Low flow and over abstraction

Low Flow

River flow rates vary throughout the year and can change seasonally and between wet and dry years due to rainfall and ground water contributions. A natural river corridor comprises a river channel, its associated flood plain and the aquifer which can affect the flow. The flow rate, and in particular the speed of flows, will in turn modify the river channel and flood plain. Ideally there is a diversity of speed and depth of water throughout a river system. The aquatic and bankside, or riparian, communities of plants and animals are adapted to the natural range of flow within a river system. However, extreme dry or wet conditions may cause changes that can take years for plants and animals to fully recover.

When there is low flow, fine sediment can settle out more easily, oxygen levels may decrease and the channel can become narrower. This change in habitat can cause the fish and invertebrate communities to change. However, the extent and how it would change also depend on other conditions such as water quality, temperature and physical properties of the river such as gradient. Flat rivers, impoundments, such as weirs, and excess silt from the catchment will exacerbate the effects of reduced water flow.

Abstraction

Water can be abstracted from rivers and aquifers for public supply, industry, irrigation and farming such as for fish and watercress. Where this happens, this artificially lowers the flow rate. Most abstraction is non-consumptive but in the case of public supply, the water is returned downstream or even to a different catchment, leaving a stretch of river with reduced flows. In summer the effect of this can be more severe as the demand for water is higher and natural flows are lower.

Water is typically abstracted from headwaters and groundwater as these tend to have higher water quality. This mean less treatment is required to meet drinking water standards, reducing costs for water companies, their customers and the use of energy and chemicals. Abstractions in the lower reaches tend to be smaller in proportion to the local river flow.

Abstraction rates above 20,000 litres per day are licensed by the Environment Agency to ensure that the impact of multiple abstractions does not exceed the recovery capacity of the river, or limit the available water for downstream users. This is reviewed in the Catchment Abstraction Management Plan (CAMS) which identifies any waters at risk of being over licensed or over abstracted. Where such issues are identified the Environment Agency or the abstractors such as water companies will investigate their effect on flow rates and the river ecology.

The effect of abstraction can also be amplified when river channels are modified, for example over-widened, dredged, or impounded. This reduces the resilience of the river ecology to both the effects of abstraction, natural drought and flooding.

Abstraction in the Stour

In the Stour catchment, drinking water is typically abstracted from the aquifer except in the lower Stour where it is abstracted from the river at Longham and stored, with water from the River Avon in reservoirs. The aquifer fills each year with the winter rains and slowly discharges to the river through the drier summer period. Abstraction from the aquifer will reduce river levels further and possibly exacerbate stress during the 'low flow' period in late summer when flows naturally fall to their lowest levels. It may also delay the recharge of springs with autumn rainfall and is more significant in the small upper tributaries. Where abstraction is close to winterbourne tributaries, the natural dry period can be longer and conditions in drought years exacerbated.

Due to the concentration of urban development on the coast, the demand for drinking water is greatest in the lower reaches and flow rate was identified as a reason for failure of ecological condition for only 1% of the Stour water bodies in 2013. The Environment Agency has identified a number of sites where there is concern for over abstraction which have been, or are being, investigated. Whilst the CAMS reviews the broad effect of licensed abstraction, these investigations assess more closely the actual reduction in flow and determine whether the river ecology is affected by these changes. In the Stour catchment there have been areas of concern, such as the Shreen and Ashfield Water at Mere and the river Tarrant, and have subsequently been investigated. To find out more visit: www.wessexwater.co.uk/About-us/Environment/Environmental-investigations/.


Low flow at Pimperne Brook, Andy House


Sampling at a low flow site, Shawn Beaston