

## **Cycleau; integrating research and decision-making for whole river basin management**

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**Abstract** The Cycleau project is a large and complex EU-funded project that links regions in Britain, Ireland and France with similar environmental and social issues. It aims to develop a more holistic, generic approach and methodology to whole catchment management by promoting understanding of issues affecting the whole river basin and estuary, and working in partnership with all stakeholders to plan and deliver environmental improvements. It will collate quantitative information from a variety of sources and at a variety of scales in order to inform decision-making within catchments. The first step is to interpret and present scientific data in order to inform the community and management of the area. The achievement of long-term sustainable outputs as outlined in the Water Framework Directive will require an integrated approach to presentation of scientific data and true partnership-working to involve the whole community in the decision-making process. Several examples of demonstration projects in Cornwall are presented.

**Key words** catchment management; decision making; Fal; Fowey; habitats; Helford; physical processes; pollution; Red River; water framework directive

### **THE CYCLEAU PROJECT**

Cycleau aims to develop a common, transnational, holistic approach to the planning and management of catchments. In particular, the project aims to share information and know-how and to look for solutions to problems common to many European rivers, estuaries and coasts. The driving force behind the project is the implementation of the Water Framework Directive (*OJL 327*).

The project ran from July 2003 to December 2006. It was funded by the NWE Interreg IIIB program with a budget of just over 13 million €, 7.8 million € of which were funded through European Regional Development Fund funding. The project includes partners and catchments in the UK, France and Ireland. The lead partner is the Environment Agency for England and Wales. The project started with 11 partners of various types. Some were technical organizations, such as research institutes and universities whereas others were public or charitable organizations such as local authorities.

#### **The sites**

Eleven river catchment areas have been chosen as demonstration sites. In the UK: Fal and Helford, Red River, Fowey, Teign, Slapton Ley, Dart, Exe and the Axe and Char

rivers. In France; the Belon in Brittany and the Le Payre in Vendee. The River Moy in Co. Mayo, Ireland, completes the group. These sites were to be used to test elements of the Cycleau methodology throughout the lifetime of the project. The sites selected share predominantly rural economies, relying on high quality coastal, estuarine and river environments. They share common issues such as the need to strengthen dialogue between farmers (e.g. sources of diffuse pollution) and local populations and stakeholders (e.g. shellfish farmers). The Cycleau approach is based on the water cycle and deals with whole river catchments as a single entity from source to estuary mouth.

Although a large and complex project, the strategic objectives of Cycleau are relatively clear. However, the decision-making in order to achieve those objectives relies upon good scientific knowledge of physical, social and ecological processes, an ability to integrate information from different sources in a meaningful and effective way, an understanding of management strategies and an ability to communicate all this effectively to all stakeholders including the general public.

### **Cycleau methodology**

The project aims to develop a shared, integrated approach to the planning and management of natural water resources in the coastal zone. Cycleau takes an innovative perspective; taking the principles of combining resource planning and management in the coastal zone and applying them to whole catchment planning and management. Cycleau aims to produce a “roadmap” methodology for communities wishing to use best practice environmental management.

## **THE CYCLEAU ACTIONS**

The actions in the project are comprised of three aspects: baseline information, participation and intervention actions.

### **Information**

Information actions are aimed at obtaining more targeted or better information on catchments, which is an essential prerequisite for any catchment management exercise as it provides the baseline of current conditions in the catchment and highlights where the issues and opportunities lie that need to be addressed. Often baseline information on catchments is not holistic in its approach, but tends to focus on a limited number of elements. However, successful catchment planning needs to encompass economic, community and environmental activity.

*Catchment Profiling* aims to identify what information is available on each catchment, and to collate, analyse and present this information in an accessible way.

*Risk Assessment* aims to develop a common risk assessment methodology and to use this to assess the impact and likelihood of events and activities that could prevent the achievement of Cycleau objectives within the catchment.

*Targets* aims to identify project targets that are realistic, relevant, achievable and measurable.

At the time of writing, the first catchment profiles have been completed ([www.cycleaucornwall.org.uk](http://www.cycleaucornwall.org.uk)), risk assessment applied to selected issues is underway, and targets arising from the risk assessment have yet to be set.

