

## Establishing an Innovative and Transnational Feed Production Approach for Reduced Climate Impact of the Aquaculture Sector and Future Food Supply

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### Abstract

In a recent study, the Food and Agriculture Organization of the United Nations quantified greenhouse gas (GHG) emissions from aquaculture. The three investigated systems: Striped catfish, Nile tilapia and carp, revealed emission of 1.37, 1.58 and 1.84 kg CO<sub>2</sub> per kg live weight fish, respectively. These values do not include the land use and processing for feed production. GHG emissions from aquaculture, including feed production, are almost twice as high, with 87% of total GHG emissions associated to feed production. The main objective of CLIMAQUA is to develop a flexible system for the production of *Galdieria sulphuraria* (*G. sulphuraria*) biomass that can be used in a decentralized manner in the areas of aquaculture and fish processing, thus contributing to regional development and the reduction of greenhouse gases. The scientific, but also technical working objective of the project is the development of feed production technologies adapted to local environmental conditions based on *G. sulphuraria* in combination with the treatment of lowvalue side streams and the recycling of nutrients from inorganic and organic wastewater, sludge and fish residues from aquaculture. In order to broaden the applicability, not limiting the approach to a certain geographic area and assessing climate impact of feed production in different climate zones, *G. sulphuraria* biomass productions will be carried out in Africa (South Africa with moderate and subtropical climate) and Europe (Norway, with temperate and marine climate). The long sun exposure duration over the year in South Africa is beneficial to the cultivation of phototrophic algal strains utilizing nutrient-rich wastewater, while the relatively long dark duration in Norway indicates the cultivation of heterotrophic strains utilizing nutrient-rich sludge from aquaculture. Making use of regional environmental conditions, such as temperature and sunshine duration, can contribute to GHG emission deduction by reduced temperature regulation and artificial illumination.