

**Sustainable Water Management
Doctoral Programme (Water4All)**



METU



Title of the PhD Project	Applicability of Greywater Reuse within the Context of Circular Cities
Acronym	Green-For-Grey
Research Fields of the Project	Environmental Engineering, Water Sanitation Engineering, Water Resources Engineering, Environmental and Life Science
Keywords	Nature Based Solution, Wastewater Recovery, Wastewater Segregation, Circular City, Sustainability
Host Institution, Department and Campus Location	Gebze Technical University, Gebze, Kocaeli, Turkiye
PhD Awarding Institution and Graduate Programme	Gebze Technical University, Gebze, Kocaeli, Turkiye PhD in Environmental Engineering
Name and Affiliation of Main Supervisor	Assist. Prof. Dr. Derya AYRAL ÇINAR
Name and Affiliation of Co-Supervisors	Assist. Prof. Dr. Emel TOPUZ
Research Environment and Infrastructure	GTU Environmental Engineering Department has several laboratories such as Instrumental Analysis, Microalgal Biotechnology, Air Pollution Laboratory, Drinking Water Laboratory, Soil Pollution and Solid Waste Sample Preparation Laboratory, Chemical Oxidation Laboratory, Electrotechnology Application Laboratory and Membrane Technologies Laboratory. https://www.gtu.edu.tr/kategori/368/0/display.aspx?languageld=2
Scientific Context of the Project	Urban areas are known to be the major consumer of resources and producer of waste. In addition to resulting in these severe environmental impacts contributing to climate change, urban areas are also affected by climate change. In order to overcome this challenge, sustainable and circular systems are proposed to be implemented. Nature Based Solutions (NBS) are one the options and they aim to design systems inspired by nature to minimize resource consumption and waste production. These types of circular systems are regarded more sustainable and beneficial in terms of adaptation to climate change through increasing resilience of the cities.

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	<p>A comprehensive knowledge about wastewater management strategies exist to protect water resources and soil. However, increasing wastewater production exceed the wastewater treatment plants capacities especially under the conditions that have been changing due to climate change. Besides, many valuable components in the wastewater such as water, organic matter and nutrients are discharged into water bodies. Recovery of these components will decrease raw material demand especially if the critical situation about water scarcity is considered. Wastewater segregation is suggested for better management of wastewater because domestic wastewater can be categorized in different streams which have different properties in terms of contaminant load and flowrate. Among those streams, greywater as the wastewater originating from sinks and shower has a higher volume with lower pollutant load. So, it is regarded appropriate for water recovery.</p> <p>In this study the goal is investigation of the applicability of NBS to manage greywater in a sustainable way. For this purpose, two NBS options will be used to manage greywater and their sustainability and circularity performance will be evaluated. The study will contribute selection of the appropriate NBS for greywater.</p>
Brief Workplan	<p>Project will include infrastructure construction for greywater collection, wetland and green wall. At the second stage, wetland and green wall will be operated to manage the greywater. Wetland operational conditions will be optimized to improve water quality and enhance water recovery. Recovered water will be evaluated in terms of its suitability for irrigation water. Additionally, green wall will be operated with the collected greywater. At the final step, sustainability and circularity of these two options will be assessed to determine a feasible greywater management strategy.</p>
Innovative Aspects of the Project	<p>Applicability of constructed wetland and green wall for greywater recovery will be compared in the context of sustainability and circularity in order to adapt to best available greywater management strategy. Currently literature is still in the development stage to compare green walls and wetlands for greywater management. However, there is a significant need to understand which option could be preferred considering greywater production quantity, required treatment level, appropriateness for irrigation and social acceptance.</p>
Training Opportunities of the Project	<p>The University of Natural Resources and Life Sciences, Vienna, AU Bilgi University, TR</p>
Interdisciplinary Aspects	<p>Architecture, Earth Sciences, Economy, Policy</p>

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Intersectoral Mobility <input checked="" type="checkbox"/> Short Visit <input type="checkbox"/> Secondment	Gebze Municipality, TR
International Academic Secondment	University of Calabria, IT

Main Supervisor							
Brief CV	<p>Assist. Prof. Dr. Derya AYRAL ÇINAR</p> <p>E-mail: deryacinar@gtu.edu.tr</p> <p>Academic Degrees</p> <table><tr><td>Ph.D. Environmental Engineering, The University of Michigan, USA</td><td>2015</td></tr><tr><td>M.Sc. Environmental Engineering, The University of Michigan, USA</td><td>2010</td></tr><tr><td>B.Sc. Environmental Engineering, Istanbul Technical University, Türkiye</td><td>2007</td></tr></table> <p>Professional Networks</p> <p>Google Scholar: https://scholar.google.com/citations?user=RoyCcVMAAAj&hl=tr&oi=ao</p> <p>ResearchGate: https://www.researchgate.net/profile/Derya-Ayral-Cinar</p> <p>Scopus: https://www.scopus.com/authid/detail.uri?authorId=55218032700</p> <p>ORCID: https://orcid.org/0000-0001-6378-6897</p>	Ph.D. Environmental Engineering, The University of Michigan, USA	2015	M.Sc. Environmental Engineering, The University of Michigan, USA	2010	B.Sc. Environmental Engineering, Istanbul Technical University, Türkiye	2007
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Brief CV	<p>Assit. Prof. Dr. Emel TOPUZ</p> <p>E-mail: emeltopuz@gtu.edu.tr</p> <p>Academic Degrees</p> <table><tr><td>Ph.D. Environmental Engineering, VU Amsterdam University, Netherlands</td><td>2015</td></tr><tr><td>Ph.D. Environmental Engineering, Istanbul Technical University, Turkey</td><td>2015</td></tr><tr><td>M.Sc. Environmental Engineering, Istanbul Technical University, Turkey</td><td>2009</td></tr><tr><td>B.Sc. Industrial Engineering, Istanbul Technical University, Turkey</td><td>2008</td></tr><tr><td>B.Sc. Environmental Engineering, Istanbul Technical University, Turkey</td><td>2007</td></tr></table> <p>Professional Networks</p> <p>Google Scholar: https://scholar.google.com/citations?hl=tr&user=h2fX3QoAAAAJ</p> <p>ResearchGate: https://www.researchgate.net/profile/Emel-Topuz</p> <p>Scopus: https://www.scopus.com/authid/detail.uri?authorId=35811536400</p> <p>ORCID: https://orcid.org/0000-0002-8985-5958</p>	Ph.D. Environmental Engineering, VU Amsterdam University, Netherlands	2015	Ph.D. Environmental Engineering, Istanbul Technical University, Turkey	2015	M.Sc. Environmental Engineering, Istanbul Technical University, Turkey	2009	B.Sc. Industrial Engineering, Istanbul Technical University, Turkey	2008	B.Sc. Environmental Engineering, Istanbul Technical University, Turkey	2007
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