Cambridge Environmental Assessments

PS2339

Assessing the temporal and seasonal changes in the ecology of untreated mesocosms and natural water bodies

Alan Lawrence

PS2339 background

- **Uncertainty exists with regards to interpretation of mesocosm studies…**
- **How do the ecological communities in mesocosms relate to those in real edge of field water bodies?**

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Aquatic mesocosms

- **Experimental systems designed to represent water bodies potentially exposed to contaminants**
- **Allow for field scale assessment of direct & indirect effects**
  - **Populations**
  - **Communities**
  - **Recovery, recolonisation**
- **Mostly static, some differences in design**
- **Often ‘re-set’ during winter refurbishment**

Project aims to answer some specific questions…

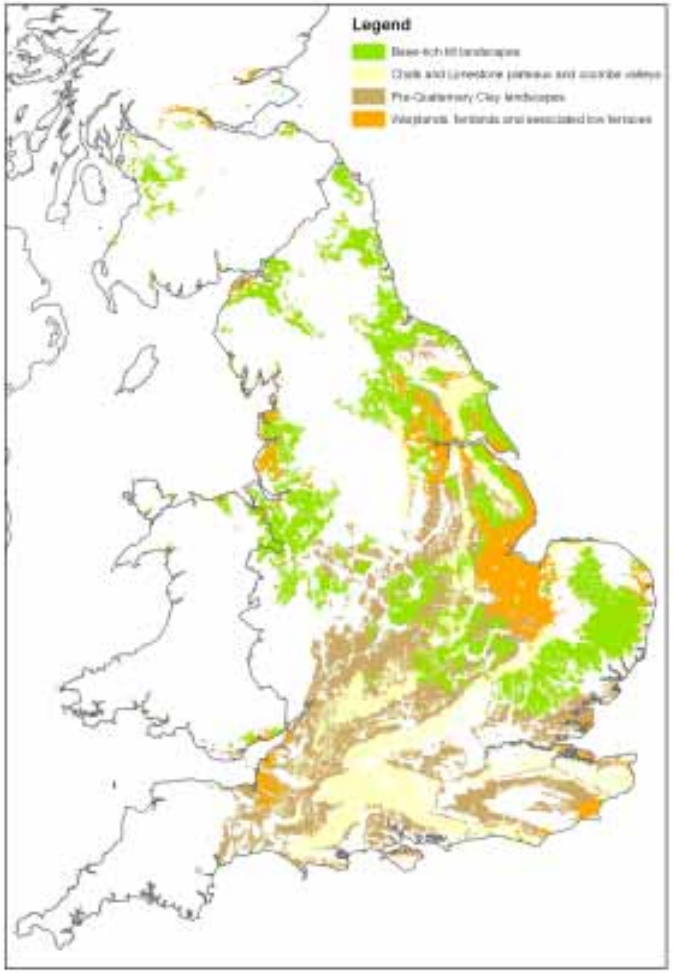
- **How ecologically representative are mesocosms of natural water bodies in the agricultural landscape?**
- **Do summer mesocosm studies represent the worst case scenario in terms of seasonal changes in communities?**
- **Could seasonal differences affect uncertainty associated with endpoints derived from spring/summer mesocosm studies for pesticides applied in autumn/winter?**

