

**Call:** STHB.02.03-IP.01-001/22

**Author:** [REDACTED]

**Checksum:**

## A Project information

### A1 Project

#### Project title

Eco-designing for the coastal zone nutrient's circularity (ECONUT)

#### Project description

For millennia, nutrient supply in agriculture depended on natural processes like soil weathering and biological nitrogen fixation, as well as the internal recycling of nutrients with organic residuals as organic fertilizers. However, with the increasing dependence of modern society and agriculture on fossil energy, agricultural productivity has become dependent on continued external nutrient inputs. High inputs of synthetic fertilizers meant that the internal recycling of nutrients in agroecosystems has become more and more irrelevant in sustaining yields. Inappropriate and excessive use of fertilizers causes their accumulation in the soil, which leads to their degradation. Accidental loss of nutrients from nitrogen fertilizers results in elevated amounts of greenhouse gases, such as N<sub>2</sub>O emissions, groundwater pollution, and eutrophication of surface waters. The “circular bioeconomy” is extensively discussed in science and policy, and its implementation in practice is considered a panacea for fixing many current sustainability problems. An essential part of the latest growth strategy (e.g., the European Green Deal) is the circular economy model, which focuses on resource efficiency and includes the management of biomaterial and waste.

Under climate change, eutrophication and soil degradation conditions, the Baltic Sea region is facing the challenge of recovering and obtaining nutrients. The Baltic Sea coastal area is rich in biomass resources (algae, macrophytes, mussel shells, beach wrack), which can be used in agriculture for sustainable food production. One of the possibilities consistent with the circular economy is the use of marine biomass resources as both a fertilizer and an adsorbent for nutrient recovery. These solutions will prevent nutrients from dispersing into the environment and becoming pollutants. This biomass can be used to force dune succession since this vegetation is limited by nutrient availability. Cycling nutrients can therefore improve biodiversity in coastal zones and strengthen natural coastal protection measures with increasing the potential of sand accumulation. According to the idea of nutrient cycling, it also involves the application of marine biomass as fertilizer to the soil and the simultaneous use of gypsum to the soil in order to reduce the leaching of nutrients available for assimilation by crops. The circular nutrient economy demands innovations, including optimizing biofertilizers, prepared from algae/mussel or beach wrack biomass, technologies to maximize benefits for soils and vegetation, carbon sequestration into soils and pest-pathogen control. Marine biomass is a reservoir of nutrients that can be extracted and used for fertilizer production by applying advanced technologies. Many studies were done seeking to use marine resources (especially microalgae) for biodiesel, biogas production or use it for bioenergy. However, the potential benefits of recycling biomass back to agricultural land for soil quality and crop nutrition in a “circular manner” has received little attention. A little research has been done to develop suitable biofertilizer technologies using macroalgae regarding their impact on human health (organic contaminants, heavy metals) and their more appropriate formulations, for current regulations and to open the market. It creates opportunities for the development of by-products such as biomass fertilizer that could contribute to more sustainable nutrient cycling in an arable farming system. Using treated beach wrack as organic fertilizer and dune stabilizer returns nutrients and carbon to the soil, enriches soil quality, crop growth, and nutrition. The dune cover based on treated beach wrack protects dunes from erosion, improves biodiversity. It elevates resistance to biotic and abiotic stress and acts as a biofortification agent (promoting micronutrient uptake by plants and crops) that is essential for human nutrition and natural ecosystems' sustainability.

#### Start date

2023-09-01

#### Planned project end date

2026-08-31

#### Target groups



**Call:** STHB.02.03-IP.01-001/22

**Author:** [REDACTED]

**Checksum:**

EU South Baltic region farmers, agricultural specialists, local and regional authorities (municipalities), environmental protection agencies, public health care and food risk assessment institutions, entrepreneurs, scientists, wastewater treatment plants, NGO, public. In accordance with the opinion of the main target groups' representatives, the solutions for the next essential issues should be found: safety biofertilizer preparation; conservative agricultural practices for a sustain agricultural ecosystem; evaluation of the nutrients uses efficiency; nutrients losses and surface water eutrophication's reduction; circular nutrients' cycling technologies

**Thematic scope**

Promoting the use of recycled materials as raw materials

**Project location**

Whole country

Project location