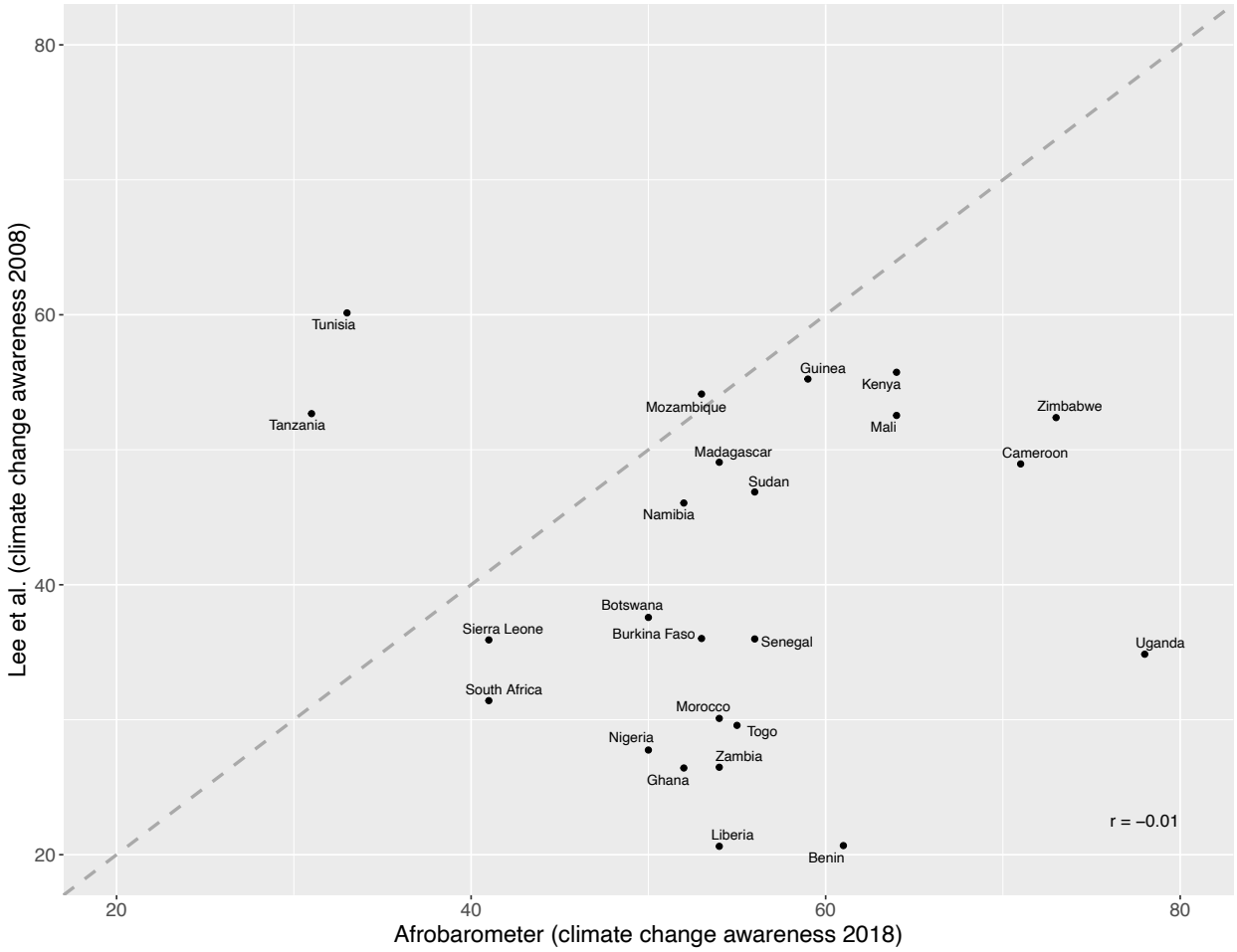
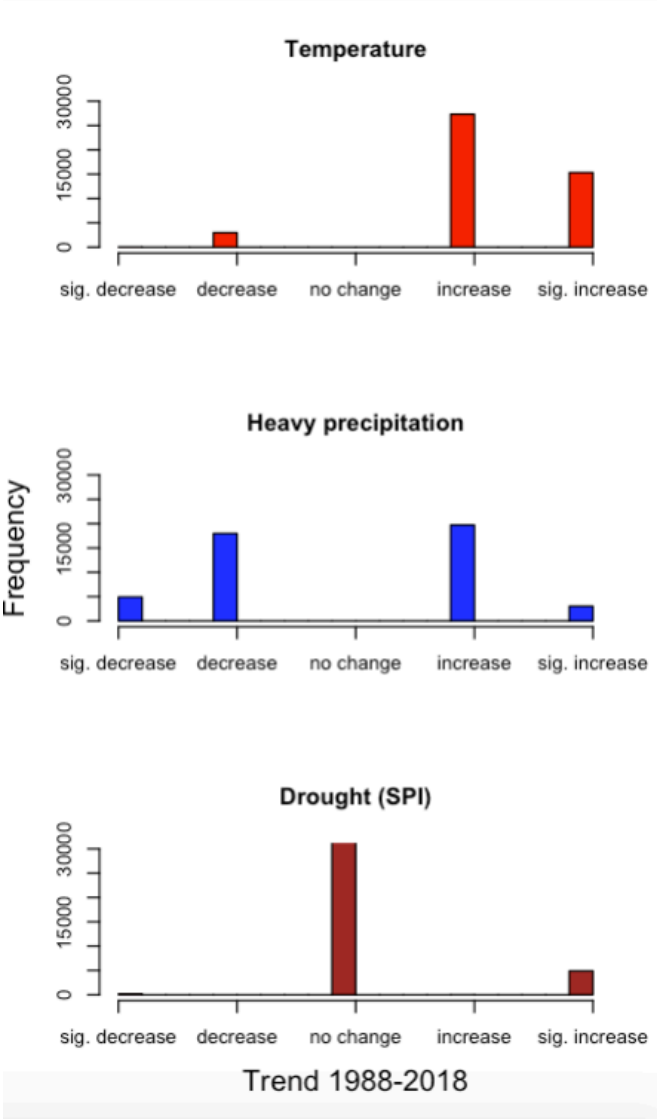


Supplementary Fig. 1: Lack of correlation between climate change literacy and climate change vulnerability in the Notre Dame Global Adaptation Index (ND-GAIN)[1].

We found no correlation between country-level climate change literacy and a country-level index of climate change vulnerability (r= –0.04).



Supplementary Fig. 2: Lack of correlation between estimates of climate change awareness from Afrobarometer in 2016–18 and those from Lee et al[2] that used a Gallup World Poll from 2008



Supplementary Fig. 3: Distribution of 30 year trends in temperature, heavy precipitation and extreme drought at the locations of respondents in the Afrobarometer survey. Drought was measured as Standardized Precipitation Index.

Supplementary Table 1: Drivers of perceptions of climatological changes

Model 1 examines perceived changes in floods and model 2 examines perceived changes in droughts. Both dependent variables range from -2, indicating people observed a significant decrease in the metorological trend, to 2 meaning respondents perceived a significant increase in the meteorological trend. Both models are OLS regressions, with random effects are at the country level and standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Omitted base categories for weather variables are no change, unless marked with $^{+}$, then omitted base category is an insignificant increase (see Supplementary Discussion of Perception).

