Increased economic and health risks due to climate change

Due to climate change, 160 million to 200 million people in India could be exposed to heat waves exceeding survival thresholds over the next 10 years (McKinsey report, 2020), with urban areas in India expected to be one of the first places in the world to experience fatal heat waves. In addition to the direct effects on health, climate change will reduce the effective number of hours that can be worked outdoors, potentially threatening 2.5% to 4.5% of GNP already by 2030.

Climate change also has a direct effect on vector-borne diseases, such as Malaria and Dengue, as the development period of the insects' life cycle and the subsequent development of parasites in their bodies are influenced by climatic conditions. Climate change has thus emerged as a new threat and challenge to ongoing efforts to reduce vector-borne diseases; for example, recent studies have shown that, as a result of climate change, the transmission windows of malaria the north-eastern states are likely to be temporarily extended by 2-3 months.

Climate-health risk management in India project

The Flemish Institute for Technological Research (VITO - coordinator), AVIA-GIS and the Public Health Foundation India-Centre for Environmental Health (PHFI-CEH) have partnered up in the project "*Climate-health risk management in India*" (CHARISMA), which is funded through the Flemish Climate Funding (Belgium). In a collaborative effort with local stakeholders and authorities, this three-year project aims to support India in drawing up measures to adapt and cope with climate and health impacts caused by climate change.

Project objective

Climate-health services and mapping tools will be developed and provided to the public and local stakeholders through a web-based platform, to provide exposure and vulnerability analyses for climate-related diseases such as heat stress and vector-borne diseases to be carried out for current and future climate conditions. Based on the data presented in the web-based platform, which will be *tailored to the local needs of stakeholders and authorities*, action plans can be jointly prepared;

- extreme heat stress mapping integrating urban heat island effects at high spatial resolution for population exposure and vulnerability analysis;
- impact analysis of adaptation plans (spatial planning, building code) integrated inside climate change scenarios;
- the establishment of disease calendars for different geo-agro-climatic zones such that the regions can use them to take appropriate measures in good time throughout the year;
- estimating the trend of climate-sensitive diseases by age group and population group;
- highlighting the conditions and risk factors which favour the emergence and spread of diseases and communicating them to the regions for timely action.

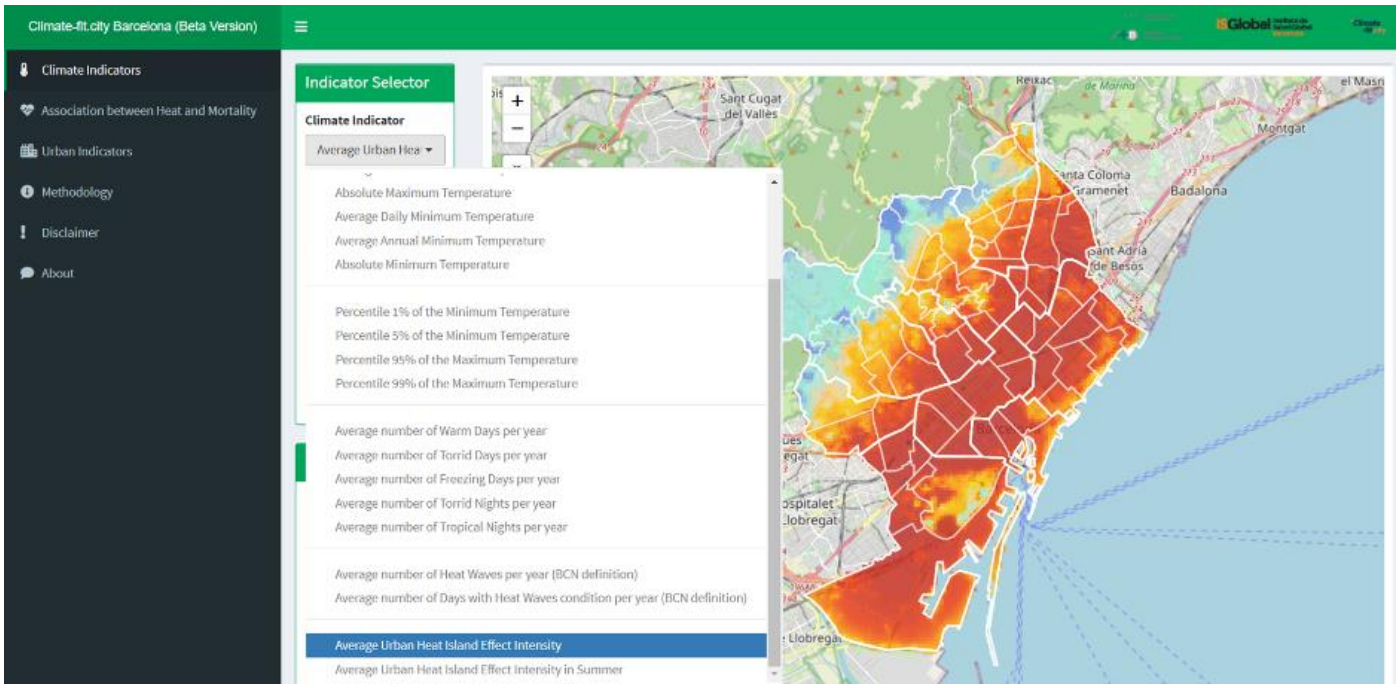
A single reference web-based information system containing data tailored to local needs

The climate-health service will be provided in a web-based platform providing information regarding Climate Health (CLIM-HIS; CLIMate Health Information System) and Vector-borne diseases (CLIM-V-HIS).

