

River water level

What is river water level?

Water (or river) level is a measure the depth of water in a river at a specific location. Scientists also refer to the measurement of the level of water in a river relative to an arbitrary point (e.g. the river bed) as 'river stage'.

Why do we measure river water level?

Measurements of water level in a river are important for a variety of reasons. In the UK the Environment Agency operate a network of monitoring stations that continuously measure river level primarily to understand, and provide a prior warning of, flood risk to people and properties. On the River Chess there is a continuous water level monitoring station at Rickmansworth. You can see the live feed from this site at:



<https://flood-warning-information.service.gov.uk/station/7190?direction=u>

River water level is also important for the health of a river as many plant and animal species need specific ranges of water level at different times of the year. We also use water level to calculate how much water is flowing through a river per unit of time (known as 'discharge').

What are the natural controls on water level?

In many rivers the water level responds quite quickly (within hours) to rainfall falling in the river catchment. In a chalk catchment a significant proportion of the rain will move through the ground into the underlying chalk aquifer, and this rain can take decades to reach the river. This means that water levels and discharge in a chalk river have a distinctive pattern that relates to the time of year or season. On the River Chess Association website you see how the annual water cycle works in a chalk aquifer:

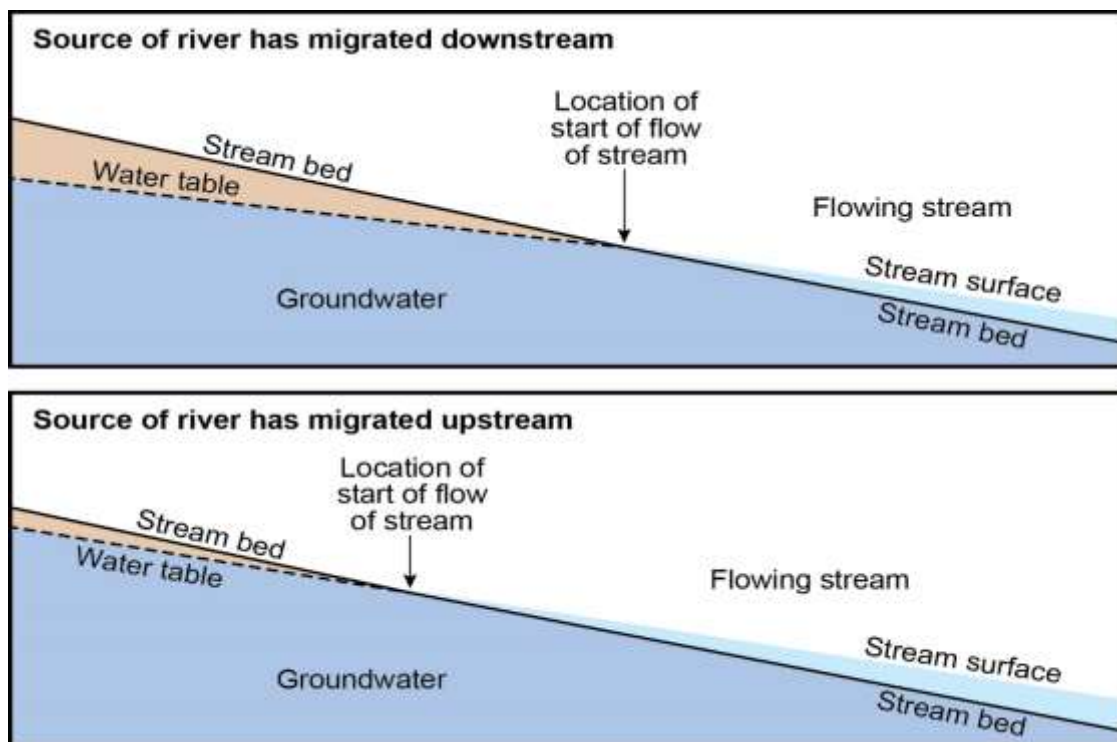
<http://www.riverchessassociation.co.uk/water-cycle.html>

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Chalk streams are particularly interesting because sections of these rivers (termed **winterbournes**) can, quite naturally, stop flowing at times of the year when groundwater levels are low. This is because groundwater supplies these rivers with much of their flow. When groundwater levels drop then flow in the river will decrease and may even cease.



Winterbourne Section of the River Chess at Queens Head in Chesham



Adapted from: USGS Report 1139

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How do human activities change water level?

Humans abstract (remove) water from rivers to use in our homes, farms and industries. In areas of the UK with a chalk geology we often extract water from the ground (i.e. groundwater) for domestic water supply. Because chalk rivers depend on groundwater for their flow (> 75% of the water in a chalk river comes from the ground) then using groundwater for domestic supply can reduce the level of water in the river. This means that stretches of the river can dry up at unexpected times in the year, or for longer periods of time than might be desirable or healthy for fish.

Much of the water we use in our homes travels through our drainage systems to the local sewage treatment works. This water is treated to remove harmful chemicals, and then discharged into the nearest river as 'treated effluent'. Because human populations are high in the South East of the UK, and water usage is also high, this treated effluent can make a very significant contribution to river levels, flow and water quality. For example, in the River Chess treated sewage effluent can comprise up to 75 % of the river water, depending on location.

Humans also affect the speed and extent to which water levels can change in our rivers. When we create hard surfaces such as roads and pavements we alter the flow of rain water which moves over our street surface and into drainage pipes, instead of through the soil to the groundwater below. This flow of water is called 'urban runoff'. This rapid flow of runoff means that water levels in chalk rivers with an urban catchment will respond more quickly to rainfall than might occur naturally. Also, only a little water is lost to the ground, so a greater volume of water reaches our rivers. Urban runoff may carry with it the pollutants that have been deposited on the road and pavement surfaces (e.g. metals and oils).