

Doctoral Researchers in the Digital Waters (DIWA)  
Doctoral Pilot  
Aalto University

Direct Link: <https://www.AcademicKeys.com/r?job=242705>

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Posted Aug. 5, 2024, set to expire Dec. 30, 2024

**Job Title** Doctoral Researchers in the Digital Waters (DIWA)  
Doctoral Pilot

**Department** T213 Built Environment

**Institution** Aalto University  
, , Finland

**Date Posted** Aug. 5, 2024

**Application Deadline** Open until filled

**Position Start Date** Available immediately

**Job Categories** Graduate Student

**Academic Field(s)** Ecological and Environmental

**Job Website** [https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/Doctoral-Researchers-in-the-Digital-Waters--DIWA--Doctoral-Pilot\\_R40351](https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/Doctoral-Researchers-in-the-Digital-Waters--DIWA--Doctoral-Pilot_R40351)

**Apply By Email**

**Job Description**

Aalto University is where science and art meet technology and business. We shape a sustainable future by making research breakthroughs in and across our disciplines, sparking the game changers of tomorrow and creating novel solutions to major global challenges. Our community is made up of 13 000 students, 400 professors and close to 4 500 other faculty and staff working on our dynamic campus in Espoo, Greater Helsinki, Finland. Diversity is part of who we are, and we actively work to ensure our community's diversity and inclusiveness. This is why we warmly encourage qualified candidates from all backgrounds to join our community.

Doctoral Researchers in the Digital Waters (DIWA) Doctoral Pilot

The Aalto University is inviting applications for Doctoral Researcher positions in the Digital Waters

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(DIWA) doctoral education pilot. The duration of the positions is three years, starting no later than in January 2025. The open positions cover variety of topics related to water and its management (see below the link to each open position), and we therefore encourage applications from a diversity of fields.

DIWA doctoral pilot positions are funded by the Ministry of Education and Culture. The research themes of the open positions are linked to DIWA Flagship ([url=http://www.digitalwaters.fi]www.digitalwaters.fi, [url=https://digitalwaters.fi/phd-pilot/apply/]https://digitalwaters.fi/phd-pilot/apply/ ) funded by Research Council of Finland. The flagship is a leading research and innovation ecosystem, bringing research and new innovations together to support decision-making and management in the water sector - digitally. DIWA enables a transition towards the digital representation of real-world water systems (Digital Twin) to reproduce hydrological storages, their states, fluxes and processes, as well as ecosystem responses with novel options for improved scenario analyses, planning and governance.

The doctoral pilot will contribute to all five Flagship research themes related to hydrosphere processes; new observational systems; integrated analysis and modelling; digital services, platforms, and business applications; and transformative water management. The relevant research areas in the pilot cover variety of contexts, including river systems, groundwater processes, agricultural systems, and pristine, rural and urban areas. Similarly important are the interactions and responses in the hydro-, atmo- and cryosphere as well as diverse linkages between water, climate, land, and ecosystems. The large datasets and other information gathered during DIWA flagship will be available for doctoral researchers. Both the DIWA flagship and the doctoral pilot aim for major societal impact, and will collaborate with key stakeholders from public and private sector as well as civil society.

The DIWA doctoral pilot offers a unique and multidisciplinary research and learning environment that provides systematic training, access to excellent research infrastructure, and professional career development. Doctoral Researchers will be working closely with the researchers, supervisors, and partner organisations of the DIWA ecosystem, including cities and municipalities, ministries, companies, research institutes and civil society organisations. Doctoral Researchers can have secondment periods in the partner organisations outside academia. The pilot will include altogether 60 Doctoral Researchers, out of which, 14 Doctoral researchers at Aalto University.

We are now looking for a Doctoral Researchers for the following topics at Aalto University (see the detailed descriptions at the end of this page):

1. Improving flood and water quality predictions considering flow-vegetation-sediment interactions across scales within river and floodplain systems
2. Stormwater management in construction sites
3. Digital water governance ?

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4. Seasonal processes (incl. freeze-thaw and ice cover impacts) within river systems, and development of their data analyses and observation methods, enabling their inclusion into digital twins of watersheds
5. Spatial modeling of water balance in agricultural fields and the surrounding environment

Requirements for the position \*

Master's degree from a relevant field (completed before starting in the position) \*

A good command of English (typically demonstrated with an official certificate, e.g., IELTS/TOEFL). \*

Applicants should demonstrate the ability and enthusiasm to work as part of a multidisciplinary research and expert network.

