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## Methods for measuring and modelling plastic transport and accumulation in large rivers

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Although freshwater systems are known to be the transport paths of plastic debris to the ocean, studies in rivers are rare. In recent years, measurements are advancing, but they hardly address the spatial distribution of plastic debris in the whole water column. Waste collecting activities in the Nationalpark Donau-Auen – a part of the Austrian Danube River to the East of Vienna – indicate that increasing quantities of plastic waste can also be found near the banks and within the inundation areas of our rivers. The EU financed project "PlasticFreeDanube" tries to find the sources, environmental impacts, transported amounts and paths, compositions and possible plastic accumulation zones.

A robust, net-based device was developed which can be applied at high flow velocities and discharges even at large rivers. The device consists of a strong and stable equipment carrier allowing a steady positioning. Three frames can be equipped with 1-2 nets each, having different mesh sizes exposed over the whole water column. The methodology was tested in the Austrian Danube River, showing a high heterogeneity of microplastic concentrations over the cross-section but also vertically over the depth. It was found that even higher amounts of plastic can be transported in a subsurface layer or even bottom-near.

Three-dimensional numerical modelling has proven to be a great support in describing and analyzing plastic particle transport in flowing waters. Flow fields near river engineering structures such as groynes and guiding walls were characterized by the models as they are known to be plastic accumulation zones. The models can be used for predicting potential accumulation zones in Danubian inundation areas and can provide recommendations for creating "artificial" accumulation zones where plastic can be more easily extracted from the river.