Part C

WATER JOINT PROGRAMMING INITIATIVE

WATER CHALLENGES FOR A CHANGING WORLD

2018 JOINT CALL
Closing the Water Cycle Gap

"Evidence based assessment of NWRM for sustainable water management"

"EviBAN"

Table of contents

List of abbreviations

NBS	Nature-Based Solutions
ESS	Ecosystem Services
NWRM	Natural Water Retention Measures
MAR	Managed Aquifer Recharge
SAT	Soil Aquifer Treatment
SES	Social-Ecological System
ICT	Information & Communication Technology
ISA	Integrated Sustainability Assessment
SDG	Sustainable Development Goals
CS	Case Study
WP	Work Package
AR	Artificial Aquifer Recharge
PSC	Project Steering Committee
PMT	Project Management Team

1. EXCELLENCE

1.1. Introduction

In many regions of Europe, it is becoming difficult to reconcile water supply and demand in terms of both quantity and quality. In the southern and drier regions, extensive use of ground and surface resources causes strong environmental impacts, while the use of alternative sources such as desalination and reuse are limited by their cost. This challenge is also found outside Europe in water scarce regions, *e.g.* in South Africa. In other, especially northern, regions of Europe, surface water is more accessible in terms of quantity, but challenges there are related to protecting water quality from point source and/or diffuse discharges, as well as to managing stormwater in urban areas.

With nature-based solutions (NBS), the same solution can in principle be used to achieve multiple management objectives. Their use and sustainability must therefore be evaluated in a holistic manner, taking both primary function (benefits) and wider impacts (co-benefits) into account. Some of the potential benefits are an improvement in the status of the water bodies and lower economic cost for water users. However, lack of knowledge and awareness – especially about wider costs and benefits at different scales, the conditions under which NBS perform best, and how they are best combined with other measures – hinder innovation uptake. To increase implementation of NBS, synergies with other management goals should be included in the evaluation of NBS versus conventional solutions. There is therefore a need for new knowledge to better understand the ecosystem services (ESS) provided and the potential of NBS in sustainable water resources management in complex situations of water demand and supply.

EviBAN will develop new knowledge on how natural water retention measures (NWRM), including managed aquifer recharge (MAR) and engineered grey-green solutions for stormwater management – that primarily manage water quantity – and other NBS such as soil aquifer treatment (SAT) and stormwater filters – that also treat water to improve quality – can optimally be used to achieve multiple management objectives. In this proposal, the term NBS refers to the aforementioned management measures, although a broader definition of NBS can also cover other solutions. The results from EviBAN will be integrated in a toolbox for adaptive water management that will contain performance modelling tools for specific NBS and tools to provide a wider assessment of benefits and co-benefits using a social-ecological system (SES) perspective[1].

1.2. State-of-the-art and relation to the work programme

NBS can play a key role in mitigating impacts of and/or adapting to the challenges listed in section 1.1 by increasing the fresh water availability in a sustainable manner, mitigating pollution of water resources and providing resilient measures for managing stormwater. There are, however, common knowledge gaps that need to be addressed.

There is a need to link hydrologic modelling of NWRM with meteorological input from regional climate models to optimise stormwater management under changing climatic conditions, and to improve the basis for optimised use of infiltration to augment ground water resources. Climate models are advancing, with simulated rainfall at increasingly finer resolution, and their results should now be extended for planning, design and assessment of NWRM. Improved scenarios of regional precipitation and air temperature facilitate understanding of and adaptation to future climate change impacts on the water cycle[2], and gives opportunity for detailed examination of local and regional scale impacts of climate and land-use changes on quantity and quality of water resources.

MAR for water reuse applications has been rapidly growing during the last decade[3] to face the deterioration of groundwater quality and the decreasing groundwater quantity[4]. Non-conventional water sources for MAR have potential, but pre-treatment is necessary to remove critical contaminants (pathogens, ammonia, trace metals etc.) to ensure the long-term system performance and to meet regulatory demands. SAT uses the physical and biogeochemical properties of the vadose zone and aquifer for water quality improvement and can provide tertiary

[1] Ostrom, E. 2009. A general framework for analysing sustainability of social-ecological systems. Science 325:419-422. http://dx.doi.org/10.1126/science.1172133

[2] Larson, M.A.D., Christensen, J.H., Drews, M., Butts, M.B. & Refsgaard, J.C. 2016. Local control on precipitation in a fully coupled climate-hydrology model. Scientific Reports 6:22977 doi: 10.1038/srep22927

[3] Lazarova et al. (2011) Water quality management of aquifer recharge using advanced tools Water Science & Technology 64.5.

[4] Kazner, C., Wintgens, T. & Dillon, P. (Eds.). (2012). RECLAIM WATER - Advances in Water Reclamation Technologies for Safe Managed Aquifer Recharge. London UK: IWA Publishing. ISBN 9781843393443

treatment for secondary effluent[5]. SAT is a treatment system with low operating cost and stable performance[6]. Inorganic pollutants such as heavy metals and hazardous ions can be removed, as well as organics and pathogens[7].

To maximise co-benefits, NBS should be evaluated in a holistic perspective with knowledge about the interaction between ecological and social processes, including population dynamics, lifestyle/living standard development, and governance. Recently, the European Knowledge and Learning Mechanism on Biodiversity and Ecosystem Services (EKLIPSE) published a state-of-the-art impact summary to support planning and evaluation of NBS dealing with challenges related to climate change, including water scarcity and quality in addition to flood protection. Building on mapping and assessment of ecosystems and their services[8], the framework reflects the potential of NBS for co-production of ESS across climate, ecosystems, and socio-economic and socio-cultural systems. It recognises that impacts of NBS on the environment vary across geographic and temporal scales. A framework for strategic assessment and implementation of co-benefits of NBS in urban areas was later developed in GREEN SURGE[9].

EviBAN will extend current knowledge by examining impacts of climate change under extreme rainfall events, where ambient air temperature is near the freezing point, and where warming is expected to have significant impact on winter snow conditions. This will provide critical parameters for improved design of NWRM for stormwater management, and will build on StormFilter[10], which investigated reactive filter media for co-management of quantity and quality of stormwater runoff. Further, EviBAN will extend current knowledge on optimising the use of MAR techniques with different water sources in complex situations of water demand and supply, including aspects related to seasonality in water availability, and cost of extraction and treatment to achieve water quality standards.

EviBAN will apply a SES perspective with a focus at the tactical level, shedding light on how selected NBS are assessed by relevant stakeholders, how this affects their implementation and acceptability, and how this in turn influences the evaluation of NBS impacts in selected case studies. Optimising supply and demand may also be viewed as balancing a SES – provision, use and valuation of ESS. In DESSIN[11], an ESS evaluation framework with a sustainability assessment module was developed[12]. EviBAN will also build on AquaNES[13], with automated monitoring of SAT/MAR; and SUWAM, with sustainability assessment of alternatives in water management[14].

EviBAN will promote adaptive water management for global change (theme 1.1) by developing a toolbox to evaluate implementation of NBS in various conditions regarding climate change, anthropogenic activities and societal change. A tool for initial assessment of the social ecological context and scope for NBS in specific cases will be developed. EviBAN will address stormwater management with NWRM in case studies with test sites for grey-green engineered solutions and flood protection alternatives, and by further developing an existing stormwater management tool. EviBAN will address management of runoff and treated wastewater by infiltration of peak stormwater flows in water scarce areas to augment groundwater sources and by SAT/MAR of secondary wastewater treatment effluent, including application, dissemination and optimisation of a SAT/MAR ICT (Information & Communication Technology) tool to extend MAR practices and management to a larger scale. An optimization tool for complex situations of water demand and supply will be developed to enable determination of the best solution for multiple management objectives. To evaluate the sustainability of alternatives for NBS in a holistic manner, an integrated

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[5] Amy G. and Drewes J. (2007). Soil aquifer treatment (SAT) as a natural and sustainable wastewater reclamation/reuse technology: Fate of wastewater effluent organic matter (EfOM) and trace organic compounds. Environ Monit Assess, 129, 19–26.

[6] Kai He, Shinya Echigo, Sadahiko Itoh (2016) Effect of operating conditions in soil aquifer treatme0nt on the removals of pharmaceuticals and personal care products. Science of Total Environment. 565, 672-681.

