

Research Program

Innovative processes for integrated rainwater management

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1 Preamble

Rainwater is becoming a very important and valuable resource due to the increasing scarcity of water. The retention of rainwater in urban areas increases the availability of water. On-site use can have positive effects on urban climate, for example, if cooling can be achieved through evaporation. Furthermore, the sewer system is relieved and mixing with domestic and commercial wastewater is avoided. In addition to groundwater recharge through local infiltration, rainwater can be used for irrigation and in households as service water. However, the hygienic quality and possible contamination with harmful substances must be taken into account during use. Precipitation is the largest untreated source of potentially high pollutant loads (organic carbon compounds, phosphorus, nitrogen, heavy metals, anthropogenic trace substances and micro plastics) and pathogens in surface waters in Germany.

Moreover, extreme weather events such as long periods of drought and heavy rainfall also affect the available water resources and their quality in Germany. Especially against the backdrop of increasing heavy rainfall events, there are new challenges in the drainage, storage and treatment of rainwater. The overload situation that occurs during heavy rainfall often leads to the discharge of sewage water into surface waters and an associated load of pollutants and germs.

With improved integrated rainwater management, a contribution is made to climate-adapted urban development, protection of water bodies and human health. The aim of this call for proposals is therefore to use new approaches to improve the quality of rainwater and thus open up further possibilities for its use.

In Baden-Württemberg the importance of this research field was recognized early on and taken up in initial research projects, as well as supported by the establishment of a "Baden-Württemberg Water Research" network. Due to its broad research landscape of academic and non-academic institutions, there is a great potential to contribute to sustainable rainwater management through innovative research projects and thus to further strengthen the national and international competitiveness of the location in this research field.

2 Aim and Subject of the Call

With this call for proposals, the Baden-Württemberg Stiftung is focusing on innovative research approaches to improve the rainwater management with particular regard to increasing extreme events. The focus is on research into 1.) technologies for the decentralized treatment of rainwater, 2.) the natural purification performance of blue-

green infrastructures, and 3.) the influence of extreme hydrological events on water quality.

Program focus 1: Innovative processes and technologies for decentralized rainwater treatment

The requirements for rainwater treatment are constantly increasing for the discharge and storage of rainwater. At the same time, increasing densification in urban areas and the associated space problems are making it more and more difficult to implement large-scale centralized treatment measures. However, there is a large number of methods for decentralized rainwater treatment. The vast majority of these decentralized treatment systems has been developed for new construction or comprehensive rehabilitation of traffic areas. Only a few of the known methods are suitable for retrofitting with decentralized treatment systems without structural interventions.

The development of small-scale and cost-effective solutions that are adapted to the changing climatic conditions (heavy rainfall/drought) is therefore of great importance. The development of various technical, biological and near-natural processes for the decentralized treatment of rainwater is therefore the focus of this program priority.

Program focus 2: Potentials of blue-green infrastructures to reduce pollution

Against the background of increasing extreme weather events (drought, heavy rainfall), the integration of blue-green water infrastructures, for example, tree trenches, swales, green roofs, will play an important role in climate-adapted urban development in order to store and reuse water locally. The implementation of blue-green water infrastructures in urban areas has so far pursued the goal of reducing surface runoff while increasing infiltration and evapotranspiration. In addition, the increased implementation of multifunctional blue-green infrastructures in urban environments offers great potentials to increase water quality.

However, the natural purification capacity of blue-green infrastructures to reduce pollutant loads has not been sufficiently researched to date. Therefore, as part of this research program, studies will be conducted on blue-green infrastructures to increase rainwater quality. Related issues such as possible pollutant accumulation with effects on the vegetation used are also to be considered.

Program focus 3: Influence of extreme hydrological events on water quality

Rainwater runoff has different degrees of pollution depending on the area of origin and the catchment area. In the inner-city area, it is mainly traffic and parking areas as well as facades and metal roofs that cause a high level of material pollution. The situation is further aggravated in the event of heavy rainfall. The overflow events that occur repeatedly lead to the entry of wastewater. The pollutants and trace substances contained therein (from domestic, commercial and other sources) as well as pathogens thus enter the surface waters directly. So far, there is insufficient knowledge about the actual discharge of substances during overflow events.

The influence of dry periods on water quality has also been little investigated. During prolonged dry periods, some streams are fed predominantly by discharges of treated wastewater, with as yet unknown effects on water quality. In addition, the drought-induced concentration of pollutants and trace substances influences water quality and water ecology. Therefore, innovative methods are to be used to investigate the discharge of substances into surface waters after extreme events and to develop strategies for prevention and reduction.

