

Data sets for the identification of a global typology for coastal urban vulnerability under rapid urbanization

(<https://doi.org/10.5880/PIK.2019.020>)

Till Sterzel^{1,2}, Matthias K.B. Lüdeke³, Carsten Walther³, Marcel T. Kok⁴, Diana Sietz³, Paul L. Lucas⁴

1. *climate-babel, Straße nach Fichtenwalde, 14547 Beelitz-Heilstätten, Germany,*
2. *adelphi, Alt-Moabit 91 10559 Berlin*
3. *Potsdam Institute for Climate Impact Research, Research Domain II – Climate Impacts and Vulnerabilities, Telegraphenberg, 14473 Potsdam, Germany*
4. *PBL Netherlands Environmental Assessment Agency, 3720 AH Bilthoven, The Netherlands*

Contact persons: Till Sterzel till@climate-babel.org, sterzel@adelphi.de, Matthias Lüdeke: luedeke@pik-potsdam.de

1. Licence

Creative Commons Attribution 4.0 International License (CC BY 4.0)



2. Citation

When using the model please cite:

Sterzel, Till; Lüdeke, Matthias K. B.; Walther, Carsten; Kok, Marcel; Sietz, Diana; Lucas, Paul (2019): Data sets for the identification of a global typology for coastal urban vulnerability under rapid urbanization. GFZ Data Services. <http://doi.org/10.5880/PIK.2019.020>

The data are supplementary to:

Sterzel, T.; Lüdeke, M. K. B.; Walther, C.; Kok, M. T.; Sietz, D.; Lucas, P. (2019). Global typology of coastal urban vulnerability under rapid urbanization. PLoS One, **accepted**

3. Abstract

Coastal areas are urbanizing at unprecedented rates, particularly in low- and middle-income countries. Combinations of long-standing and emerging problems in these urban areas generate vulnerability for human well-being and ecosystems alike. Based on the presented data sets a spatially explicit global systematization of these problems into typical urban vulnerability profiles can be derived for the year 2000 using largely sub-national data.

We present here 11 indicator datasets for urban expansion, urban population growth, marginalization of poor populations, government effectiveness, exposures and damages to climate-related extreme events, low-lying settlement, and wetlands prevalence.

Applying a standard k-means cluster analysis to this input data reveals a global typology of seven clearly distinguishable clusters, or urban profiles of vulnerability (for results see Sterzel et. al., 2019).

4. Data Files:

Indicator	Indicator dataset	Spatial resolution	File name	Format
Rapid urban population increase	Changes in urban population from 1990 to 2000 in percent of 1990 (Klein Goldewijk et al. 2010)	0.5°x0.5°	urpop_change9000prc_round.asc	Ascii, ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999
Urban expansion	Changes in urbanized area from 1990 to 2000 in percent of 1990 (Klein Goldewijk et al. 2010)	0.5°x0.5°	urb_ext_90-00.asc	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999
Government effectiveness	Government effectiveness, aggregate and individual governance indicators (Kaufmann et al. 2010)	National	GE with code-1.txt	Ascii, 3 columns: VSF-country code, ISO country code, indicator
Average per capita income	Per capita GDP (PPP\$) (UNSTAT 2005; The World Bank 2006)	National	gdp_2000.txt	Ascii, 2 columns: ISO country code, indicator
Slum population level	Slum population in 2000 in percentage of the urban population (UN-HABITAT 2008)	National	slum2001_prc_withIMA GEcoding.csv	Ascii, 2 columns: ISO country code, indicator
Wetlands prevalence	Combination of prevalence of key wetlands, and the percentage of those that immediately surround urban areas (Lehner & Doell 2004; CIESIN 2016)	0.5°x0.5°	wet_matr.txt	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999

Cyclone damage	Fatalities per year from cyclones (Dilley et al. 2005)	0.5°x0.5°	cycl_mean.txt	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999
Flood damage	Fatalities per year from floods (Dilley et al. 2005)	0.5°x0.5°	flood_mean.txt	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999
Cyclone occurrence	Average relative frequency and distribution of cyclones (Dilley et al. 2005)	0.5°x0.5°	cyclone_freq_mean.asc	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999
Flood occurrence	Average relative frequency and distribution of high floods (Dilley et al. 2005)	0.5°x0.5°	flood_freq_mean.asc	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999
Low-lying settlement	Total urban population currently living 2m or less above sea level; calculated using the digital elevation model SRTM v4.1 (Jarvis et al. 2008) and urban population data (Klein Goldewijk et al. 2010)	0.5°x0.5°	pop_flooded_2m_2013 0425.txt	ncols 720 nrows 360 xllcorner -180.000000 yllcorner -90.000000 cellsize 0.500000 NODATA_value -9999

5. References

- CIESIN (2016): Gridded Population of the World Version 4 (GPWv4) [Internet]. Socioeconomic Data and Applications Center (SEDAC), Columbia University. [cited 2016 May 25]. URL: <http://sedac.ciesin.columbia.edu/data/collection/gpw-v4/sets/browse> (last access: 15 November 2019).
- Dilley M, Chen RS, Deichmann U, Lerner-Lam A, Arnold M. (2005): Natural Disaster Hotspots - A Global Risk Analysis [Internet]. Washington D.C.: URL: <http://documents.worldbank.org/curated/en/2005/04/6433734/natural-disaster-hotspots-global-risk-analysis> (last access: 15 November 2019).
- Jarvis, A., Guevara, E., Reuter, H. I., Nelson, A. D. (2008) : Hole-filled SRTM for the globe: version 4: data grid. Web publication/site, CGIAR Consortium for Spatial Information. URL: <http://srtm.csi.cgiar.org/> (last access: 15 November 2019).
- K. Klein Goldewijk, A. Beusen, P. Janssen (2010): Long-term dynamic modeling of global population and built-up area in a spatially explicit way: HYDE 3.1. Holocene, 20(4), pp. 565-573, <http://doi.org/10.1177/0959683609356587>
- Kaufmann, D., et al. (2010): The Worldwide Governance Indicators Methodology and Analytical Issues. Policy Research Working Paper WPS 5430. The World Bank Development Research Group Macroeconomics and Growth Team June 2010. URL: <http://documents.worldbank.org/curated/en/630421468336563314/The-worldwide-governance-indicators-methodology-and-analytical-issues> (last access: 15 November 2019).
- Lehner, B. and Döll, P. (2004): Development and validation of a global database of lakes, reservoirs and wetlands. Journal of Hydrology 296/1-4: 1-22. <https://doi.org/10.1016/j.jhydrol.2004.03.028>
- Sterzel, T.; Lüdeke, M. K. B.; Walther, C.; Kok, M. T.; Sietz, D.; Lucas, P. (2019): Global typology of coastal urban vulnerability under rapid urbanization. PLoS **One, accepted**
- UN-HABITAT (2008). State of the World's cities 2008/2009. 224p. ISBN 978-92-1-132010-7. URL: <http://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2562> (last access: 15 November 2019).
- UNSTAT (2005): National Accounts Statistics: Main Aggregates and Detailed Tables (New York: United Nations, Department of Economic and Social Affairs, Statistics Division). URL: <https://unstats.un.org/unsd/nationalaccount/madt.asp> (last access: 15 November 2019).
- World Bank (2006): World Development Indicators WDI (Washington, DC: World Bank). URL: <http://documents.worldbank.org/curated/en/918311468316164759/World-development-indicators-2006> (last access: 15 November 2019).