Land cover change and flood extent in Silang-Sta. Rosa sub-watershed

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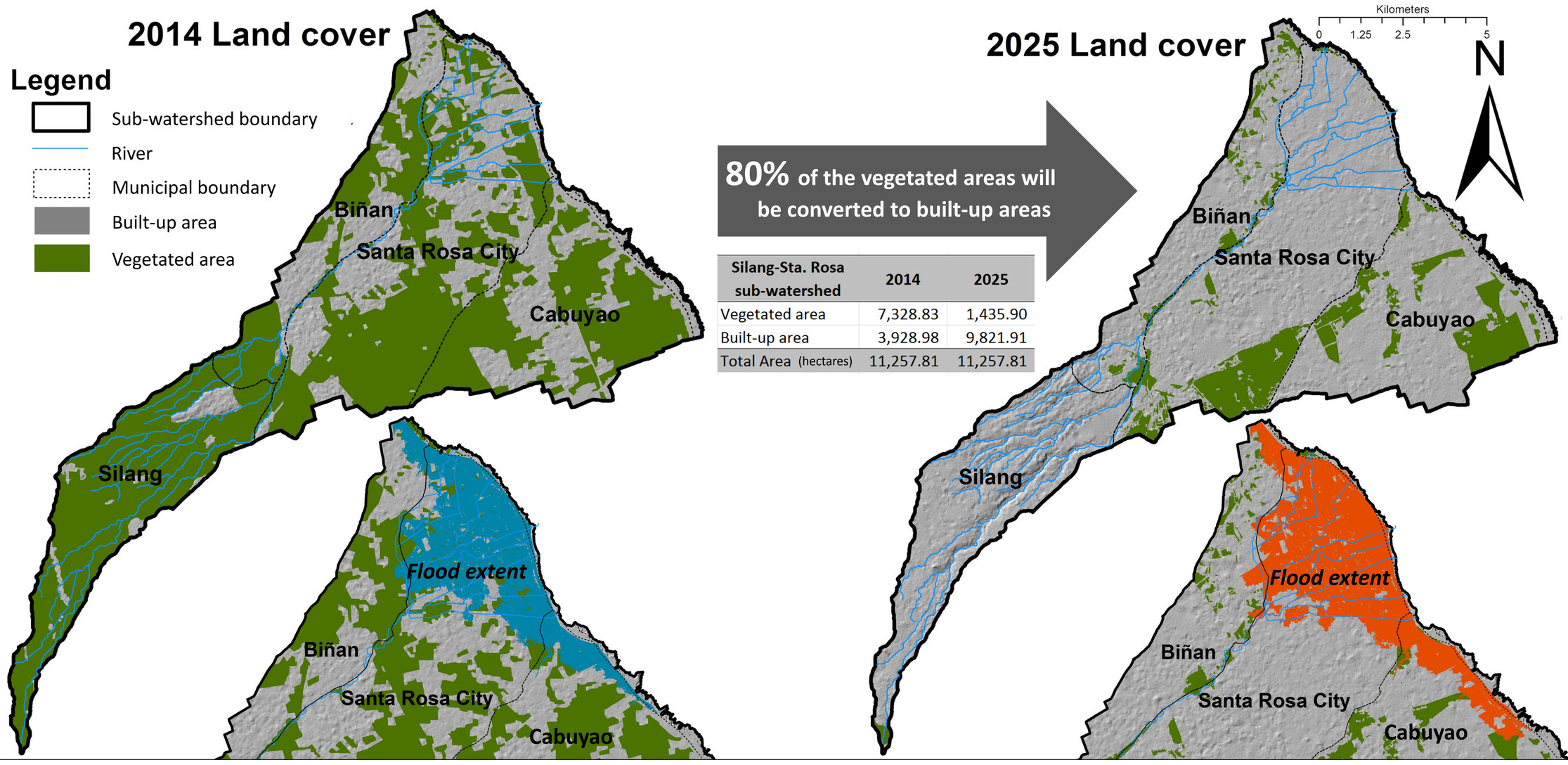
Overview

- The current (2014) [1] and future (2025) [2] land cover maps were generated and analyzed for flood modelling [3].
- High resolution digital elevation model from LiDAR data [4] was used to generate detailed terrain for accurate flood simulation.
- Findings from this study will be shared to the local government units to help make their land-use planning climate sensitive.