[7] Reemtsma, T., Miehe, U., Duennbier, U., Jekel, M. (2010). Polar pollutants in municipal wastewater and the water cycle: occurrence and removal of benzotriazoles. Water Res. 44 (2), 596-604.

[8] Maes, J., Teller, A., Erhard, M., Liquete, C., Braat, L., Berry, P., Egoh, B., 2013. Mapping and assessment of ecosystems and their services: An analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020. doi:10.2779/12398.

[9] Raymond, CM et al 2017. A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. Environmental Science and Policy, 77:15-24.

[10] http://www.vtt.fi/sites/stormfilter

[11] https://dessin-project.eu/?p=2390

[12] Anzaldua et al., 2018. Getting into the water with the Ecosystem Services Approach: The DESSIN ESS evaluation framework

[13] AquaNES project (H2020 research and innovation programme under grant agreement n° 689450)

[14] Helness, H., Damman, S., de Clercq, W.P., and Elema, N.M. (2017). A Framework for Integrated Sustainability Assessment of Water Cycle Services. European Journal of Sustainable Development, Volume 6, Issue 4.

sustainability assessment (ISA) tool will be developed. The ISA will condense the results from the other tools and optimal use of NBS will be linked to the United Nations (UN) sustainable development goals (SDGs)[15]. Integrative management by implementing NWRM such as MAR (theme 1.2) and mitigating water stress in coastal zones (theme 1.3) will be addressed in the case studies with infiltration of stormwater to augment ground water resources and SAT/MAR of wastewater treatment plant effluent. Reuse of water (theme 2.2) is addressed by the developed decision support tools, which can also evaluate the inclusion of non-conventional water sources such as regenerated water.

1.3. Objectives and overview of the proposal

The main objective of EviBAN is to increase the knowledge on how NBS can be used for management of water resources to counter negative impacts of climate change, anthropogenic activities and societal change, and how NBS should be optimally used under different conditions to contribute to progress towards SDGs. Through integrating results from diverse case studies in South Africa, France, Finland and Norway, EviBAN will develop a toolbox for adaptive water management suited for different conditions with respect to climate change, anthropogenic activities and societal change in Europe and beyond. This will be achieved by:

1) Developing a governance assessment tool for initial mapping of the social ecological context and scope for NBS in specific cases. This effort will provide knowledge on key stakeholder perspectives and pre-existing knowledge of the applicability of NBS in different regional and local contexts, including assessment of drivers and barriers to implementation and/or upscaling in the studied cases.
2) Developing a stormwater management tool incorporating reactive hydrogeochemical transport for a typical NWRM under different climate change scenarios. This effort contributes to the downscaling of climate model results to NWRM and similar systems, to assess their sensitivity to climate factors and to determine how model parameters can be optimised to assist with the design and maintenance of NWRM and similar NBS.
3) Implementing a SAT/MAR ICT tool for better long-term management of water discharge of WWTP in a sensitive coastal area to extend SAT/MAR, practices and management to a larger scale. Hydrogeological, hydrogeochemical and modelling expertise will be provided at meetings and trainings with local stakeholders.
4) Developing an optimisation tool for evaluation of implementation of NBS in complex situations of water demand and supply. The tool will consider seasonality in water availability, quality, and cost of extraction and treatment. Calibration and subsequent validation will be based on case studies in EviBAN.
5) Developing an ISA tool for NBS to identify sustainable management options based on performance and optimisation according to selected sustainability criteria for evaluation of measures with respect to ESS and SDGs under a range of climate, anthropogenic activity, ecosystem and societal conditions.

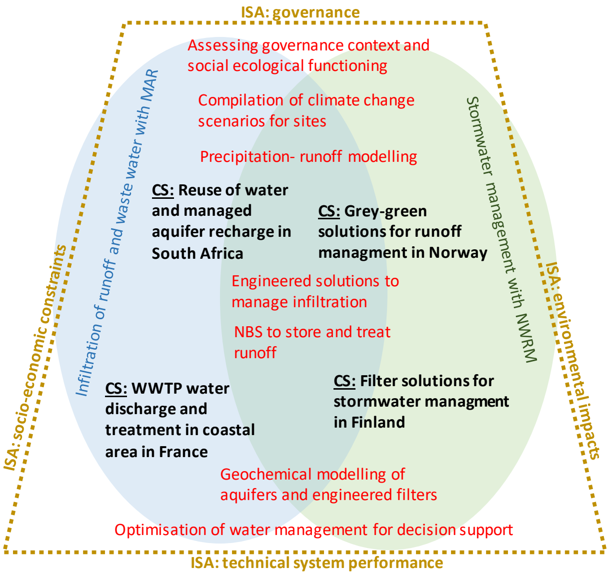

Figure 1. Overview of case study (CS) approach.

To achieve these objectives, EviBAN will apply a case study (CS) approach (Figure 1). The case studies' main focuses are on infiltration of runoff and treated wastewater with MAR or on urban stormwater management by NWRM. The CS are distinct (see section 1.4) but have links through common external pressures (*e.g.* climate change, constraints by natural water cycle, water demand), shared tools (*e.g.*, models such as SWMM, MARTHE, PHREEQC), and shared NBS, such as enhanced infiltration techniques required in MAR and pursued by NWRM.

Assessing the scope for implementation of NBS requires systematic knowledge of the governance context and perceived social and ecological functioning of the system in question. Identification of optimal solutions requires the ability to consider multiple water sources and technical measures, whether the case is on infiltration or stormwater. While the response to be optimised and input will be unique in each case, the optimisation procedure will be common. To ensure progress towards SDGs, the use of NBS needs to

[15] https://sustainabledevelopment.un.org/sdgs

be assessed in an ISA where results concerning technical system performance, environmental impacts, governance, and socio-economic aspects across the case studies are combined in a holistic assessment. In EviBAN, stakeholders will be involved in co-design of the water management tools and solutions for the 4 demo-sites. The results will be operationalised in a toolbox with the shared models, the optimisation tool and the framework for ISA, and be available on the project website after the project. The toolbox and project activities are illustrated in Figure 2.

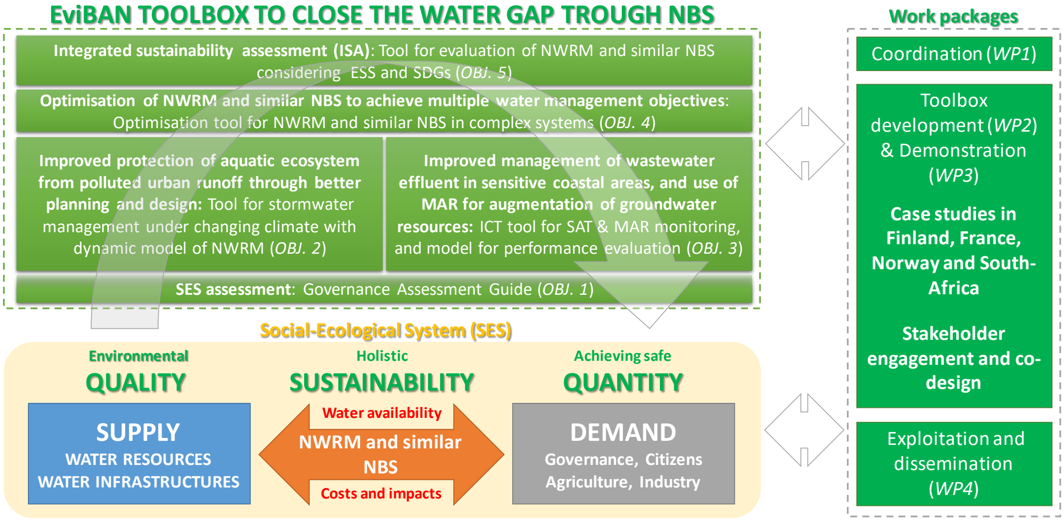

Figure 2. Overview of the toolbox and work packages (WPs).

1.4. Research methodology and approach

The activities will be organised in work packages (WPs) for: Coordination (WP1); Toolbox development (WP2); Demonstration (WP3); and Exploitation and dissemination (WP4) as outlined in Figure 2 above. Execution of the activities will be the responsibility of the principal investigators from the collaborating partners: BRGM, ImaGeau, and Géo-Hyd (FR); Stellenbosch University (SA); VTT and AALTO (FIN); and SINTEF (NO). While SINTEF will be the coordinator of the project, work in the WPs will be a joint and integrated effort utilising the complementary competences of the partners. The case study stakeholders will be important dialogue partners and provide access to important data and sites for fieldwork. The case studies are described below.

