Floods and flow

Why do some areas flood?

Sandy soils, such as in the lower part of the Stour catchment, allows the ground to soak up water thus reducing the volume of water that runs off so the rivers fill up more slowly. Clay soils (such as in the upper Stour area) allows less water to permeate through, increasing the surface run off into the river system.

Flood risk

The character of the flood risk to communities, changes along the length of the river Stour as the geology and topography vary. The impermeable clays of the upper catchment lead to fairly quick increases in water levels after rainfall. The central band of permeable chalk on Cranborne Chase means that the river receives a groundwater feed. Water levels rise more slowly, but may remain high for some time as the groundwater continues to drain through the chalk. The lower catchment has the semi-permeable sands, clays and gravels of the Dorset Heaths and exhibits a mixed response to rainfall. The flood risk at the lower end of the river at Bournemouth is a complex mix of the river's response that depends on the location of the rainfall in the catchment. In addition, Christchurch is at risk of flooding from the sea.

In urban areas, water reaches rivers faster. There are many impermeable surfaces, such as roads and pavements, which force rain water into the surface water drainage system and on towards the rivers. In addition, due to the impermeable surfaces, urban areas are at risk from surface water flooding.

Flooding at Christchurch © Environment Agency

Flows

Natural flow regimes are determined by the climate, run-off, catchment size and geomorphology without the impacts of dams, weirs, extraction and river management.

Three anthropogenic processes have predominantly altered flows in streams, rivers and their floodplains and wetlands. These are:

- Building of weirs (including all dams and weirs and off-river storages)
- Diversion of flows by structures or extraction
- Alteration of flows on floodplains with levees and structures (including those on wetlands to allow water storage).

Such alterations to natural flow regimes can occur at any scale in coastal or inland catchments and can be intentional or unintentional, affecting all orders of streams, rivers, their floodplains and floodplain wetlands, and the flow of freshwaters into estuaries.

Flooding on water meadows

Alteration of natural flow regimes in rivers and streams and their floodplains and wetlands has a variety of impacts which includes reduction of habitat due to change in area, frequency and duration of flooding of floodplains and wetlands.

Some floodplain wetlands have been used to store water from rivers altering their flow regime from intermittent to permanent inundation. This kills vegetation that establishes in response to intermittent flooding.

Riparian zones (land that adjoins, directly influences or is influenced by a body of water) and the organisms inhabiting them have been altered as a result of change in flow patterns

both from the catchment and along the length of the river. Such change in flows to and from floodplains has led to bank erosion, reduced nutrient filtering capacity and changes to stream behaviour. Aquatic communities throughout catchments and in coastal waters have been impacted by sedimentation and other changes following clearing of native vegetation which in turn alters the flows to and from wetlands on floodplains.

The creation of deeper, more permanent and disturbed habitat may allow the establishment and spread of invasive non-native species that may displace native species.

Survival of ecological communities relies on the maintenance of ecological processes, species life cycles and their interactions. Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands may disrupt these processes. For example, deeper more permanent water or shallower less permanent water will change the physical, chemical and biological conditions that in turn will alter the biodiversity. Species composition and the presence of particular life cycle stages will be changed. Disruption of ecological processes may continue long after initial flow alteration, causing continued decline in biological diversity.

What can be done?

Slowing the flow and increasing out of bank storage: An important way to reduce flooding downstream is to hold water back in and on the land; this effectively slows the flow of water and reduces the size of the peak flow in the river.

Stour Meadows, Blandford, floods to hold water back to slow the flow and reduce flooding downstream.

Best management practices: Natural influences on soil storage capacity of water relate to factors like the soil depth, aspect and slope of fields. Adopting best management practices for soils can significantly improve the structure and functioning of the soil as a store for water during wet weather, it is also very cost effective and reduces nutrient and soil erosion from run off events.

Better flow connectivity: Flow connectivity relates to how easy it is for rainwater falling on the land to reach the stream. High connectivity can be bad from a flood risk perspective as larger volumes of water will reach the streams and rivers in a catchment quickly, resulting in high levels of discharge increasing the risk of a flood.

Reduce the impact of activities: Reduce the impact of activities which result in alteration to the natural flow of rivers and streams and their floodplains and wetlands by adapting or where possible removing structures or limiting activities such as:

- Weirs
- Pumping
- Floodplain storage
- Change of drainage pattern
- Water abstraction
- Construction of levee banks and other structures (e.g. roads and bridges) on the floodplain
- Extraction of gravel and alluvial sands and dredging