



Funding Application: Sustainable Student Future Projects (DINI)

Project Title: GUMNO – The Campus Sponge Community Garden: Bridging
Research and Student Action for Climate Resilience

Applicant: EcoNET (Student Environmental Action Club, Brandenburg University
of Technology Cottbus-Senftenberg)

Funding Amount Requested: €5,000

1. Project Abstract

The "GUMNO" Community Garden is a newly approved student-led initiative at the Brandenburg University of Technology (BTU) Cottbus-Senftenberg. Spearheaded by EcoNET, this project aims to transform a blank university plot into a living laboratory for climate adaptation. By integrating innovative Sponge City concepts and Nature-based Solutions (NbS), GUMNO will directly address the regional crises of extreme heat and drought while actively engaging BTU's highly international student body. Grounded in regional climate research conducted at BTU (the IAWAK-EE project), GUMNO will serve as a green infrastructure blueprint, an educational hub, and an international community space for the university.

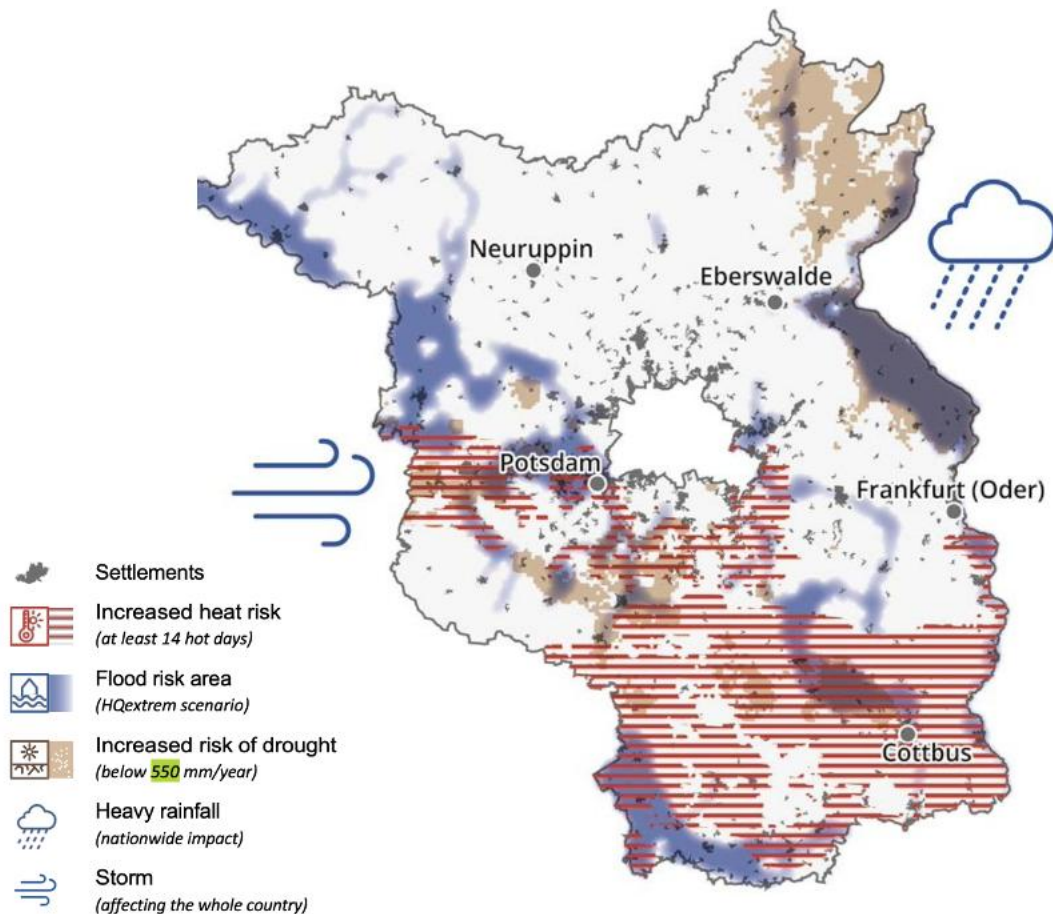
2. Problem Statement & Regional Context

The state of Brandenburg is a recognized nationwide hotspot for climate vulnerability in Germany. Over recent decades, the region has experienced an accelerated rise in mean annual temperatures (up by 1.5 since 1881), severe summer droughts, and drastically declining groundwater levels. These macro-climatic shifts manifest locally on campus as a pronounced Urban Heat Island (UHI) effect, where sealed surfaces and lack of managed vegetation restrict natural cooling through evapotranspiration.

