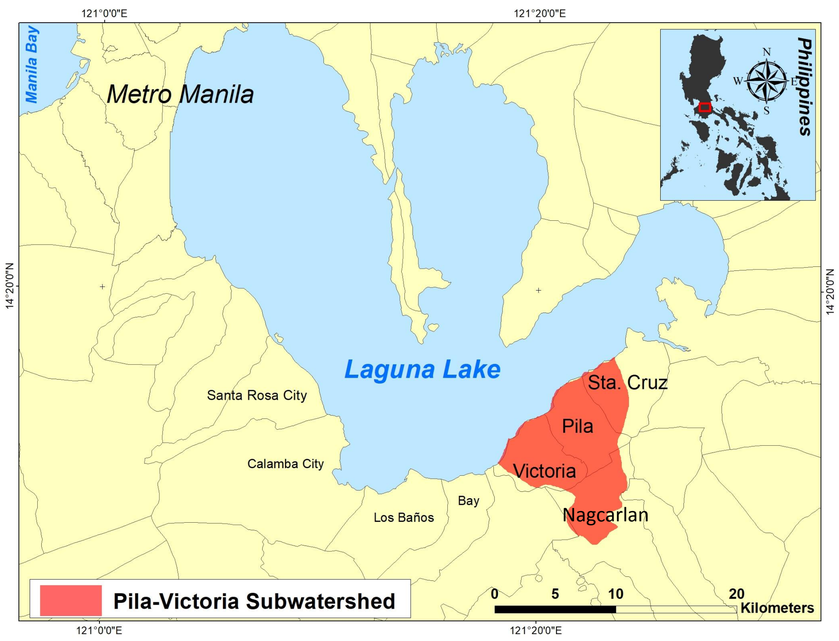
Land cover change and flood extent in the Pila-Victoria subwatershed, Philippines

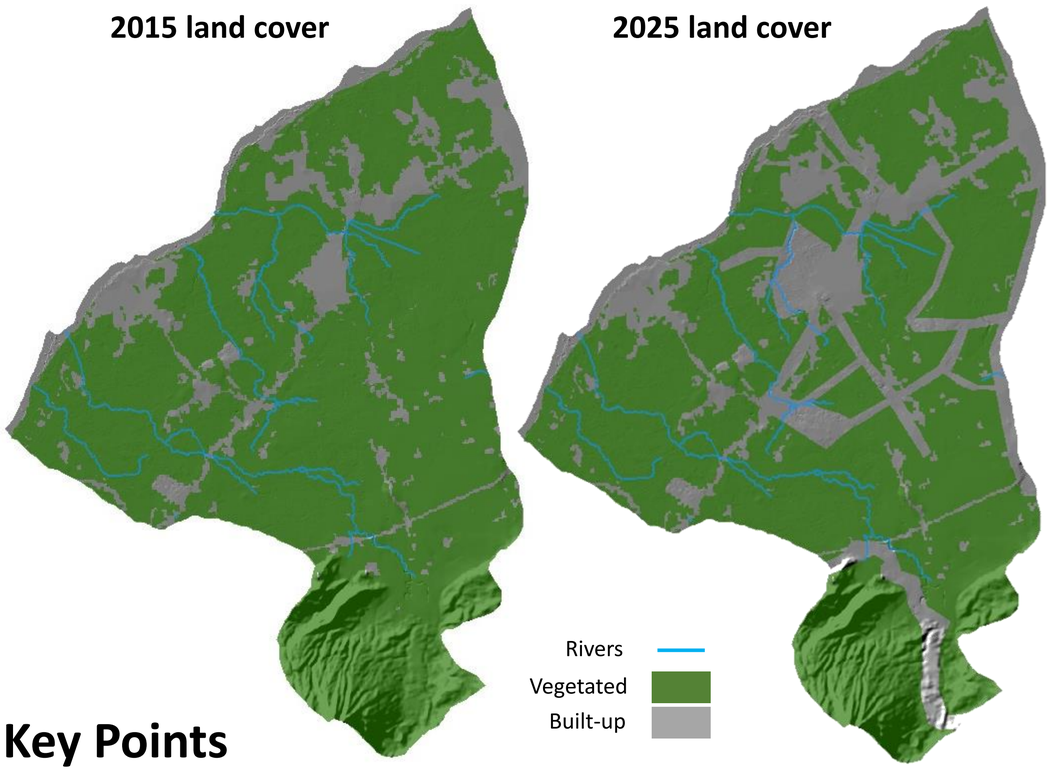
Milben A. Bragais[a], Brian A. Johnson[b], Donald Luna[a], Akio Onishi[b, c], Isao Endo[b], Damasa B. Magcale-Macandog[a], Masayuki Kawai[b]