Agon in Normandy, France: **Description:** Tertiary treatment of secondary WWTP effluent (33 500 inh. eq./ BOD5= 2120 kg /day) by reed bed and a sand dune filter. The MAR/SAT system has been chosen to protect the sensitive shellfish production zone on the surrounding estuary. Since 2016, the ImaGeau Subsurface Monitoring System is implemented for real time monitoring of saline intrusion. Water quality and quantity are analysed to develop an ICT tool (BRGM/Géo-Hyd) to assess efficiency of SAT in context of saline intrusion. **Stakeholders** are SAUR (WWTP management for local authorities), Seine Normandy Water Agency (Public Institution with mission is to support water resources protection), ARS (Regional Agency of Health), SMEL and Agon Municipality.
Hessequa Municipal area in the Western Cape, South Africa: **Description:** Water stressed areas relying partly on groundwater for water supply. Pressures on water resources due to drought. Artificial aquifer recharge (AR) in the Goukou River, using flushed water during high rain periods, is a potential water resource. Potential impacts of the AR-process on biodiversity and estuarine health will be a key parameter in the plausibility of using AR. Optimisation of best combination of water sources and NWRM to use. Optimisation tool to be customised for use by local municipal officials. **Stakeholders** are Hessequa Municipality, Cape Nature, National and Provincial departments for water and environment.
KLIMA 2050 - Høvringen, Vikaune Fabrikker - Sveberg and Storm Aqua – Sandnes, Norway: **Description:** Eco-engineered grey-green solutions for rooftops and engineered pervious surface materials for runoff management with respect to quality and quantity. *Høvringen* consists of 3 large-scale test fields, whereas *Sveberg* consists of 4 large-scale test fields, hence both sites enable parallel testing of different measures. The sites are in mid Norway. In *Sandnes* (southern Norway), there are two full-scale installations. One site focuses on infiltration and the other on treatment. All sites are instrumented to measure the water balance and climatic conditions. **Stakeholders** are Storm Aqua and Vikaune Fabrikker (suppliers of grey-green solutions).

Stormwater NBS test sites in Espoo and Vantaa, Finland:
Description: Biofilters and similar NBS to capture and treat stormwater runoff from roads prior to infiltration or discharge to receiving surface waterbodies. Site monitoring and acquisition of data for hydrologic, hydraulic and geochemical performance assessment. Consecutively linked hydrological and hydrogeochemical transport modelling of NBS performance and impact during heavy rainfall/snowmelt events in cold conditions. **Stakeholders** are regional and local authorities, local community, landscape designers, suppliers.

1.5. Originality and innovative aspects of the research (ambition)

Empirical data from meteorological measurements and intensive monitoring of stormwater NBS will enable validation of sequentially linked numerical hydrologic-hydrogeochemical stormwater models, which will yield new information about the implementation of NWRM or similar NBS, and quantity and quality of stormwater infiltrated to groundwater or discharged. Application of the optimization tool on AR of peak stormwater flows in water scarce areas to augment groundwater sources will enable new applications of MAR techniques, in complex situations of water demand and supply. The ICT system will facilitate communication with decision makers and a larger public to overcome acceptance barriers. The governance assessment tool will operationalise the SES concept for assessment of barriers, drivers and scope for NBS in a new way. The ISA will integrate different perspectives used for evaluating NBS and give an operationalised assessment of progress towards SDGs that is lacking today.

1.6. Clarity and quality of transfer of knowledge for the development of the consortium partners in light of the proposal objectives

Development of the toolbox requires a multidisciplinary approach where the current expertise of the consortium partners will contribute to shared tasks. Through the case study approach with linking of topics and use of common tools between case studies, all partners will gain new knowledge during the collaboration to develop and demonstrate the toolbox in WP2 and WP3. Since not all partners will be involved in all tasks, the consortium partners will meet in annual workshops to share and discuss results. EviBAN will build on several past studies performed by partners in the consortium, *e.g.* DESSIN, SUWAM, AquaNES and StormFilter as referred to in section 1.2.

1.7. Quality of the consortium partners and collaborative arrangements. Capacity of the consortium to reinforce a position of leadership in the proposed research field

The consortium partners are leading research institutions or universities in their regions, or private enterprises supplying state of the art technologies for management of the type of NBS that will be studied in EviBAN. SINTEF is responsible for stormwater management in KLIMA 2050[16], a centre for research driven innovation, which is one of the Norwegian Research Council's major program types and has a track record in sustainability assessment and ecosystem service evaluations from the EU projects TRUST[17] and DESSIN[18]. VTT and Aalto University bring their expertise in stormwater management and experience with the models applied in StormFilter[19] to the collaborative effort in EviBAN. BRGM, ImaGeau and Géo-Hyd add to this with experience and expertise from application of MAR in AquaNES[20]. SUWI has extensive experience in modelling and governance. The collaborative case study approach in EviBAN and the dissemination activities during the project are designed to ensure co-learning and transfer of knowledge within the consortium and to the stakeholders.

2. IMPACT

2.1. Impact of the proposal

EviBAN will develop new knowledge on how NBS should be used under different conditions to contribute to progress towards SDGs and transfer the knowledge into innovative tools for adaptive water management.

In the short term, the case studies with strong commitment of end users and stakeholders will bring direct outcomes aligned with the WJPI SRIA – Theme 5, and the expected impacts in the H2020 Societal Challenge 5, Call topic SC5-33-2016. Enhancing innovation capacity and integration of new knowledge will be ensured by the collaboration within EviBAN, which will be enriched by the strong multidisciplinary team (climate-science, water engineering, hydrogeology, ICT, water treatment, water network and quality), the noteworthy trans-nationality of the activities

[16] http://www.klima2050.no/
[17] http://www.trust-i.net/
[18] https://dessin-project.eu/?p=2390
[19] http://www.vtt.fi/sites/stormfilter
[20] AquaNES project (H2020 research and innovation programme under grant agreement n° 689450)

(four countries) and the commitment of private and public stakeholders (from local to regional public administrators). This will ensure impacts such as the *improved use of […] resources in the area of water research and innovation, an improved synergy […] between national and EU funding, […] exchange of good practices; strengthened international leadership of European research in this area, and implementation of the objectives of the JPI on Water.*

The knowledge will be operationalised through the toolbox, so end-users and potential clients can benefit from all the synergies between the functionalities developed. This will give more sustainable water management by utilising recommendations for the inclusion of climate and stormwater model parameters in local standards for NBS design, facilitating use of NBS as a sustainable means of reducing diffuse water pollution, evaluating optimal implementation of NBS with different water sources in terms of resulting water quality and economic cost, performing ISA on MAR strategies as management options, and improving stakeholder involvement through use of ICT-tools.

In the intermediate term, the toolbox will support achievement of the UN SDGs, strengthen the competitiveness and growth of companies, and support the development of technological solutions and services for the implementation of EU water policy. The tools developed in EviBAN are responding to urgent needs to close the water gap in different socio-economic and climatic areas. These needs are expected to increase dramatically in the future, and are strong drivers for worldwide implementation of the solutions developed by the project´s companies, thus contributing particularly to *SDG 6 'Ensure availability and sustainable management of water and sanitation for all'*, *SDG 13 'Take urgent action to combat climate change and its impacts'*, and the development of *'innovations meeting the needs of European and global markets'*. Also, these tools promote a sustainable way to reach a good environmental quality and to provide safe and sufficient water for the different uses, thus supporting directly the *implementation of EU water policy.*

The long-term impact will be achieved through the exploitation of the results and the commercialisation of the tools by the collaborating companies. This will improve the management of stormwater, wastewater, groundwater and alternative sources, and develop new approaches toward a better water system sustainability, resilience and satisfaction of water users. As such, EviBAN will directly contribute to the implementation of various EU Regulations & Policies, in particular the Water Framework Directive; Groundwater Directive; Floods Directive; Water Scarcity & Drought Strategy and the Roadmap to a Resource Efficient Europe.

