The University Of Sheffield.

Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

REstoratioN of Eutrophic Waters
RENEW
Harvesting Algae Efficiently

NERC: NE/K015591/1
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Eutrophic waters

Algal Blooms and Eutrophication
- 30-40% of the world's lakes and reservoirs
- >400 coastal dead zones (expanding at 10% per decade)
- England: 77% of surface water is eutrophic
- England & Wales Economic damage: £75-114 million/yr
- US Economic damage: $2.2 billion/yr
- In China, non-point source pollution accounts for 40-50% of TN/TP pollutants

Localised treatment

Existing Remediation Methods
- Policy/legislation
- Biomanipulation (trophic cascades)

e.g. adding predatory fish to alter food web structure and increase presence of 'algae-eaters'

- Immobilisation of nutrients

Biomass Removal

Microflotation Technology (perlemax.com)
- Novel, award-winning device
- Bubbles generated under oscillatory flow.
- Forms non-coalescing, uniform microbubbles
- Forms bubbles 30 times smaller than standard Dissolved Air Flotation (DAF)
- Traditional cost of harvesting - 20-30% of total production of biofuel
- **Microflotation**: Uses 1000 times less energy than DAF
  >99% efficient algal recovery

Affordable – Efficient – Scalable Harvesting

Funding Goals:
- Pilot scale investigations of a low energy algal harvesting device for restoration of waterways
- Investigate the environmental, economic and social impacts of the process
- Offset energy input costs through resource recovery from recovered biomass

Resource Recovery

Phosphorus:
- Crucial to global food security
- By 2050 we will require 70% more food than produced today
- Phosphate rock extraction significantly effected by physical, economic, energy or legal constraints

Protein:
- Use in animal feed

Biomass:
- Feedstock for Anaerobic Digestion

Restoration with economic benefits

Biofuel:
- Harvesting from eutrophic water reduces dependence on rock phosphate for industrial growth

http://www.sheffield.ac.uk/cbe/research/renew Email: Renew@sheffield.ac.uk