ChatGPT

# Datasets for Kathmandu Flood Risk Modeling

## 1. Historical Flood Incidents (Kathmandu Valley)

- **UNOSAT Flood Impact Maps (HDX)** – Satellite-derived flood extents. Example: *"Flood Impact assessment of Kathmandu (Sep 30, 2024)"* provides geo-polygons of inundated areas (≈8 km² flooded) and counts of affected people/structures [1]. Data format: vector (shapefile) on HDX (Humanitarian Data Exchange). License: CC BY-SA. Key fields: flood extent (geometry), date, area flooded, exposure. Relevance: ground-truth inundation areas for training/validation of flood models. (Dataset accessible via UNOSAT/HDX portal.) [1]
- **Nepal Disaster Risk Reduction (DRR) Portal** – Government archive of disaster incidents (floods, landslides, etc.). Although raw downloads may not be public, the portal reports counts by location and time. For example, 2016–2025 saw ~50,000 disasters (floods affected ~17% of families) [2]. Format: aggregated CSV or reports (Nepali Govt). Relevance: historical frequency and spatial distribution of flood events; helps calibrate event probabilities. (See NepalDRR.gov.np).
- **Humanitarian Reports (ReliefWeb/OCHA)** – Narrative reports of flood events (e.g. monsoon 2024 floods). Not a structured dataset, but useful for context and event timing. No formal license; cite source.
- **Global Flood Database (Cloud-to-Street)** – A worldwide collection of ~913 historical flood events (2000–2018), each with mapped flood extent (30 m) and duration [3]. Accessible via Google Earth Engine. License: CC0 (public). Key data: binary flood mask per event, duration (days). Relevance: model training on past flood patterns; some events may cover Nepal. Example: "Global Flood DB v1" lists extents and dates [3].

## 2. Satellite-Based Rainfall

- **NASA GPM IMERG** – Integrated Multi-satellitE Retrievals for GPM (precipitation). Global 0.1°×0.1° grid (~10 km) at 30-minute intervals [4]. Data runs from 2000–present (IMERG includes TRMM era). Available runs: *Early (4 h lag)*, *Late (14 h)*, and *Final (4 mo)*. Format: HDF5 (half-hourly) or NetCDF4 (daily aggregates) [5]. License: NASA (public domain for scientific use). Key variables: precipitation rate (mm/hr), accumulation, and quality flags. Access: NASA GES DISC or NCAR RDA (see dataset d734000) [6] [5]. Spatial/temporal res: 0.1°/30 min [4]. Crucial for driving rainfall inputs in flood models.
- **NASA TRMM** – Precursor to GPM for 1998–2014. Datasets (e.g. 3B42/3B43) at 0.25° resolution (3 hr, monthly). Merged with GPM to produce a 20+ year record [7]. Useful for historical monsoon rainfall. Access via NASA GES DISC. License: NASA (free).
- **CHIRPS (Climate Hazards Group)** – 0.05° (≈5 km) quasi-global rainfall (50°S–50°N) from 1981–present [8]. Combines satellite (infrared) and station data. Available as monthly/daily grids (GeoTIFF, NetCDF). License: public domain (CC0) [9]. Key var: precipitation (mm). Useful for long-term climatology of Kathmandu rainfall. Access via UCSB CHIRPS website or Google Earth Engine [9].

## 3. Official / Local Weather Data

- **Nepal DHM Station Data** – Ground observations from the Department of Hydrology and Meteorology. Examples: Kathmandu precipitation, temperature, streamflow. Some historical summaries are publicly posted (e.g. DHM bulletins, yearbooks). Open Data Nepal publishes DHM monthly summaries (CC BY-4.0); e.g. *"Preliminary Weather Summary 2018"* with Kathmandu monthly rainfall and temperatures [10]. Format: CSV/Excel or PDF. Key vars: daily/monthly precipitation, max/min/mean temperature. Licensing: varies (often CC BY when publicly released) [10]. Relevance: provides local calibration data; more accurate for valley than satellite. (Full time series may require formal request, or use global archives such as NOAA/NCEI).
- **Global Meteorological Archives** – Data from Nepal stations in global databases. For example, NOAA's GHCN or GSOD, and WMO's World Weather Info, include Kathmandu station observations (rain, temperature). Format: CSV or via APIs (NOAA Climate Data Online). License: generally open for research. These can supplement DHM data for model input and validation.