2.2. Expected outputs

EviBAN will produce outputs to the scientific community, to water managers and policy, and the public.

A main output for the scientific community and water managers will be the toolbox with the different tools that will be developed in WP2 and be available on the project website after the project has been completed. The tools will be in the form of software models, spreadsheet templates and written guidelines as appropriate for the different uses. Some components will be based on existing models distributed by others under open source *e.g.* SWMM or with restrictions *e.g.* MARTHE model owned by BRGM with license fees. In such cases the toolbox will provide reference to where the software can be obtained and guidance for use in contexts covered by EviBAN. The toolbox components are expected to be used primarily by the scientific community and advanced water management users.

Further outputs to facilitate uptake of the results will be four reports covering the framework and KPIs for the learning alliance and three project/international workshops on: i) Drivers and barriers to NBS, ii) Toolbox development, needs and ambitions, iii) Potential of the EviBAN NBS to 'closing the water gap'. Training sessions on hydrogeological and hydrogeochemical modelling will be organised for local stakeholders in the cases studies with MAR.

EviBAN outputs will also include case study results from: Demonstrations of NWRM for stormwater management and evaluation of MAR for peak stormwater runoff to cope with drought-stress, including optimization of the solutions; performance and optimisation of SAT for treated wastewater and dissemination of ICT solution. A main integrating output for all cases will be the ISA assessment methodology and demonstration of its applicability through different water management case studies. These outputs will come in the form of a main results report and a policy brief for each of the case studies that will be aimed at water managers and policy makers, respectively. Further, manuscripts for five scientific papers are planned to address the four case studies and the developed toolbox.

Outputs aimed at the public include digital content on the project webpages and in social media about the demonstration sites, dissemination events and information from the stakeholder workshops.

2.3. Exploitation and communication activities (measures to maximise impact)

The project consortium includes consulting companies that are willing to commercially exploit the results. An exploitation plan will be developed in WP4, and the management of IPR will be considered in the Consortium Agreement. The dissemination of the results at local and regional scales is ensured by the direct involvement of the key stakeholders at an early stage in all case studies. The project will follow Water JPI rules such as dissemination by Open Access for the most important outputs (Green Open Access or Gold Open Access) and data management plan (submission of metadata on data generated and their exploitation). This approach aims to ensure a suitable communication to society and dissemination to stakeholders to foster future implementations.

A data management plan will be developed using the framework provided by the Norwegian Centre for Research Data. The framework follows the FAIR-principles[21] and will as far as possible meet the requirements for open access[22]. The plan will include strategies for data collection, metadata standards, file formats and modalities of data sharing and exploitation during and after the project.

2.4. Market knowledge and economic advantages/return of investment

EviBAN will contribute substantially to existing water cycle knowledge and demonstrate the added value of using climate information and services, ICT tools and models for quantity and quality to improve NBS design, evaluate implementation alternatives, and in decision making by end users. Further, EviBAN will provide knowledge required to operationalise integrated sustainability assessments for evaluating applicability of NBS in different regional and local contexts. The results will be disseminated widely to enhance the knowledge on NBS through stakeholders.

3. IMPLEMENTATION

3.1. Overall coherence and effectiveness of the work plan

EviBAN is organised with 4 work packages divided in tasks and sub-tasks as described in the table below.

<table>
<tr><th>WP Number</th><th>WP Title</th><th>Duration (months)</th><th>Starting Month</th><th>End Month</th><th>Partners and person months</th></tr>
<tr><td rowspan="2">WP1</td><td>Coordination</td><td>36</td><td>1</td><td>36</td><td><u>SINTEF</u> (1.5); Aalto (0.5); BRGM (0.5); SUWI (0.5)</td></tr>
<tr><td colspan="5">WP1 will provide the arenas for coordination of activities between the partners, organise project-wide meetings and workshops, facilitate project-wide involvement of stakeholders, and perform formal monitoring and reporting from the project to the FPOs.

T1.1 Coordination and management (<u>SINTEF</u>, Aalto, BRGM, SUWI)
This task will organise PMT meetings and annual consortium meetings, manage the project according to the work plan and deliver status reports to the funding partner organisations as required.

T1.2 Quality assurance and risk management (<u>SINTEF</u>, Aalto, BRGM, SUWI)
The first activity in this task will be to prepare a risk management plan. Subsequently, the activity will be to monitor the quality of the work in the project through independent QA of deliverables to ensure that risks in the risk management plan are avoided or mitigated and that the work complies with the objectives set in the work plan and the Consortium Agreement.

T1.3 Stakeholder engagement and co-design (<u>SINTEF</u>, Aalto, BRGM)
This task is to facilitate a Learning Alliance, involving multiple stakeholders and ensuring co-development across cases.[23] The process will be built around a common virtual workspace, an annual stakeholder workshop locally for each case study, and annual workshops for the project partners and key stakeholders from all partner countries, in connection with the consortium meetings. The Learning</td></tr>
</table>

[21] Wilkinson, Mark D. et al. (2016) "The FAIR Guiding Principles for scientific data management and stewardship". Scientific Data. 3(160018). https://doi.org/10.1038/sdata.2016.18.
[22] European Commission: "Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020", Version 3.2, 21 March 2017 [Downloaded 20.11.2017].
[23] Lundy M. et al 2006. Learning Alliances: An approach for Building Multi-stakeholder Innovation Systems in Smits, S.J., P.B. Moriarty and Sijbesma, C. (eds.) (2007) Learning Alliances: Scaling up innovations in water, sanitation and hygiene sector. Delft, the Netherlands, IRC International Water and Sanitation Centre (Technical Paper Series No 47).

<table>
<tr><td></td><td colspan="5">Alliance will draw on and provide inputs to the co-design in WP2 and 3 and provide annual recommendations for dissemination in WP4.

Deliverables (Month of delivery and brief description)
D1.1 (Month 3): Risk management plan (T1.2).
D1.2 (Month 6): Conceptual framework and KPIs for the learning alliance (T1.3).
D1.3 (Months 12, 24, 36): 3 Project / International workshop reports, with a focus on experiences and recommendations: i) Drivers and barriers to NWRM, ii) Toolbox development, needs and ambitions, iii) Potential of the EviBAN NWRM and NBS as measures for 'closing the water gap' (T1.3).
D1.4 (Months 12, 24, 36): Formal status reports to the FPOs in the required format (T1.1).

Milestones (Month of achievement and brief description)
M1.1 (Months 12, 24): First and second annual local workshop completed in all case studies (T1.3).</td></tr>
<tr><td rowspan="2">WP2</td><td>Toolbox development</td><td>24</td><td>1</td><td>24</td><td><u>SINTEF</u> (5.0); Aalto (7.0); VTT (2.5); BRGM (8.0); Géo-Hyd (6.0); ImaGeau (2.0); SUWI (3.0)</td></tr>
<tr><td colspan="5">WP2 will develop the toolbox for evaluating NWRM and similar NBS using a SES approach and is organised with tasks for each of the tools in the toolbox outlined in Figure 2.

T2.1 Governance Assessment Tool (<u>SINTEF</u>, Aalto, BRGM, Géo-Hyd, ImaGeau, SUWI, VTT)
Based on the approach applied in the INTERREG IVb DROP project,[24] a tool for initial assessment of the social-ecological context and scope for NWRM/NBS in specific cases will be developed. Based on document studies and semi-structured interviews, five interrelated dimensions will be assessed: Levels and scales, actors and networks, goal ambitions and perceptions of the challenge, strategies and instruments, and responsibilities and resources for implementation. An initial framework will be made and co-developed with all partners, then tested in the Norwegian case. Following application in WP3, a final version will be presented, in form of a Governance Assessment Guide.

T2.2 Stormwater management tool for NWRM/NBS (<u>Aalto</u>, SINTEF, VTT,)
The toolbox will be supplied with models and guidelines for simulating urban hydrological processes and key subsurface processes of stormwater infiltration and percolation in engineered soils. The urban catchment modelling tool will be US EPA SWMM[25], which has recently been automatized for easier applicability with open data sources[26]. The stormwater filter processes will be modelled with the use of PHREEQC (see reference in T2.3) or a similar open-source model. The geochemical model results will provide information about the filter performance to be used in parameterising simple water quality descriptions in SWMM. The models will be prepared to simulations driven by a set of climate change scenarios describing future precipitation and evapotranspiration under different emission scenarios[27]. Finally, SWMM will be prepared to support the optimisation method identifying the most appropriate stormwater treatment design in adaptive water resources management (T2.4).

