LuxCarta

Mapping your world in 3D

CASE STUDY

FLOOD RISK MODELING

Sub-Meter Terrain Accuracy Over 31,000 km²

Satellite-Derived Elevation Data for National-Scale Flood Risk Modeling

31,342	0.94 m	56%	38,061	+0.02 m
km² coverage	RMSE accuracy	improvement	validation points	bias (near zero)

THE CHALLENGE

A major South Asian flood risk assessment initiative required high-resolution, hydrologically accurate elevation data covering more than 31,000 km2 of complex terrain, including river floodplains, agricultural canals, embankments, and urban areas. Traditional airborne LiDAR surveys would have been prohibitively expensive. The project needed a satellite-based solution delivering production-ready terrain data without compromising on accuracy.

OUR APPROACH

LuxCarta produced a 1-meter Hydro-Enforced Digital Terrain Model (HDTM) using a structured three-phase methodology combining automated processing with expert manual quality control.

01 Bare-Earth Extraction
Remove buildings, vegetation and above-ground features from satellite DSM

02 Hydrological Processing
Flatten lakes, enforce drainage, remove sinks, preserve embankments

03 Manual Quality Control
GIS analysts inspect, digitize missed features, validate consistency

WHY IT MATTERS

Flood models are only as good as the terrain data behind them. An elevation error of even 1-2 meters can mean missing a flood-prone area entirely. This project proves satellite-derived elevation processed with the right methodology delivers accuracy levels previously associated only with airborne LiDAR, at a fraction of the cost and deployment time.

ACCURACY PROGRESSION

Initial DSM
Starting point
2.14 m

Intermediate DTM
After bare-earth extraction
2.04 m

Final HDTM
After hydro-enforcement
0.9429 m

56% improvement in accuracy

KEY RESULTS

Coverage	31,342 km²
Resolution	1 meter
Vertical Accuracy (RMSE)	0.94 m
Vertical Accuracy (LE90)	1.56 m
Validation Points	38,061
Mean Bias	+0.02 m
Points within +/-1 m	68%
Points within +/-2 m	95%
Points within +/-3 m	99%

DELIVERABLES

- 1 m Digital Surface Model (DSM)
- 1 m Digital Terrain Model (DTM)
- 1 m Hydro-Enforced DTM (HDTM)
- 1 m Elevation Contours
- Vector layers (breaklines, water features)

luxcarta.com

sales@luxcarta.com