

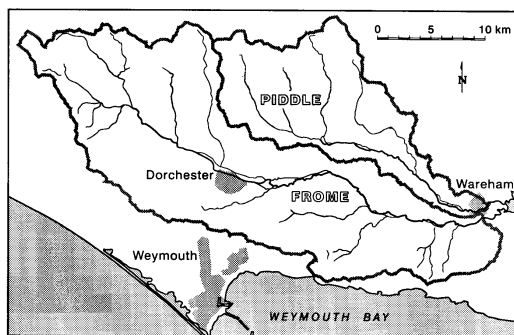
WATER AND RIVER LIFE RESEARCH IN THE FROME AND PIDDLER CATCHMENTS OF DORSET

The Natural Environment Research Council's Lowland Permeable Catchment Thematic Research Programme (LOCAR)

Introduction

In southern Britain, land-use changes, possibly drier summers and other environmental pressures increasingly affect water quality and sediment loads as well as water supplies from chalk groundwater resources. Summer water shortages have led to headwater streams drying out. Prolonged winter rains have caused groundwater flooding. Expanding housing and business areas raise water demands and increase competition between rural, urban and ecological water demands.

Wise management of these complex problems requires accurate knowledge of all facets of the water cycle. Good scientific understanding of the relationships between rainfall, recharge of groundwater stores, and runoff to rivers is needed. To help provide the basic and applied science needed to achieve this better management of water and river and wetland life, the Natural Environment Research Council (NERC) has initiated the five-year LOCAR programme of intensive research in three areas, the Pang and Lambourn catchments in Berkshire, the Frome and Piddle catchments in Dorset and the Tern catchment in Shropshire. The emphasis of this programme is on the interactions between surface water and groundwater, and between groundwater and rivers, and the effects of these interactions on the fish and other organisms in the rivers.



The Frome and Piddle Catchments

The LOCAR Programme

New instrumented sites have been set up within the study catchments to measure rainfall, evaporation, infiltration, groundwater levels and river flows so that all the components of the water cycle can be measured automatically.

Samples of water are taken at regular intervals and during storms to monitor the movement of chemicals and sediments. The new instrumentation adds to the existing data collection system operated by the Environment Agency. As a result, the Frome and the Piddle, along with the other two areas, will be among the best understood rivers in the country. Annual surveys of the habitat conditions in the rivers and of the land use examine how changes within the catchment area affect conditions in the river. The data collection and the annual surveys are the responsibility of a catchment service team based at the Centre for Ecology and Hydrology at Winfrith Technology Centre.

Following a national competition, research grants for detailed investigations have been awarded to bring together the best possible research expertise to carry out projects over the period 2002-2006.

The LOCAR projects

Six individual projects are being conducted in the Frome and Piddle catchments. Two deal with river flows and chemicals and sediment transport, one with the interaction between the deposition of fine sediment and the growth of plants in the stream, one with how the vegetation in chalk streams affects the deposition of fine sediment and seeds and other plant propagules along the river and one examines how fish use the side streams and other parts of the flood plains during periods of high water. All these projects use data from the main set of instruments but will also carry out additional investigations in the field.

A major project examines the water arriving at the ground surface and assesses its infiltration into the soil, the chemicals that it carries with it, the movement of the water into the ground and the fluctuations of the groundwater table, the chemistry of the groundwater, the emergence of groundwater along and beneath the stream beds, where groundwater and surface waters mix and the complex chemical changes that then take place. This study will test models based on investigations carried out elsewhere in the programme on new data collected in the Frome and Piddle.

Another project examines the movement of fine sediment and the chemicals attached to the

sediments, into the rivers to find out where the sediment comes from, how it is temporarily stored whether in the river channel or on the floodplain, and what happens to the chemicals attached to the sediments. In this way, sediment budgets will be calculated, facilitating forecasting of sediment problems in other catchments.

A third project investigates the impact of vegetation and its management along the Frome and Piddle on the quantity, pattern, quality and species composition of deposited fine sediment and vegetation propagules (seeds and vegetative fragments). This work will increase understanding of the best ways of managing vegetation in rivers and help in planning river restoration.



River Piddle at Baggs Mill gauging station

The fourth project looks closely at the processes by which fine sediments and the nutrients attached to them interact with plants in the rivers. It will find out how plants trap and retain sediments and the ways in which the trapped sediments affect biological and biogeochemical processes. Such relationships are fundamental to the health of the aquatic ecosystem and need to be understood if we wish to predict how either land use or climatic changes will affect the fish and other organisms in the river.

The chalk is geologically complicated and, in terms of water movements, has both fine pores through which water moves slowly and fissures through which it moves relatively rapidly. One project will establish how much of the groundwater moves through the fissures and how much through the pores and consequently how quickly rivers will rise when groundwater reaches them after extremely heavy rain. It looks at how the water moves through the chalk and investigates how any contaminants carried by the water are reduced in concentration while the water is passing through the chalk.

The sixth project sets out to establish the nature, timing and significance of off-river habitat use by

lowland river fishes in relation to hydrology and environmental conditions, and the value of these habitats for fish communities, including different life history stages. The ultimate aim is to achieve better understanding of the effects of river and catchment management plans on lowland river fish populations.



River Frome at East Stoke

Project outcomes

While operationally separate, these six projects interlink to provide detailed understanding of how water, sediment and chemicals move through the Frome and Piddle catchments. They help with sound water resources management, understanding of the impacts of land use changes and assist in the management of fisheries and the ecologically important wetlands.

The LOCAR project team members are anxious to communicate with all interested parties about the project and about ways in which the results can be used. Ways of ensuring the effectiveness of that communication are being discussed with appropriate organisations.

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