	Perceived Drought	Perceived Flood
Age:	0.050**	-0.009
26-35	(0.019)	(0.026)
36-45	-0.008	-0.025
	(0.023)	(0.033)
46-55	0.047	0.035
	(0.040)	(0.041)
56+	0.055	0.041
	(0.036)	(0.050)
Female	0.008	0.023
	(0.018)	(0.027)
Radio News	-0.004	-0.002
	(0.013)	(0.012)
Urban	-0.122*	0.088
	(0.051)	(0.059)
Education:	-0.065	-0.106
Primary Schooling	(0.079)	(0.113)
Secondary Schooling	-0.142*	0.028
	(0.072)	(0.076)
Post-Secondary	-0.131	0.066
Schooling	(0.088)	(0.085)
Lived Poverty Index	0.242***	0.193***
	(0.030)	(0.038)
Community Engagement	0.091***	0.081**
	(0.026)	(0.027)
Agriculture Employment	0.129*	-0.075
	(0.065)	(0.110)
Middle Class Household	0.038	0.013
	(0.027)	(0.040)
Exposed Shelter	0.102	0.092
	(0.073)	(0.080)
Mobility Index	0.133	0.113
	(0.081)	(0.131)
Climatological Affected	0.023*	-0.003
	(0.010)	(0.011)
Hydrological Affected	-0.034	-0.018
	(0.018)	(0.020)
Meteorological Affected	-0.004	-0.001
	(0.015)	(0.018)
30-Day Precipitation	-0.002*	0.001*
	(0.001)	(0.001)
PPT 10-Year	-0.314*	-0.535*
Increase	(0.126)	(0.230)
Sig. Increase	-0.323	-0.660***
	(0.197)	(0.182)
Decrease	-0.361**	-0.356
	(0.132)	(0.282)
Sig. Decrease	-0.406*	-0.258
	(0.185)	(0.315)
PPT 30-Year^{+}	-0.033	-0.025
	(0.132)	(0.123)
Sig. Increase	0.173*	
Decrease	(0.078)	-0.041
	0.306	(0.106)

	Perceived Drought	Perceived Flood
Sig. Decrease	(0.169)	-0.277*
		(0.127)
30-Day Temperature	0.107	-0.010
	(0.071)	(0.071)
Temp 10-Year	-0.108	0.221
Increase	(0.191)	(0.142)
Sig. Increase	-0.018	-0.115
	(0.186)	(0.155)
Decrease	-0.148	0.298
	(0.168)	(0.181)
Sig. Decrease	-0.401	-0.066
	(0.264)	(0.292)
Temp 30-Year+	0.023	-0.053
Sig. Increase	(0.065)	(0.088)
Decrease	0.066	0.046
	(0.129)	(0.090)
Drought 10-Year	0.116	0.033
Increase	(0.085	(0.101)
Sig. Increase	0.075	-0.215
	(0.122)	(0.180)
Decrease	-0.015	0.005
	(0.061)	(0.053)
Sig. Decrease	-0.260*	0.065
	(0.105)	(0.219)
Drought 30-year	-0.002	-0.064
Sig. Increase	(0.124)	(0.095)
Sig. Decrease	0.014	-0.120
	(0.172)	(0.245)
Constant	0.463	-0.134
	(0.363)	(0.407)
Observations	30788	30303

Supplementary Discussion to Supplementary Table 1: Perception of weather and climate changes

In Supplementary Table 4, we test whether perceptions of climatological changes (increased droughts and floods) are affected by physical changes in the environment. Increased deaths associated with climatological events is associated with increased drought perceptions. Decreased precipitation in the month prior to the interview increases drought perceptions, but any change in precipitation is associated with a perceived decrease in droughts. Surprisingly, actual changes in droughts have little effect on drought perceptions. Only a significant decrease in droughts in the ten years prior to the interviews is associated with a significant decrease in drought perceptions.

Increased precipitation in the 30 days prior to the interview is associated with perceived increases in floods. However, increases in the year prior to the interview are associated with a perceived decrease in flooding. No other consistent associations between climatological changes and perceived flooding emerge in these analyses. These results highlight the importance of measuring both perceptions of the changing environment and measures of the environment its self. While both are related, measured changes in the physical environment do not fully explain the variance in individual perceptions, and both exert independent influences on climate change literacy.

Supplementary Table 2: Effects of Education by Gender

Linear probability model regressing climate change literacy on each socio-demographic characteristic, replicating Supplementary Table 2. This model additionally includes an interaction between gender and education. In most instances, education increases climate change literacy for both men and women at statistically indistinguishable rates. However, post-secondary schooling increases literacy for men significantly more than women. The magnitude of the effect is small – holding all else equal, men who complete post-secondary education are 2 percentage points more likely to be climate literate than women.

Climate Literacy	Socio-Demographics
Age:	-0.004
26-35	(0.011)
36-45	0.001
	(0.012)
46-55	0.014
	(0.011)
56+	0.016
	(0.011)
Female	-0.076***
	(0.012)
Education:	0.035**
Primary Schooling	(0.014)
Secondary Schooling	0.203***
	(0.020)
Post-Secondary	0.362***
Schooling	(0.023)
Education X Female:	0.008
Primary Schooling	(0.014)
Secondary Schooling	-0.028*
	(0.034)
Post-Secondary	-0.006
Schooling	(0.017)
Radio News	0.019***
	(0.003)
Urban	0.036***
	(0.010)
Lived Poverty Index	-0.011*
	(0.005)
Community Engagement	0.016***
	(0.004)
Agriculture Employment	-0.005
	(0.009)
Middle Class Household	0.052***
	(0.008)
Exposed Shelter	-0.021
	(0.010)
Mobility Index	0.089***
	(0.017)
Perceived Drought	0.018***
	(0.004)
Perceived Flood	0.003
	(0.003)
Constant	0.209***
	(0.025)
Observations	31507

Supplementary Table 3: Mean Literacy by Gender

This table shows the percent of men and women are climate change literate in each country, as well as the difference in literacy rates between the genders.

Country	Men	Women	Difference
Benin	54.24%	33.72%	20.52%
Botswana	39.49%	28.03%	11.46%
Burkina Faso	44.15%	25.42%	18.73%
Cabo Verde	48.74%	42.57%	6.16%
Cameroon	55.89%	42.40%	13.48%
Cote d'Ivoire	47.50%	28.88%	18.62%
Gabon	65.44%	55.00%	10.44%
Gambia	46.06%	31.32%	14.74%
Ghana	45.77%	26.41%	19.36%
Guinea	60.80%	36.18%	24.62%
Kenya	50.82%	42.88%	7.94%
Lesotho	31.33%	26.83%	4.50%
Liberia	39.93%	19.53%	20.40%
Madagascar	48.91%	40.10%	8.82%
Malawi	67.39%	53.36%	14.04%
Mali	45.92%	26.71%	19.21%
Mauritius	68.50%	63.17%	5.33%
Morocco	46.51%	38.86%	7.65%
Mozambique	27.68%	21.46%	6.22%
Namibia	33.00%	24.46%	8.53%
Niger	31.39%	18.14%	13.25%
Nigeria	33.08%	26.62%	6.46%
STP	55.11%	42.43%	12.68%
Senegal	40.87%	23.38%	17.49%
Sierra Leone	37.73%	20.97%	16.76%
South Africa	31.99%	24.45%	7.54%
Sudan	42.68%	37.82%	4.85%
Tanzania	34.00%	22.02%	11.98%
Togo	52.00%	33.33%	18.67%
Tunisia	29.01%	16.44%	12.56%
Uganda	67.67%	56.23%	11.44%
Zambia	41.83%	31.22%	10.61%
eSwatini	47.83%	31.40%	16.43%

Supplementary Table 4: Determinants of climate change literacy

Linear probability models, with climate literacy as the binary dependent variable. The marginal effects from Models 1-5 (Socio-Demographics, Disasters, Precipitation, Temperature, and Drought) are illustrated in Figure 4 in the main text. In order to avoid problems of collinearity, especially between measures of drought and precipitation, we first regressed climate change literacy on each set of meteorological drivers independently. In the final model, we regress literacy on all drivers (Model 6).