We encourage applicants from a variety of relevant fields to apply: see the detailed topic descriptions below.

Applicants must fulfill the admission criteria of the Aalto Doctoral Programme in Engineering and, if chosen for a position, apply for, obtain and accept the right to pursue doctoral studies at Aalto University. For more information on the general requirements and the application process for doctoral studies, please visit [[url=https://www.aalto.fi/en/study-options/aalto-doctoral-programme-in-engineering](https://www.aalto.fi/en/study-options/aalto-doctoral-programme-in-engineering)]<https://www.aalto.fi/en/study-options/aalto-doctoral-programme-in-engineering>  
Our workplace values equality and diversity, and we therefore encourage qualified applicants from all backgrounds to apply for our open positions.

What we offer \*

We offer you an interesting job in an inspiring and multidisciplinary work environment. We will familiarize you with your work tasks, and you will be part of a competent team that will provide you with support for your tasks. We encourage and offer opportunities for continuous development of your own expertise. \*

You will become part of a wide and unique network of Doctoral Researchers, early career and senior researchers, and supervisors within the DIWA Flagship and the related Doctoral Education Pilot Projects. \*

The expected starting date in the position is at the latest on January 1st, 2025. Presence in Finland for the duration of the contract is compulsory. \*

Employment contracts will be made for three years with the funding from the Finnish Ministry of Education and Culture. Contract includes a prerequisite to apply, receive and accept doctoral study right within the probation period of the first 6 months. \*

Aalto University follows the salary system of Finnish universities. The starting salary is approximately 2700 €/month (gross), and it increases as the Doctoral Researcher progresses in the research and studies. \*

The contract includes Aalto University occupational healthcare. \*

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We work in a hybrid way with flexible office hours, and the primary workplace is at our active university campus in Otaniemi, Espoo.

Join us!

To apply, please submit your application through our recruitment system by Sunday September 15 2024 (23:59 EET [UTC+3]). Click "Apply now".

Please include the following documents in English, preferably as a single pdf-file (name the file: lastname\_firstname\_application.pdf): \*

Letter of Motivation (1-2 pages), where you introduce yourself and describe your research interests and motivation for pursuing doctoral studies. Applicant is asked to indicate their preferences in case of applying multiple positions at Aalto or between the partner universities of the DIWA doctoral education pilot ([url=https://digitalwaters.fi/phd-pilot/apply/]https://digitalwaters.fi/phd-pilot/apply/). \*

A Curriculum Vitae (2 pages), including contact details of two relevant referees (please see CV example:

[url=https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Ftenk.fi%2Fsites%2Fdefault%2F06%2FTENK\_CV\_template\_2020.docx&wdOrigin=BROWSELINK]TENK\_CV\_template\_2020.docx (live.com)). You are also encouraged to include links to your personal webpage, LinkedIn page or similar. \*

List of Publications, including the titles and possible links to Bachelor Thesis and Master's Thesis as well as possible scientific publications. \*

An official Study Transcript of your Master's degree, listing all courses and grades. \*

A copy of the M.Sc. degree certificate or equivalent (for doctoral study application it will need to be officially translated into Finnish, English or Swedish). If the degree is still pending, then a plan for its completion must be provided. \*

Research statement of the selected research topic (2-3 pages), indicating the planned context, research questions, key methods and theories as well as novelty of your research. The research statement can be checked with the Turnitin Originality Check plagiarism detection software. The use of artificial intelligence to assist in the preparation of the research plan should be clearly indicated in the research plan.

Kindly note that we will start to go through the applications and may also invite suitable candidates to interview already during the application period. The position will be filled as soon as a suitable candidate is identified: this can happen already before the application period closes. You are thus encouraged to submit your application as soon as possible.

Aalto University reserves the right to leave the position open, extend the application period, reopen the application process, and to consider candidates who have not submitted applications during the

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application period.

Any questions?

For additional information about the DIWA doctoral researcher positions regarding the Aalto University, kindly contact Assistant Professor Eliisa Lotsari ([eliisa.s.lotsari@aalto.fi](mailto:eliisa.s.lotsari@aalto.fi)).

