

# Assessment of deep water nutrient supply for an offshore *Ulva sp.* cultivation project in the Eastern Mediterranean Sea

**Meiron Zollmann**, The Department of Environmental Studies, Porter School of Environmental and Earth Sciences, TAU

## Supervisors:

**Alexander Golberg**, The Department of Environmental Studies, TAU

**Hadar Traugott, Alexander Liberzon**, School of Mechanical Engineering, TAU,

## Abstract:

Offshore cultivation of marine macroalgae is as a potential sustainable resource for fuel, food and chemicals. Offshore, the high productivity of macroalgae cultivation depends on external nitrogen supply. The current work examines the idea of supplying nitrogen for *Ulva sp.* cultivation in the oligotrophic Eastern Mediterranean Sea (EMS), by artificial upwelling of nutrient-rich deep seawater (DSW). Growth rates, protein and starch contents of *Ulva sp.* were measured for time varying fertilization with nitrate concentrations corresponding to nutrient concentrations of DSW at increasing depths of the EMS. A maximal daily growth rate of 18% was measured for fertilization ten times per week with  $5.8\mu\text{M}$ , which corresponds to the artificial upwelling from the depth of 700 m at EMS. Protein and starch contents ranged between 1-6% and 8-15% of dry weight. Finally, yields and energetic costs of DSW pumping were modeled for an example case of 10-hectare offshore farm. The model predicts a high productivity but low energetic efficiency, which can be improved by coupling the biomass production with offshore power sources such as ocean thermal energy conversion.