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| References | <p>URBAN GreenUP Deliverable D2.4 - Monitoring program to Valladolid. https://www.urbangreenup.eu/insights/deliverables/d2-4---monitoring-program-to-valladolid.kl</p> <p>URBAN GreenUP Deliverable D3.4 - Monitoring program to Liverpool https://www.urbangreenup.eu/insights/deliverables/d3-4---monitoring-program-to-liverpool.kl</p> <p>URBAN GreenUP Deliverable D4.4 – Monitoring program to Izmir https://www.urbangreenup.eu/insights/deliverables/d4-4---monitoring-program-to-izmir.kl</p> <p>URBAN GreenUP Deliverable D5.3: City Diagnosis and Monitoring Procedures https://www.urbangreenup.eu/insights/deliverables/d5-3-city-diagnosis-and-monitoring-procedures.kl</p> <p>Hankin B, Craigen I, Chappell NA et al. (2016) Strategic Investigation of Natural Flood Management in Cumbria. Jeremy Benn Associates, Skipton, UK. See http://naturalcourse.co.uk/uploads/2017/04/2016s4667-Rivers-Trust-Life-IP-NFM-Opportunities-Technical-Report-v8.0.pdf (accessed 02/02/2018). https://www.gov.uk/government/publications/flood-risk-maps-for-surface-water-how-to-use-the-map http://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/stream-order.htm http://meetingorganizer.copernicus.org/EGU2015/EGU2015-8582.pdf</p> |
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4.38 Total surface area of wetlands within a defined area

Project Name: UNaLab (Grant Agreement no. 730052)

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| Total surface area of wetlands within a defined area | Climate resilience Water Management |
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| Description and justification | <p>Wetlands are unique ecosystems that occur in places where the water table is close to the ground level, or where land is covered by water, either seasonally or permanently. Convention on Wetlands (Ramsar, Iran, 1971), or Ramsar Convention, defines wetlands as “... a wide variety of inland habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as saltmarshes, mangroves, intertidal mudflats and seagrass beds, and also coral reefs and other marine areas no deeper than six metres at low tide.” Conservation and restoration of wetlands is regarded as one of the critical factors for establishing climate</p> |

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| | adaptation as part of the disaster risk reduction. Wetlands provide resilience against water-related hazards such as floods, storm surges and droughts by capturing and holding water and gradually releasing it. Peatlands enhance climate resilience by storing carbon. |
| Definition | Total surface area covered with wetlands within a defined area (ha) |
| Strengths and weaknesses | + Straightforward assessment of the surface area occupied by wetlands - Requires access to local records or international/local spatial datasets |
| Measurement procedure and tool | The extent of the surface area covered by wetlands can be assessed using the land-use raster data (local or EU-wide, e.g., Corine Land Cover) in GIS software that allows to examine the total area. Satellite imagery may be used for visual assessment and manual surface area calculation. |
| Scale of measurement | City; municipality |
| Data source | |
| Required data | Land-use raster of the area of interest; local records; satellite imagery |
| Data input type | Quantitative |
| Data collection frequency | Annually |
| Level of expertise required | Moderate – requires knowledge of GIS software Low – when assessing visually using satellite images |
| Synergies with other indicators | Direct relation to <i>Water management</i> and <i>Biodiversity</i> challenge categories |
| Connection with SDGs | SDG 6 Clean water and sanitation, SDG 11 Sustainable cities and communities, SDG 13 Climate action, SDG 15 Life on land |
| Opportunities for participatory data collection | Participatory data collection can be implemented among local people; another opportunity is community involvement in wetland management |
| Additional information | |
| References | Kumar, R., Tol, S., McInnes, R.J., Everard, M. and Kulindwa, A.A.. <i>Wetlands for disaster risk reduction: Effective choices for resilient communities</i> . Ramsar Policy Brief, (1). Gland, Switzerland: Ramsar Convention Secretariat, 2017. Ramsar Convention Secretariat. <i>Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites</i> . Ramsar handbooks for the wise use of |

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Ramsar Convention Secretariat. *Participatory skills: Establishing and strengthening local communities' and indigenous people's participation in the management of wetlands*. Ramsar handbooks for the wise use of wetlands, 4th edition, vol. 7. Ramsar Convention Secretariat, Gland, Switzerland, 2010.

Renaud, F.G., Sudmeier-Rieux, K. and Estrella, M. (eds.). *The Role of Ecosystems in Disaster Risk Reduction*. Tokyo: United Nations University Press, 2013.

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4.39 Total surface area of restored and/or created wetlands

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| Total surface area of constructed and/or restored wetlands within a defined area | Climate resilience Water Management |
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| Description and justification | Wetlands are unique ecosystems that occur in places where the water table is close to the ground level, or where land is covered by water, either seasonally or permanently. Convention on Wetlands (Ramsar, Iran, 1971), or Ramsar Convention, defines wetlands as "... a wide variety of inland habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as saltmarshes, mangroves, intertidal mudflats and seagrass beds, and also coral reefs and other marine areas no deeper than six metres at low tide." Conservation and restoration of wetlands is regarded as one of the critical factors for establishing climate adaptation as part of the disaster risk reduction. Wetlands provide resilience against water-related hazards such as floods, storm surges and droughts by capturing and holding water and gradually releasing it. Peatlands enhance climate resilience by storing carbon. |
| Definition | Surface area of constructed and/or restored wetlands within a defined area (ha) |