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

Project Name: UNaLab (Grant Agreement no. 730052)

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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

	exacerbate the health effects of heat-related stress such as heat exhaustion, dehydration and heatstroke. Heatwaves in Europe are associated with significant morbidity and mortality. Furthermore, climate change is expected to increase average summer temperatures and the frequency and intensity of hot days (Russo et al., 2014). In cities and urban areas, the UHI tends to exacerbate heatwave episodes.
Definition	Number of combined tropical nights (>20°C) and hot days (>35°C)
Strengths and weaknesses	+ Easy and straightforward assessment - Requires substantial amount of external data for modelling
Measurement procedure and tool	This indicator is assessed through continuous monitoring of temperature, and/or estimated by applying meteorological models such as the WRF (NCAR & UCAR, n.d.; NOAA, n.d.)
Scale of measurement	Building/plot to regional scale
Data source	
Required data	Initial and boundary conditions, topography, land use and urban parameters (building height, width, number of road lanes) (Emmons et al., 2010; Pineda, Jorba, Jorge & Baldasano, 2004). These data can be obtained through national statistics, municipal departments, Corine Land Cover, and a mapping application such as OpenStreetMap.
Data input type	
Data collection frequency	Annually, and before and after NBS implementation
Level of expertise required	Low – for continuous temperature monitoring High – for applying meteorological models
Synergies with other indicators	Assessed from *Mean or peak daytime temperature* indicator and connected with *Urban Heat Island* 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 sample collection, e.g., air quality measurements if these are not automated
Additional information	
References	Emmons, L.K., Walters, S., Hess, P.G., Lamarque, J.-F-, Pfister, G.G., Fillmore, D. … Kloster, S. (2010). Description and evaluation of the Model for Ozone and Related chemical Tracers, version 4 (MOZART-4). *Geoscientific Model Development*, *3*, 43-67.

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6.45 Human comfort: Universal thermal climate index (UTCI)

Project Name: UNaLab (Grant Agreement no. 730052)

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Universal Thermal Climate Index (UTCI)	**Climate Resilience** **Natural and Climate Hazards** **Health and Wellbeing**
Description and justification	UTCI index represents air temperature of the reference condition with the same physiological response as the actual condition. The UTCI provides a one-dimensional value that reflects the human physiological reaction to the multi-dimensional outdoor thermal environment (Bröde et al., 2012). It can predict both whole body thermal effects (hypothermia and hyperthermia; heat and cold discomfort), and local effects (facial, hands and feet cooling and frostbite). Applications of the UTCI include weather forecasts, bioclimatological assessments, bioclimatic