T2.3 Optimising a SAT/MAR ICT tool for better long-term management of MAR (<u>BRGM</u>, Géo-Hyd, ImaGeau)
This task will provide multi-scale reactive transport modelling for SAT. The coupled software MARTHE-PHREEQC[28] for the hydrodynamic, hydro-dispersive modelling and reactive transport of the hydro-system will be used to create a generic SAT model to simulate treated wastewater organic and inorganic contaminants removal in soil including complex biodegradation and sorption processes</td></tr>
</table>

[24] DROP Governance assessment team 2013. Water Governance Assessment Tool. With an Elaboration for Drought Resilience. June, 2013. www.dropproject.eu
[25] Rossman, L.A. 2015. Storm Water Management Model User's Manual Version 5.1. EPA-600/R-14/413b.
[26] Warsta, L., Niemi, T.J., Taka, M., Krebs, G., Haahti, K., Koivusalo, H., Kokkonen, T. 2017. Development and application of an automated sub-catchment generator for SWMM using open data. Urban Water Journal 14, 954-963.
[27] IPCC. 2014. Climate Change 2014 Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland.
[28] [28] Thiery, D. 2015- Modélisation 3D du transport réactif avec le code de calcul MARTHE v7.5 couplé aux modules géochimiques de PHREEQC. Rapport BRGM/RP-65010-FR, 164 p. 88 fig.

for unsaturated/saturated hydraulic conditions. Several scenarios will be tested including treated wastewater quality indicators (ammonium, DOM, micropollutants concentration, …) for different hydrodynamic conditions (climatic & WWTP discharge) and different SAT dimensions to create a purification function/analytical solution. To assess the impact of WWTP discharge with or without SAT systems at catchment scale, groundwater/surface water exchanges will be integrated and tested in the georeferenced desktop ICT tool NORRMAN by Géo-Hyd. Integrating linear hydrographic chart database, this tool will determine concentrations of pollutants and hazardous substances parameters at each kilometre point including both purification functions for river and WWTP using SAT system.

T2.4 Development of optimisation tool. (SINTEF, Aalto, BRGM, SUWI)
An optimisation tool will be developed to find best possible combination(s) of different water sources and treatment/management solutions for cases where the water management objectives are related to MAR or stormwater management. This will be a software implementation of an optimisation model at tactical level for efficient matching of supply and demand, ensuring resilience of the considered systems. The stakeholder workshops in T3.1 will be an important source of input for initial development and subsequent calibration and validation. The model will have parameters and relations describing complex situations, *e.g.*, seasonal water availability, technical performance parameters for treatment/management options and economic parameters. Input provided or generated by the other tools in the toolbox, for example, the hydrological model, will be considered, and the solutions suggested by the optimization tool will provide input to the ISA tool developed in T2.5.

T2.5 ISA tool for NWRM and similar NBS to identify sustainable management options (SINTEF, Aalto, BRGM, SUWI)
A framework will be developed to quantify the impacts along the chain from implementation of NBS as adaptation/mitigation measures, via changes in ecosystem services to changes in SDG indicators. SDG indicators will be selected from those developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed on in 2017 in the United Nations Statistical Commission[29]. The framework will have evaluation criteria with indicators to measure the baseline – defined as the current situation – and progress towards future sustainability objectives with respect to social, governance, economic, technical and environmental impacts that will be co-defined with the case study stakeholders and relate to the selected SDGs. The criteria and indicators for a given case should build on established frameworks (*e.g.* DESSIN[30], MARS[31], OpenNESS[32], OPERAs[33], AQUACROSS[34], Making Ecosystems Count[35]), but be adapted to local conditions. A method for integration of the different assessments to quantify progress towards SDGs and compare alternative NWRM will be included in the tool. Integration of the sub-parts of the framework and comparison of alternatives will be based on multivariate analysis (MVA) using principal components.

Deliverables (Month of delivery and brief description)
D2.1 (Month 24): Report: documentation of toolbox components and guide for use (T2.1-5).
D2.2 (Month 24): Manuscript for scientific paper: General ISA framework evaluation of NWRM and similar NBS to identify sustainable management options based on performance and optimisation according to selected sustainability criteria (T2.5).
D2.3 (Month 24): Toolbox components available on the project website (T2.1-5).

Milestones (Month of achievement and brief description)
M2.1 (Month 8): Outputs and input data defined for all tools in toolbox.
M2.2 (Month 18): Prototypes of all tools in toolbox available for testing.

[29] https://unstats.un.org/sdgs/indicators/indicators-list/
[30] https://dessin-project.eu/?p=2390
[31] http://www.mars-project.eu/
[32] http://www.openness-project.eu/
[33] http://www.operas-project.eu/
[34] http://aquacross.eu/
[35] https://snappartnership.net/teams/making-ecosystems-count/

WP3	Demonstration	32	5	36	Aalto (25.0); SINTEF (5.0); VTT (3.5); BRGM (25.0); Géo-Hyd (4.0); ImaGeau (4.0); SUWI (18.0)

WP3 will demonstrate the applications of the WP2 toolbox methods in the case studies. WP3 will collect the supporting data from the study sites and prepare site maps, environmental datasets, and climate change summaries for dissemination in WP4. The joint goal is to integrate the case study results through applications of optimisation in the selected most suited case studies, and through the ISA exercises in all case studies.

T3.1 Data compilation
T3.1.1 SES mapping and data compilation for the case studies (SINTEF, Aalto, BRGM, SUWI): Information for initial mapping of the SES and scope for NBS will be prepared for all case studies to provide input to the ISA in T3.2.1-4 and T3.3.1-4. The quantitative data about climate, hydrology, water quality, site characteristics, and socioeconomic variables will be compiled from existing data sources and new measurements.

T3.1.2 Stormwater management in Finland (Aalto, VTT): Available stormwater data on water quantity and quality and site data will be compiled from the Espoo and Vantaa sites about road filter performance in Finland for T3.2.2. The water quantity and quality measurements in the sites will be continued in collaboration with the local stakeholders to gather records on several intensive precipitation - storm runoff events during a period of 15-18 months. A set of future climate scenarios will be gathered from open archives to describe a range of climate projections under different emission scenarios. Supplementary data for SES mapping of suburban development will be prepared for T3.2.4.

T3.1.3 Eco-engineered grey-green solutions in Norway (SINTEF): Meteorological and stormwater runoff data from Høvringen (data available from 2016), Sveberg (data available from 2018) and Sandnes (data available from 2015) will be compiled, and the retention and detention capacities will be calculated for T3.2.3. In addition, the Høvringen test site has a setup to create artificial rain events and the eco-engineered grey-green solutions are regularly tested under intensive precipitation. These data will also be used for performance assessment of the engineered grey-green solutions in T3.2.3.

T3.1.4 MAR case study in the South Africa (SUWI): Hydrological Response Units (HRUs) have already been mapped in the Hessequa Municipal area. Mean annual and seasonal run-off of the Goukou River, and river water quality will be identified to assess the potential range of stormwater volumes available for MAR. The importance of flushing caused by intense rainfall events for maintaining good estuarine health will be determined (ecological flow requirement). A student will be sent to BRGM to learn the MARTHE software package. Data to assess optimal implementation of grey-green NWRT to increase AR will be collected. Information on existing water sources and supply infrastructure will be obtained from the municipality's Water Services Development Plan. Equipment and construction cost data will be obtained from local suppliers for optimisation of alternatives. SES mapping data about the sites will be compiled for T3.3.4.

T3.1.5 WWTP case study in France (BRGM): Data from the subsurface monitoring device (SMD) acquiring online water salinity, water level of the Agon-Coutainville sand dune aquifer, climate databases, water quality sampling campaign (pH, T°C, Eh, trace and major ions, micropollutants, viruses and pathogens), WWTP operational data, will be directly implemented and searchable in the ICT tool for T3.3.3. SES mapping data about coastal area management will be compiled for T3.3.4.