For questions about applying, please contact HR partner Sanni Mero ([sanni.mero@aalto.fi](mailto:sanni.mero@aalto.fi)).

If you have already applied some other previously open DIWA PhD pilot position, and you have questions about this new application process, please contact both Prof. Lotsari and HR partner Mero via above e-mails.

Want to know more about us?

You can watch these videos: [[url=https://www.youtube.com/watch?v=#61;5k\\_og\\_6zUJQ](https://www.youtube.com/watch?v=#61;5k_og_6zUJQ)]Aalto University - Towards a better world, [[url=https://www.youtube.com/watch?v=#61;dUfEGVM-ZP8&feature=#61;youtu.be](https://www.youtube.com/watch?v=#61;dUfEGVM-ZP8&feature=#61;youtu.be)]Aalto People, and [[url=https://www.youtube.com/watch?v=#61;ZK6pDWm1\\_CE](https://www.youtube.com/watch?v=#61;ZK6pDWm1_CE)]Shaping a Sustainable Future. Read more about working at Aalto: [[url=https://www.aalto.fi/en/careers-at-aalto](https://www.aalto.fi/en/careers-at-aalto)]<https://www.aalto.fi/en/careers-at-aalto>

About Finland

Finland is a great place for living with or without family - it is a safe, politically stable and well-organized Nordic society. Finland is consistently ranked high in quality of life and was just listed again as the happiest country in the world: [[url=https://worldhappiness.report/news/its-a-three-peat-finland-keeps-top-spot-as-happiest-country-in-world/](https://worldhappiness.report/news/its-a-three-peat-finland-keeps-top-spot-as-happiest-country-in-world/)]<https://worldhappiness.report/news/its-a-three-peat-finland-keeps-top-spot-as-happiest-country-in-world/>. For more information about living in Finland: [[url=https://www.aalto.fi/en/careers-at-aalto/for-international-staff](https://www.aalto.fi/en/careers-at-aalto/for-international-staff)]<https://www.aalto.fi/en/careers-at-aalto/for-international-staff>

TOPIC DESCRIPTIONS (see also same descriptions from [[url=https://digitalwaters.fi/phd-pilot/apply/](https://digitalwaters.fi/phd-pilot/apply/)]<https://digitalwaters.fi/phd-pilot/apply/>)

1. Improving flood and water quality predictions considering flow-vegetation-sediment interactions across scales within river and floodplain systems.

Background

Improved understanding of the dynamics and processes of water, sediment, vegetation, nutrients, harmful substances, and fish habitat use is critical for sustainable river management. River and floodplain vegetation sets a critical control on the flow of water and substances, as well as providing

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essential habitats. Improved hydrodynamic modeling capability with upscaling using remote sensing methods is highly relevant for flood and water quality predictions under changing climatic and hydrologic conditions.

#### Topic description

The primary objective of this research is to investigate how model predictions on flow velocity distributions, water stages, transport of substances, and fish habitat use can be improved for nature-based solutions (NBS). To support the optimal design and management of rivers and engineered channels, the research will focus on physically based determination of flow resistance in vegetated flows on different scales. The work is methodologically based on laboratory flume experiments and/or field investigations, and modelling incorporating remotely sensed data. Proposed measurement techniques include lidar, drone-based surveys, and tracer experiments. Field sites with background information are available for upscaling. Research infrastructure of the Aalto Environmental Hydraulics Lab is available for this project (<https://www.aalto.fi/en/services/environmental-hydraulics-lab>).

This research links to DIWA Task 1.3 Surface water processes and environment: “A comprehensive understanding of flooding, water quality (nutrients and carbon) concentrations and fluxes, river system geomorphology, and sediment transport is gained from different land use regions, i.e. from a natural state to regulated rivers, managed lands and urbanized catchments.” In addition, the project contributes to Task 3.2: Dynamic simulation models.

Applicants must have a completed (or a nearly completed) Master of Science degree in a related field (engineering or natural sciences). Knowledge on environmental hydraulics or fluid mechanics in fluvial environments is required. Proficiency in experimental methods (e.g. laboratory flume investigations and ground-based validation of remote sensing applications) is considered an asset. Good oral and written proficiency in English is expected, with experience on scientific writing appreciated.

Collaboration/secondment with Finnish Environment Institute (Syke) and Natural Resources Institute Finland (Luke).

