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Legislative drivers: opportunities and challenges for river management

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Plan Design Enable

The role of a geomorphological consultant

- Geomorphological consultants in the UK have started to become more prevalent in consultancies over the last 10 years
- Prior to this time advice was dominated by geomorphologists from academia
- Use of geomorphologists have occurred in concurrent with emergence of river restoration, working with natural processes and general improvements to habitat
- Geomorphologists now used in a range of projects such as river restoration, weir removal, sediment management, bank erosion assessments, EIA and sustainable flood management
- Dominant techniques are stream reconnaissance / rapid geomorphology assessments over a short reach or catchment baseline surveys / fluvial audits
- Legislative changes resulting from European Union Directives has led to increased opportunities for geomorphologists

Legislative Drivers – European Directives

- Key Directives affecting river management include:
  - Habitats Directive (Directive 92/43/EEC)
    - Transposed into English and Welsh law through the Conservation of Habitats and Species Regulations 1994 have now replaced by Conservation of Habitats and Species Regulations 2010
  - Water Framework Directive (Directive 2000/60/EC)
    - Transposed into English and Welsh law through the Water Environment (Water Framework Directive) England and Wales Regulations 2003
  - Floods Directive (Directive 2007/60/EC)
    - Transposed into English and Welsh law through the Flood Risk Regulations 2009 and consolidated through the Floods and Water Management Act 2010

Habitats Directive

Council Directive 92/43/EEC on the Conservation of natural habitats and wild fauna and flora, known as the Habitats Directive, was adopted in 1992

a) Aim to contribute towards ensuring bio-diversity through the conservation of natural habitats and wild fauna and flora

b) Measures should be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora

c) Measures need to take into account the economic, social and cultural requirements and regional and local characteristics

(adapted from Directive 1992/43/EEC of the European Parliament and of the Council)

- Around 2000km of river length in England has been designated under this legislation
- Measures need to be adopted in the designated rivers that will either maintain or restore the river towards favourable conservation status

Water Framework Directive

The purpose of the Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which:

a. prevents further deterioration and protects and enhances the status of aquatic ecosystems while protecting the wider water environment;

b. promotes sustainable water usage;

c. progressive reduction of individual pollutants or groups of pollutants that present a significant threat to the water environment;

d. ensures the progressive reduction of pollution of groundwater;

e. contributes to mitigating the effects of floods and droughts.

(adapted from Directive 2000/60/EC of the European Parliament and of the Council)

Water Framework Directive – general principles

- Good Ecological Status (GES)
  - Principal objective for all waterbodies is to prevent further deterioration and ensure that they will improve towards favourable status (good) over time through actions undertaken in the River Basin Management cycles
- Heavily Modified Waterbodies (HMWB) / Artificial waterbodies
  - Heavily Modified Waterbody – is an existing body of water that has had it's original appearance significantly altered for a particular purpose the use of which needs to be retained (eg for navigation or flood defence)
  - Artificial Waterbody is a waterbody that is man-made in nature (eg canal)
  - GES will not need to be achieved in these instances but Good Ecological Potential (GEP) will
  - GEP will be reached when all the programme of measures identified for the particular waterbody are judged to be in place

Hydromorphology

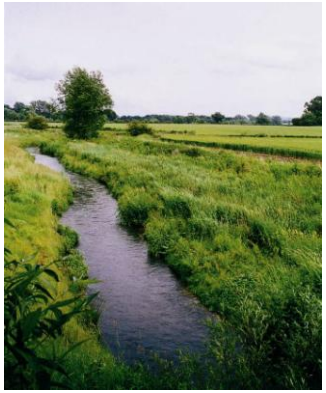
- Hydromorphology is a term that encompasses hydrological and geomorphological characteristics, which in combination, support a healthy ecology
- 1st time hydromorphology specifically mentioned in legislation
- Hydromorphology quality elements (for rivers) are composed of:
  - Hydrological regime
    - Quantity and dynamics of flow
    - Connection to ground water bodies
  - River Continuity
  - Morphological conditions
    - River depth and width variation
    - Structure and substrate of river bed
    - Structure of the riparian zone
- Hydromorphology is critical for
  - Mitigation measures - Heavily Modified Waterbodies/Artificial waterbodies
  - Improving waterbodies towards Good Ecological Status
  - Distinction between High and Good status

Floods Directive

- The purpose of this Directive is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community.
- Requires Member States to:
  a) carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding.
  b) draw up flood risk maps by 2013
  c) establish flood risk management plans focused on prevention, protection and preparedness by 2015
  d) Directive applies to inland waters as well as all coastal waters
- Floods and Water Management Act (England and Wales) also encompasses a range of new measures under the Pitt review of 2007 floods which includes sustainable drainage and water level management

WFD Mitigation measures

- To reach GEP a variety of mitigation measures are available. Each waterbody will have measures that have not been identified which need to be present to achieve GEP
- Examples of mitigation measures:
  - Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution
  - Protect and enhance ecological value of marginal aquatic habitat, banks and riparian zone



  - Protect and restore historic aquatic habitats

WFD Mitigation measures

- Examples of mitigation measures:
  - Install fish passes

  - Removal of structures

WFD Mitigation measures

- Examples of mitigation measures:
  - Sediment management strategies (develop and revise) which could include a) substrate reinstatement, b) sediment traps, c) allow natural recovery minimising maintenance, d) riffle construction, e) reduce all bar necessary management in flood risk areas

