

Application of Next Generation Sequencing to analyse and monitor microbial community throughout depuration treatment

Next Generation Sequencing technology (NGS) is a powerful approach that allows high-throughput massive parallel sequencing of DNA from different organisms yielding millions or billions of sequences from a single sample. Each sequence is then compared to other sequences available in public or private databases and identified, providing the whole picture of the composition of different organisms present in the analysed sample. Analysis of the microbial populations through DNA/RNA sequencing based on NGS Illumina MiSeq technology is an extremely powerful tool and a technologically advanced efficient way to identify and distinguish different microbial species and strains within a sample and should be used as a benchmark in future monitoring throughout depuration treatments and population dynamics studies. Traditional molecular methods for identifying organisms based on DNA/RNA analysis are often slow and organism specific, thus not allowing the analysis of millions of different microorganisms in a single sample test. Moreover, classic identification of microalgae based on microscopic visualization often are not able to discriminate between morphologically similar microalgae. A NGS tool, capable of overcoming the limits of morphological discrimination through microscopy, is a fundamental component of a successful large-scale microalgae production.

Next Generation Sequencing workflow

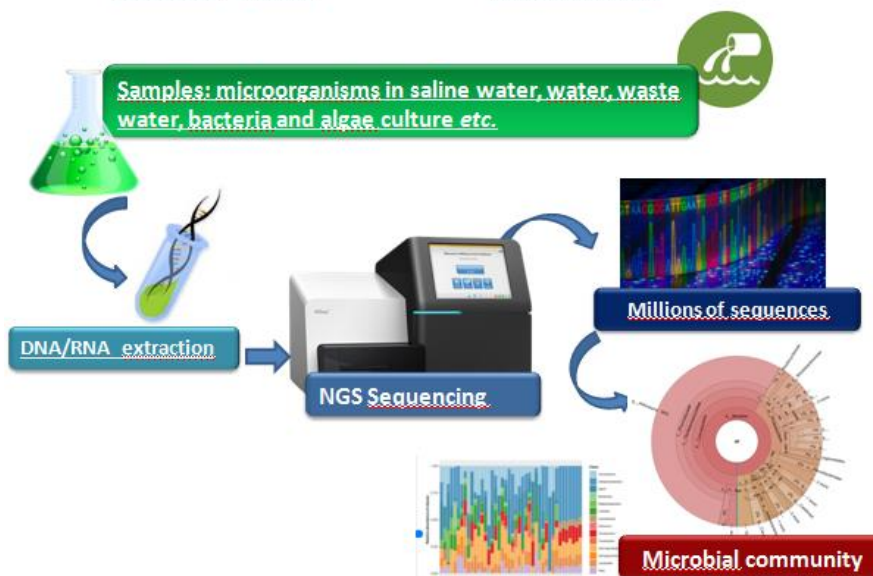


Figure 1: DNA is extracted from different samples (saline water, culture, waste water *etc.*) containing a complex microbial community. In laboratory, specific regions (16S rRNA/18S rRNA) are amplified and sequenced on MiSeq Illumina machine. The output consists of millions of sequences identified by comparison with reference databases. The composition of the microbial community is defined and analysed.

All NGS analyses in SaltGae project were performed by PTP Science Park (<https://www.ptp.it>), project partner.