Random effects are at the country level. Robust standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Omitted base categories for weather variables are no change, unless marked with $^{+}$, then omitted base category is an insignificant increase. Only 32 respondents lived in locations with a significant decrease in temperature since 1988. We, therefore, pooled all respondents who experienced any decrease in temperature. The results are robust to excluding these cases. Only 20 respondents lived in locations that experienced an insignificant increase in droughts since 1988. These respondents were pooled with those who experienced no change in droughts (SPI), though the results are robust to if we excluding these 20 cases or pooling them with those who experienced a significant change in droughts. These results exclude Zimbabwe, where the literacy questions were asked differently (Supplementary information 1). However, in Supplementary Table 5, we show the results are robust to including Zimbabwe.

Climate Literacy	Socio-Demographics (Model 1)	Disasters (Model 2)	Precipitation (Model 3)	Temperature (Model 4)	Drought (Model 5)	All Drivers (Model 6)
Age:	-0.004	-0.004	-0.004	-0.004	-0.005	-0.013
26-35	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)
36-45	-0.001	-0.001	-0.001	-0.001	-0.003	-0.012
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.015)
46-55	0.012	0.012	0.013	0.013	0.011	-0.001
	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)	(0.014)
56+	0.014	0.014	0.015	0.015	0.014	0.000
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.016)
Female	-0.086***	-0.086***	-0.087***	-0.087***	-0.086***	-0.088***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Radio News	0.019***	0.019***	0.019***	0.019***	0.019***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Urban	0.036***	0.036***	0.032***	0.031***	0.036***	0.033*
	(0.011)	(0.011)	(0.009)	(0.009)	(0.011)	(0.015)
Education:	0.038**	0.038**	0.037**	0.037**	0.038**	0.041
Primary Schooling	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.022)
Secondary Schooling	0.184***	0.184***	0.184***	0.184***	0.183***	0.168***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.022)
Post-Secondary	0.357***	0.357***	0.363***	0.363**	0.356**	0.348***
Schooling	(0.022)	(0.021)	(0.021)	(0.022)	(0.022)	(0.027)
Lived Poverty Index	-0.010*	-0.010*	-0.008	-0.009	-0.010*	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Community Engagement	0.016***	0.016***	0.015***	0.015***	0.016***	0.019**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
Agriculture Employment	-0.008	-0.008	-0.006	-0.006	-0.007	0.021
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.016)
Middle Class Household	0.053***	0.052***	0.053***	0.053***	0.054***	0.063***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Exposed Shelter	-0.019	-0.019	-0.019	-0.019	-0.018	-0.014
	(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.014)
Mobility Index	0.085***	0.085***	0.091***	0.090***	0.087***	0.084***
	(0.018)	(0.018)	(0.016)	(0.016)	(0.017)	(0.021)
Perceived Drought	0.018***	0.018***	0.017***	0.017***	0.018***	0.029***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Perceived Flood	0.003	0.003	0.003	0.003	0.003	0.008

Climate Literacy	Socio-Demographics (Model 1)	Disasters (Model 2)	Precipitation (Model 3)	Temperature (Model 4)	Drought (Model 5)	All Drivers (Model 6)
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
Climatological Affected	**--**	-0.003	--	--	--	-0.002
		(0.003)				(0.003)
Hydrological Affected	**--**	0.002	--	--	--	0.003
		(0.005)				(0.004)
Meteorological Affected	**--**	0.001	--	--	--	0.001
		(0.004)				(0.004)
30-Day Precipitation	--	--	-0.000	--	--	-0.000
			(0.000)			(0.000)
PPT 10-Year	--	--	0.073*	--	--	0.089*
Increase			(0.030)			(0.042)
Sig. Increase	--	--	0.077*	--	--	0.082*
			(0.031)			(0.041)
Decrease	--	--	0.069*	--	--	0.067
			(0.029)			(0.042)
Sig. Decrease	--	--	0.097*	--	--	0.119*
			(0.046)			(0.055)
PPT 30-Year[+]	--	--	0.030	--	--	0.035
Sig. Increase			(0.024)			(0.028)
Decrease	--	--	0.010	--	--	0.002
			(0.015)			(0.021)
Sig. Decrease	--	--	-0.001	--	--	-0.014
			(0.020)			(0.033)
30-Day Temperature	--	--	--	0.005	--	0.008
				(0.010)		(0.018)
Temp 10-Year	--	--	--	0.046	--	0.044
Increase				(0.031)		(0.043)
Sig. Increase	--	--	--	0.035	--	0.028
				(0.029)		(0.047)
Decrease	--	--	--	0.027	--	0.012
				(0.033)		(0.045)
Sig. Decrease	--	--	--	0.071*	--	0.011
				(0.036)		(0.054)
Temp 30-Year[+]	--	--	--	0.001	--	0.008
Sig. Increase				(0.007)		(0.014)
Decrease	--	--	--	0.016	--	0.034
				(0.017)		(0.040)
Drought 10-Year	--	--	--	--	0.014	-0.001
Increase					(0.012)	(0.020)
Sig. Increase	--	--	--	--	0.044	0.019
					(0.025)	(0.033)
Decrease	--	--	--	--	0.016	0.014
					(0.010)	(0.015)
Sig. Decrease	--	--	--	--	-0.001	-0.014
					(0.035)	(0.045)
Drought 30-year	--	--	--	--	0.002	0.071***
Sig. Increase					(0.015)	(0.025)
Sig. Decrease	--	--	--	--	0.053	0.024
					(0.035)	(0.040)
Constant	0.208***	0.201***	0.123**	0.159***	0.198***	0.042
	(0.023)	(0.059)	(0.041)	(0.039)	(0.025)	(0.104)
Observations	30660	30660	29122	29122	30564	29122

PPT = precipitation, Temp = temperature

Supplementary Table 5: Correlation between weather and perceptions

The correlation between changes in the observed weather and climate record, number of disasters, and perceived changes in the severity of droughts and floods. Disasters indicate the logged number of people affected by each type of disaster (hydrological, meteorological, and climatological) from the EM-DAT data. Changes in precipitation (PPT), standardized precipitation index (SPI), standardized precipitation evapotranspiration index (SPEI), and temperature are all raw continuous values of change from the ERA5 data. Perceptions of drought and flood are from the Afrobarometer data. All correlations are significant with $p < 0.0001$.

Variables	(1)	(2)
(1) Perceived Drought	1.00	
(2) Perceived Flood	0.273	1.00
(3) Hydrological Affected	-0.097	-0.075
(4) Meteorological Affected	-0.136	0.005
(5) Climatological Affected	0.062	0.011
(6) All Disaster Affected	-0.030	-0.064
(6) 30 Year PPT Change	-0.131	0.073
(7) 10 Year PPT Change	-0.040	-0.020
(8) 30 Year SPI Change	0.107	-0.054
(9) 10 Year SPEI Change	-0.020	-0.020
(10) 30 Year SPEI Change	0.017	0.075
(11) 10 Year SPI Change	0.105	-0.039
(12) 30 Year Temp Change	0.055	-0.095
(13) 10 Year Temp Change	0.071	-0.077

Supplementary Table 6: Additional regression techniques for climate literacy

All models are robustness checks of Supplementary Table 2, with climate literacy as the binary dependent variable. The first model includes fixed effects at the level of the country instead of random effects. The random effects model presented in the main text is more efficient, allowing both the slope and intercepts of each effect to vary across each sample. The results of the fixed effects model are substantively similar to the random effects model in Supplementary Table 2.

