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CO	Confidential, only for members of the consortium (including the Commission Services)	



MarBEF Supported Workshop

Measuring Biodiversity and Ecosystem Function in Estuarine Systems.

(18th – 22nd June 2007)

By Rebecca Aspden, and David M. Paterson

The workshop ‘Measuring Biodiversity and Ecosystem Function in Estuarine Systems’ was carried out for a third year at St Andrews University (18th-22nd June 2007), as part of the MarBEF Core Strategic Programme.



Figure 1: Study site: The Eden Estuary

Researchers examining depositional systems employ a variety of techniques but often have little guidance as to how to balance their aims with requirements, capabilities and costs. The workshop integrated the theory and practice of assessing ecosystem function in estuarine systems, and was aimed at early stage researchers (PhD and early post-doctoral researchers) or scientists returning/changing to estuarine study who wished to develop their understanding from a functional perspective and be introduced to the most recently developed methods. As such participants were given the chance to learn techniques carried out by SERG (Sediment Ecology Research Group) in the Gatty Marine Laboratory (University of St Andrews, Scotland).

The recently completed EU project HIMOM produced a toolbox of techniques designed for the sampling of tidal flats. The methodology, as well as experiences gained from road-testing the techniques, formed a key component of the workshop. All participants were given the HIMOM CD-ROM which includes a book of protocols with advice in local application, case studies and video demonstrations.

The week consisted of a variety of lectures from experts in the field, including plenty of hands on experience with the equipment both in the laboratory and out at one of the local study sites (figure 2).



Measuring Biodiversity and Ecosystem Function in Estuarine Systems



Monday 18th June : Harold Mitchell Building (Lecture theatre (LT))

- 10:00 Introduction including safety (D.M. Paterson) (Lab)
10:15 Estuarine systems and ecosystem function (D.M. Paterson) (Lecture theatre, LT)
10.45 *Tea-break*
11.15 Introduction to the Hierarchical Monitoring Method concept (R.Aspden) (LT)
11.45 EPS and the role of microphytobenthic mats in estuarine systems (R.Perkins/D.Paterson) (LT)
12.30 *Lunch in town (TBA)*
14.00 Introduction to the measurement of sediment stability (LT) (J Saunders)
14.15 Introduction to spectral reflectance (LT) (B Jesus)
14.30 Introduction to PAM fluorescence (LT) (R. Perkins)
15.15 Hands on experience with the equipment we will be using tomorrow (Lab)

Tuesday 19th June (Low tide 12.18 BST)

- 09.00 Prepare and pack equipment for field work (Lab)
11.00 Field work at the Eden Estuary
14.00 *Lunch provided at lab*
15.00 Sieve cores and prepare samples for freeze drying over night (Lab)
16.00 *Measuring biodiversity and ecosystem function in the marine benthos (M.Solan) (LT)*

Wednesday 20th June

- 9.00 Continue to sieve cores and sample prep, clean and tidy equipment (Lab).
10:30 *Tea-break*
11.00 Why pigments are important (E.Defew) (LT)
11.15 *Introduction to Biodiversity measurements (A.Magurran) (LT)*
12.15 Introduction to EPS analysis (S. Gerbersdorf) (LT)
12.45 *Lunch (feel free to head into town)*
14.00 Introduction to Low Temperature Scanning Electron Microscopy (I.Davidson) (LT)
14.30 Up to Geog for EM demonstration and particle size demonstration.

Thursday 21st June

- 09.00 Macrofauna identification session (R.Aspden) (LT, lab)
10.30 *Tea-break*
11.00 Continue macrofauna identification session and final pigment analysis (Lab)
12.30 *Lunch (feel free to head into town)*
14.00 Diatom session (E. Defew) (LT, lab)
16.30 Introduction to community analysis (J.Saunders)

Friday 22nd June

- 09:00 Free time to finish off analysis and prepare brief presentations.
10.30 Participant presentations (Lab)
12.00 Course review (Lab)
13.00 Course ends.

Figure 2: Schedule of the workshop.

The first day of the workshop consisted of introductory presentations on estuarine systems and ecosystem function, the hierarchical monitoring method concept, biodiversity measurements, EPS and the role of microphytobenthic mats in estuarine systems, and PAM fluorescence. Introductions to equipment, followed by guided use in the laboratory to familiarise participants with the techniques was provided, along with any background or specialist knowledge required. Further presentations were given throughout the week, on various topics such as microphytobenthic identification, low temperature scanning electron microscopy, macrofauna identification, extracellular polymeric substance analysis and community analysis.

Guest lectures were presented throughout the week from a range of experts in each of the subjects. The lectures were presented by Dr Rupert Perkins (University of Cardiff) – “PAM fluorescence”, Professor Anne Magurran (University of St Andrews) - “Introduction to biodiversity measurements”, Dr Bruno Jesus – “Introduction to spectral reflectance”, and Dr Martin Solan (University of Aberdeen) – “Measuring biodiversity and ecosystem function in the marine benthos”. These additional lectures were greeted with great enthusiasm by the participants, and the feedback received after each of the presentations was very positive.



Figure 3: Participants are taught how to take fluorescence measurements by Dr Rupert Perkins.



Figure 4: Participants gained experience in various techniques including spectral reflectance.

Field work took place on the afternoon of the second day and provided an opportunity for participants to carry out techniques in situ, as well as providing the chance to carry out field work in estuarine systems to those with no prior experience. Emphasis was placed on this aspect of the workshop as participants from previous workshops had expressed how useful they found this experience as it helped put the techniques they were learning into context.

Following on from the field work the participants were provided with laboratory facilities to carry out a suite of measurements using the samples they collected in the field:

- **Water content**
- **Wet bulk density**
- **Colloidal-S carbohydrate**

- **Organic content**
- **Pigment analysis using spectrophotometry**
- **Fluorescence using a field fluorometer**
- **Sediment stability using the cohesive strength meter and shear vane**
- **Macrofaunal taxonomy**
- **Microphytobenthic composition using microscopy**
- **Sediment surface analysis using low temperature scanning electron microscopy.**



Figure 5: Participants carrying out laboratory analysis on the samples obtained during the field work.

A feedback form was distributed to each of the participants and the information was collected at the end of the course. From the forms it was determined that all participants enjoyed the experience and found it fulfilled all the course requirements. A couple of participants suggested that they could be allowed to focus on certain aspects of the course rather than take part in all the techniques. This would apply to those participants with prior knowledge of some techniques who have no wish to spend the day learning a technique they have already mastered. This suggestion will be incorporated into the course if it is held again

A great week was had by all and SERG would like to thank all the participants for their enthusiasm throughout the workshop.

List of participants from the workshop:

Lien Steenhuyse - University Ghent
Helena Coelho - CESAM
Jayne Fitch - Uni College Dublin
Bart Vanelslander - University Ghent
Eva Maria Zetsche - University of Aberdeen

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