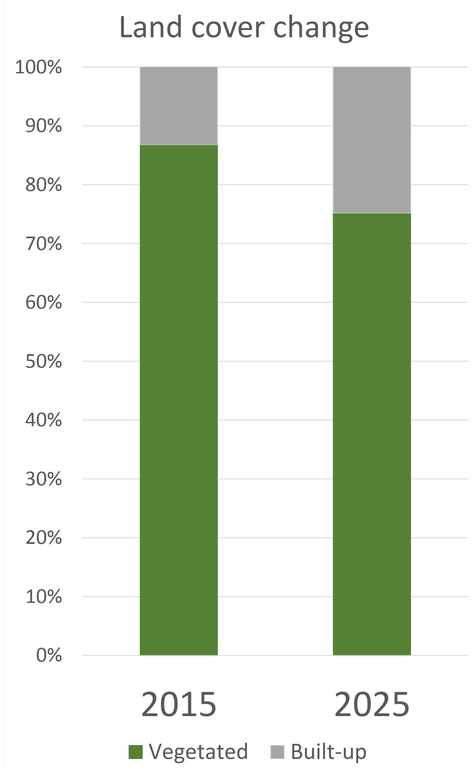
[a] University of the Philippines Los Baños, [b] Institute for Global Environmental Strategies, and [c] Tokyo City University

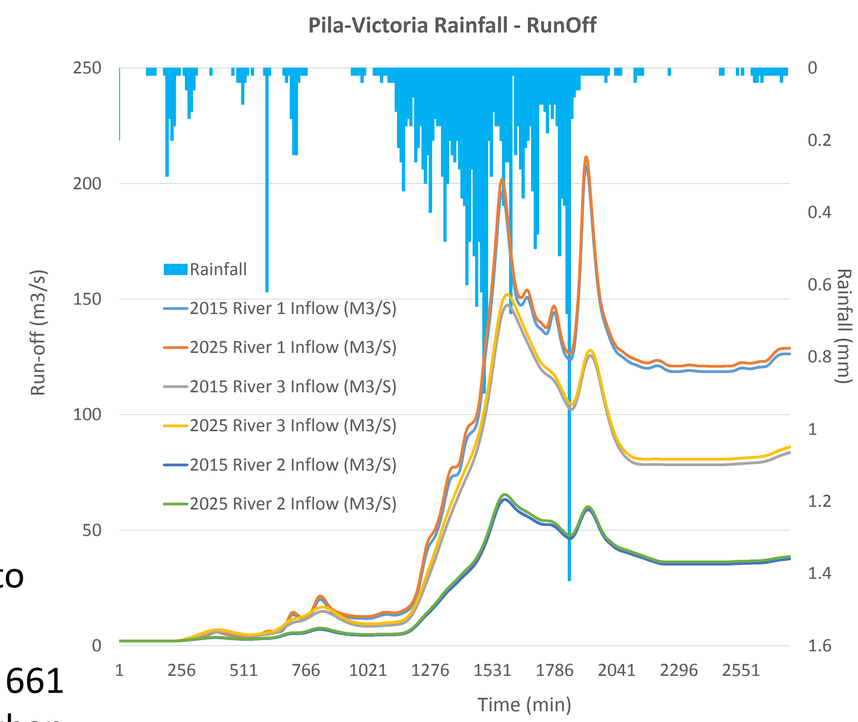
Overview

- Current (2015)[1] and future (2025)[2] land cover maps were generated and used as inputs for flood modelling.
- Event-based precipitation[3] with 10-year return period classification and high resolution digital terrain model[4] were used to generate a detailed flood simulation [5].
- Findings from this study will be shared with the local government units in the subwatershed to help make their land-use planning climate sensitive.