The aim of this call for proposals in all three program foci is to support excellent projects from application-oriented fields whose research results have the prospect of later transferability into practice. It is possible to work on more than one research focus in a research project. For the research projects, existing measurement series and databases, for example from the LUBW monitoring, can also be used. In the application-oriented projects, special attention is paid to the transfer from science to practice. For the active participation of potential users, it is therefore possible to involve practice partners in the form of an advisory board accompanying the project.

3 Eligibility

All universities located in Baden-Württemberg and all non-profit non-university research institutions based in Baden-Württemberg are eligible to participate.

4 Terms and Conditions

The research is conducted on behalf of Baden-Württemberg Stiftung gGmbH on the basis of a contract with the research institution (contract research). All rights to the results are reserved by Baden-Württemberg Stiftung gGmbH.

The starting point of each research project should be a particular research issue that fits the objectives of the call. In addition, the research objectives should have concrete exploitation potential that could result to an application in the medium term.

Financing will be provided for personnel and material costs, travel expenses, and – in duly justified cases – investment costs in the form of depreciation throughout the project.

Applications can be submitted by individual working groups/research institutions or by consortia of different research institutions. Required by the research issue, an interdisciplinary approach is obligatory. Applications must always specify to what extent the competences required to conduct the research project are already in place.

If several research institutions are involved, then a jointly appointed project leader must be named as a contact person for Baden-Württemberg Stiftung who will act as coordinator for the research institutions and will be responsible for the overall execution of the project.

A one-stage application procedure is envisaged. Applications must be submitted by the date specified below and will be evaluated by an independent panel of experts that will provide Baden-Württemberg Stiftung with recommendations for a decision.

The evaluation criteria are:

- Relevance of the topic with regard to the objectives of the call for proposals
- Scientific quality and level of innovation of the proposal
- Differentiation from the international state of the art
- Application relevance and economic added value for the state of Baden-Württemberg
- Quality of the work plan
- Qualification of the working group/research institution/network
- Adequacy of the budget

Projects within the scope of this call for applications can be rejected without giving reasons. There is no entitlement to funding. By submitting a project description, applicants agree to these terms and conditions.

The project duration should not exceed 3 years. The Baden-Württemberg Stiftung gGmbH provides up to 3 million euros (plus VAT) for this research programme.

5 Application Process

All applications from universities must be submitted by their rectorates. Applications from non-university research institutions must be submitted by their management.

6 Deadlines

Applications in German or English must be received by the project management organization **by 28th November 2022 12th December 2022, 4 pm** (cut-off deadline).

Applications must be submitted electronically via Project Management Jülich's Internet portal <https://bws-wasser.ptj.de/>. The PDF document „Approval of legally binding“ signed by the rectorate of the university or the management of the research institutions must be uploaded to the portal. The signature in the PDF is sufficient. The signed document must not be submitted by post or fax.

7 Scope and Content of Application

The outline of the project application is specified in the online submission tool (<https://bws-wasser.ptj.de/>) and includes the following points:

- General information (coordinator, partner, institution, title and acronym of project, legally valid signature)
- Summary: brief, generally comprehensible description of the project in German
- Objectives of the project
- Innovation and relevance of the project compared to the current state of the art
- Scientific background (own project-related preliminary work, publications and existing infrastructure)
- Patent situation
- Detailed presentation of the work plan
- Milestone Plan: verifiable Milestones every six months for each project partners involved
- Exploitation plan
- Financial plan: Breakdown of net costs, indicating VAT separately (if no VAT is specified, Baden-Württemberg Stiftung will assume costs to be gross amounts incl. VAT):
 - Personnel costs incl. person months and pay groups (financing is available for a maximum of € 77,400/a for postdocs, € 71,700/a for doctoral researchers, and € 52,800/a for technical employees – each plus VAT)
 - Itemized material costs (small instruments up to € 5,000, consumables, travel expenses)
 - Investment costs in justified exceptional cases (applicable to new investments of € 5,000 or more, depreciation period according to official depreciation table, billable depreciation only for the period of use during project)
 - Overview of total costs

- For cooperation projects, a clearly differentiated financial plan must be provided that logically presents the items and resources planned for each partner.

The requirements for applications are outlined in the guidelines (see <https://bws-wasser.ptj.de/>). The guideline contains the planned structure of the application as a template as well as the maximum number of characters for each of the above application fields in the submission tool. This ensures that an application does not exceed the maximum number of 20 pages.

8 Project Management

Baden-Württemberg Stiftung gGmbH has commissioned Project Management Jülich (PtJ) with the implementation and monitoring of the research program. Project Management Jülich is responsible for the organizational aspects of the program and is the key contact for all applicants.

Contact details for PtJ:

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