The second model includes Zimbabwe. The third model is a logistic regression rather than a linear probability model. The fourth model includes the CHIRPS data measures of both drought and precipitation trends over the ten and thirty year period before the Afrobarometer interviews. Standard errors are in parentheses and are robust standard errors for Models 1 and 2, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Omitted base categories for weather variables are no change, unless marked with $^{+}$, then omitted base category is an insignificant increase.

Climate Literacy	(1)	(2)	(3)	(4)
Age:	-0.004	-0.008	-0.042	-0.008
26-35	(0.012)	(0.014)	(0.034)	(0.014)
36-45	0.002	-0.005	-0.031	-0.006
	(0.012)	(0.016)	(0.038)	(0.016)
46-55	0.015	0.007	0.025	0.009
	(0.012)	(0.016)	(0.044)	(0.016)
56+	0.016	0.012	0.048	0.014
	(0.012)	(0.019)	(0.044)	(0.020)
Female	-0.086***	-0.088***	-0.399***	-0.086***
	(0.007)	(0.008)	(0.026)	(0.008)
Radio News	0.019***	0.015***	0.070***	0.016***
	(0.003)	(0.003)	(0.008)	(0.004)
Urban	0.031**	0.024	0.125***	0.030
	(0.009)	(0.016)	(0.030)	(0.017)
Education:	0.037**	0.043	0.247***	0.045
Primary Schooling	(0.013)	(0.023)	(0.038)	(0.024)
Secondary Schooling	0.190***	0.184***	0.866***	0.190***
	(0.018)	(0.026)	(0.039)	(0.031)
Post-Secondary	0.363***	0.357***	1.606***	0.349***
Schooling	(0.021)	(0.029)	(0.052)	(0.033)
Lived Poverty Index	-0.009	0.005	0.024	0.000
	(0.005)	(0.006)	(0.015)	(0.008)
Community Engagement	0.015***	0.015*	0.079***	0.014*
	(0.004)	(0.007)	(0.016)	(0.007)
Agriculture Employment	-0.005	0.016	0.092**	0.016
	(0.009)	(0.018)	(0.033)	(0.017)
Middle Class Household	0.053***	0.060***	0.264***	0.060***
	(0.008)	(0.010)	(0.038)	(0.011)
Exposed Shelter	-0.022*	-0.019	-0.071*	-0.018
	(0.011)	(0.013)	(0.030)	(0.013)
Mobility Index	0.093***	0.079***	0.364***	0.089**
	(0.016)	(0.021)	(0.064)	(0.031)
Perceived Drought	0.017***	0.028***	0.128***	0.027***
	(0.004)	(0.005)	(0.010)	(0.006)
Perceived Flood	0.003	0.006	0.025**	0.008
	(0.003)	(0.005)	(0.009)	(0.006)
30-Day Temperature	0.008	0.007	0.017	--
	(0.012)	(0.018)	(0.017)	
Temp 10-Year	0.048	0.047	0.231	--
Increase	(0.031)	(0.042)	(0.125)	
Sig. Increase	0.034	0.024	0.132	--
	(0.031)	(0.048)	(0.130)	
Decrease	0.025	0.013	0.111	--
	(0.032)	(0.045)	(0.127)	
Sig. Decrease	0.071	-0.011	0.072	--
	(0.037)	(0.058)	(0.218)	

Climate Literacy	(1)	(2)	(3)	(4)
Temp 30-Year+	0.001	-0.002	-0.000	--
Sig. Increase	(0.007)	(0.017)	(0.028)	
Decrease	0.017	0.030	0.106	--
	(0.018)	(0.044)	(0.054)	
30-Day Precipitation	0.000	0.000	0.000**	--
	(0.000)	(0.000)	(0.000)	
PPT 10-Year	0.076*	0.079	0.385*	0.289***
Increase	(0.030)	(0.042)	(0.166)	(0.051)
Sig. Increase	0.080*	0.047	0.225	0.253***
	(0.031)	(0.050)	(0.176)	(0.055)
Decrease	0.078*	0.072	0.355*	0.279***
	(0.029)	(0.042)	(0.166)	(0.049)
Sig. Decrease	0.105*	0.102*	0.475**	0.254***
	(0.046)	(0.052)	(0.180)	(0.056)
PPT 30-Year+	0.027	0.002	-0.049	0.053
Sig. Increase	(0.024)	(0.039)	(0.055)	(0.088)
Decrease	0.010	-0.015	-0.055	0.022
	(0.014)	(0.024)	(0.029)	(0.083)
Sig. Decrease	0.003	-0.034	-0.149**	-0.021
	(0.017)	(0.035)	(0.045)	(0.090)
Drought 10-Year	0.012	-0.012	-0.053	0.001
Increase	(0.013)	(0.020)	(0.030)	(0.016)
Sig. Increase	0.021	-0.003	-0.008	-0.016
	(0.021)	(0.036)	(0.070)	(0.031)
Decrease	0.016	0.007	0.022	0.037
	(0.010)	(0.016)	(0.036)	(0.037)
Sig. Decrease	0.003	-0.037	-0.218	0.078
	(0.035)	(0.042)	(0.116)	(0.057)
Drought 30-year	-0.005	0.079**	0.337***	-0.035
Sig. Increase	(0.013)	(0.029)	(0.041)	(0.027)
Sig. Decrease	0.058	0.015	0.040	-0.046
	(0.035)	(0.042)	(0.204)	(0.025)
Climatological Affected	--	-0.000	--	--
		(0.003)		
Hydrological Affected	--	0.001	--	--
		(0.004)		
Meteorological Affected	--	0.003	--	--
		(0.004)		
Constant	0.071	0.063	-1.960***	-0.113
	(0.055)	(0.110)	(0.215)	(0.092)
Observations	29969	29122	29969	31151

Supplementary Table 7: Excluding early respondents

Replicating Supplementary Table 2, below are linear probability models with climate literacy as the binary dependent variable. In these models, we excluded all participants interviewed before 2017. We calculated trends in changing precipitation, drought, and temperature for the 1988-2018 and 2008-2018 period. Those interviewed earlier in the survey period did not experience the end of these trends before being interviewed. However, excluding these respondents does not substantively change our findings. Random effects are at the country level. Robust standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Omitted base categories for weather variables are no change, unless marked with $^{+}$, then omitted base category is an insignificant increase.