Proposed land cover conversion and predicted flood extent



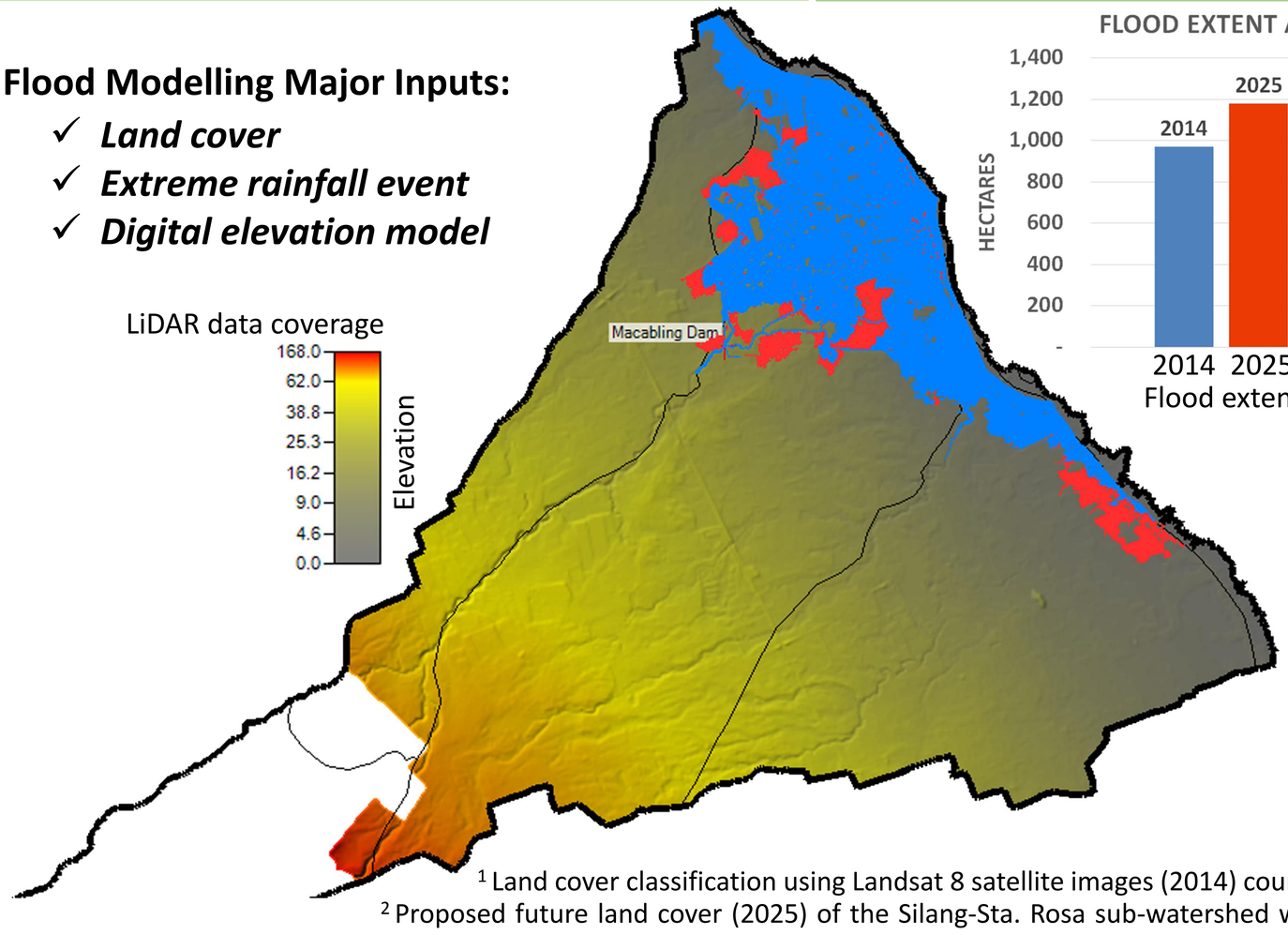
Silang-Sta. Rosa sub-watershed	2014	2025
Vegetated area	7,328.83	1,435.90
Built-up area	3,928.98	9,821.91
Total Area (hectares)	11,257.81	11,257.81

Input precipitation: 10 year Rain Return Period [5]

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 installed in Silang (Upstream)

Flood Modelling Major Inputs:

- ✓ ***Land cover***
- ✓ ***Extreme rainfall event***
- ✓ ***Digital elevation model***



Key Messages

- The proposed land cover conversion will result to increased impervious area by 150% (from 3,929 has. to 9,822 has.)
- Increased impervious area will increase the flooded area by 22% (from 970 has. to 1,180 has.)
- The predicted increase in flooded area only accounts the land cover change scenario.
- According to DOST-PAGASA (2011)[6], heavy daily rainfall events (exceeding 300mm) will continue to increase in number in most parts of the Philippines including Luzon where Silang-Sta. Rosa sub-watershed is located.
- The increase intensity and occurrence of extreme rainfall events due to climate change will further increase the number of flooded areas in the subwatershed.

[1] Land cover classification using Landsat 8 satellite images (2014) courtesy of the United States Geologic Survey (USGS) with pixel size of 30 m

[2] Proposed future land cover (2025) of the Silang-Sta. Rosa sub-watershed was derived from the participatory mapping activity participated by the four involve local government units (cities of Santa Rosa, Biñan, and Cabuyao and the municipality of Silang).

[3] Flood extent boundary 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.

[4] LiDAR (Light detection and ranging) data for the downstream part of the subwatershed was requested from the Phil-LiDAR project of the Philippine government for flood modelling and resource inventory using airborne LiDAR technology.

[5] 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

[6] Department of Science and Technology - Philippine Atmospheric, Geophysical & Astronomical Services Administration (DOST-PAGASA), 2011. Climate Change in the Philippines.

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