Furthermore, Brandenburg faces a unique hydrological crisis due to the regional discontinuation of groundwater pumping from lignite mining, threatening local water budgets. At the same time, the risk of

catastrophic flash floods from sudden heavy rain events has intensified. To bridge the "implementation gap" between theoretical climate adaptation strategies and practical execution, universities must model accessible, scalable nature-based solutions.

Fig. 1: Impacts of Climate Change on Heat and Precipitation in the state of Brandenburg, based on average values for the reference period 1991 to 2020



Source: Ministerium für Landwirtschaft, Umwelt und Klimaschutz (MLUK) Brandenburg. (2024). *Arbeitshilfe Resilient im Klimawandel* (Fig. 3). Land Brandenburg.

3. Project Concept: The "GUMNO" Sponge Garden

"GUMNO" represents a fresh start. Having recently secured a utilization contract from the university for a new campus plot, EcoNET has the unique opportunity to build a community garden completely from scratch using water-smart, climate-resilient designs. Rather than relying on traditional, resource-intensive gardening, GUMNO will pioneer Sponge City mechanics on campus to maximize rainwater retention, localized cooling, and biodiversity.

What "GUMNO" Means for Community

At the core of this initiative is its name, "GUMNO," a traditional Sorbian word that historically refers to a communal threshing floor or a shared village meeting space. By rooting the project in the indigenous Sorbian heritage of the Lusatia region, the garden honors local history while reinterpreting it for a modern, globalized campus. This linguistic and cultural foundation acts as a powerful bridge which brings together international students who are eager to connect with the authentic heritage of their new region and local German students who share a pride in regional traditions. By transforming this historic concept into a shared ecological endeavor, GUMNO creates a welcoming, inclusive environment where diverse backgrounds merge to build a climate-resilient space for everyone.

Connecting GUMNO and Institutional Research

The project directly aligns with the technical references of the BTU-led IAWAK-EE project (*Information-supported anticipatory water balance-based adaptation to climate change - Elbe Elster*), translating regional macro-research into a tangible, student-scale campus initiative. While the overarching IAWAK-EE framework focuses on large-scale landscapes and regional water scarcity in drought hotspot areas like Brandenburg, GUMNO acts as a hyper-local living laboratory. It applies the same scientific principles by retaining water longer in the local soil matrix to fuel plant evapotranspiration and lower land surface temperatures directly within the university settlement fabric.

More information on the IAWAK-EE Research Project at BTU can be found at <https://www.iawak-ee.de/>.

Applying the Adaptation Blueprint to Campus

By adapting measures from the IAWAK-EE catalogue for settlement areas and agricultural transitions, the campus plot will be transformed using two primary research-backed strategies. First, to achieve drought mitigation through enhanced soil metrics, GUMNO will mirror IAWAK principles of organic soil amendment by utilizing high-humus compost and biochar substrate mixtures in its hugelkultur beds. This directly alters the pore size distribution of sandy campus soils, increasing soil moisture capacity to allow the garden to store up to five times its weight in water, which minimizes the need for external irrigation and protects the plot against severe summer droughts. Second, to provide heat relief via structured evapotranspiration blocks, the design draws inspiration from IAWAK's landscape structuring and settlement shading blueprints. The garden will integrate multi-layered native woody plants and shrubs into its built structures to form a dense vegetation profile that slows down local airflow and keeps transpired water vapor close to the ground, maximizing microclimatic cooling and lowering local ambient air temperatures.