Climate Literacy	(1) Socio-Demographics	(2) Disasters	(3) Precipitation	(4) Temperature	(5) Drought	(6) All Drivers
Age:	-0.009	-0.009	-0.009	-0.010	-0.010	-0.015
26-35	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)
36-45	-0.005	-0.005	-0.004	-0.005	-0.007	-0.015
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)
46-55	0.011	0.011	0.013	0.013	0.010	0.001
	(0.012)	(0.013)	(0.013)	(0.013)	(0.012)	(0.015)
56+	0.011	0.011	0.013	0.012	0.012	0.003
	(0.011)	(0.011)	(0.012)	(0.012)	(0.011)	(0.016)
Female	-0.089***	-0.089***	-0.090***	-0.090***	-0.089***	-0.092***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.009)
Radio News	0.019***	0.019***	0.018***	0.018***	0.019***	0.016***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban	0.038***	0.038***	0.033***	0.032***	0.038***	0.029*
	(0.012)	(0.012)	(0.009)	(0.009)	(0.011)	(0.013)
Education:	0.040**	0.040**	0.039*	0.038*	0.040**	0.035
Primary Schooling	(0.015)	(0.015)	(0.016)	(0.016)	(0.015)	(0.019)
Secondary Schooling	0.189***	0.189***	0.189***	0.188***	0.188***	0.167***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.021)	(0.025)
Post-Secondary Schooling	0.359***	0.359***	0.366***	0.365***	0.359***	0.340***
	(0.024)	(0.024)	(0.025)	(0.025)	(0.024)	(0.030)
Lived Poverty Index	-0.013*	-0.013*	-0.011*	-0.011*	-0.013*	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)
Community Engagement	0.016***	0.016***	0.015**	0.015**	0.016***	0.015*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Agriculture Employment	-0.010	-0.010	-0.008	-0.008	-0.010	0.022
	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.017)
Middle Class Household	0.048***	0.048***	0.048***	0.048***	0.049***	0.058***
	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)	(0.010)
Exposed Shelter	-0.009	-0.009	-0.009	-0.009	-0.008	-0.007
	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)	(0.015)
Mobility Index	0.086***	0.086***	0.094***	0.091***	0.086***	0.093***
	(0.019)	(0.019)	(0.017)	(0.017)	(0.018)	(0.019)
Perceived Drought	0.017***	0.017***	0.015***	0.016***	0.017***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Perceived Flood	0.002	0.002	0.003	0.002	0.002	0.003
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)	(0.005)
Climatological Affected	--	-0.001	--	--	--	-0.001
		(0.003)				(0.002)
Hydrological Affected	--	0.001	--	--	--	0.000
		(0.005)				(0.004)

Climate Literacy	(1)	(2)	(3)	(4)	(5)	(6)

	Socio-Demographics	Disasters	Precipitation	Temperature	Drought	All Drivers
Meteorological Affected	--	0.004	--	--	--	0.000
		(0.004)				(0.004)
30-Day Precipitation	--	--	0.000	--	--	-0.000
			(0.000)			(0.000)
PPT 10-Year	--	--	0.071*	--	--	0.063
Increase			(0.030)			(0.040)
Sig. Increase	--	--	0.073*	--	--	0.056
			(0.031)			(0.043)
Decrease	--	--	0.074*	--	--	0.042
			(0.029)			(0.042)
Sig. Decrease	--	--	0.108*	--	--	0.072
			(0.048)			(0.049)
PPT 30-Year+	--	--	0.036	--	--	0.017
Sig. Increase			(0.024)			(0.032)
Decrease	--	--	0.015	--	--	0.009
			(0.016)			(0.019)
Sig. Decrease	--	--	0.010	--	--	0.017
			(0.019)			(0.030)
30-Day Temperature	--	--	--	0.013	--	-0.007
				(0.009)		(0.017)
Temp 10-Year	--	--	--	0.058	--	0.043
Increase				(0.032)		(0.043)
Sig. Increase	--	--	--	0.041	--	0.040
				(0.031)		(0.045)
Decrease	--	--	--	0.044	--	0.023
				(0.032)		(0.044)
Sig. Decrease	--	--	--	0.103*	--	0.072
				(0.048)		(0.055)
Temp 30-Year+	--	--	--	-0.000	--	-0.012
Sig. Increase				(0.009)		(0.012)
Decrease	--	--	--	0.012	--	0.034
				(0.018)		(0.042)
Drought 10-Year	--	--	--	--	0.013	0.010
Increase					(0.014)	(0.016)
Sig. Increase	--	--	--	--	0.054*	0.034
					(0.026)	(0.028)
Decrease	--	--	--	--	0.015	0.006
					(0.012)	(0.016)
Sig. Decrease	--	--	--	--	-0.000	-0.025
					(0.037)	(0.045)
Drought 30-year	--	--	--	--	0.003	0.072**
Sig. Increase					(0.016)	(0.024)
Sig. Decrease	--	--	--	--	0.055	0.043
					(0.034)	(0.037)
Constant	0.226***	0.210***	0.138**	0.166***	0.217***	0.089
	(0.027)	(0.062)	(0.044)	(0.043)	(0.029)	(0.101)
Observations	25761	25761	24223	24223	25665	24223

Supplementary Table 8: Alternative measure of climate change literacy

Here we use linear probability models to understand who has heard of climate change, rather than who has heard climate change and thinks that it is, at least in part, caused by human actions. Linear probability models, with random effects are at the country level. Robust standard errors are in parentheses, * p < 0.05, ** p < 0.01, *** p < 0.001. Omitted base categories for weather variables are no change, unless marked with $^{+}$, then omitted base category is an insignificant increase.

Heard of Climate Change	(1)	(2)
Age:	0.001	-0.007
26-35	(0.009)	(0.011)
36-45	0.015	0.001
	(0.011)	(0.014)
46-55	0.034**	0.017
	(0.011)	(0.016)
56+	0.025*	0.007
	(0.012)	(0.018)
Female	-0.081***	-0.089***
	(0.008)	(0.010)
Radio News	0.025***	0.021***
	(0.003)	(0.004)
Urban	0.033**	0.020
	(0.011)	(0.014)
Education:	0.056***	0.030
Primary Schooling	(0.015)	(0.030)
Secondary Schooling	0.231***	0.197***
	(0.019)	(0.028)
Post-Secondary	0.365***	0.334***
Schooling	(0.021)	(0.027)
Lived Poverty Index	-0.009	0.003
	(0.006)	(0.008)
Community Engagement	0.023***	0.024***
	(0.004)	(0.007)
Agriculture Employment	0.003	0.009
	(0.012)	(0.027)
Middle Class Household	0.042***	0.047***
	(0.008)	(0.012)
Exposed Shelter	-0.019	-0.010
	(0.013)	(0.014)
Mobility Index	0.066**	0.083**
	(0.021)	(0.031)
Perceived Drought	0.011**	0.018***
	(0.004)	(0.005)
Perceived Flood	0.001	0.011
	(0.003)	(0.007)
30-Day Temperature	--	0.002
		(0.020)
Temp 10-Year	--	0.030
Increase		(0.055)
Sig. Increase	--	-0.000
		(0.063)
Decrease	--	-0.002
		(0.060)
Sig. Decrease	--	0.118
		(0.085)
Temp 30-Year^{+}	--	-0.014
Sig. Increase		(0.016)
Decrease	--	-0.010
		(0.030)
30-Day Precipitation	--	-0.000
		(0.000)
PPT 10-Year	--	0.058
Increase		(0.035)

Heard of Climate Change	(1)	(2)
Sig. Increase	--	0.003
		(0.035)
Decrease	--	0.054
		(0.042)
Sig. Decrease	--	0.078
		(0.055)
PPT 30-Year[+]	--	0.062
Sig. Increase		(0.042)
Decrease	--	0.000
		(0.025)
Sig. Decrease	--	-0.030
		(0.034)
Drought 10-Year	--	-0.022
Increase		(0.019)
Sig. Increase	--	0.015
		(0.031)
Decrease	--	0.023
		(0.015)
Sig. Decrease	--	-0.046
		(0.043)
Drought 30-year		0.078**
Sig. Increase		(0.026)
Sig. Decrease		0.015
		(0.031)
Climatological Affected		0.003
		(0.003)
Hydrological Affected		0.006
		(0.005)
Meteorological Affected		-0.003
		(0.004)
Constant	0.345***	0.196
	(0.032)	(0.124)
Observations	31515	29977

Supplementary Table 9: Alternative measures of drought

Instead of using SPI as a measure of drought, here we first use the Standardized Precipitation Evapotranspiration Index (SPEI). Model 1 used a 3-month SPEI. Model 2 includes the trend in 95th percentile occurrences per year of consecutive dry day (CDD) events. We determined dry spells frequency throughout the year and the wet season and the duration of the longest dry spell (Max CDD) of the year. A dry spell is a period of at least 5 consecutive days when daily rainfall is less than 1 mm. The omitted base category for each level of drought is no change in drought, unless marked with $^{+}$, then omitted base category is an insignificant increase. Random effects are at the country level. Robust standard errors are in parentheses, * p < 0.05, ** p < 0.01, *** p < 0.001.