Work will be done in WAT/Aalto (Water and Environmental Engineering | Aalto University <https://www.aalto.fi/en/departments-of-built-environment/water-and-environmental-engineering>).

## 2. Stormwater management in construction sites

### Background

Environmental protection in construction sites often revolves around dust and noise control. However, stormwater in construction sites is known to be rich in suspended solids and nutrients. It is also prone



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to be contaminated with oil products and metals. As construction can be regarded as a temporary disturbance, and the space needed for stormwater management is limited, treatment of stormwater can be inadequately arranged. Even though the awareness for the need to manage stormwater better in construction sites is increasing, a thorough, science-based knowledge about the extent of stormwater impacts and the identification of best management practices to enhance the quality of stormwater leaving construction sites is rather thin.

#### Topic description

This study is motivated by the need to advance stormwater management in construction sites. The objective is to explore the legislation and other instructions regulating stormwater management during the construction phase 1) to identify what the most significant pollutants and stormwater related risks encountered in construction sites are, 2) to define the preferred methods for construction site runoff management, and 3) to identify barriers and enablers in developing better stormwater management. Subsequently, case study sites will be selected to assess the quality of stormwater and to conduct an analysis to identify construction impacts and to suggest best practices for stormwater treatment. The study develops new tools to support decision making related to planning, design and operation of stormwater management at constructions sites. The new tools may be related to spatial data, online monitoring, digital twins and/or hydrological and water quality modelling. During the study process, a close collaboration with a private industry partner is encouraged, as well as with other interest groups related to the study topic.

The applicant is expected to have a master's degree in hydrological sciences, water or environmental engineering, or in a related field. The position requires good teamwork skills and self-management. The applicant should have experience in computational methods (GIS, simulation modelling). Programming skills are seen as an asset.

Work will be done in WAT/Aalto (Water and Environmental Engineering | Aalto University  
[url=<https://www.aalto.fi/en/departement-of-built-environment/water-and-environmental-engineering>]<https://www.aalto.fi/en/departement-of-built-environment/water-and-environmental-engineering>)

### 3. Digital water governance

#### Background

Water is critically important for addressing the key sustainability challenges related climate change, biodiversity, and pollution, and there are high hopes that so-called Twin Transition (green and digital transition) will provide new, more sustainable and efficient ways of working also in the water sector. Yet, the thorny issues related to participation and decision-making power remain, as water brings together a variety of actors with differing interests, needs and knowledges. Such a setting calls for new

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ways of viewing the role that digitalisation has for water resources management and governance.

#### Topic description

The doctoral research under this topic will look at the role that digitalisation has for the governance of water resources in Finland, considering both established (e.g. EU Water Framework Directive) and emerging (e.g. multistakeholder platforms such as water vision processes) governance mechanisms. The research will study critically the potential of this Twin Transition in the water field, considering the pros and cons of digitalisation (e.g. digital participation, citizen science, access to information) and the ways it links to key sustainability challenges. The research is expected to have one or more case studies (e.g. Vantaanjoki River Basin), but also consider the themes at national level.

The position requires understanding of the key theories related to sustainability, natural resources management and governance. Understanding on the aspects related to digitalisation and its linkages to governance is a strong merit. The position also requires knowledge on qualitative research methods, while knowledge on quantitative research methods is a merit. The applicants can therefore come from a variety of relevant fields, including water and natural resources management, environmental sciences, sustainability science, political science, and social sciences as well as information science and information technology. Experience from carrying out expert interviews and related analysis methods and software is a merit. As the research utilises also relevant Finnish-language planning and policy documents, the competency also in Finnish is a strong merit.

Collaboration/secondment with Finnish Environment Institute (Syke).

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4. Seasonal processes (incl. freeze-thaw and ice cover impacts) within river systems, and development of their data analyses and observation methods, enabling their inclusion into digital twins of watersheds

#### Background

More than half of Earth's rivers are covered by ice during the winter months and their catchments cover more than one-third of the land area globally. In addition to changing seasonal river discharges, climate change is changing river ice regimes; shorter ice-cover duration is observed in many and river ice cover will continue to decline over the 21st century on a global scale. This is critical, as river ice regulates, together with discharges, important functions of river systems, including river flow characteristics, flooding, and sediment transport, which in turn affect ecosystem functioning and



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biodiversity, and also impacts human societies. Climate change is affecting the globe the fastest within the polar region, where the river environment functions within the watersheds are dependent on the seasonal hydrological conditions and the length of the ice-covered period. Therefore, for understanding these future impacts, present seasonal processes are needed to understand, data processing approaches and observation networks are needed to develop, and also inclusion of the processed observations to Digital Twins of watersheds, are crucial for enhancing the understanding of the changing river systems, and also larger societal impacts.