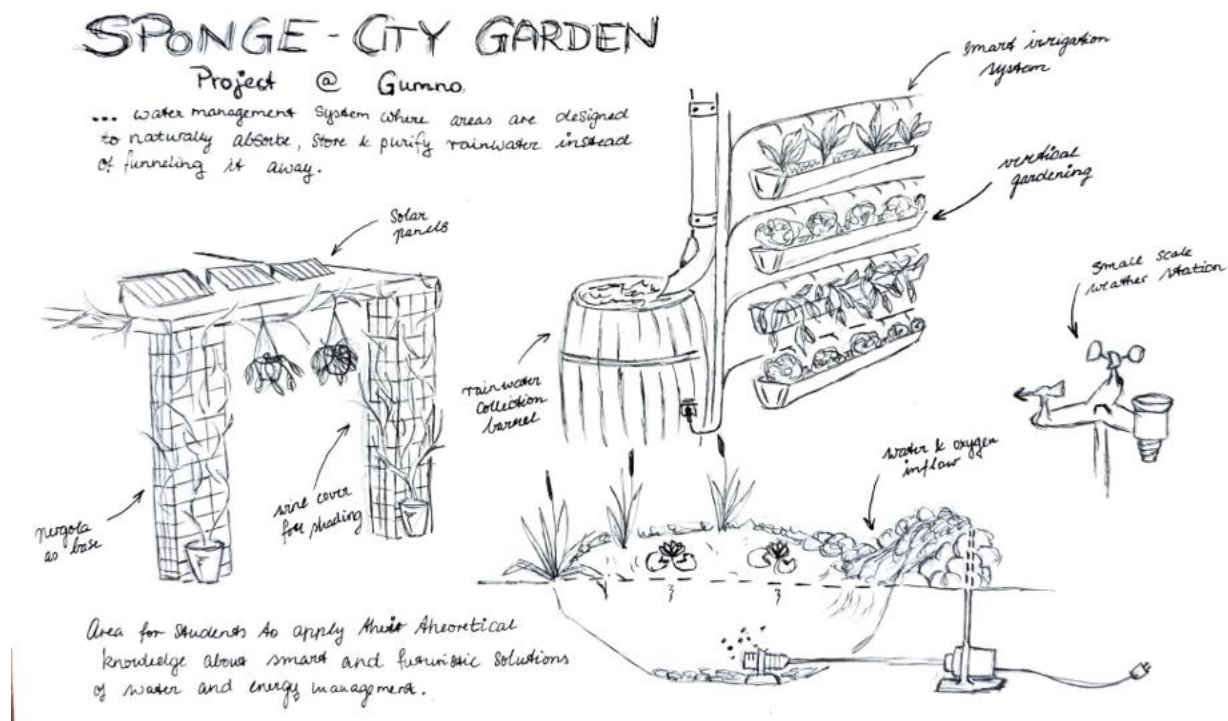


Fig. 2: A conceptual sketch of the sponge city concepts for GUMNO community garden by a member of BTU EcoNET

Climate Resilient Space and Campus Life

As summer heatwaves and severe drought periods become more frequent in eastern Germany, university campuses face intensifying urban heat island effects. For students, GUMNO provides a vital microclimatic refuge. By utilizing the cooling capacity of evaporated water and dense plant shading, GUMNO builds up a lower temperature gradient above the ground. This creates a significantly cooler outdoor study and community meeting space, directly benefiting student health, mental well-being, and academic focus during peak summer semesters.

Interdisciplinary Collaboration

Unlike traditional, closed-off research plots, GUMNO is built upon a co-creation framework that fosters community through multiple levels of engagement. This inclusive approach is driven by EcoNET, a club open to all students across the entire university, moving far beyond the boundaries of Environmental and Resource Management. The garden serves as a vibrant, interdisciplinary collaborative ground where students from power engineering, world heritage, architecture, environmental sciences, and the social sciences work side-by-side. Every phase of the project, from the initial architectural design and engineering of the sponge mechanics to the final hands-on implementation, represents a melting pot of diverse academic backgrounds. This collaborative synergy fosters genuine community ownership, as the physical acts of gardening create a shared sense of environmental stewardship and collective action. Ultimately, by combining structured shade, native greenery, and climate-resilient seating areas, it

naturally functions as an inclusive social hub for workshops, student meetups, and open-air campus culture.

