Spring ponds - algal biomass systems

Project Staff	Principal investigator:	Dr S Heaven
	Named investigator:	Dr AM Salter
	Named investigator:	Dr LN Pak
	Named investigator:	Prof. CJ Banks
Start year	2005	
Finish year	Ongoing	

Experimental algal ponds in Almaty, Kazakhstan

Work to date

This work is a continuation and development of previous projects on waste stabilisation pond systems, carried out in conjunction with partners in Kazakhstan (see INTAS and INCO-Copernicus projects in this area). The research considers a range of factors affecting algal revival and growth, focusing particularly on phenomena in the unsteady state period occurring between the end of winter and the onset of summer conditions.

Instrumented ponds in Kazakhstan

The results of the work have led to novel approaches aimed at designing for seasonal variation and local climate conditions. The research has now developed into the broader theme of non-steady state conditions, with much wider applications.

Research areas include

- Development of simple climate-based models for design and performance of pond systems in different regions
- Application of existing complex models to algal systems
- Investigation of the potential of parameters such as oxygen productivity as an indicator of the health of algal systems
- Light penetration in pure and mixed algal cultures
- Growth of other microbial groups, such as purple non-sulphur bacteria

Cultures of Chlorella, Scenedesmus and mixed purple bacteria

Algal biomass

The work is based on operation, monitoring and modelling of algal systems, with facilities including instrumented ponds and 1000-litre temperature-controlled tanks for algal growth. Work carried out by the Bioenergy group is also looking at the potential for algal production as a source of biomass for renewable energy and product generation for biorefineries.
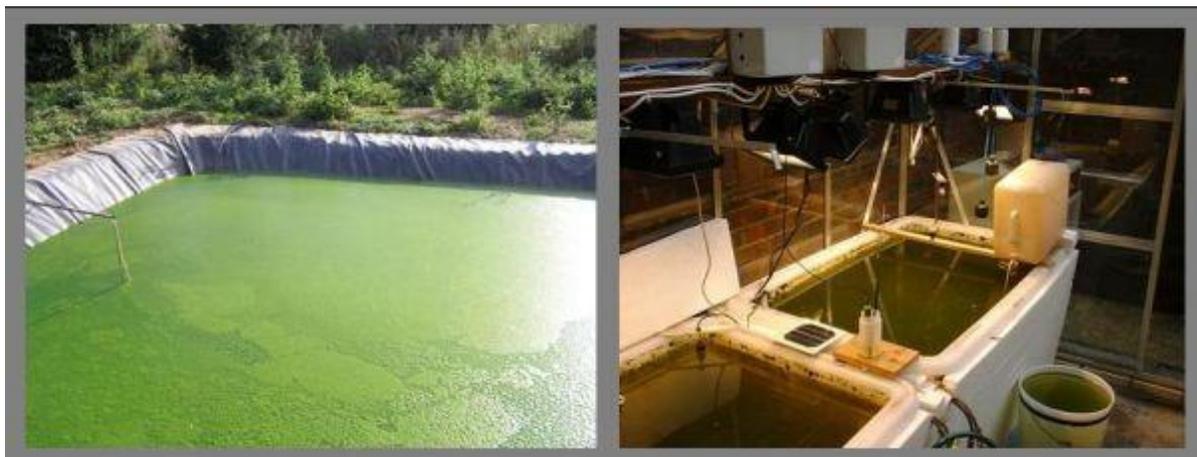
Growth in natural and semi-controlled conditions

Collaborators

Almaty Univerity of Power Engineering and telecommunications

Publications

Heaven, Sonia, Salter, Andrew M., Clarke, Derek and Pak, Lyubov N. (2012) Algal wastewater treatment systems for seasonal climates: application of a simple modelling approach to generate local and regional design guidelines. Water Research, 46, (7), 2307-2323. (doi:10.1016/j.watres.2012.01.041).

Whalley, C.P., Heaven, S., Banks, C.J. and Salter, A.M. (2012) Seasonally loaded waste stabilisation ponds: a novel application for intermittent discharge. Water Science & Technology, 66, (9), 1893-1899. (doi:10.2166/wst.2012.397).

Heaven, S., Salter, A.M. and Clarke, D. (2011) Calibration of a simple model for waste stabilisation pond performance in seasonal climates. Water Science and Technology (In Press).

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