Climate Literacy	(1) SPEI	(2) CDD 95th Percentile	(3) CDD
Age:	-0.0043	-0.00455	-0.00422
26-35	(0.0114)	(0.0115)	(0.0114)
36-45	0.0007	0.000252	0.000631
	(0.0121)	(0.0121)	(0.0121)
46-55	0.0137	0.0132	0.0137
	(0.0113)	(0.0114)	(0.0113)
56+	0.0166	0.0162	0.0169
	(0.0115)	(0.0114)	(0.0113)
Female	-0.0853***	-0.0853***	-0.0855***
	(0.0067)	(0.00671)	(0.00671)
Radio News	0.0193***	0.0193***	0.0193***
	(0.0030)	(0.00302)	(0.00301)
Urban	0.0351***	0.0361***	0.0361***
	(0.0010)	(0.0104)	(0.0104)
Education:	0.0383**	0.0383**	0.0375**
Primary Schooling	(0.0134)	(0.0134)	(0.0132)
Secondary	0.1886***	0.189***	0.188***
Schooling	(0.0181)	(0.0182)	(0.0180)
Post-Secondary	0.3581***	0.358***	0.358***
Schooling	(0.0211)	(0.0211)	(0.0211)
Lived Poverty Index	-0.0107*	-0.0107*	-0.0108*
	(0.0048)	(0.00481)	(0.00485)
Community	0.0159***	0.0160***	0.0158***
Engagement	(0.0038)	(0.00388)	(0.00382)
Agriculture	-0.0065	-0.00601	-0.00691
Employment	(0.0091)	(0.00933)	(0.00954)
Middle Class	0.0523***	0.0522***	0.0520***
Household	(0.0080)	(0.00789)	(0.00791)
Exposed Shelter	-0.0208*	-0.0209*	-0.0211*
	(0.0103)	(0.0104)	(0.0101)
Mobility Index	0.0879***	0.0883***	0.0862***
	(0.0165)	(0.0178)	(0.0176)
Perceived Drought	0.0175***	0.0175***	0.0176***
	(0.0037)	(0.00369)	(0.00364)
Perceived Flood	0.0027	0.00265	0.00263
	(0.0029)	(0.00287)	(0.00288)
Drought 10-Year	-0.0357	-0.000704	
Increase	(0.0593)	(0.0141)	--
Sig. Increase	0.0076	0.0204	--
	(0.0146)	(0.0433)	
Decrease	--	-0.00963	--
		(0.00920)	
Sig. Decrease	--	0.0171	--
		(0.0212)	
Drought 130-Year	-0.0009		-0.0204
Increase	(0.0138)	--	(0.0157)
Sig. Increase	-0.0133	0.00174	-0.0223
	(0.0238)	(0.0191)	(0.0134)
Decrease	-0.0001	--	-0.0170
	(0.0109)		(0.0109)

Climate Literacy	(1) SPEI	(2) CDD 95th Percentile	(3) CDD
Sig. Decrease	-0.0549 (0.0405)	0.00488 (0.0105)	0.0198 (0.0287)
Constant	0.2148*** (0.0263)	0.216*** (0.0265)	0.226*** (0.0261)
Observations	31410	31410	31376

Supplementary Table 10: Heterogeneity in sensitivity to climatological changes

Here we test to see whether those who interact more with the natural environment ("exposed") are more sensitive to climatological changes. Model 1 interacts climatological changes with whether or not a respondent is employed in agriculture. Model 2 interacts climatological changes with whether a respondent lives in exposed shelter, and Model 3 interacts changes with whether a respondent lives in an urban or rural area. Linear probability models, with climate literacy as the binary dependent variable. For these models, we use the continuous measures of changes in weather in the past 10 and 30 years before the respondent interview. Random effects are at the country level. Robust standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Climate Literacy	Agricultural Employment	Exposed Shelter	Urban
Age:	-0.008	-0.009	-0.008
26-35	(0.013)	(0.014)	(0.013)
36-45	-0.005	-0.006	-0.006
	(0.015)	(0.015)	(0.015)
46-55	0.007	0.007	0.007
	(0.015)	(0.016)	(0.015)
56+	0.012	0.010	0.012
	(0.019)	(0.020)	(0.019)
Female	-0.087***	-0.087***	-0.087***
	(0.008)	(0.008)	(0.008)
Radio News	0.014***	0.014***	0.014***
	(0.004)	(0.004)	(0.004)
Urban	0.026	0.027	0.065**
	(0.015)	(0.016)	(0.025)
Education:	0.047*	0.045	0.046*
Primary Schooling	(0.023)	(0.024)	(0.023)
Secondary Schooling	0.186***	0.183***	0.185***
	(0.027)	(0.028)	(0.027)
Post-Secondary	0.359***	0.357***	0.358***
Schooling	(0.030)	(0.030)	(0.030)
Lived Poverty Index	0.006	0.005	0.006
	(0.007)	(0.007)	(0.007)
Community Engagement	0.017*	0.017*	0.017*
	(0.008)	(0.008)	(0.008)
Agriculture Employment	-0.000	0.019	0.017
	(0.026)	(0.016)	(0.016)
Middle Class Household	0.059***	0.060***	0.059***
	(0.010)	(0.010)	(0.010)
Exposed Shelter	-0.019	-0.047	-0.018
	(0.012)	(0.028)	(0.012)
Mobility Index	0.076***	0.075***	0.074***
	(0.022)	(0.022)	(0.022)
Perceived Drought	0.026***	0.026***	0.026***
	(0.005)	(0.005)	(0.005)
Perceived Flood	0.007	0.006	0.007
	(0.005)	(0.005)	(0.005)
30-Day Temp	-0.009	0.002	0.018
	(0.019)	(0.018)	(0.016)
Exposed X 30-Day Temp	0.037	-0.001	-0.037**
	(0.021)	(0.017)	(0.012)
10-Year Temp	-0.096	-0.103	-0.079
	(0.168)	(0.176)	(0.193)
Exposed X 10-Year Temp	0.126	0.119	0.086
	(0.188)	(0.150)	(0.152)
30-Year Temp	0.617	0.401	1.180
	(1.048)	(1.207)	(1.120)
Exposed X 30-Year Temp	0.194	0.998	-1.266
	(1.051)	(0.889)	(1.029)
30-Day Precip	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)

Climate Literacy	Agricultural Employment	Exposed Shelter	Urban
Exposed X 30-Day Precip	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
10-Year Precip	-0.002	0.011	-0.002
	(0.163)	(0.168)	(0.132)
Exposed X 10-Year Precip	0.002	-0.007	0.032
	(0.173)	(0.120)	(0.132)
30-Year Precip	0.386	0.165	0.169
	(0.515)	(0.463)	(0.470)
Exposed X 30-Year Precip	-0.309	0.385	0.366
	(0.679)	(0.361)	(0.518)
10-Year Drought	-0.060	-0.013	-0.012
	(0.116)	(0.122)	(0.118)
Exposed X 10-Year Drought	0.239	0.032	0.029
	(0.133)	(0.147)	(0.135)
30-Year Drought	0.923	0.972	1.011
	(0.623)	(0.666)	(0.561)
Exposed X 30-Year Drought	-0.192	-0.015	-0.234
	(0.753)	(0.688)	(0.590)
Constant	0.178***	0.184***	0.158***
	(0.040)	(0.043)	(0.037)
Observations	29969	29969	29969

Supplementary Table 11: Alternate EM-DAT specifications

To ensure the null effect of the disasters as captured by the EM-DAT data in the main text are not a result of our specific model specification, we conducted four additional robustness checks with alternative specifications of the EM-DAT data. Each model below is a linear probability model, with climate literacy as the binary dependent variable. Random effects are at the country level. Robust standard errors are in parentheses, * p < 0.05, ** p < 0.01, *** p < 0.001. In the first model, we include the total logged number of people affected by all disasters combined, including hydrological, meteorological, and climatological disasters. In the second model, rather than using the number of people affected we use the number of disasters in each country. We include a count of the number of disasters in each country, broken down by the type of disaster. In the final model, we include the count of hydrological, meteorological, and climatological events in each country. However, we only include events that are above the following thresholds: 50 or more total deaths per event; 50 or more injured per event; 10,000 or more affected per event; or 5,000 or more homeless per year with event. In each model, there is still no effect of disasters on climate change literacy.