T3.2 NWRM in stormwater management
T3.2.1 Demonstration of governance assessment tool (SINTEF, Aalto): Based on the data collected in T3.1.1, a limited number of key stakeholders (<10) from each case study will be subject to in-depth interviews. Together with the relevant documents, this material will be systematically analysed and compared, with respect to extent, coherence, flexibility, intensity of the governance regimes, SES perspectives and scopes for NWRM in stormwater management.

T3.2.2 Stormwater filter performance under changing climate (Aalto, VTT): The Storm water Management model setup from WP2 (T2.2) will be parameterised to the NWRM test sites in Espoo

	and Vantaa based on the data from T3.1.2. The model is coupled with a geochemical solute transport model and numerical assessment of filter performance will be conducted based on data and modelling results. The stormwater model is calibrated and validated against the measurements and applied to simulate the performance of the filters under changing climate. Simulations of future periods will be carried out using several climate scenarios and RCPs. The results will provide input to ISA in T3.2.4. The doctoral student working on the task will have a mobility period of 3 months at SINTEF. T3.2.3 Optimising NWRM based on grey-green solutions for stormwater management (SINTEF, Aalto, VTT): Different NWRM using engineered grey-green solutions at the Høvringen test site will be assessed for stormwater management based on the data collected in T3.1.3 and the optimization tool developed in WP2 (T2.4). The results will be compared to the solutions implemented at the NWRM test sites in Espoo and Vantaa, to identify common conclusions and as a measure to transfer knowledge between case studies. They will also feed into the ISA in T3.2.4. T3.2.4 Integrated sustainability assessment of NWRM solutions (SINTEF, Aalto, BRGM, Géo-Hyd, ImaGeau, SUWI, VTT): Stakeholder workshops will be held to specify the scope for the assessment (setting, objectives, timeframe, alternative solutions) in the given cases. The ISA framework developed in WP2 and input from T3.1.1-3 and T3.2.1-3 will be applied to selected NWRM implemented or considered for use as adaptation and mitigation measures in stormwater management at the demonstration sites. The results will be discussed in stakeholder workshops. **T3.3 MAR in adaptive water management** T3.3.1 Demonstration of governance tool (SINTEF, SUWI, BRGM): Based on the data collected in T3.1, a limited number of key stakeholders (<10) from each case study will be subject to in-depth interviews. Together with the relevant documents, this material will be systematically analysed and compared, with respect to extent, coherence, flexibility, intensity of the governance regimes, SES perspectives and scopes for MAR as part of adaptive water management. T3.3.2 MAR for adaptive water management in a water stressed area in South Africa (SUWI, SINTEF, BRGM): The South African case study will be performed at two sites in the Hessequa Municipal area along the South Coast. **Aim 1)** Test and refine models that can help decision-makers determine how much stormwater, if any, can be removed from a river system for AR, without causing environmental harm to the downstream estuaries (using the Goukou data from T3.1.4). MARTHE hydrodynamic software (task 2.3) will be used to model scenarios of removing stormwater from the system and to create a comparison with ecological flow requirements to determine the optimum amount of water that can be removed for AR. A mobility period will give a student from SUWI training on the MARTHE software at BRGM. **Aim 2)** Provide decision support to determine the optimum combination of different water sources and implementation of NWTM to increase AR under an array of different circumstances (using second site's data from T3.1.4). This will help municipalities along the South Coast with planning a guaranteed water supply for residents, especially during drought situations and peak tourist times. Desktop modelling of using various water availability scenarios and water sources combined with implementation of NWRM to increase AR will be performed. The assessment will draw on data for performance of NWRM based on grey-green solutions (T3.1.3) and use the optimisation tool developed in WP2 (Task 2.4). The management solutions identified in this task will be assessed with the ISA tool (T3.3.4), which will be adapted to the local conditions for use by local municipalities in collaboration with the case study stakeholders. T.3.3.3 Planning of Soil aquifer treatment of WWTP discharge in sensitive coastal area (BRGM, VTT): The aim of the case study will be two-fold: **Aim 1)** Using SAT generic model developed in WP2, a PhD student managed by both BRGM and Géo-Hyd team will be in charge of the development of the specific SAT/MAR modelling in context of AGON-Coutainville coastal area. The goal of this task is to provide an operational tool to predict water quality taking into account complex hydrodynamic system (Climate, tides, WWTP operations) based on data acquired on Agon-Coutainville site (see T3.1.5) including the saline intrusion online monitoring systems from ImaGeau. Particular attention will be given to the evolution of the salinity and fate and transport of micropollutants in this hydro-system. **Aim 2)** This coastal area is threatened by a huge number of

<table>
<tr><td></td><td colspan="5">WWTP discharges and by saline intrusion. To extend the evaluation of the impact of implementing SAT of WWTP-effluent at a larger scale of the catchment, historical discharge water quality of other classical WWTPs in the catchment (compiled in T3.1.5) will be introduced in the optimised NORRMAN tool to compare a classical treatment system to a SAT system. The tool will also be capable to compare the quality of discharge water to the required regulatory values from the EU Urban Wastewater Treatment Directive.

T3.3.4 Integrated sustainability assessment of MAR solutions (SINTEF, Aalto, BRGM, Géo-Hyd, ImaGeau, SUWI, VTT): Stakeholder workshops will be held to specify the scope for the assessment (setting, objectives, timeframe, alternative solutions) in the given cases. The ISA framework developed in WP2 and input from T3.1.4-5 and T3.3.1-3 will be applied on MAR solutions implemented or considered for use to augment groundwater resources or as adaptation and mitigation measures in sensitive coastal areas. The results will be discussed in stakeholder workshops.

Deliverables (Month of delivery and brief description)
D3.1 (Month 24): Scientific article manuscript about NWRM in stormwater management (T3.2.2-3)
D3.2 (Month 24): Technical report or article manuscript about MAR solutions (T3.3.2-3)
D3.3 (Month 30): Technical report analysing application of optimisation model to case studies (T3.2.2-3 and T3.3.2-3)
D3.4 (Month 36): Scientific article manuscript on ISA of demonstrated solutions (T3.2.4 and T3.3.4)
D3.5 (Month 36): Article manuscript on drivers and barriers to NWRM/NBS based on the application of the governance assessment tool (T3.2.1. and T3.3.1)

Milestones (Month of achievement and brief description)
M3.1 (Month 6): Digital content to the project webpages about the demonstration sites (T3.1.1-5)
M3.2 (Month 11): Stakeholder workshops at demo sites (T3.1.2-5)
M3.3 (Month 14): Available data prepared for the case studies (T3.1.1-5)
M3.4 (Month 28): ISA framework established for the case studies (T3.2.4 and T3.3.4)</td></tr>
<tr><td>WP4</td><td>Exploitation and dissemination</td><td>36</td><td>1</td><td>36</td><td>BRGM (15.34); SINTEF (2.5); VTT (1.0); Aalto (2.0); Géo-Hyd (3.2); ImaGeau (3.35); SUWI (2.5)</td></tr>
<tr><td></td><td colspan="5">WP4 will promote the innovation developed during EviBAN by companies in collaboration with scientific institutions, stakeholders and policy makers for the development of the adaptive water management toolbox as outlined in section 2.3. WP4 will inform about project life, results of the project and make results available for use by:

• Disseminating scientific research results and communicate project outcomes.
• Preparing and following up data management plan, dissemination plan and publication strategy.
• Implementing an exploitation plan for the results of each case study making connection between project partners, interested parties, stakeholders and policy-makers regarding the SAT/MAR ICT tool, responsible use of flood water for artificial recharge, engineered grey-green solutions and other NWRM for stormwater management.
• Preparing and maintaining the project website and input for social and printed media.