## **Participation**

This action is called Stakeholder and Public Participation. It aims to find out what people think about catchment and water management and how they can be better involved, informed and empowered. It is a cross-cutting element; stakeholders and the public are to be involved in all the actions within the project. The development of tools to raise public awareness is part of the innovative aspect of the participation action. Cycleau will be testing new techniques of community engagement and empowerment in water management systems. As such, Cycleau is a laboratory for decision-making processes in water management projects. It aims to develop local participation to act as a model for programmes on a wider scale such as the River Basin District which in SW Britain consists of very many different small river catchments.

## **Action**

The Intervention Actions explore how issues which are common denominators of catchment profiling and planning are addressed and built into the Cycleau methodology.

*Physical Processes* aims to increase understanding of how sediment transport throughout the catchment links to estuary dynamics. Activities such as dredging in the Belon River in Brittany will aim to tackle sedimentation problems.

*Diffuse Pollution* aims to develop methods to mitigate pressures from agricultural, maritime and industrial activities, e.g. development of a small grants scheme for farmers in association with the Farming and Wildlife Advisory Group (FWAG).

*Acute Pollution* aims to develop a methodology for planning the control and management of acute pollution incidents such as oil spills.

*Habitat Action* aims to mitigate the impacts of human activity on habitats and increase environmental carrying capacity of ecosystems to positively contribute to biodiversity, social and economic activity.

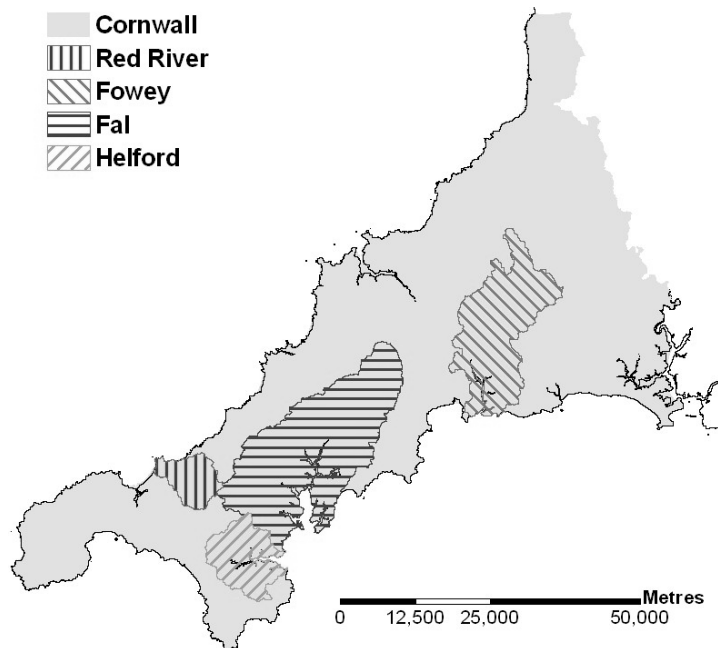
## **THE CYCLEAU PROJECT IN CORNWALL**

Cycleau in Cornwall has the largest number of actions of any partner (Table 1). It covers three catchments (almost one third of the area of Cornwall, Fig. 1) under political control of over half the elected councillors of Cornwall County Council.

For Cycleau purposes, the Fal and Helford Estuary catchments are treated as one demonstration catchment extending to their joint mouth (the Natura 2000 designation boundary). The Cycleau team is based within the Natural Environment Service of Cornwall County Council.