Climate Literacy	(1)	(2)	(3)	(4)
Age:	-0.00188	-0.00180	-0.00185	-0.00437
26-35	(0.0120)	(0.0120)	(0.0120)	(0.0118)
36-45	0.00297	0.00310	0.00301	-0.00120
	(0.0126)	(0.0126)	(0.0126)	(0.0123)
46-55	0.0172	0.0174	0.0172	0.01184
	(0.0116)	(0.0116)	(0.0116)	(0.0115)
56+	0.0201	0.0203	0.0201	0.0141
	(0.0120)	(0.0120)	(0.0120)	(0.0117)
Female	-0.0847***	-0.0847***	-0.0847***	-0.0860***
	(0.00696)	(0.00696)	(0.00696)	(0.0069)
Radio News	0.0204***	0.0204***	0.0204***	0.01928***
	(0.00315)	(0.00316)	(0.00315)	(0.0031)
Urban	0.0523***	0.0523***	0.0523***	0.03644***
	(0.00981)	(0.00980)	(0.00980)	(0.0107)
Education:	0.0413**	0.0415**	0.0413**	0.0380**
Primary Schooling	(0.0137)	(0.0137)	(0.0137)	(0.0136)
Secondary Schooling	0.197***	0.197***	0.197***	0.184***
	(0.0178)	(0.0178)	(0.0178)	(0.0179)
Post-Secondary	0.393***	0.393***	0.393***	0.3569***
Schooling	(0.0208)	(0.0208)	(0.0208)	(0.0216)
Lived Poverty Index	-0.0141**	-0.0142**	-0.0142**	-0.0102*
	(0.00504)	(0.00504)	(0.00504)	(0.0050)
Community Engagement	0.0158***	0.0158***	0.0158***	0.0156***
	(0.00396)	(0.00397)	(0.00397)	(0.0039)
Agriculture Employment	-0.0196*	-0.0199*	-0.0197*	-0.0082
	(0.00905)	(0.00904)	(0.00902)	(0.0094)
Perceived Drought	0.0181***	0.0181***	0.0180***	0.0182**
	(0.00379)	(0.00380)	(0.00379)	(0.0038)
Perceived Flood	0.00292	0.00292	0.00289	0.0028
	(0.00300)	(0.00299)	(0.00300)	(0.00295)
Disaster Total Affected	-0.00148	--	--	--
	(0.00453)			
Hydrological Event Count	--	0.00312	--	-0.0082
		(0.00608)		(0.01845)
Meteorological Event Count	--	-0.00280	--	0.0049
		(0.0105)		(0.0071)
Climatological Event Count	--	-0.0162	--	-0.0005
		(0.0174)		(0.1212)
Disaster Event Count	--	--	-0.00180	--
			(0.00463)	
Constant	0.246***	0.233***	0.244***	0.1967
	(0.0644)	(0.0477)	(0.0481)	(0.0386)
Observations	30786	30786	30786	30768

Supplementary Table 12: All articles reviewed on climate change literacy, awareness and perception

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Supplementary Table 13: Detailed categorization of types of agricultural employment (Afrobarometer Round 3)

Country	Subsistence farmer (own consumption only)	Peasant farmer (own consumption and sale)	Commercial farmer (mainly for sale)	Farm worker	Fisherman	Pastoralist / herder / raise livestock	Aggregate R 3	Agriculture / farming / fishing / forestry (R7)
Benin	9%	23%	5%	2%	2%	0%	42%	27%
Botswana	3%	2%	0%	2%	0%	0%	7%	4%
Cape Verde	6%	2%	1%	5%	2%	0%	15%	11%
Ghana	10%	15%	2%	7%	3%	0%	37%	24%
Kenya	16%	17%	1%	3%	0%	1%	38%	25%
Lesotho	11%	4%	1%	1%	0%	1%	16%	14%
Madagascar	24%	29%	2%	2%	1%	0%	58%	62%
Malawi	30%	23%	4%	1%	1%	0%	59%	42%
Mali	25%	9%	0%	0%	1%	0%	35%	35%
Mozambique	31%	9%	1%	6%	1%	0%	48%	29%
Namibia	7%	2%	1%	5%	1%	0%	16%	6%
Nigeria	3%	7%	2%	5%	1%	0%	17%	16%
Senegal	15%	6%	2%	1%	1%	0%	26%	19%
South Africa	1%	1%	0%	6%	0%	0%	8%	3%
Tanzania	24%	37%	1%	1%	1%	0%	65%	54%
Uganda	15%	29%	2%	1%	1%	0%	48%	46%
Zambia	13%	8%	0%	3%	2%	0%	27%	26%
Zimbabwe	15%	7%	0%	7%	0%	0%	30%	13%
18-country average	14%	13%	2%	3%	1%	0%	33%	25%

Note: In Round 3 (2005/2006) of Afrobarometer, interviewers recorded different types of agricultural employment in a more detailed way. This can be seen here in Columns 2-7 in this table.
Column 8 shows the aggregate percentage of respondents per country who worked in the agriculture, farming, fishing, and pastoralist categories. The last column (Column 9) displays the percentage of respondents working in this group in Round 7 (2016/2018) for comparison. While the aggregated category in R7 also includes "forestry", no respondents were recorded in this category in R3.

Supplementary Information: Afrobarometer survey materials - Variable question wording and coding

Below we have included the English question wording and coding of all questions from the Afrobarometer used in our analyses. All questions come from round 7 of the Afrobarometer and are asked the same in all countries except where specified otherwise. The countries included in our analyses are as follows: Benin, Botswana, Burkina Faso, Cabo Verde, Cameroon, Côte d'Ivoire, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.

Climate Change Literacy: Climate change literacy is our primary dependent variable. Respondents were first asked "Have you heard about climate change or haven't you had the chance to hear about this yet?" The response options were "no," "yes," or "don't know." If respondents answered yes, they were then asked "People have different ideas about what causes climate change. What about you, which of the following do you think is the main cause of climate change, or haven't you heard enough to say?" The response options were "human activity, like burning fuel and other activities that pollute the atmosphere," "natural processes," "both human activity and natural processes," "none of these," and "don't know." The dependent variable is coded as 1 for climate change literate if respondents both indicated they had heard about climate change and indicated it was caused by human activity or both human activity and natural processes. Otherwise the dependent variable is coded as 0.

In Zimbabwe, respondents were not asked about the causes of climate change. In the main analysis, respondents from Zimbabwe were coded as climate change literate if they had heard of climate change, and 0 otherwise. In the supplemental results, we remove Zimbabwe from the analyses, and the results remain unchanged.