Contribution to Ongoing Research

GUMNO functions as a critical validation site for the university's ongoing climate research by bridging the gap between theory and application. The site acts as a platform for empirical data gathering, as it can be equipped with low-cost micro-sensors to track real-time soil moisture retention, infiltration rates, and localized ambient temperature drops, providing valuable data to validate IAWAK-EE's macro-scale predictive algorithms. Furthermore, it serves as a blueprint for urban scaling, aligning with Brandenburg's climate adaptation strategy to integrate sponge city adaptation measures by 2030. By testing how specific combinations of native plants, organic fertilizers, and sponge architecture perform in a high-traffic settlement area, GUMNO provides a scalable model that municipalities can readily copy for public parks, schools, and urban residential areas facing similar arid climate regimes.

4. Planned Projects and Funding Requirements

The requested €5,000 in funding will be used to purchase raw materials and equipment for the implementation of the following interconnected climate-adaptation measures:

- **Rainwater Collection & Smart Irrigation:** Installation of localized cisterns and storage tanks connected to smart, gravity-fed solar irrigation systems. This addresses water scarcity during low-rainfall periods and replaces the use of drinking water for campus greenery.
- **Pergolas for Structural Shading:** Construction of wooden pergolas wrapped in climbing vines (green facades). This creates passive vertical cooling, mitigates localized heat stress, and provides a comfortable outdoor seminar space for students.
- **Rain Gardens and Shallow Retention Ponds:** Creation of shallow, temporary ground-level infiltration zones to catch surface runoff during extreme rain events, encouraging natural groundwater recharge instead of overloading municipal drainage.
- **Hügelkultur Beds:** Implementation of layered woody debris and compost beds that naturally retain deep subsoil moisture, dramatically reducing irrigation needs during summer droughts.
- **Mini Microclimate Weather Station:** Installation of an open-source, digital sensor station to track real-time soil moisture, humidity, and temperature variations, generating open data for student research and climate tracking.

Category / Installation	Description & Material Specifications	Estimated Cost
Water Harvesting & Smart Irrigation	2x 1000L IBC food-grade rainwater tanks, UV-resistant jackets, gravity-fed drip irrigation lines, solar-powered automated timers, and heavy-duty connector valves.	€1,200
Modular Pergolas & Shading	Demountable timber framework (treated larch wood), ground anchors (screw-in, non-concrete), climbing vines (e.g., wild grape, hops) for vertical vegetation and shade.	€1,200
Hügelkultur & Mobile Raised Beds	Certified local organic soil, compost, wood chips, and raw lumber for structural framing of the modular, relocatable raised beds.	€700
Rain Garden & Infiltration	Unlined filtration zones for shallow temporary retention zones, geotextile fabric, native gravel/sand aggregates, and drought-tolerant/flood-resilient perennial plants.	€650
Biodiversity & Ecosystem Supports	Raw materials for a large, student-built insect hotel; 3x specialized bat boxes; 4x local bird nesting boxes; and a native wildflower seed mix.	€450
Microclimate Sensors & Solar	1x 50W off-grid monocrystalline solar panel, 12V deep-cycle battery, weatherproof housing, and open-source Arduino/Raspberry Pi digital soil moisture and temperature sensors.	€400
Workshop Tools & Safety Gear	Hand tools (shovels, saws, drills), eco-friendly wood stains, and essential safety equipment (gloves, protective eyewear) for student volunteers.	€400
Total Requested Funding		€5,000

The budget is based on a student-led implementation model and volunteer work, requiring little to no labor costs. Low cost materials will be used for all aspects of the garden and will also significantly reduce the costs. The team also plans to request in-house support from the university wherever necessary for further maintenance of the garden in the future.

