

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



METU

İTÜ



<b>Title of the PhD Project</b>	Revaluation of segregated domestic wastewater streams as a source of fertilizers for sustainability through the use of yellow water (source separated urine)
<b>Acronym</b>	UrineSustain
<b>Research Fields of the Project</b>	Environmental Engineering, Microbial Ecology, Bioreactor Engineering
<b>Keywords</b>	Yellow water, microalgae, bioremediation
<b>Host Institution, Department and Campus Location</b>	Istanbul Technical University, Department of Environmental Engineering, ITU Ayazaga Campuss, Maslak, 34467 Istanbul
<b>PhD Awarding Institution and Graduate Programme</b>	Istanbul Technical University, Graduate School, PhD in Department of Environmental Engineering
<b>Name and Affiliation of Main Supervisor</b>	Prof. Dr. Vedat Uyak
<b>Name and Affiliation of Co-Supervisors</b>	Assoc. Prof. Dr. Mahmut Altınbaş
<b>Research Environment and Infrastructure</b>	Istanbul Technical University is an institution that plays a leading role in science, technology, arts, and sports. ITU aims to be the center of science, which connects the past to the present by producing projects for the future. The ITU Environmental Engineering Laboratories ( <a href="https://cevmuhlab.itu.edu.tr">https://cevmuhlab.itu.edu.tr</a> ) consist of 2400 square meters of management offices, 2300 square meters of research laboratories, and 350 square meters of student laboratories. The ITU Environmental Engineering department has 17 different laboratory infrastructures, including Molecular Biology Laboratory, Instrumental Analysis Laboratory, and Physical Processes Laboratory.



METU

İTÜ



<p><b>Scientific Context of the Project</b></p>	<p>Domestic wastewater treatment is a process that aims to remove pollutants from used water and make it reusable. Purification ensures contaminated water is cleaned before harming natural water resources or the environment. In this way, the risk of water pollution and damage to ecosystems is reduced. Different treatment techniques are used for this, but collecting domestic wastewater sources separately may be more effective for waste management. In particular, a separate urine, and yellow water, collection is a crucial sustainability management approach. Repurposing domestic wastewater urine as a fertilizer source can create a sustainable circular economy model and reduce natural resource use. Separated urine can be collected in special storage tanks or containers. This storage allows urine to be deposited at an appropriate time for processing. Urine can be safe when it is free of harmful microorganisms.</p> <p>By implementing these processes, it is possible to recover valuable resources contained in domestic wastewater and promote a sustainable circular economy model. However, to effectively implement such systems, various technical, economic, and social difficulties may need to be overcome. At this stage, microalgae can be used effectively. Microalgae, with their high growth capacity, can bioremediate urine. Additionally, microalgae can produce bioenergy sources such as biogas, biodiesel, or biofuel from biomass. This provides clean energy sources that replace fossil fuels. In this study, microalgal species that show high biomass production and bioremediation properties in the urine environment will be screened. Large-scale treatment will be carried out with microalgae species that show the highest growth efficiency. Afterward, the obtained microalgae biomass will be examined as biodiesel raw material.</p>
<p><b>Brief Workplan</b></p>	<p>Characterization of growth rates of different microalgae cultures in yellow water newly isolated indigenous algae species, an adaptation of selected microalgae species to undiluted yellow water, characterization of metabolites, and design of a novel photobioreactor for source separated yellow-water with microalgae.</p>
<p><b>Innovative Aspects of the Project</b></p>	<p>Species that grow efficiently in yellow water will be detected and isolated. Through the use of microorganisms, valuable resources will be recycled from domestic wastewater. It will be possible to observe a model of circular economy that is sustainable. It will be demonstrated that yellow water can be used to generate bioenergy, which is used both as a growth medium and as a fertilizer for microalgae biomass.</p>

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



METU

İTÜ



<p><b>Training Opportunities of the Project</b></p>	<p>The researcher will be trained in the area of microalgae cultivation, wastewater treatment, biomolecule, and metabolite characterization. There will be an opportunity for participation of the researcher in bioenergy production from biomass.</p>
<p><b>Interdisciplinary Aspects</b></p>	<p>This highly multidisciplinary project involves environmental engineering (wastewater treatment), chemical biology (adaptation techniques), analytical biotechnology (characterization and purification techniques), bioreactor engineering (bioreactor management techniques).</p>
<p><b>Intersectoral Mobility</b></p> <p><input checked="" type="checkbox"/> Short Visit</p> <p><input type="checkbox"/> Secondment</p>	<p>Host: RS Research</p> <p>Context of Mobility: Training in wastewater treatment focusing on yellow water</p>
<p><b>Intersectoral Mobility</b></p> <p><input type="checkbox"/> Short Visit</p> <p><input type="checkbox"/> Secondment</p>	<p>TBD</p>
<p><b>International Academic Secondment</b></p>	<p>TBD</p>