Age: Respondents were asked "How old are you?" We recoded age as an ordinal variable as follows: 0 if respondents are 18-25, 1 if respondents are 26-35, 2 if respondents are 36-45, 3 if respondents are 46-55, and 4 if respondents are 56 or older.

Female: Female respondents were coded as 1 and males as 0. The interviewer indicated the gender of the respondent at the conclusion of the interview.

Urban: Respondents were coded as 1 if their primary sampling unit was in an urban area, and 0 if their primary sampling unit was rural.

Exposed Shelter: Respondents who live in shacks and traditional houses were coded as 1 and those in any other type of shelter were coded as a 0.

Education: Respondents were asked "What is your highest level of education?" They were not given response options, but their level of education was coded based on their open-ended response. Respondents were coded as follows: 0 for no formal schooling, 1 for some or completed primary schooling, 2 for some or completed secondary schooling, and 3 for some or completed post-secondary schooling including university, post-graduate, or post-secondary qualifications other than university degree.

Agriculture Employment: Respondents were asked “What is your main occupation?” They were coded as 1 if they indicated their employment was agriculture, farming, fishing, or forestry and 0 otherwise.

Radio News: Respondents were asked “How often do you get news from the following sources?” Here we focused on news from the radio. Responses options were coded as follows: (4) “Every Day,” (3) “A few times a week,” (2) “A few times a month,” (1) “Less than once a month,” (0) “Never.” “Don’t know” responses were coded as missing.

Lived Poverty Index (LPI): This additive index is based on five questions, where respondents were asked “Over the past year, how often, if ever, have you or anyone in your family gone without: 1) enough food to eat, 2) enough clean water for home use, 3) medicines or medical treatment, 4) enough fuel to cook your food, 5) a cash income?” Response options included (0) “Never,” (1) “Just once or twice,” (2) “Several times,” (3) “Many times,” and (4) “Always.” The “don’t know” responses were recoded as missing variables. The responses to each of the five questions were summed and then divided by five to create an index that ranges from 0 to 4.

Upper/Middle class Household: Respondents who are a shop owner, or work in a managerial, mid- or upper-level position, were coded as 1. Additionally, if the head of the household (not the respondent) works in a managerial, mid- or upper level position, they were coded as a 1. All other respondents were coded as 0.

Community Engagement Index (CEI): This index is based on two questions. Respondents were asked “Here is a list of actions that people sometimes take as citizens. For each of these, please tell me whether you, personally, have done any of these things during the past year?” The activities included attending a community meeting and getting together with others to raise an issue. Respondents were coded as 0 if they had done neither of these activities, 1 if they had done one of these activities at least once, and 2 if they had both of these activities at least once.

Mobility index: This index is based on four questions. The first three were based on observations by the interviewer, and include: “Is there any kind of paid transport, such as a bus, taxi, moped, or other form available?” Respondents were coded as 1 if the interviewer indicated this was the case, and 0 otherwise. The second question was “Thinking of the journey here: What was the most common surface of the road over the last 5 kilometres before arriving at the start point of the PSU/EA?” Respondents were coded as 1 if the road was paved/tarred or concrete, and 0 otherwise. The third question was “Thinking of the journey here: What was the condition of the road in the last 5 km before reaching the start point of the PSU/EA? Was the road in excellent or good condition and easy to traverse, or was it in poor or very poor condition, that is, difficult to traverse due to potholes, waterlogging or other issues, or was it impassable at any point?” Respondents were coded as 1 if the road was good or very good, and 0 otherwise. The final question asked respondents whether they themselves, or someone else in the household owns a motor vehicle or motorcycle. If they answered yes, they were coded as a 1 and zero otherwise. The response to this question, along with the interviewer observations from the exposure index, were summed to an index ranging from 0 to 4. For the analyses, we normalized the index to range between 0 and 1.

Drought Perception: Respondents were asked the following about droughts: “In your experience, over the past 10 years, has there been any change in the severity of the following events in the area where you live? Have they become more severe, less severe, or stayed about the same?” The response options included “much more severe,” “somewhat more severe,” “stayed the same,” somewhat less severe,” and “much less severe.” The “don’t know”

responses were coded as missing. For the analyses, much less severe was coded as -2, less severe as -1, about the same as 0, more severe as 1, and much more severe as 2.

Flood Perception: Respondents were asked the following about floods: "In your experience, over the past 10 years, has there been any change in the severity of the following events in the area where you live? Have they become more severe, less severe, or stayed about the same?" The response options included "much more severe," "somewhat more severe," "stayed the same," somewhat less severe," and "much less severe." The "don't know" responses were coded as missing. For the analyses, much less severe was coded as -2, less severe as -1, about the same as 0, more severe as 1, and much more severe as 2.

In the regression analysis (described in the Methods), subnational literacy scores were computed for each Afrobarometer survey country, using the 'Local Level 1' code. The region codes of these results were used to cluster regions into their respective countries using the Afrobarometer Round 7 Survey Manual[3]. These subnational regions could then be compared to the Level 1 administrative boundary regions in the GADM dataset, a high-resolution Database of Global Administrative Areas[4]. For 59% of the Afrobarometer survey countries, regional level Afrobarometer data was directly comparable to the administrative one GADM dataset. 23% of the Afrobarometer survey countries were assigned Afrobarometer boundaries that were more refined than the level 1 regions and could therefore be aggregated up into the respective administrative one boundary- the Afrobarometer region names either matched the administrative region 2 boundaries or the level 3 boundaries. Weighted averages were subsequently calculated, to accurately represent the literacy scores of these aggregated regions.

In contrast, 18% of countries contained literacy scores for regions larger than the administrative 1 boundaries. For example, Tunisia has six major regions: South West, South East, North West, Centre West, North East and Centre East Tunisia. These regions, together with 'Great Tunis', the capital city of Tunisia, form the Afrobarometer regional dataset. The subnational level 1 dataset for Tunisia, however, has 24 governorates. These 24 governorates were therefore clustered into their respective regions. Morocco has 12 regions with the Afrobarometer regions mirroring these 12 regions, 3 of which are in Western Sahara. The GADM dataset, however, has 15 very different regions and does not include Western Sahara. As a result of border disputes, extensive research was needed to appropriately aggregate the 12 Afrobarometer regions into the 15 Level 1 regions. Although the boundaries chosen may not represent the most recent political boundary, they are the most appropriate for this dataset. Lastly, three countries (Cabo Verde, Mauritius and Uganda) have distinct Level 1 regions where no Afrobarometer surveys were conducted, these regions were assigned 'No data' in the analysis.

To ensure that average literacy scores at each subnational region are less sensitive to outliers, all Afrobarometer regions with less than 30 respondents were excluded from the dataset. Here, we followed Krönke, Lockwood and Mattes[5] who applied a similar threshold when calculating sub-national averages using Afrobarometer data. In total, 68 regions had to be excluded, including the three Western Sahara regions. As a result, the mean literacy score for 336 of the 436 original Afrobarometer regions could be mapped using Quantum GIS. Similarly, the national literacy scores were mapped using Quantum GIS. Countries where no Afrobarometer surveys were conducted were assigned 'No data'.

Summary Table: Afrobarometer Study Materials	
Total number of African AB countries	34
Total number of AB regions	463
Number of countries where all AB regions matched admin1 regions	20
Number of countries where AB regions did not match admin1 regions	14
Number of countries where AB regions had to be aggregated into admin1 regions	8
Number of countries where admin1 regions had to be aggregated into AB regions	6
Number of weighted averages calculated	48
Final number of regions	404
Number of regions n<30	68
Total number of regions mapped	**336**

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