## 4. Digital Elevation Models (DEM)

- **Copernicus Global DEM (GLO-30)** – 30 m resolution DSM (Digital Surface Model) covering all land, derived from TanDEM-X/WorldDEM [11]. Access: Copernicus Open Access Hub (requires registration) or via OpenTopography (COG/TIFF) [11]. Data format: GeoTIFF. License: Copernicus (free for use, CC-BY). Note: DSM includes buildings/vegetation; may need to remove features or use as proxy for flow accumulation.
- **NASADEM (SRTM Reprocessed)** – ~30 m DEM from Shuttle Radar Topography Mission (merged with ASTER, ICESat, etc) [12]. Available globally (excludes sea). Access via USGS EarthExplorer or LP DAAC (HGT/GeoTIFF). Format: HGT/GeoTIFF, 1-arcsec. License: public domain (NASA) [13]. Provides bare-earth elevation for terrain slope and watershed delineation.
- **ALOS AW3D30** – 30 m global Digital Surface Model from JAXA's ALOS satellite [14]. Format: GeoTIFF (tiles). License: free for any use [14]. Contains surface (buildings/vegetation). Useful for high-res topography and drainage modeling. Data downloadable from JAXA site (AW3D "World 3D – 30m").
- **ASTER GDEM v3** – 30 m global DEM (NASA/METI). Format: GeoTIFF. License: public domain (NASA LP DAAC). Coverage includes Nepal, though quality is lower in steep terrain. (Optional source for comparison.)

For DEMs, key variables are elevation (m). These datasets allow derivation of slope, flow accumulation, and flood-prone low-lying areas.

## 5. Road Network Data

- **OpenStreetMap (OSM) – Nepal** – Vector road network covering Kathmandu Valley. Access: Geofabrik Nepal extract (download `{nepal-latest.osm.pbf}` or shapefiles) [15]. Formats: `.osm.pbf` (OSM XML) or ESRI Shapefile. License: ODbL (free, share-alike). Key tags: `highway` (road class), `surface`, `lanes`, etc. Roads and bridges are tagged. This data is regularly updated and was used in Nepal flood impact studies (e.g. **Melamchi 2021** road damage) [16]. Relevance: model how floods affect transportation; input to vulnerability analysis. (Geofabrik link above provides current data.)

**Sources:** Each dataset above is publicly available under the stated terms [1] [2] [10] [4] [5] [11] [14] [12] [15] [16]. Always check specific dataset portals for download formats and citations. Use these data (with proper attribution) to train flood prediction models for Kathmandu Valley.

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[1] Flood Impact assessment of the Capital city of Kathmandu, Bagmati Province, as of 30 September 2024 [Nepal] - Big Ten Academic Alliance Geoportal
https://geo.btaa.org/catalog/f922be53-fdd6-483d-a4ee-a9612997d4f9

[2] An Overview of Fire, Landslide, and Flood Disasters in Nepal Connecting Development Dots
https://nepalindata.com/devnotes/overview-fire-landslide-and-flood-disasters-nepal/

[3] Global Flood Database v1 (2000-2018) | Earth Engine Data Catalog | Google for Developers
https://developers.google.com/earth-engine/datasets/catalog/GLOBAL_FLOOD_DB_MODIS_EVENTS_V1

[4] What is the spatial and temporal resolution of GPM data? | NASA Global Precipitation Measurement Mission
https://gpm.nasa.gov/node/3176

[5] [6] NCAR RDA Dataset d734000
https://rda.ucar.edu/datasets/d734000/

[7] Data | NASA Global Precipitation Measurement Mission
https://gpm.nasa.gov/data

[8] [9] CHIRPS: Rainfall Estimates from Rain Gauge and Satellite Observations | Climate Hazards Center - UC Santa Barbara
https://www.chc.ucsb.edu/data/chirps

[10] Datasets - Open Data Nepal
https://opendatanepal.com/dataset?tags=temperature

[11] Updated Copernicus Global 30m DEM Now Available | OpenTopography
https://opentopography.org/news/updated-copernicus-30m-DEM-available

[12] [13] NASADEM: NASA 30m Digital Elevation Model | Earth Engine Data Catalog | Google for Developers
https://developers.google.com/earth-engine/datasets/catalog/NASA_NASADEM_HGT_001

[14] Dataset | ALOS@EORC
https://www.eorc.jaxa.jp/ALOS/en/dataset/aw3d30/aw3d30_e.htm

[15] Geofabrik Download Server
https://download.geofabrik.de/asia/nepal.html

[16] Free and Open-Source Geospatial Datasets for Early Damage Assessment: A Case of Melamchi Flood Nepal | Asia-Pacific Network for Global Change Research
https://www.apn-gcr.org/publication/free-and-open-source-geospatial-datasets-for-early-damage-assessment-a-case-of-melamchi-flood-nepal/