**Table 1** Summary of principal intervention actions and scientific studies in Cornwall.

Action	Catchment Fal and Helford	Fowey	Red River
Physical processes	(i) Analysis of distribution of TBT contaminated sediments. (ii) Demonstration of appropriate sediment management and treatment	(i) removal of sand and reducing the rate of sand input into the upper catchment (ii) Two year study of rate and quantity of sediment inputs into the estuary from the upper catchment (both suspended solids and bed load). (iii) linking reduction in inputs to minimisation of harbour dredging	–
Diffuse pollution	(i) Farm grant scheme to reduce inputs of sediment and nutrients into the Helford estuary (ii) Sediment budget for the Helford (Exeter University) (iii) Typing of <i>E. coli</i> in water and sediment samples to identify sources (Exeter University)	–	Use of a passive pilot treatment plant to demonstrate removal of metals (Zn, Cu) in the river from diffuse sources using iron-rich mine water. (Environment Agency)
Acute pollution	Trial of novel movable moored boom system to allow removal of floating oil and prevent its deflection onto sacrificial beaches.	–	–
Habitat action	(i) Audit of opportunities for habitat enhancement, restoration and re-creation to improve biodiversity and ecosystem functioning (ii) Trial of new mooring system aimed at reducing impact on marine habitats (iii) Demonstration of an outdoor wintering area for cattle with linked wetland system for nutrient and sediment reduction. (iv) Development of other opportunities to increase environmental carrying capacity of the catchment	(i) Development of marsh area as a Local Nature Reserve (ii) Development of project to demonstrate removal of invasive Japanese knotweed in headwaters. (iii) Development of other opportunities to increase environmental carrying capacity of the catchment	(i) Regeneration of a coastal sand quarry as a mosaic of sand dune and wetland habitats (ii) Enhancement and regeneration of floodplain and associated wetland habitats (iii) Development of other opportunities to increase environmental carrying capacity of the catchment



**Fig. 1** Cycleau catchments in Cornwall.

### **Information gathering**

The information gathering and interpretation for each catchment in Cornwall is co-ordinated by an Environmental Information Officer who liaises with the rest of the Cycleau team, other departments of the County Council, and other agencies and organizations to obtain data and present it as a catchment profile. The use of a digital GIS is essential to enable users to compare geographic data sets in order to inform decision-makers of key character zones, geographic issues and risks, and enable the setting of strategic and local targets within the catchment. It is hoped that it will ultimately be possible to produce a web-based interactive user-friendly version of the catchment profiles in order to enable decision-makers to visualize, interact with and understand the data and the effect that actions in one part of the catchment may have on another part (e.g. change in land use in the upper catchment of the Fowey has led to increased transport and deposition of sand in the river and potential for increased need to dredge in the estuary). This presentation of data in digital format is prejudiced by the complexity and cost of digital data licensing within the UK where data sets that have been collected using public money are not freely available to be incorporated and interpreted by the project.

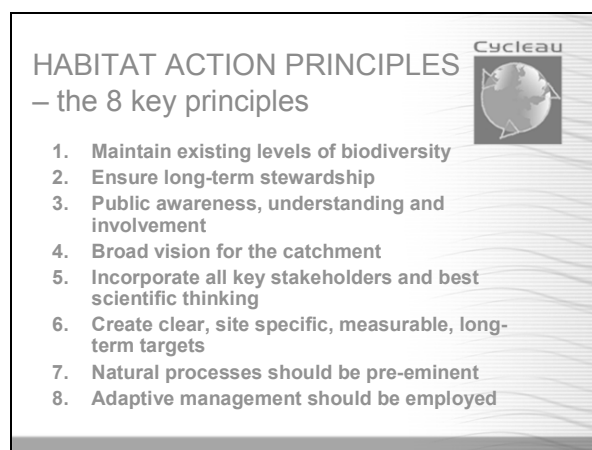
### **Participation**

Within Cornwall there are three part-time community facilitators, one for each catchment. Their role is to support voluntary partnerships (e.g. Fal/Helford Special Area of Conservation (SAC) Advisory Group; Red River Working Party; Fowey Estuary Partnership) and encourage them to take a whole catchment approach; engage the interest of the whole community in water and land management issues within the

catchment; interpret scientific issues to these “stakeholders” and co-ordinate Cycleau activity within the catchment. Although the catchments cover different areas, the number of issues does not necessarily reflect the size of the catchments. A key issue for each catchment is the need to promote understanding of the connections (both physical and social) between the upper and lower catchment and the coast. One method that has been used on the Red River is the organization of trips to physically transport people from the source to the sea. On the Fal the issue is particularly acute as there are extreme socio-economic differences between parts of the upper catchment (clay-mining, upland farming) and parts of the lower catchment (retired rock-stars, millionaires’ houses and expensive yachts. It is important that decision-makers are aware of the socio-economic data as well as the physical and ecological data when decisions on whole catchment management are made, and that each sector of the population has an equal opportunity to express their views.

