

## **GIS-based tool to determine streamside forest shelterbelt width**

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**Abstract** Forest areas can intercept surface runoff from upslope bare areas and transfer it to interflow. Therefore, planting protective forests along the banks of rivers, reservoirs, and lakes preserves natural water sources from pollution. Depending on the particular landscape conditions, the streamside forest shelterbelt (SFS) width is often either wider or narrower than the ecologically substantiated width. As a result, either water quality worsens or the ecologically unjustified prohibition of forest use leads to economic losses. The assessment of SFS width using GIS technologies allows considerable simplification of evaluation procedures and their application in practice. DEM processing is integrated into most modern GIS software packages. For example, the popular ESRI ArcGIS package with its Spatial Analyst module provides extra options for calculating a series of relief-based hydrological features, which include calculation procedures for surface flow direction, length of flow-producing slopes and surface flow accumulations. Two algorithms for GIS-based SFS construction were tested for several rivers of the Yenisei basin and Krasnoyarsk Reservoir, Siberia. The first algorithm is technically simple and based on empirical equations of runoff slope length, slope steepness and soil infiltration. The second one includes a three-dimensional flow accumulation procedure and thus it is more sensitive to real surface structure. Both algorithms are ready to be used in practice. The results obtained indicate that, on average, the SFS width along banks of large rivers might be reduced, while in some cases it should be widened along the banks of small streams.

**Key words** GIS; DEM; streamside forest shelterbelt; surface runoff; Central Siberia