

Supplementary Materials for

Nighttime light data reveal how flood protection shapes human proximity to rivers

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Supplementary Materials

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References (47–49)

Supplementary Materials

Maximum flood extent mapping

The flood extent for the Brisbane 2011 event was downloaded from Department of Natural Resources and Mines, State of Queensland ([http://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q="Flood extent - Queensland - January 2011"](http://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=)). The dataset was derived from the high resolution aerial photography acquired 5-21 January 2011. Freely available Landsat imagery, from U.S. Geological Survey (USGS) Global Visualization Viewer³⁹, was used to estimate and delineate maximum flood extent in the other three study areas (Fig. 1). The selection of satellite imagery was made based on availability and lack of obscuring clouds, which sometimes resulted in using multiple imagery for one flood event to estimate the maximum flood extent (table S1). As the only available Landsat image for the Limpopo study area has 34% cloud cover it was combined with a radar image from Radarsat-1. Flood masks were created using image classification and visual analysis of spectral signatures characterized for water, where threshold values distinguishing flooded areas from non-flooded areas was identified (refs. 47–49).

Figures and Tables

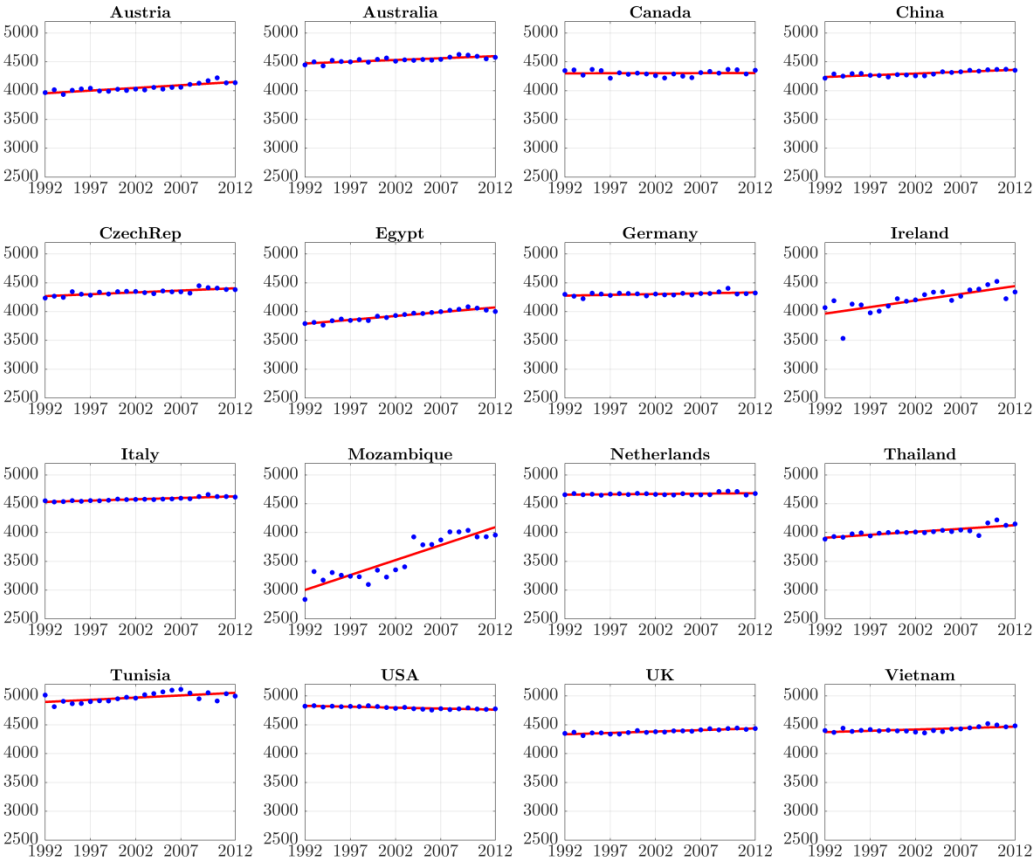


Fig. S1. Large-scale analysis: trends in human proximity to rivers.