Task 4.1 Dissemination plan (BRGM, Aalto, VTT, SINTEF, SUWI)
This task will be dedicated to the preparation and follow-up of the dissemination plan to reflect the project progress and outputs to relevant targeted groups by:
• Identifying the stakeholders and areas that could potentially use the results of the project.
• Planning of dissemination events adjusted to project lifetime and after project end to deliver key messages of the project (technology, environmental, social, economic impacts).
• Using specific network platforms (Water supply and sanitation technology platform (WssTP) working groups, European innovation partnership (EIP) water action groups, Joint Research Centre (JRC) of the European commission).
• Publishing scientific results with EU funding acknowledgement and Open Access for the most important outputs (Green Open Access or Gold Open Access).</td></tr>
</table>

	• Prepare and follow up a Data Management Plans (DMP) to make project data findable, accessible, interoperable and reusable (FAIR) as recommended by the H2020 Open Research Data Pilot. **Task 4.2 Exploitation of EviBAN research & innovations (BRGM, Aalto, Géo-Hyd, ImaGeau, SINTEF, SUWI, VTT)** The goal of this task is to provide information about the EviBAN toolbox for adaptive water management with NBS to end users and policy-makers. Thereby improving public knowledge at commercial, societal and political levels. Closely related to this action, private companies (e.g. Géo-Hyd) will draft Exploitation Plans for each innovating tool developed in EviBAN to assess the marketability and the cost effectiveness of the technologies to enable their commercialisation. Exploitation of project results will be further ensured through dissemination to the stakeholders in each case study and beyond. ASTEE, the French association of water & waste professionals, the Water Association Finland, Norsk Vann in Norway and Water Research Commission in South Africa will be contacted to include dissemination from EviBAN in relevant forums. **Task 4.3 Communication (Project website) (SINTEF, Aalto, BRGM, Géo-Hyd, ImaGeau, SUWI, VTT)** This task will ensure the visibility of the project during and after the lifetime of the project by: • Creating a specific design (logo, layout) • Developing and maintaining the project website for at least 3 years after the project. • Creating flyers, posters, brochures • Active presence on social networks such as LinkedIn, Twitter, YouTube **Deliverables (Month of delivery and brief description)** D4.1 (Month 4): Project Website (T4.3) D4.2 (Months 6, 12, 18, 24 & 30): Dissemination plan (regularly updated) (T4.1) D4.3 (Month 9): Data Management plan (T4.1) D4.4 (Month 20): Exploitation plan (T4.2) D4.5 (Month 36): Dissemination events (T4.1) **Milestones (Month of achievement and brief description)** M4.1 (Month 6): Initial data Management plan completed (T4.1) M4.2 (Month 6): Initial Dissemination plan template available (T4.1) M4.3 (Month 6): Stakeholders and Policymakers database available (T4.1)

3.2. Appropriateness of the management structure and procedures, including quality management

The project will be organised with a **Project Steering Committee (PSC)**, a **Project Management Team (PMT)** and **WP leaders** supervising specified tasks for each research partner.

The **PSC** will have one representative from each of the project partners. The PSC will act as a reference group for the project.

The **PMT** will consist of the coordinator, Senior Scientist Dr *Herman Helness* from SINTEF, the WP leaders and a representative from South Africa to ensure that all participating countries are represented. The PMT will communicate regularly and be responsible for planning activities, allocation of resources, and status reporting.

WP leaders will be Dr *Herman Helness*, SINTEF (WP1); Dr *Mehdi Ahmadi*, SINTEF (WP2); Professor *Harri Koivusalo*, Aalto University (WP3); Dr *Marie Pettenati*, BRGM (WP4). Senior Scientist Dr *W.P. de Clercq*, SUWI, will represent the South African case study in the PMT.

QA of results and monitoring of project progress in relation to the risk management plan will be the responsibility of the project's quality manager, Dr *Edvard Sivertsen*, SINTEF. To monitor the progress and quality of work, the QA manager will be part of the project management team. In case of deviations the QA manager will consult the coordinator and/or PIs to discuss necessary actions. In addition, independent quality control will be carried out on all reports and scientific publications prior to publication. Throughout the project, video conferences and SharePoint solutions will be used to ensure efficient cooperation.

Month/ Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Work Package 1			**D1.1**			**D1.2**						**D1.3 D1.4 M1.1**						
Work Package 2								**M2.1**										**M2.2**
Work Package 3						**M3.1**					**M3.2**			**M3.3**				
Work Package 4				**D4.1**		**D4.2, M4.1, M4.2, M4.3**			**D4.3**			**D4.2**						**D4.2**
Progress Monitoring						**X**						**X**						**X**
Mobility Schemes				**Mob in T3.3.2**	**Mob in T3.3.2**	**Mob in T3.3.2**												
Risk Management						**X**						**X**						**X**

Month/ Description (continued)	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**
Work Package 1						**D1.3 D1.4 M1.1**												**D1.3 D1.4**
Work Package 2						**D2.1, D2.2 D2.3**												
Work Package 3						**D3.1, D3.2**				**M3.4**		**D3.3**						**D3.4 D3.5**
Work Package 4		**D4.4**				**D4.2**						**D4.2**						**D4.5**
Progress Monitoring						**X**						**X**						
Mobility Schemes	**Mob in T3.2.2**	**Mob in T3.2.2**	**Mob in T3.2.2**															
Risk Management						**X**						**X**						

3.3. Risk management

The risks identified for EviBAN are related to data availability, stakeholder involvement, collaboration in the consortium and achieving the ambitious objectives of the project.

The risks related to data availability are considered to be low due to established demo sites in the case studies with already existing data collection infrastructure (France, Norway, Finland) and data available from ongoing or previous studies (all case studies).

Risks related to stakeholder involvement have been minimised by ensuring commitment to the project in the initiation phase as seen by the letters of intent attached to the application. To further ensure this, facilitation of stakeholder involvement is a dedicated task in WP1.

Several of the project partners have collaborated in previous projects and the risks of problems in collaboration are considered low. However, risks related to collaboration have been minimised by the management structure where the project steering committee has representatives from all partners and the project management team is balanced with representatives from all case studies. To ensure the smooth collaboration in EviBAN, the project management team will meet regularly and there will be regular workshops to facilitate the wider collaboration in the consortium. The risk related to consortium collaboration will be further minimised through establishment of a consortium collaboration agreement which will be based on the template from the Norwegian Research Council.

In a research project there will always be a certain risk related to achieving ambitious goals. This risk can be divided in a risk related to performing the described work and a risk related to the outcome of this work. In EviBAN, the risk of not being able to perform the described task is considered to be low. The risk related to the outcomes of this work will be higher for the longer-term impacts in terms of exploitation than the immediate short-term results. To ensure exploitation and to minimise the risks related to long-term impact, the exploitation task in WP4 is led by an industry partner. The risks related to the short-term results will be minimised by preparing a risk management plan, which will be updated during the project (WP1). At this stage, the consortium has principally considered the involvement of all key stakeholders to guarantee a successful implementation and use of the results in the short- and long-term perspectives. Other aspects that will be taken into account in the risk management plan concern the adaptation to the local regulations regarding health and safety and environmental protection. These issues have successfully been tackled in other projects involving similar case studies (e.g., MAR with treated water in the DESSIN project), so the risk for the project is considered low.

3.4. Potential and commitment of the consortium to realise the project

The project team represents internationally recognised partners within their fields of research, with a broad and varied competence. **SINTEF** is a multidisciplinary private research institute that performs contract research and development for industry and the public sector. It is Scandinavia's largest independent research organisation with about 2000 employees. The research groups from SINTEF bring expertise on water and sanitation services and integrated water management, economics and operations research, including governance, financing, and innovation. **Stellenbosch University Water Institute** will contribute with expertise on water management, water availability and quality modelling as well as knowledge on local conditions at the selected case studies in South Africa. **Aalto University** will bring to the project its modelling and experimental experience on urban hydrological and stormwater quality processes. Management of water resources and built environment under rapid urbanisation and climate change threats falls within the key university-level focus area of human-centred living environment. The Aalto Water and Environmental Engineering research group provides EviBAN with state-of-the-art water laboratory facilities, field campaign capacity, and modelling capabilities. **VTT Technical Research Centre** is ideally suited to contribute expertise to within the proposed multidisciplinary EviBAN project. In the past 20 years, VTT has participated in >1000 European R&D FP projects within various thematic programs. In EviBAN, the VTT department of Lifetime Management (100 persons), and specifically the Infrastructure Health team will cooperate with experts from the environmental and water technologies divisions of VTT. Complementary national projects utilising unique laboratory facilities will contribute NWRM design and hydrodynamics knowledge to this project. **BRGM (**French geological survey), **Géo-Hyd** and **ImaGeau (**companies) bring expertise and extensive experience on sub-surface water management processes, measures, modelling and data-handling.

The project activities are also in line with the consortium partner institutions' strategic priorities, ensuring commitment at the management level of the institutions.

