

The International Water Management Institute (IWMI) is a non-profit, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. Headquartered in Colombo, Sri Lanka, IWMI is a CGIAR Research Center and leads the CGIAR Research Program on Water, Land and Ecosystems (WLE).

Megapolis City Region Food Systems and their vulnerability towards climate change related hazards

Felix Thiel, Ilsa Phillips, Nikita Drechsel

References:

1. UN-Habitat (2018). State of Sri Lankan Cities Report, available at: <http://unhabitat.lk/publications/the-state-of-sri-lankan-cities-2018/>
2. FAO. (2018). Assessing and Planning City Region Food System Colombo (Sri Lanka) Sythesis Report. Rome, Licence: CC BY-NC-SA 3.0 IGO.
3. Department of Agriculture (2016). Weather & Climate, available at: <https://www.doa.gov.lk/index.php/en/weather-climate>
4. Eriyagama, N.; Smakhtin, V.; Chandrapala, L.; Fernando, K. 2010. Impacts of climate change on water resources and agriculture in Sri Lanka: a review and preliminary vulnerability mapping. Colombo, Sri Lanka: International Water Management Institute. 51p. (IWMI Research Report 135). doi:10.3910/2010.211
5. IPCC, 2014: Climate Change (2014): Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
6. Ministry of Environment. 2011. Second National Communication on Climate Change under the United Nations Framework Convention on Climate Change (UNFCCC). Democratic Socialist Republic of Sri Lanka.
7. USAID. (2018). Climate Risk Profile Sri Lanka. (November 2018), 1-5.
8. Werner, A. D., Bakker, M., Post, V. E. A., Vandenbohede, A., Lu, C., Ataie-Ashtiani, B., ... Barry, D. A. (2013). Seawater intrusion processes, investigation and management: Recent advances and future challenges. *Advances in Water Resources*, 51, 3-26. <https://doi.org/10.1016/j.advwatres.2012.03.004>
9. Ministry of Megapolis and Western Development, (2016). 'The Megapolis - Western Region Master Plan 2030: From Island to Continent'
10. Amarnath, G.; Alahacoon, N.; Smakhtin, V.; Aggarwal, P. 2017. Mapping multiple climate-related hazards in South Asia. Colombo, Sri Lanka: International Water Management Institute (IWMI). 41p. (IWMI Research Report 170). [doi: 10.5337/2017.207]



Characterisation of the Megapolis City Region Food Systems

City region Food systems (CRFS)

The City-Region is understood as a given geographical region that includes one or more urban centres, peri-urban and rural hinterlands across which flows of people, food, goods, and resources occur. A CRFS encompasses all food system actors and activities taking place in the city region over which the local government has intervention powers. It is understood that any city region will always be fed by multiple food sources, local, regional, national or international, so that the city region food system does not exist in isolation from a global food system.

Urban

The “Western Region Megapolis” (WRM, Western province) consisting of Colombo and its conurbation, with a population of 5.8 million is projected to further attract approx. 9 million citizens by 2030.¹ It is the commercial, transport, industrial, and financial hub of the country and is the epicentre of the Sri Lankan economy.

City Region

The WRM is not able to provide enough arable land to fulfil the needs of its growing population. Therefore, nearly the entire agricultural sector of the island acts as city region with the WRM area in its centre (grey highlighted districts, map).

The main commodities are:

- rice (carbohydrates)
- coconut (fats)
- fish and beans (proteins)
- brinjal (most grown vegetable) (vitamins and minerals)
- papaya and banana (vitamins and minerals)

Climatic Zones of Sri Lanka

Sri Lanka is an island in the Indian Ocean situated in the equatorial zone and can be divided into three climatic zones:

Wet Zone – covering the south-western region (> 2500 mm/yr)

Intermediate Zone – situated between the wet and the dry zone (1750 - 2500 mm/yr)

Dry Zone – the largest zone covering the northern and eastern part of the country (< 1750 mm/yr)³

Climate Change and related hazards:

Droughts (marked red on map)

The frequency and duration of droughts is projected to increase in the dry zone of Sri Lanka severely depleting freshwater reserves, causing seasonal changes and affecting agricultural output.^{4, 5} Over the 20-year time period, 1985-2004, 1400 droughts were recorded in Sri Lanka affecting over 8 million people and 280,000 ha of cropland (primarily in the dry zone).⁶

Spatial analyses of rainfall patterns reveal an overall expansion of the dry zone straining the capacity of irrigation systems.⁴

Floods (marked light blue on map)

The occurrence of floods is predicted to increase across the country affecting the livelihoods of thousands and causing major crop failures.⁴

Extreme Rainfall Events (marked dark blue on map)

The frequency and intensity of extreme precipitation events is projected to increase in the wet zone of Sri Lanka and an overall increase in rainfall variability is expected across the country affecting crop production and the adaptive capabilities of farmers.⁴ The occurrence of landslides has increased as a consequence of the rise of extreme rainfall events.⁴

Extreme Temperature (marked yellow on map)