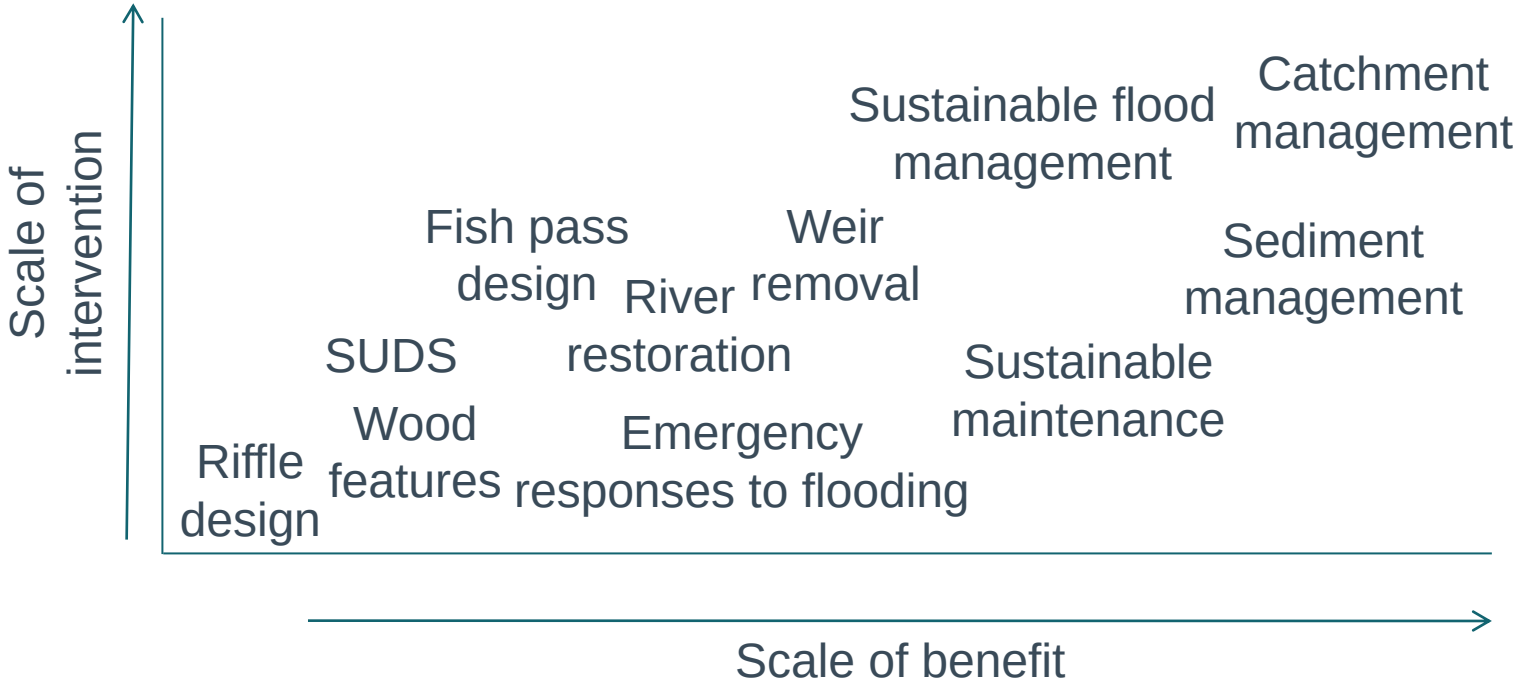


  - Increase in-channel morphological diversity, e.g. install instream features; 2 stage channels


  - Re-opening existing culvert

Emerging Research Agendas – tools for practical management

- Various directives have led to the need for more sustainable management of water to improve our water environment
- Frameworks now in place to enable such techniques to be used
- Need improved scientific justification of different measures



SUDS = Sustainable Urban Drainage Systems

Linkages between research and practical river management

- Large array of measures that are currently available for use in sustainable river management to ensure achievement of objectives of the various Directives
- Multidisciplinary partnerships and multidisciplinary teams are key to delivering benefits on the ground
- Increased evidence based required for the success of the various measures
- Need to further enhance guidance documentation
- Monitoring and appraisals need to be undertaken more frequently to develop good practice guidelines
- Beneficial for new research to tie into legislative requirements
- To ensure wide adoption any new research tool needs to be scientifically robust, cost effective and widely available (no restrictive licences)

Dissemination

- Need improved connection between research and end users to ensure applied research can get adopted into every day practice
- At times research can get ‘lost’ between research report production/paper and guidance documentation that can have practical benefits to wide variety of end users
- Good examples where research has been adopted eg
  - Guidebook of applied fluvial geomorphology outlining techniques such as river reconnaissance/fluvial auditing
- Need to enable continue collection of evidence in this regard
- Responsibilities also on statutory authorities who commission work to disseminate work transparently and efficiently
  - eg Scottish Environment Protection Agency
    - Leading dissemination of guidance manuals on their website
- Dissemination bodies – eg UK River Restoration Centre

Conclusions

- Recent legislation has led to significant opportunities for sustainable river management
- Frameworks are now in place to justify a variety of techniques to be used to improve habitat
- Need to be have research agenda to further justify methods and evolve new techniques to support practical application
- Techniques need to be scientifically robust, cost effective and widely available
- Dissemination of research results to a wide audience is going to be critical for success
- Forthcoming years there is going to be an increasing need to do more for less
- Improving sustainable management under this scenario is possible but it will require all bodies to work together to ensure good practice can be adopted from conception of strategies/projects all the way through to construction