4. DESCRIPTION OF THE PARTICIPATING RESEARCHERS

Partner Number, according to Part A	Research Team Members (for personnel include name, position and affiliation)	General Description
Partner 1: SINTEF, principal investigator Dr Herman Helness	**Mehdi Ahmadi, Research Scientist, SINTEF**	Dr.ing, expertise in environmental engineering, aquatic science and water system management. Leading the WssTP working group on Green Infrastructures
	Sigrid Damman, Senior Scientist, SINTEF	Cand.Polit Social anthropology, 20 yrs. experience, social systems, governance, innovation, social sustainability in the water sector
	Adrian Tobias Werner, Research Scientist, SINTEF	Dr.ing, Operations research, 15 yrs. experience in optimisation, mathematical modelling and analysis, economics
	Edvard Sivertsen, Senior Scientist, SINTEF	Dr.ing. Work package leader for Stormwater management in KLIMA 2050. 16 yrs. broad experience from industry and water research
Partner 2: Stellenbosch University Water Institute, principal investigator Dr Willem de Clercq, Senior Researcher,	**Mrs Marlene de Witt, Project Manager, Stellenbosch University Water Institute**	MSc Environmental Management; 10 yrs. experience: ecological systems, sustainability, governance, water resources management, agriculture
Partner 3: VTT Technical Research Centre of Finland Ltd, principal investigator Dr Riitta Molarius	**Mr. Juhani Korkealaakso, Principal Scientist and Research Node Leader, VTT**	MSc Applied Geophysics; 30 yrs. experience: geophysics, geomaterials, stormwater management, flood prediction, climate modelling and urban water management infrastructure design
	Mr. Sami Partamies, Research Scientist, VTT	PhLic Geology and Geochemistry; 15 yrs. experience: geochemical modelling and geochemical stormwater and groundwater analysis
	Mr. Ville Rinta-Hiiro, Research Scientist, VTT	MSc in Geotechnics; 5 yrs. experience: soil mechanics, numerical modelling and monitoring and urban water management infrastructure and stormwater control design
Partner 4: Aalto University School of Engineering, principal investigator Dr. Harri Koivusalo, Professor	**N.N., Doctoral student, Aalto University School of Engineering**	To be hired through competitive international recruiting
	Dr. Nora Sillanpää, PostDoc researcher, Aalto University School of Engineering	DSc Stormwater management: 14 yrs. experience on urban hydrology and stormwater quantity and quality assessments

Partner Number, according to Part A	Research Team Members (for personnel include name, position and affiliation)	General Description
Partner 5: BRGM, principal investigator Dr Marie Pettenati	**Dr Marie Pettenati, Project Manager, Hydrogeochemistry modelling, BRGM (PI)**	PhD in hydrogeology and geochemistry. Specialist for conceptualizing reactive transport models of organic and inorganic pollutants in the vadose zone-aquifer continuum, with a particular focus on active management of water resources (MAR).
	Dr. Géraldine Picot-Colbeaux Project Manager, hydrodynamic modelling, BRGM	PhD in Hydrogeology, expert on MAR, agriculture, unsaturated/saturated environment monitoring and modelling.
Partner 6: IMAGEAU, principal investigator Matthieu Baïsset	**Matthieu Baïsset, Project Manager, Hydrogeologist**	M.Sc. in geosciences, in charge of hydrogeological service, involved in aquifers characterisation, coastal aquifer management, well design, wellfield management and protection at ImaGeau.
Partner 7: GEO-HYD, principal investigator Loic Thomas	**Loic Thomas, Project Manager**	Team Manager for IT Development & Data Management, leads the software development activities of the company in the field of environmental data management and processing.

5. CAPACITY OF THE CONSORTIUM ORGANISATIONS

Partner Number (Organisation Name)		General Description
Partner 1: SINTEF	**Role and main responsibilities in the project**	Coordinator of the project, leader of WP2 and responsible for socio-economic, optimisation and sustainability assessment activities. Responsible for the Norwegian demo sites
	Key research facilities, infrastructure, equipment	KLIMA 2050 demonstration sites for grey green solutions.
	Relevant publications and/or research/innovation products	Rouillard J.J. *et al.* (2016). Governance Regime Factors Conducive to Innovation Uptake in Urban Water Management: Experiences from Europe. *Water* 2016, 8, 477; doi:10.3390/w8100477. http://www.klima2050.no/hovringen-bluegreengray-roofs/
Partner 2: Stellenbosch University Water Institute	**Role and main responsibilities in the project**	Case study research for WP2 and WP3.
	Key research facilities, infrastructure, equipment	MoU with municipality of the demo site.
	Relevant publications and/or research/innovation products	* Semi-arid catchments under change: Adapted hydrological models to simulate the influence of climate change and human activities on rainfall-runoff processes in southern Africa. * Investigating Potential Additional Sources of Groundwater Flow into a Defined Watershed.
Partner 3: VTT	**Role and main responsibilities in the project**	Geochemical modelling of stormwater controls.
	Key research facilities, infrastructure, equipment	Stormwater treatment sites of Espoo and Vantaa, laboratory rigs with stormwater simulators at VTT
	Relevant publications and/or research/innovation products	Korkealaakso, J. 2014. VTT Technical Report VTT-R-05775-14. 31 pp. "Modeling tool to support the application of CLASS results in hydraulic dimensioning and design of permeable pavement structures"
Partner 4: Aalto University School of Engineering	**Role and main responsibilities in the project**	WP3, Stormwater management and modelling, participant of ISA analyses.
	Key research facilities, infrastructure, equipment	Stormwater treatment sites in the cities of Espoo and Vantaa, Field instrumentations, Water laboratory facilities.
	Relevant publications and/or research/innovation products	Sillanpää, N., Koivusalo, H. (2015) Urban development impacts on runoff event characteristics and unit hydrographs across warm and cold seasons in high latitudes. Journal of Hydrology, 521, 328–340. Guan, M. *et al.* (2015) Modeling and assessment of hydrological changes in a developing urban catchment. Hydrological Processes 29, 2880–2894.

Partner Number (Organisation Name)		General Description
Partner 5: BRGM	**Role and main responsibilities in the project**	WP4 leader, Modelling developer in WP2 and case study provider in WP3.
	Key research facilities, infrastructure, equipment	Agon-Coutainville SAT demo-site, Laboratory facilities: Mass Spectrometry; On-line and offline solid phase extractors.
	Relevant publications and/or research/innovation products	* FRAME, A novel FRamework to Assess and Manage contaminants of Emerging concern in indirect potable reuse: http://www.frame-project.eu/previous-news/dss/index.html *AQUI-FR(https://www.metis.upmc.fr/~aqui-fr/index_eng.html), a national multi-model hydrogeologic system M. Pettenati et al. (2017) Advanced monitoring-modelling communication tool for optimising Soil Aquifer Treatment (SAT) system design & operation in AquaConsoil Lyon, 26-30 June 2017. 14th International Deltares Conference on Sustainable Use and Management of Soil Sediment and Water Resources.
Partner 6: IMAGEAU	**Role and main responsibilities in the project**	Responsible for Subsurface Monitoring Device (Saline intrusion online monitoring) & development of ICT tool.
	Key research facilities, infrastructure, equipment	SMD system at Agon-.Coutainville demo-site.
	Relevant publications and/or research/innovation products	IMAGEAU has tested subsurface monitoring devices in various subsoil storage contexts 1. **Mustang** (EU FP7-ENERGY-2008-1): High resolution **monitoring** with Subsurface Monitoring Device – A multiple space and time scale approach for the quantification of deep saline formations for CO_2 storage. 2. **Panacea** (EU FP7-ENERGY-2011-1 GA No. 282900): **Monitoring** (With SMD) and predicting the long-term behaviour of CO_2 injected in deep geological formations
Partner 7: GEO-HYD	**Role and main responsibilities in the project**	GeoHYD is responsible for ICT development tool and data management concerning MAR/SAT site of Agon-Coutainville.
	Key research facilities, infrastructure, equipment	GeoHyd is a consultancy providing services in computing and the environment.
	Relevant publications and/or research/innovation products	* DSS co-designer: http://www.frame-project.eu/previous-news/dss/index.html *Risk assessment of pesticides in Pays de Loire - Implementation of the SIRIS method with the Rouen Laboratory of Eco-toxicology, * Norrman software in order to simulate the impact of discharges on water bodies