In the case partial funding is awarded, EcoNET would prioritize cost-effective installations which implement the key necessities of sponge city systems: rainwater collection, retention, and infiltration. These concepts are supported by the installation of rainwater harvesting infrastructure, vertical gardening

and structured shading via pergola, hugelkultur beds which prioritize water retention, and a shallow, temporary pond for water infiltration. Additionally, the purchase of tools and safety equipment is integral to the implementation of any and all projects. Below is a partial funding table outlining key installations:

Prioritized Installation	Sponge City Mechanism & Premium Material Selection	Partial Cost
Rainwater Harvesting Infrastructure	1x Premium 1000L IBC collection tank with a heavy-duty UV protective jacket, high-flow downspout diverters, and commercial-grade gravity drip lines.	€700
Vertical Gardening & Pergola	Full structural larch-wood pergola layout, heavy-duty screw anchors (non-permanent), and mature, fast-climbing perennial vines for immediate vertical shading.	€1,200
Hugelkultur Beds	Bulk purchase of professional-grade organic topsoil, nutrient-rich compost, clean wood chips, and timber framing to build high-capacity water retention beds.	€550
Shallow, Temporary Retention Pond	Unlined filtration zones for shallow temporary retention zones, geotextile fabric, native gravel/sand aggregates, and drought-tolerant/flood-resilient perennial plants.	€650
Construction Tools & Safety Gear	Heavy-duty shared construction equipment (power drills, post-hole diggers, wheelbarrows, saws, and shovels) plus comprehensive personal protective equipment for volunteers.	€400
Minimum Project Total		€3,500

5. Implementation Timeline (July – October 2026)

The project will execute rapidly over the upcoming months to leverage the summer season and the return of students for the winter semester:

- July 2026: Design Finalization & Procurement
 - Review layout plan and technology blueprints with EcoNET and university academic advisors.
 - Order all modular building materials, water tanks, and sensor kits.
- August 2026: Earthworks & Assembly (Phase I)
 - Excavate the shallow rain garden/retention area.
 - Assemble the modular wooden pergolas, hugelkultur bases, and raised beds.
 - Install the rainwater collection tanks and solar panels.
- September 2026: Planting & Technological Integration (Phase II)
 - Plant native perennials, vertical climbers, and biodiversity flora.
 - Deploy the automated drip irrigation lines and calibrate the digital microclimate sensors.
 - Mount the bird, bat, and insect habitats.
- October 2026: Community Launch, Workshops & Monitoring
 - Host the official opening ceremony coinciding with the start of the winter semester.
 - Run peer-to-peer workshops on urban water stewardship.
 - Begin automated data collection and monitoring of soil moisture and localized UHI mitigation.

The GUMNO Community Garden will be maintained by EcoNET through a structured volunteer-maintained schedule and weekly gardening sessions. For the inspection of technical components monthly or bi-monthly sessions will be held. Small consumable parts such as filters, seals and valves will be replaced as required by the volunteer contributions. The EcoNET group will also maintain a digital record (e.g. spreadsheet) of the expenses for equipment and maintenance.

6. Student Involvement, Inclusivity & Education

EcoNET is uniquely positioned to drive this project. As a student environmental action club composed largely of international students from the Environmental and Resource Management (ERM) program, alongside German peers from power engineering, architecture, and urban design, we bring an interdisciplinary, global perspective to campus sustainability.

GUMNO will actively shape the university community through a three-tiered engagement strategy:

- Hands-on Construction Co-creation: Students will physically build the rain gardens, pergolas, and hugelkultur beds, breaking down psychological barriers regarding the complexity of climate adaptation.
- Curriculum Integration: The garden will serve as a practical excursion site and data source for modules in environmental sciences, urban planning, and ecology.
- Community Workshops & Excursions: EcoNET will host regular hands-on workshops, peer-to-peer training on water-saving behaviors, and climate adaptation excursions.



Photo: Members of BTU EcoNET enjoying a cherry harvest in the open gardening club at the Cottbus Pädagogische Zentrum für Natur und Umwelt

7. Expert Networking & Partnerships

To ensure long-term ecological success and professional execution, EcoNET is firmly networked with prominent environmental organizations, university faculty, and research initiatives. We are actively partnered with:

- NABU, NAJU, and BUND: Providing access to local conservation experts, biological surveying tools, and professional guidance on regional biodiversity and native plant selection.
- The IAWAK-EE Research Project (BTU), led by Prof. Dr. Astrid Sturm and Dr. Nonka Markova-Nenova: Ensuring our garden measures perfectly mirror the optimized water-retention and evapotranspiration models developed by university scientists for our unique position in the high climate risk region of the Elbe-Elster (Southern Brandenburg).
- Prof. Dr. Michael Beckmann, Chair of Environmental Planning and Director of Environmental Resource Management Masters Program - BTU: Academic advisor to EcoNET.
- Prof. Dr. Louise Rütting, Chair of Plant and Soil Sciences, BTU: academic advisor to GUMNO Community Garden.