METU

İTÜ



Main Supervisor										
<b>Brief CV</b>	<p><b>Prof. Dr. Vedat UYAK</b></p> <p>E-mail: <a href="mailto:uyakv@itu.edu.tr">uyakv@itu.edu.tr</a></p> <p><b>Academic Degrees</b></p> <table><tr><td>Ph.D.</td><td>Environmental Engineering, Istanbul Technical University, Türkiye</td><td>2002</td></tr><tr><td>M.Sc.</td><td>Environmental Engineering, University of Iowa, USA</td><td>1997</td></tr><tr><td>B.Sc.</td><td>Environmental Engineering, Cumhuriyet University, Türkiye</td><td>1989</td></tr></table> <p><b>Professional Networks</b></p> <p>Google Scholar: <a href="https://scholar.google.com/citations?user=8oWyPXsAAAAJ&amp;hl=tr&amp;oi=ao">https://scholar.google.com/citations?user=8oWyPXsAAAAJ&amp;hl=tr&amp;oi=ao</a></p> <p>ResearchGate: <a href="https://www.researchgate.net/profile/Vedat-Uyak">https://www.researchgate.net/profile/Vedat-Uyak</a></p> <p>Scopus: <a href="https://www.scopus.com/authid/detail.uri?authorId=55996485200">https://www.scopus.com/authid/detail.uri?authorId=55996485200</a></p> <p>ORCID: <a href="https://orcid.org/0000-0002-9368-8224">https://orcid.org/0000-0002-9368-8224</a></p>	Ph.D.	Environmental Engineering, Istanbul Technical University, Türkiye	2002	M.Sc.	Environmental Engineering, University of Iowa, USA	1997	B.Sc.	Environmental Engineering, Cumhuriyet University, Türkiye	1989
Ph.D.	Environmental Engineering, Istanbul Technical University, Türkiye	2002								
M.Sc.	Environmental Engineering, University of Iowa, USA	1997								
B.Sc.	Environmental Engineering, Cumhuriyet University, Türkiye	1989								
Co-supervisors										
<b>Brief CV</b>	<p><b>Assoc. Prof. Dr. Mahmut ALTINBAŞ</b></p> <p>E-mail: <a href="mailto:altinbasm1@itu.edu.tr">altinbasm1@itu.edu.tr</a></p> <p><b>Academic Degrees</b></p> <table><tr><td>Ph.D.</td><td>Environmental Engineering, Istanbul Technical University, Türkiye</td><td>2007</td></tr><tr><td>M.Sc.</td><td>Environmental Engineering, Istanbul Technical University, Türkiye</td><td>2000</td></tr><tr><td>B.Sc.</td><td>Environmental Engineering, Istanbul Technical University, Türkiye</td><td>1997</td></tr></table> <p><b>Professional Networks</b></p> <p>Google Scholar: <a href="https://scholar.google.com/citations?user=xqbpVMYAAAAJ&amp;hl=en&amp;oi=ao">https://scholar.google.com/citations?user=xqbpVMYAAAAJ&amp;hl=en&amp;oi=ao</a></p>	Ph.D.	Environmental Engineering, Istanbul Technical University, Türkiye	2007	M.Sc.	Environmental Engineering, Istanbul Technical University, Türkiye	2000	B.Sc.	Environmental Engineering, Istanbul Technical University, Türkiye	1997
Ph.D.	Environmental Engineering, Istanbul Technical University, Türkiye	2007								
M.Sc.	Environmental Engineering, Istanbul Technical University, Türkiye	2000								
B.Sc.	Environmental Engineering, Istanbul Technical University, Türkiye	1997								

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



METU

İTÜ



	<p>ResearchGate: <a href="https://www.researchgate.net/profile/Mahmut-Altinbas">https://www.researchgate.net/profile/Mahmut-Altinbas</a></p> <p>Scopus: <a href="https://www.scopus.com/authid/detail.uri?authorId=23003289800">https://www.scopus.com/authid/detail.uri?authorId=23003289800</a></p> <p>ORCID: <a href="https://orcid.org/0000-0003-3946-741X">https://orcid.org/0000-0003-3946-741X</a></p>
--	---