#### Topic description

Previous studies demonstrated that the sediment load of Arctic rivers is controlled by surface temperature of the watershed and its relief and that greatest concentrations of sediment transport occur in spring during the main period of dynamic river ice break-up. However, recently it has been showed that in small sub-arctic Fennoscandian river channels, there is extensive sediment transport also in mid-winter. In addition to the unknowns in the ice formation, there are also large unknowns in the impact of ice on both flow characteristics and sediment transport.

The doctoral researcher will 1) first of all analyse these current seasonal fluvial processes and fills in the gaps in understanding their impact on flow, sediment transport and channel processes. However, main emphasis is in the 2) development of novel data analyses methods, with the help of novel observation systems, for understanding these seasonal processes, and finally 3) further enabling the inclusion of this processed seasonal information to Digital Twins of watersheds, created in collaboration with the DIWA consortium.

The position requires a strong theoretical background in fluvial research. Spatial data processing, field measurement, and computational methods are considered as asset. Thus, applicants should have a Masters' degree in water and environmental engineering, hydrological sciences, environmental sciences, physical geography or other relevant fields of science regarding fluvial research, spatial data analyses and computational methods.

Collaboration/secondment potential with Finnish Environment Institute (Syke), Natural Resources Institute Finland (Luke), Geological Survey of Finland (GTK), among others.

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## 5. Spatial modeling of water balance in agricultural fields and the surrounding environment

### Background

Water balance is a critical aspect of agriculture. In irrigated fields it is important to know when and how much additional water is required. In fields without irrigation, knowing the water balance within the field is a critical aspect for estimating within field growth potential. That in turn is an important source of data when planning future field operations. The agricultural water system is also affected by and affects the behavior of surface and groundwater in the vicinity. However, accurate measuring of this whole system is challenging, and therefore accurate and timely modeling of the water both within fields and in the immediate vicinity can provide immense help in assessing the situation. Precise and accurate models of agricultural fields, including the soil up to several meters in depth, can therefore help in managing the farm, and thus contribute to smart farming and improve the eco-friendliness of farms.

### Topic description

The doctoral researcher tackling this topic will focus on agricultural hydrology and investigate the means for high-resolution spatial modeling of water balance in agricultural fields and their immediate vicinity. The PhD project aims to apply/develop geospatial methods (GIS) and hydrological modeling to provide detailed-level information about the water balance based on smart sensor data from Natural Resources Institute Finland, as well as different open geospatial datasets (e.g. Earth Observation data) that will be used to predict the water balance for larger areas. An important application area for the field models will be within-field water balance, as well as the interaction of the water within the field and the water in the immediate surroundings. The results of the project can provide valuable input for smart farming and managing the ecological impacts of agriculture, and can ultimately lead into development of a digital twin for specific irrigated fields in Finland..

The position requires good skills in GIS, spatial analysis, programming, as well as hydrological modeling, and the ability to develop and assess models based on the available data. In addition, understanding of agriculture is beneficial for the position. We invite applicants with a relevant study background from disciplines, such as water management/engineering, geoinformatics, hydrogeography, agricultural sciences, data science, or a similar field.

Collaboration/secondment with Natural Resources Institute Finland (Luke). Links with Luke Maaninka and other Luke agricultural field research infrastructures.

Work will be done in GIS/Aalto (Geoinformatics | Aalto University

[url=[https://www.aalto.fi/en/departments-of-built-](https://www.aalto.fi/en/departments-of-built-environment/geoinformatics)

[environment/geoinformatics](https://www.aalto.fi/en/departments-of-built-environment/geoinformatics)]<https://www.aalto.fi/en/departments-of-built-environment/geoinformatics>)

and WAT/Aalto (Water and Environmental Engineering | Aalto University

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**Contact Information**

Please reference Academickeys in your cover letter when applying for or inquiring about this job announcement.

**Contact**

Finland