

The Global Mangrove Watch – mapping mangrove extent and change in Southeast Asia over 20 years

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Abstract:

Mangrove forests are key coastal ecosystems in the tropics that are of critical importance as breeding and nursery sites for birds, fish, and crustaceans. Mangroves constitute important pools for carbon storage and can act as buffer zones during storms and tsunamis. Once abundant along the world's tropical and subtropical coastlines, mangroves are in significant decline caused by aquaculture, agriculture and industrial and energy exploitation. Mangroves are also sensitive to climate change effects such as sea level rise, temperature extremes and changes in hydrology. Information on the state and change trends of mangroves at both national and global levels is however limited, in part because of their often remote and inaccessible locations, which make periodic mapping and monitoring by conventional means costly and time consuming.

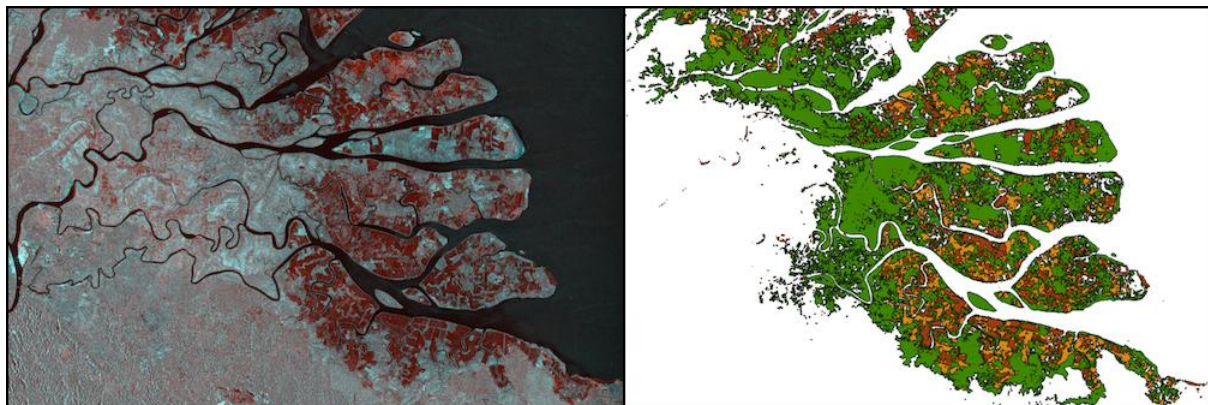
The Global Mangrove Watch (GMW) is an international initiative led by the Japan Aerospace Exploration Agency (JAXA), Aberystwyth University (U.K.) and solo Earth Observation (Japan) in collaboration with Wetlands International, DOB Ecology and the International Water Management Institute (IWMI). The project was established to support the Ramsar Wetlands Convention and the UN Sustainable Development Goals (SDG), in particular SDG 6.6.1, where countries are required to report on the change in the extent of water-related ecosystems (including mangroves) over time.

Using a combination of L-band Synthetic Aperture Radar provided by JAXA (JERS-1, ALOS and ALOS-2) and optical (Landsat-5 Thematic Mapper) satellite data, the GMW provides annual geospatial information about mangrove extents and changes – both losses and gains – at national to global scales. To date, global mangrove baseline extent and change maps have been generated for the years 1996, 2007, 2008, 2009, 2010, 2015 and 2016, while maps for 2017 and 2018 are under development.

The overall approach followed four main stages: (a) extraction of a coastal water mask from the L-band SAR data; (b) generation of a mangrove “habitat” layer using SRTM DEM data, water occurrence maps and other mangrove datasets; (c) generation of a baseline classification for the year 2010 using a combination of SAR and optical data, and (d) derivation of changes (losses and gains) relative to the 2010 baseline in all annual epochs using SAR data only.

The GMW results indicate that Southeast Asia is home to almost a third of the world’s mangroves (32%), with almost 20% in Indonesia alone. Southeast Asia is however also the region in the world with the highest rate of loss of mangroves measured in the 1996-2016 time period, corresponding to almost 45% of the global loss.

The GMW maps have been generated using free and open datasets and open source software (RSGISLib.org). They are publicly available and can be downloaded free of charge from <http://data.unep-wcmc.org/datasets/45>



Kahan River Delta, North Kalimantan, Indonesia. (left) Multi-temporal SAR image composite; (right) GMW map showing mangrove extent and changes; red – mangroves lost 1996-2007; orange – loss 2007-2016; green – mangrove cover in 2016.

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