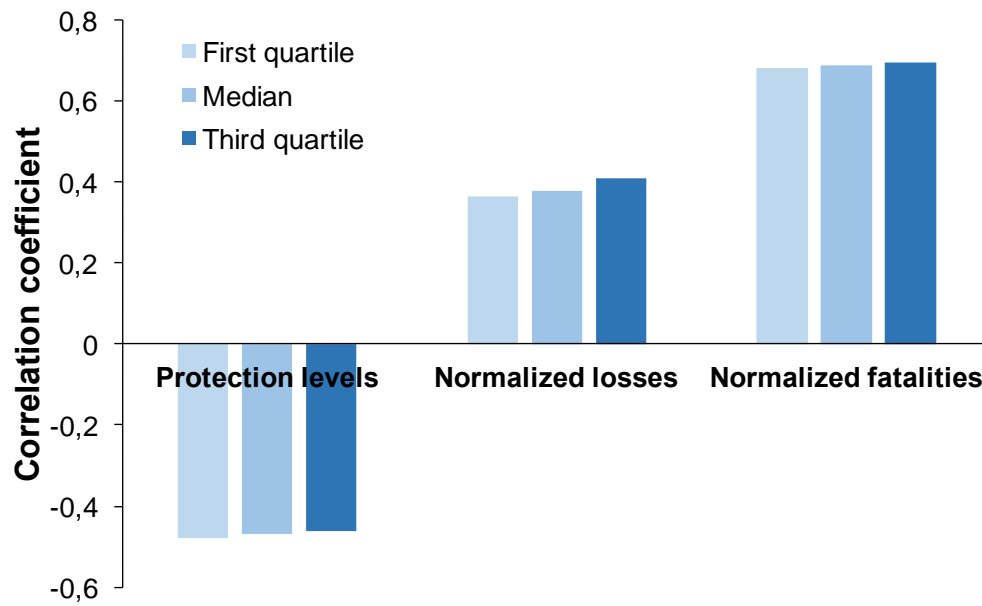


Fig. S2. Results of the robustness test: leave-one-out approach. First, second (median) and third quartile of the three correlation coefficients between average changes in river proximity and: i) flood protection levels, ii) normalized economic losses, iii) normalized flood fatalities.

Table S1. Satellite imagery used for estimation and delineation of maximum flood extent.

Study area	Product	Path/Row	Date	*CC (%)	**Res. (m)
Limpopo					
	Landsat 7 ETM+	167/077	1-Mar-2000	34	30
	Radarsat-1	–	1-Mar-2000		15
Mekong					
	Landsat 7 ETM+	126/051	26-Sep-2000	16	30
	Landsat 7 ETM+	126/052	26-Sep-2000	26	30
	Landsat 7 ETM+	126/053	26-Sep-2000	18	30
	Landsat 5 TM	125/052	27-Sep-2000	29	30
	Landsat 5 TM	125/051	27-Sep-2000	16	30
	Landsat 5 TM	125/053	27-Sep-2000	26	30
Mississippi					
	Landsat 5 TM	024/033	18-Jul-1993	0	30
	Landsat 5 TM	024/033	3-Aug-1993	10	30
	Landsat 5 TM	024/033	19-Aug-1993	10	30

* Percent cloud cover (CC) at the time of acquisition

** Spatial resolution

Table S2. Administrative areas considered for the four study areas that were affected by the occurrence of flooding.

Limpopo	Mekong	Brisbane	St. Louis
Gaza province	<p><i>Provinces Cambodia:</i></p> <p>Takeo, Kandal, Prey Veng, Kampong Speeu, Kampong Cham, Kampong Chnang, Kampong Thum</p> <p><i>Provinces Vietnam:</i></p> <p>Soc Trang, Tra Vinh, Vinh Long, Hau Giang, Can Tho, An Giang, Dong Thap</p>	Greater Brisbane	St. Louis Metropolitan Statistical Area

Table S3. Observation year, satellite number, and nightlight satellite data set. (42).

	F10	F12	F14	F15	F16	F18
1992	F101992					
1993	F101993					
1994	F101994	F121994				
1995		F121995				
1996		F121996				
1997		F121997	F141997			
1998		F121998	F141998			
1999		F121999	F141999			
2000			F142000	F152000		
2001			F142001	F152001		
2002			F142002	F152002		
2003			F142003	F152003		
2004				F152004	F162004	
2005				F152005	F162005	
2006				F152006	F162006	
2007				F152007	F162007	
2008					F162008	
2009					F162009	
2010						F182010
2011						F182011
2012						F182012
2013						F182013