SSBN 3 arc-second (90 m) Global Flood Hazard Data (World Bank License)

Summary of Permitted Use and Restrictions (Quick Reference)

Please see the Terms of Reference (ToR) for full conditions. This summary is not exhaustive and does not replace the original ToR.

The SSBN Global Flood Hazard Data contained within this folder ('the Data') has been supplied to the World Bank under a perpetual license for **internal use only**. The data remains confidential to The World Bank and SSBN Ltd. All terms of the General World Bank Data Policy for confidential data apply.

The Data may not be resold or made publicly availably. The Data may not be shared with sub-contractors, external consultancies or any other firms or individuals beyond the World Bank without written specific agreement from SSBN Ltd. SSBN Ltd retains all Intellectual Property Rights in the Data.

The full clause of caution that accompanies the Data and describes the limitations and uncertainties surrounding the Data must be read before using the Data.

Data Description

The SSBN Global Flood Hazard dataset is a gridded product at 3 arcsecond resolution (approximately 90 m but varies slightly with latitude) that shows **the maximum expected water depth in metres at 10 different return periods** (between 1-in-5 and 1-in-1000 years). The data has global coverage between 56°S and 60°N.

Within the product, two primary types of flood hazard are modelled: **fluvial** (flooding caused by rivers overtopping their banks) and **pluvial** (flooding caused by extreme local rainfall). The **urban flood** hazard layers show the **combined risk** from fluvial and pluvial flooding in urban areas.

The **urban mask** used to define the spatial extent of urban areas in each country was constructed by combining satellite-observed night time light (NTLD) data (the NOAA DMSP 'stable lights': https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html) with the Global Urban Footprint (GUF) dataset (http://www.dlr.de/eoc/en/desktopdefault.aspx/tabid-9628/16557_read-40454/). The NTLD was processed by excluding values below 5 to remove the influence of isolated light sources, and the GUF data was resampled to the resolution of the NTLD data. The urban mask was given a value of 1 for all pixels where both the processed NTLD **and** resampled GUF data had non-zero values. A copy of the mask is included with each country dataset.

Flood defence standards were estimated based on region and GDP. Satellite luminosity data was used to estimate where defences are likely to exist based on the assumption that urbanised areas are more likely to be defended than rural areas. Please note that the urban mask layer does **not** necessarily indicate where defences are implemented in the model as flood defence infrastructure has not kept pace with urbanisation in many developing countries. For the **fluvial defended (FD)** model, model defence standards can be identified from the shapefile 'FD_flood_defence_standards.shp' which is stored with the accompanying documentation for the data. For the **pluvial defended (PD)** model, it is assumed that urban drainage systems have the capacity to absorb rainfall volumes associated with return periods of between 1 year (in the least developed countries) and 10 years (in the most developed countries).

For a more detailed introduction to the data and methods used to construct the model, as well as an evaluation of its expected performance, please see the open-access peer-reviewed paper permanently available at the following link:

http://dx.doi.org/10.1002/2015WR016954

Data Limitations

All environmental models are limited by the availability and quality of their input data and the degree to which their internal mathematical structures can represent real-world processes. In this model, the **fluvial data has greater certainty than the pluvial data**, because pluvial flooding can be more easily influenced by certain small scale local features (such as storm drains or local variations in soil conditions) that this model cannot represent. **The fluvial data is known to have more skill on large rivers than it is on small rivers**, and therefore accuracy is likely to be greater on large floodplains than in headwater areas.

Because of these limitations, it is not recommended to use this dataset as the sole source of flood hazard information for site-specific analysis. While the data can provide a useful overview of the likely hazard in a particular region, more detailed local data should be sought out before detailed planning or operational decisions are made. **The data is not suitable for engineering-level analysis** (such as construction of bridges or flood defences). Such projects will require the development of a local engineering-grade model by an appropriate consultant or firm.

A useful overview of the limitations of global flood models can be found at the following link:

http:// dx.doi.org/10.1038/nclimate2742

Data Specification

Filename convention: ISO 3166-2 country code + datatype code + return period + tile number

Datatype codes:

- F = fluvial (i.e. riverine flooding)
- P = pluvial (i.e. surface water flooding from extreme rainfall)
- U = urban (maximum of fluvial and pluvial flooding; restricted to urban areas)
- M = urban mask
- +D = defended (i.e. including the effects of estimated flood defences)
- +U = undefended (i.e. excluding the effects of estimated flood defences)

Return periods refer to the '1 in xxx' event.

Large territories may be broken down into multiple tiles; these are ordered 1, 2, 3, etc.

Filename convention examples:

- MY-FD-20-1.tif = Malaysia, Fluvial Defended, 1 in 20 year event, tile 1
- CD-PU-100-2 = Democratic Republic of Congo, Pluvial Undefended, 1 in 100 year event, tile 2
- CN-UU-500-10.tif = China, Urban Undefended, 1 in 500 year event, tile 10
- BR-M-2.tif = Brazil, urban Mask, tile 2
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Data Specification (continued)

The Data are supplied in GeoTIFF format with an EPSG:4326 - WGS84 projection.

The Data are at 3 arc second (approximately 90m) resolution.

Each file shows the simulated return period maximum water depths in metres.

No-data pixels have a value of -9999.

Permanent water pixels, derived from Landsat imagery, have a value of 999.

The Data contains sources of uncertainty that can make it unsuitable for certain purposes. As with all environmental models, the accuracy of the Data may vary and cannot be guaranteed. Please read the full clause of caution that accompanies the Data before use.

All use of the Data is subject to the full Terms of Reference associated with the original supply of the Data. The General World Bank Data Policy for Confidential Data applies to the use of the Data.

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