BONUS RETURN
Reducing Emissions by Turning Nutrients and Carbon into Benefits
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SUMMARY

The **overall** aim of RETURN is to improve the adaptation and adoption of eco-technologies in the BSR for maximum efficiency and increased co-benefits. The **specific objectives** of the project are to 1) support innovation and market uptake of eco-technologies; 2) reduce knowledge gaps on policy performance, enabling/constraining factors, and costs and benefits of eco-technologies; 3) provide a framework for improved systematic stakeholder involvement; 4) support commercialization of eco-technologies; and 5) establish a user-driven knowledge platform and improve technology-user interface. These objectives are implemented in three river basins: The Vantaanjoki river basin in Finland, the Słupia river basin in Poland, and Fyrisån river basin in Sweden. The project is organized around six Work Packages (WPs) as follows WP1: Coordination, management, communication and dissemination; WP2: Integrated Evidence-based review of eco-technologies; WP 3: Sustainability Analyses; WP4: Environmental Modelling; WP5 Implementation Support for Eco-technologies; and WP6: Innovative Methods in Stakeholder Engagement.

This report summarizes key results out during the first year of the project (May 2017- May 2018) per work package as outlined in BONUS RETURN Yearly Report 2017-2018.

WP1 developed internal and external communication and dissemination plans. All templates related to management, finance, reporting, presentations, as well as the visual identity of the project were finalized. The Advisory Board was accepted and have been active in different project activities. WP1 was also responsible for the planning and execution of events including the kick-off meeting and Year 1 Consortium Meeting, an event in Almedalen in cooperation with Swedish Water, and a session at the Baltic Sea Future Conference. WP1 see through the delivery and completion of all Year 1 activities in time and according to the DoW and budget.

Identification of a knowledge gap in relation to the concept of eco-technologies (**WP2**). Despite common usage of the term 'ecotechnology', there seems to be little consensus on its practical meaning, highlighting a difficulty in ensuring stakeholders understanding of the term. To better define the term for the project context, the authors assessed which definitions of 'ecotechnology' have been used in the academic literature to date. To this end, a systematic review with a thematic synthesis was conducted. Of the 77 carbon and nutrients articles providing definitions, almost half used the term 'ecotechnology' as a buzzword (i.e. in titles, abstracts or keywords only). Some 38 themes were identified across the 49 explicit definitions and these were clustered into 9 groups: combining processes/integrating nature and society; good for society; good for nature; profitability/efficiency; making nature work for society; making society work for nature; improving processes and learning from the environment; components, equipment, machinery (hard technology); and, processes and behaviours (soft technology). The authors proposed a broad definition for the term 'ecotechnology' that is currently used within the BONUS RETURN project: Eco-technologies are human interventions in

social- ecological systems in the form of practices and/or biological, physical, and chemical processes designed to minimise harm to the environment and provide services of value to society. The conceptual framework that was developed from interpretation of themes within studies identified in the review provided a useful and meaningful summary of what is meant by the term 'ecotechnology', something that is lacking in the literature to date.

WP2 also conducted a systematic search of existing eco-technologies within the agriculture and waste water treatment sectors. Around 500 articles were shortlisted out of the nearly 35 000 scientific and grey literature records reviewed. This gave a comprehensive overview of the eco-technologies previously used in the two sectors, out of which a list of eco-technologies will be selected together with local stakeholders from the case studies, to form constellations of eco-technologies to be further assessed throughout the project (**WP3**)

Definition of criteria and system boundaries to be used in a Multi-Criteria Analysis (MCA) to assess constellations of eco-technologies in catchment areas (**WP3**). The MCA will be carried out during Year 2 in each of the catchment areas. WP3 also successfully executed and completed an innovation competition (The Carbon and Reuse Challenge) which attracted 15 applicants from different European countries and resulted in three winning innovations which BONUS RETURN will work with over the course of the project to produce pre-commercialization plans (in **WP5**).

The collection, processing, calibration and validation of input data, such as digital elevation (DEM), land and use soil maps, as well as meteorological data and information on point sources, agricultural practices, for SWAT modelling in each case study catchment (**WP4**). These results show baseline conditions of typical annual total phosphorus (Ptot) and total nitrogen (Ntot) loadings in the catchment areas. This data will be used in the next phase of WP4 to simulate different scenarios demonstrating the efficiency of selected eco-technologies.

Stakeholder platforms have been established in all three catchment areas. Stakeholder consultation workshops have been supported by **WP6**, which acts as a coordinating work package for all stakeholder-related activity in the project. A training workshop on soft systems methodology was facilitated to all case study leaders. Parallel to stakeholder interactions, WP6 started developing the co-learning platform in the form of a Serious Game System (SGS) that will draw on empirical insights generated throughout the RETURN project (Task 6.2 Serious Game System Development).