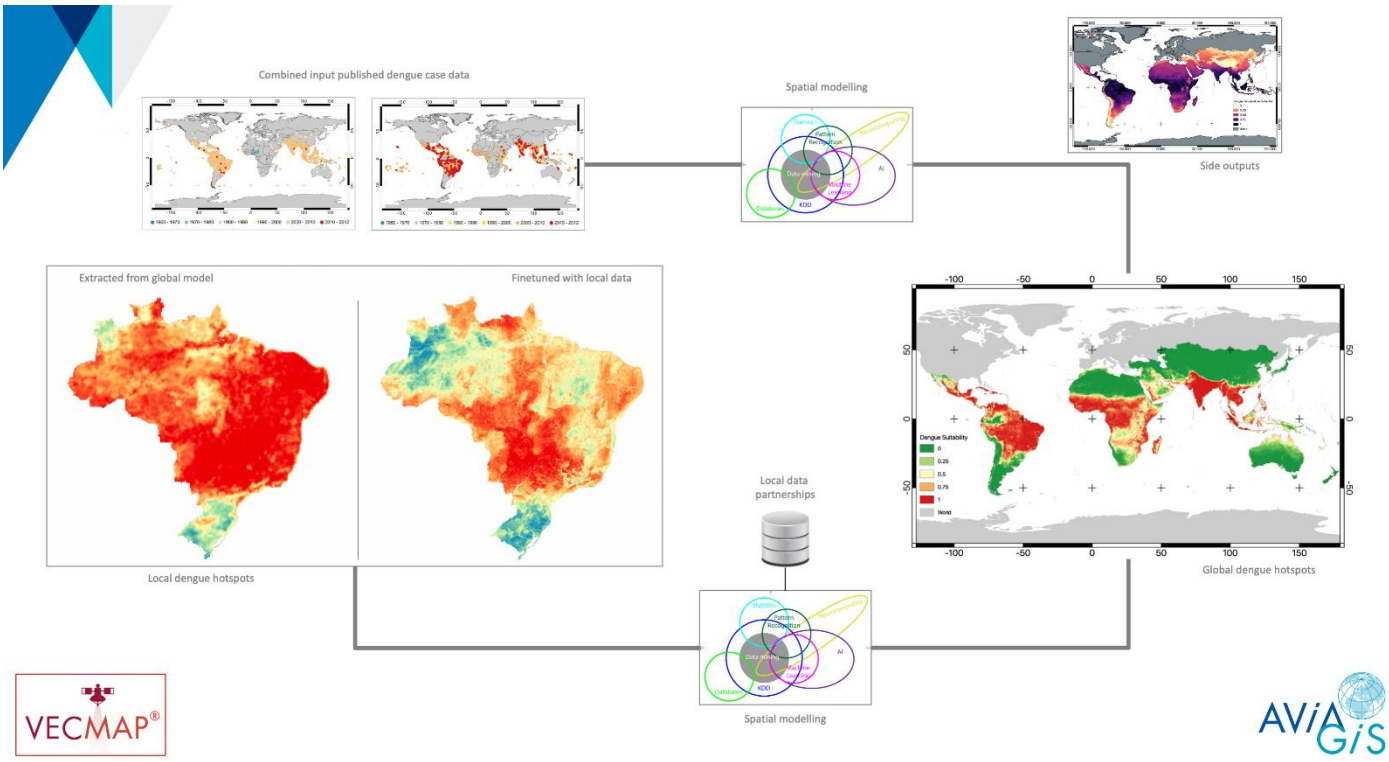
CLIM-HIS will allow users to visualize and download data, maps and indicators on urban climate conditions for a selection of 50 cities, and heat health information for 2 demonstration cities. The spatial urban climate information will take into account the urban environment and the effects of the urban heat island. Urban heat stress can then be managed on the basis of derived maps which will serve as input in determining vulnerability to heat stress and impact analyses for current and future climate conditions. These vulnerability analyses in turn serve as input for specific heat-health adaptation planning and general urban adaptation planning (e.g. green/blue spaces, natural adaptation measures, sustainable water provision) and the assessment thereof in terms of efficiency.

CLIM-V-HIS will be a tailor-made spatial decision support system, integrating all components supporting data collection to modelling vector-borne diseases. The system will be fundamental in the design of complex but cost-effective

spatial sampling and measuring strategies, based on which both static (e.g. level of presence of vector borne disease) and dynamic spatial risk maps (e.g. annual evolution of a risk) can be derived. Based on the present and future climatic conditions provided in CLIM-HIS, CLIM-V-HIS will also provide information on habitat suitability for vectors and the chances of spreading new invasive species in the area or in adjacent areas.



Exemplary Urban heat-health demonstrator developed in the Climate-Fit.city project coordinated by VITO (https://aspb.shinyapps.io/climate-fit-city-en/).



Process of global dengue hotspot mapping (https://www.avia-gis.com/vecmap)

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