Outline of the project

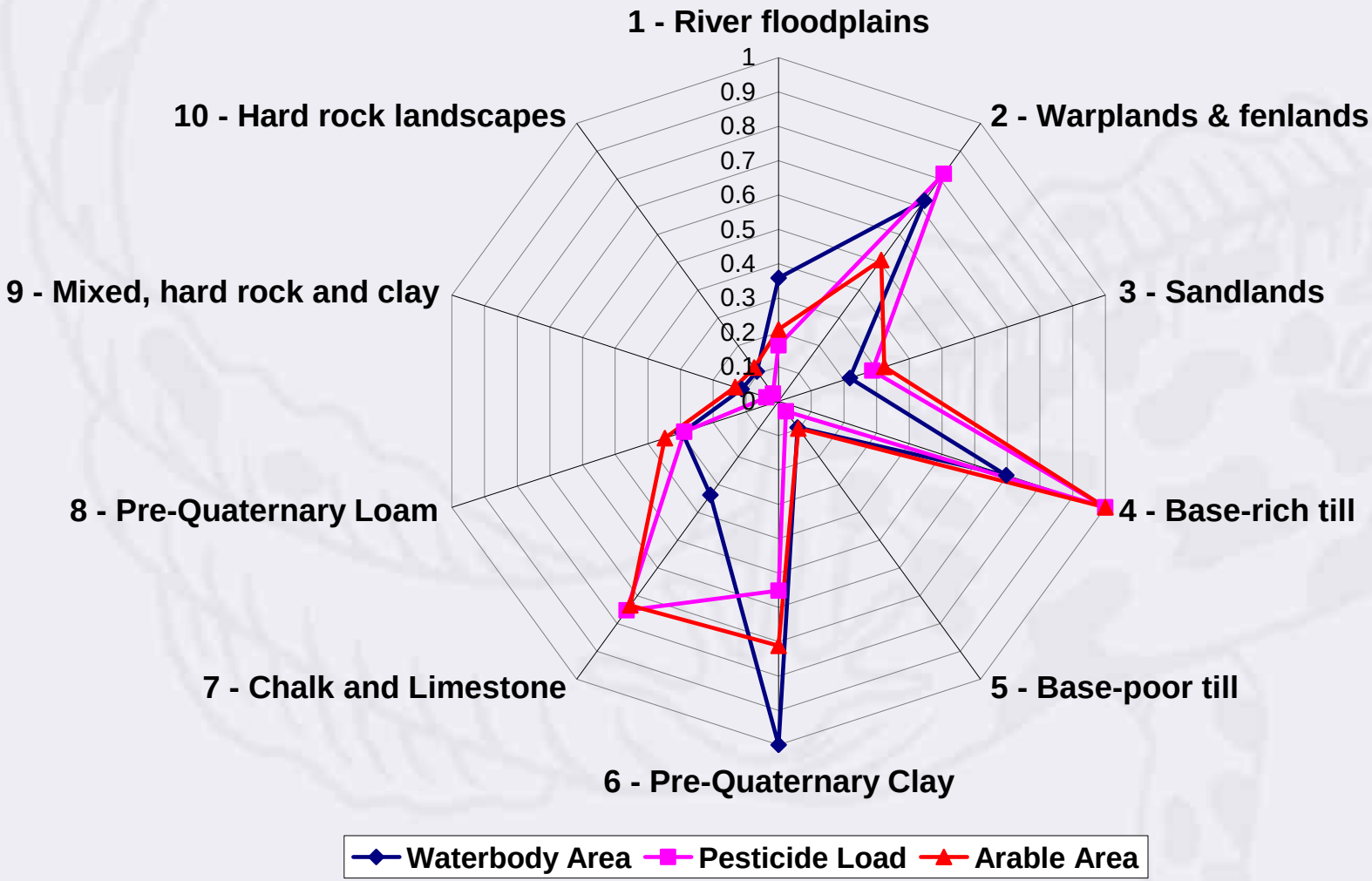
- **Two-year field sampling programme**
  - 36 edge of field water bodies
  - 3 mesocosm facilities (CEA, Mesocosm GmbH, Uni. Aachen)
- **Monthly sampling**
  - Biota (macroinvertebrates, zooplankton, phytoplankton, macrophytes)
  - Phys-chem (conductivity, pH, temperature, dissolved sediment, dissolved oxygen)

Landscape selection

- **Initial analysis of pesticide pressure, arable land, water body density – Greg Hughes**
- **Four landscape classes identified**
  - Eutrophic tills (Cambridgeshire & Suffolk)
  - Warplands & fenlands (Lincolnshire)
  - Pre-quarternary clays (Oxfordshire)
  - Chalks & limestone (various locations)



Landscape selection



Selection of sampling sites

- **Aim of 36 sampling sites in total**
- **Approx. 200 candidate sites identified; initially, proposed equal division between landscapes…**
- **Initial site visits suggested:**
  - **Sampling effort should be proportional to water body density**
  - **Types of water body sampled should be representative of those common in landscape class**
- **Three water body types identified: ponds, ditches, streams**

Sampling

Distribution of sampling effort reflects dominant water body types

Landscape	Ponds	Ditches	Streams	**Total**
Warplands	0	6	0	**6**
Eutrophic tills	7	0	6	**13**
Pre-quarternary clays	5	4	4	**13**
Chalk & limestone	0	0	4	**4**
Total	**12**	**10**	**14**	**36**

Some common points to address

- **Water bodies may dry out – *selected those which should remain wet***
- **Some drains are very large – *confine to <3 m***
- **Some candidate sites in pasture – *selected water bodies in arable landscape***
- **Access – *for two years***
- **Drainflow into ponds – *common***
- **Degraded sites – *not selected***
- **Overall, have chosen what is *representative* of water bodies in each landscape…**

Degraded sites!

Analysis, progress

- Diversity, rarity, similarity indices
- Multivariate analysis of community structures
- Abundance, life history, species at risk
- Analysis: Seamus Taylor, Naomi Blake

- Sampling has just begun
- Sampling to run until April 2010
- Dissemination at conferences, papers, posters

Thanks for your attention

For further information

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