### The Habitat Action theme

As well as the actions listed in Table 1, the Cornwall team are the transnational Theme Leaders on Habitat Action and are supporting the development of a “Cycleau methodology” for best practice guidance for Habitat Actions. There is a long experience of creation, restoration and management of terrestrial habitats within the Natural Environment Service of Cornwall County Council and Cycleau is bringing in new expertise in the creation, enhancement and management of wetland and marine habitats. The concept of increasing environmental carrying capacity by the optimization of ecohydromorphological units (e.g. Rodwell, 1998) is being promoted through demonstration work in Cornwall, e.g. building on previous studies (Jenkin *et al.*, 2000), and developing new studies on ecology and hydrology within the Red River flood plain in order to maximize water and metal retention and biodiversity value within the flood plain). Principles and descriptions of methodology are being developed with transnational partners via Theme Group workshops and meetings. Demonstration areas have been identified across the whole project area, principles (Fig. 2) and processes (Fig. 3) have been agreed and some discussion of best practice methods to identify issues, impacts and solutions has taken place.



**Fig. 2** Cycleau Habitat Action principles.

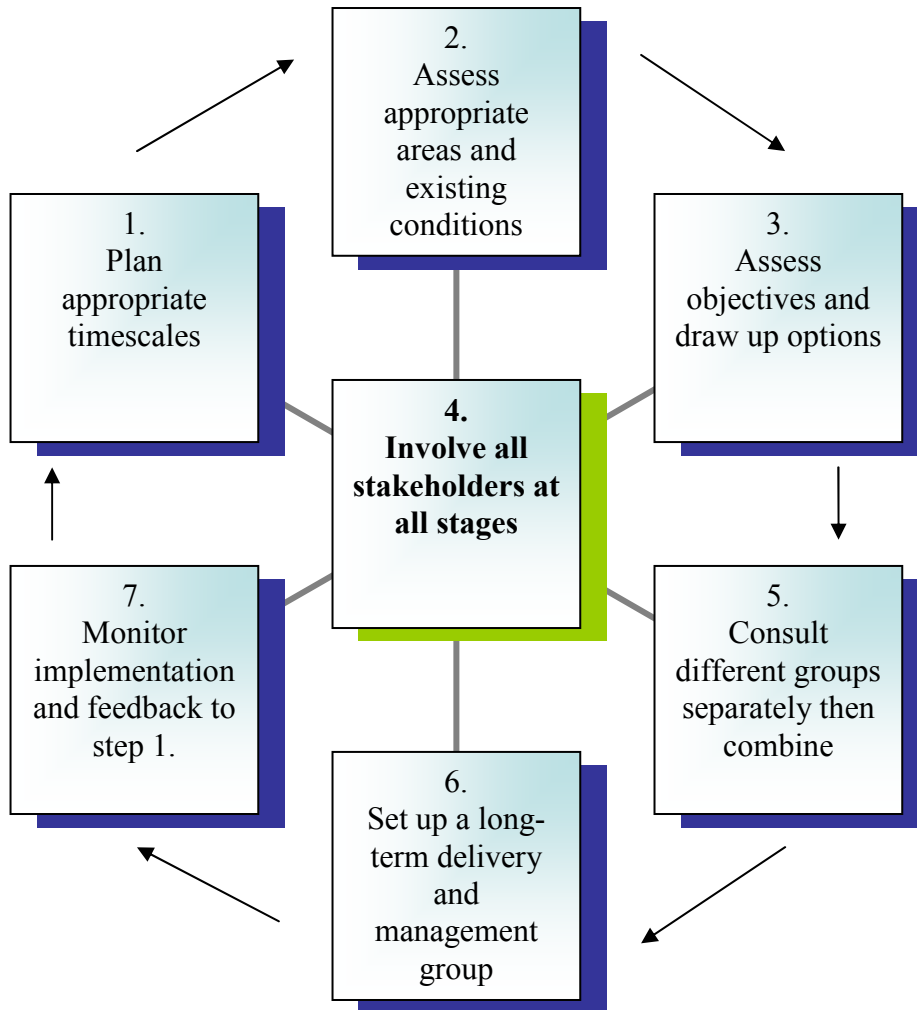


Fig 3. Processes required for effective implementation—Habitat Action Wheel.

## CONCLUSION

The Cycleau project offers the opportunity to explore issues relating to the implementation of the Water Framework. It highlights the need to collect good baseline data and to interpret it appropriately to less scientifically-minded individuals in order to engage the whole community in effective decision-making. The concept of catchment linkages is not automatically understood but the interrelationships between the physical, social and natural environment are highlighted when the water environment is used to demonstrate those linkages.

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