Air temperature and the occurrence of heatwaves is projected to increase across the entire country [0.8 – 2.0 °C by 2060] and the warming trend has accelerated in recent years.^{5, 7} Heatwaves affect some of the highest-producing districts in the country located in the shrinking intermediate and expanding dry zone of the country. The staple foods coconut and rice are particularly vulnerable to increases in temperature.⁴

Sea Level Rise (marked purple on map)

Sea level is projected to rise along the coasts of Sri Lanka [0.20 – 0.58 m by 2050] and the rate of sea level rise in South Asia has seen an acceleration in recent years leading to coastal erosion, the inundation of low lying coastal areas and wetlands and the salinization of groundwater reserves.⁸

The Megapolis CRFS & Climate Change Vulnerabilities

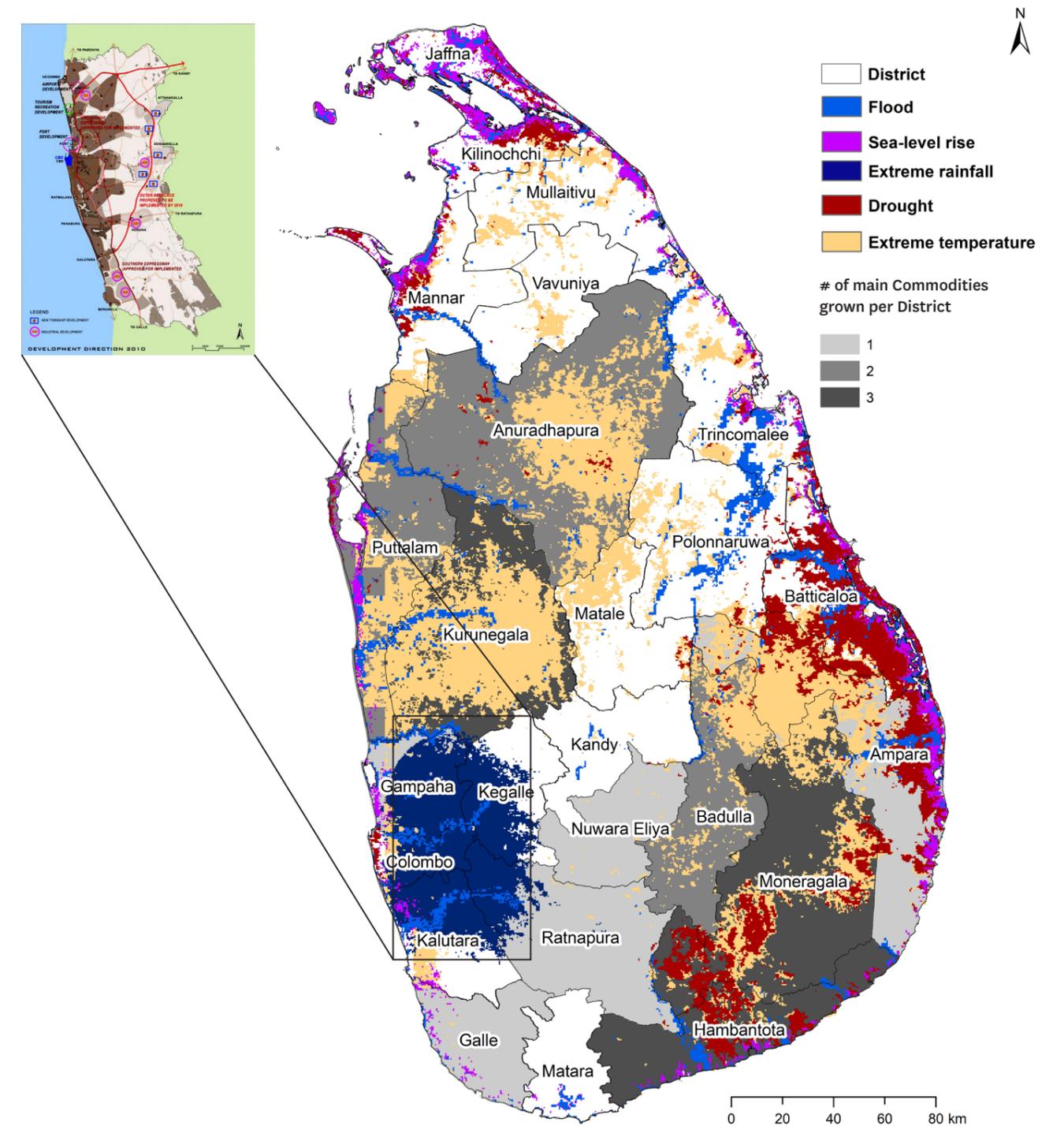


Figure 2: District map of Sri Lanka, incl. climate change related hazards, (DoA, 2018; Amarnath et al. 2017). Western province (MoMWD, 2010)

Data source: Amarnath, G.; Alahacoon, N.; Smakhtin, V.; Aggarwal, P. 2017. Mapping multiple climate-related hazards in South Asia. Colombo, Sri Lanka: International Water Management Institute (IWMI).