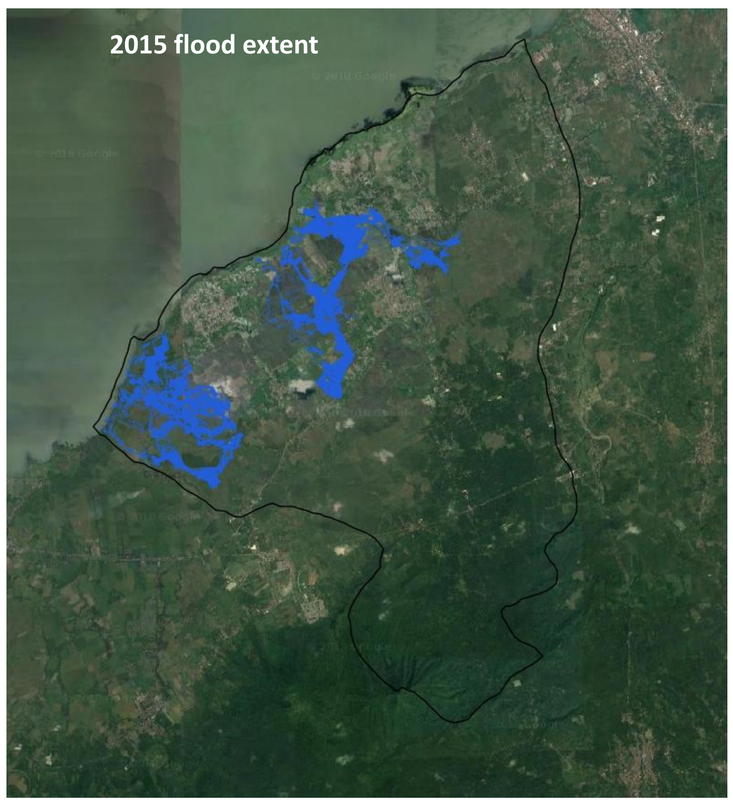


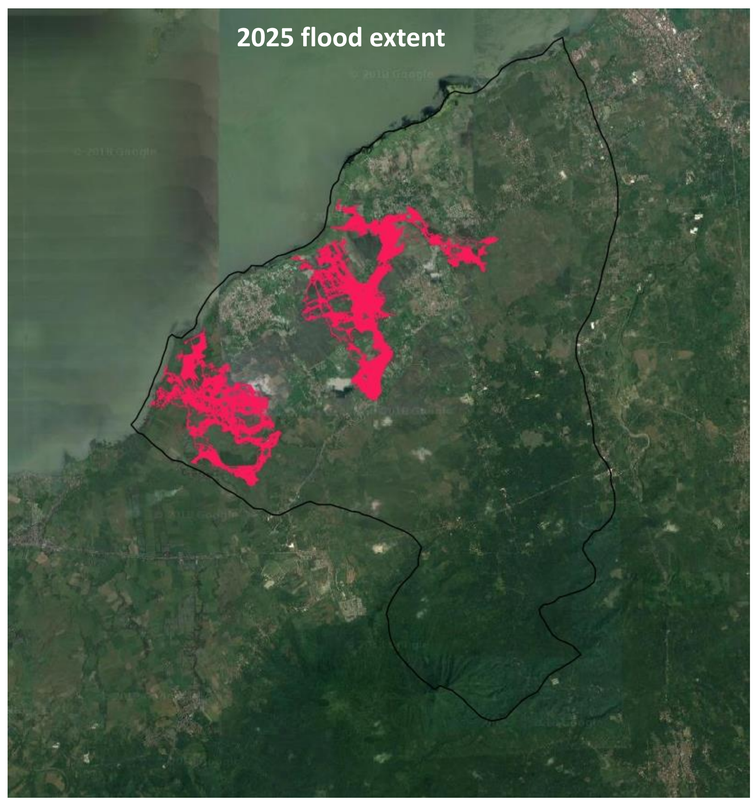


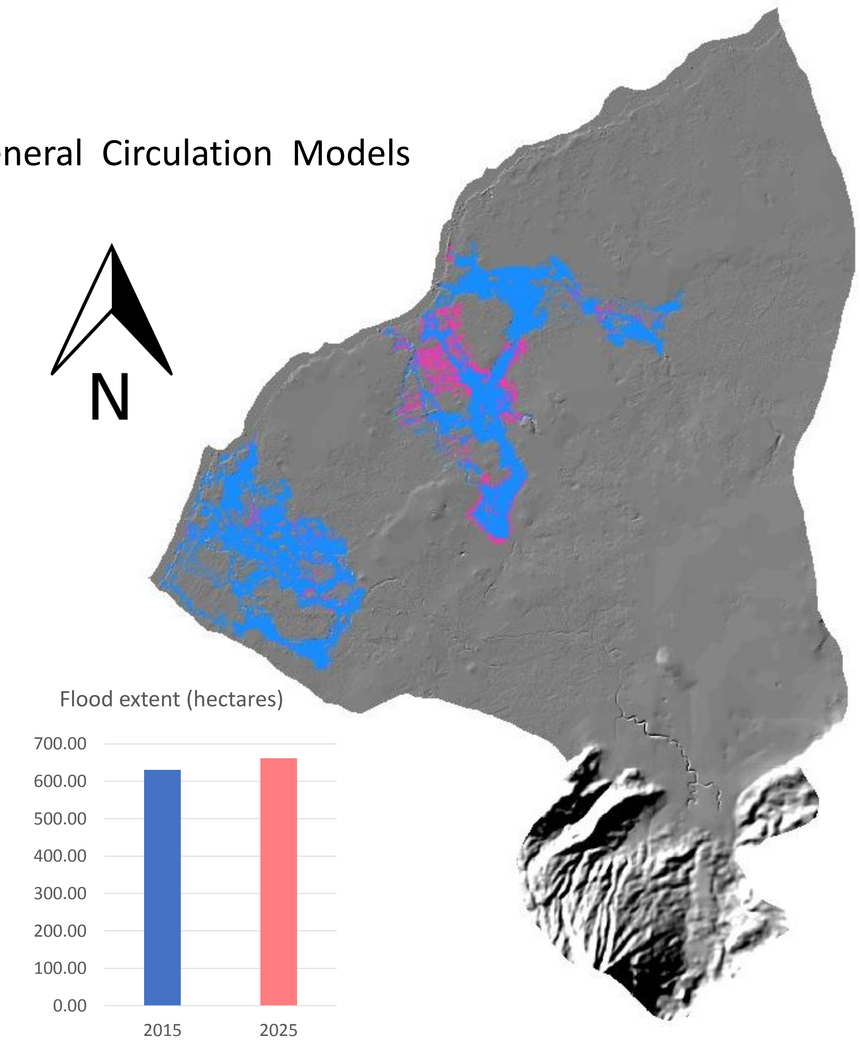


Key Points

- Land cover change analysis showed the built-up area would increase by 88% (from 1,154 ha. to 2,171 ha.) between 2015-2025, based on the participatory mapping results.
- This increase in built-up area estimated to lead to a 5% increase in flooded area (from 630 ha. to 661 ha.) in the case of a 10-year return period storm, due to higher rainfall-runoff from built-up areas than vegetated areas.
- The current flood simulation only accounts a 10-year return period extreme rainfall event.
- Further calibration and long term simulation should be conducted using down-scaled General Circulation Models (GCMs) to further assess the effects of climate change on flooding .







[1] Land cover classification of Landsat 8 and Palsar-2 satellite images, courtesy of the United States Geologic Survey (USGS) and the Japan Aerospace Exploration Agency (JAXA).

[2] Future land cover (2025) of the Pila-Victoria sub-watershed derived from the participatory mapping activity participated by the four local government units (Municipalities of Victoria, Pila, Sta. Cruz, and Nagcarlan).

[3]Selected extreme rainfall event: Typhoon Ofel (Int. Name: Son-Tinh) Oct. 25, 2012; Duration: 12 hours; Amount: 224.4 mm collected using Tipping Bucket Rain Gauge. Classified as 10 year rain return period based on Ambulong Station RIDF (Rainfall Intensity-Duration Frequency Curve) which has a 54 years record, prepared by Hydrometeorological Data Application Section (HMDAS), Hydro-Meteology Division, PAGASA. This is the same rainfall data used in Silang-Sta. Rosa subwatershed flood modelling since the extreme rainfall data is not available in the Pila-Victoria rain gauges at the moment.

[4] IfSAR (Interferometric Synthetic Aperture Radar) derived DTM with 5m x 5m resolution from the National Mapping and Resource Information Authority (NAMRIA).

[5] Flood extent boundaries were generated using the Hydrologic Engineering Center-River Analysis System (HEC-RAS), a freeware designed and coded for the U.S Army Corps of Engineers that allows both one dimensional and two dimensional hydraulic analysis for steady and unsteady flow in rivers.

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