- Prof. Dr. Claus Birkhofer, Chair of Ecology, BTU: Faculty partner in Biodiversity to GUMNO Community garden.

8. Site Regulatory Compliance & Contract

The usage rights for the designated campus plot are fully covered under our existing framework agreement with the StuRa (Studentischer Rat) of BTU Cottbus-Senftenberg.

In strict adherence to the clauses of this agreement, no permanent concrete foundations will be poured, and no deep-rooting trees will be planted. By intentionally selecting modular, surface-anchored pergolas, portable raised beds, and shallow, unlined infiltration zones, the entire garden remains fully removable and non-destructive to campus infrastructure. This ensures zero conflict with university facility management while pioneering adaptable green design.

Additionally, the contracted space also includes access to the Post Office building (left, see image below), where students can access running water and sanitary facilities. There is also access to a storage room, where tools and safety equipment can be stored, ensuring that investments in materials are not subject to risk of damage or theft. The post office building has rain gutters pre-installed, making rainwater collection cistern installation next to the allocated GUMNO site feasible and low-cost.

The GUMNO site contract is included as a separate document to this application.



Fig. 3: Preliminary layout plan for major installations at the new GUMNO contracted site illustrated over aerial imaging of the plot.

9. Transferability to Other Universities

The systemic value of GUMNO extends far beyond the borders of the Cottbus campus, positioning it as a highly replicable, open-source macro-blueprint for higher education institutions grappling with socio-ecological transformation. By intentionally designing the spatial layout to bypass permanent concrete foundations and deep-rooting vegetation, the project successfully establishes a modular green infrastructure framework. This non-destructive design ethos directly resolves the restrictive facility management regulations and legal gridlocks that typically stall student-led ecological initiatives on urban or leased university properties. Consequently, this model can be easily adapted to institutions with highly asphalted campus footprints or rigid administrative constraints.

To actively drive this horizontal knowledge transfer, EcoNET will synthesize its operational insights into a comprehensive "Sponge Campus" digital toolkit. Rather than offering generic environmental advice, this open-access practitioner's guide will provide peer institutions with technical schematics, bill-of-materials breakdowns, and a strategic roadmap for navigating regulatory compliance within German university structures. By converting localized experience into a structured, open-source methodology, GUMNO ensures that any university campus can transform from a climate-vulnerable settlement area into an active participant in regional climate adaptation.

10. Conclusion

By supporting the development of the GUMNO Sponge Community Garden, the DINI initiative invests in far more than a localized green space; it funds a highly visible, interactive catalyst for institutional climate resilience and social cohesion. GUMNO achieves a rare synthesis by anchoring cutting-edge nature-based solutions within the regional Sorbian cultural heritage of Lusatia, simultaneously addressing the physical realities of the regional climate crisis and the human need for inclusion.

The project successfully bridges the implementation gap between the university's high-level macro-research—specifically the IAWAK-EE framework—and the daily, experiential reality of a deeply diverse, international student body. By mobilizing a vibrant, interdisciplinary coalition spanning power engineering, architecture, world heritage, urban planning, and environmental sciences, GUMNO effectively transforms abstract, paralyzing climate anxiety into empirical, collective action. A financial commitment of €5,000 from DINI provides the essential material foundation required to launch this living laboratory, ultimately empowering a globally conscious generation of student stakeholders to prove that higher education institutions can actively cool their environments while warming and unifying their communities.

To Show our passion for the project, we compiled this short video which demonstrates the use of the space and conveys our vision for a sustainable project on our campus.

https://drive.google.com/file/d/1ENm-0K8Y1BE_m_GP83g0mhSUdtrOLNSL/view?usp=drive_link