6.43 Warm spell duration index (WSDI)

Project Name: UNaLab (Grant Agreement no. 730052)

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Warm spell duration index (WSDI)	**Natural and Climate Hazards**
Description and justification	Nature-based solutions can support climate change adaptation by reducing local ambient air temperature. They can also provide insulation from cold and/or shelter from wind. By moderating the urban microclimate, green infrastructure can support reduction in energy use and improved thermal comfort (Demuzere et al., 2014).
Definition	Number of days per annum when the maximum daily temperature TX > 90th percentile threshold (see indicator TX90p) for at least six consecutive days
Strengths and weaknesses	+ Straightforward assessment of heatwaves occurrence - Requires statistical tools and judgement
Measurement procedure and tool	Evaluating the effect on the heatwave reduction by assessing the daily temperatures produces more accurate results that monthly averages, which tend to "lose" the small changes that are crucial for several domains, such as health and agriculture. The WSDI defines the periods of excessive heat during the daytime, and it is evaluated using a percentile-based threshold (Alexander *et al.*, 2006): $$TX_{ij} > TX_{in}90$$ where TX_{ij} – daily maximum temperature on day *i* in period *j* $TX_{in}90$ – calendar day 90th percentile centred on a five-day window for the base period 1961-1990
Scale of measurement	Plot to district scale
Data source	
Required data	Automated continuous monitoring of ambient air temperature
Data input type	Quantitative
Data collection frequency	Annually; at minimum, before and after NBS implementation

Level of expertise required	Low – for continuous temperature monitoring; Moderate – when using the statistical tools
Synergies with other indicators	Directly evaluated from *Days with temperature > 90th percentile (TX90p)* indicato and closely related to *Daily temperature range* indicator
Connection with SDGs	SDG 3 Good health and well-being, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Opportunities for participatory data collection	Participatory data collection is feasible through direct temperature measurements if these are not automated
Additional information	
References	Alexander, L. V., Zhang, X., Peterson, T. C., Caesar, J., Gleason, B., Klein Tank, A. M. G., ... & Tagipour, A. (2006). Global observed changes in daily climate extremes of temperature and precipitation. *Journal of Geophysical Research: Atmospheres*, *111*, D05109. Demuzere, M., Orru, K., Heidrich, O., Olazabal, E., Geneletti, D., Orru, H., Faehnle, M. (2014). Mitigating and adapting to climate change: Multi-functional and multi-scale assessment of green urban infrastructure. *Journal of Environmental Management, 146*, 107-115. ETCCDI. (2009). *Climate change indices*. Available at: http://etccdi.pacificclimate.org/list_27_indices.shtml

6.44 Heatwave incidence

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Heatwave incidence expressed as the numbe orf combined tropical nights (>20°C) and hot days (>35°C) per annum	**Climate Resilience Natural and Climate Hazards**
Description and justification	Heatwave is a period of prolonged abnormally high surface temperatures relative to those normally expected. Heatwaves can be characterized by low humidity, which may exacerbate drought, or high humidity, which may