Sediment transport in Norwegian rivers and antropogenic impacts. Case studies of importance to sediment management plans.

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The river basins in Norway are of an extremely varying character and conditions differ greatly from one region to another and from high to low latitudes. Sediment sources are unevenly distributed across drainage basins and only parts of the river courses are alluvial. However, five types of rivers may be recognized on the basis of regional soil types and the processes of erosion. These are the glacier outlet rivers, the unglaciated rivers in arctic and mountain areas, the rivers draining the forested uplands, rivers in marine clay areas, and the rivers draining cultivated land. Large rivers are composed of a number of such sub- systems. The mean sediment yield of the various types are: glacier outlets 525t/km^{2}yr, arctic and mountain 34 km^{2}yr, forest rivers 2 km^{2}yr , clay areas 1016 km^{2}yr, and cultivated land 110 km^{2}yr.
A number of rivers are influenced by hydropower development involving diversions and regulation. The most common effect is an increase in aggradation of sediment in the main channels of the river systems as the reduction in water discharge reduce the carrying capacity of the river. The glacier fed river Beiarelva in northern Norway is selected here as a case study. After the regulation of this river the suspended sediment load and particle concentrations in the main channel were observed to increase. This change in the pattern of transport events is found to be associated with the storage of sediment during years of low flow and the flushing of sediment during low frequency flood events.

To prevent quick clay slides triggered by channel degradation the river bed and banks in clay areas have been protected with a layer of rock armouring in many rivers.
In the river Gråelva in the clay area of central Norway a sediment transport monitoring programme was initiated to evaluate the impact of rock armouring. The annual sediment yield resulting from the cutting off of major sediment sources decreased enormously, from maximum yields of 8 150 t/km^{2}yr to 925 t/km^{2}yr. It was not a continuous decrease; a year-to-year variability controlled by climatic variables is still present, manifesting itself in both the number and character of flood events.

Mobilisation of sediment and associated contaminants have been investigated in the River Glomma. This river drains an area of 40 000 km^2 in south central Norway. Copper mining has taken place in the upper part of the catchment for more than 300 years, in an area located about 600 km from the sea. Chemical analyses of a 2m long core of floodplain sediments in the lower part of the river basin revealed that the copper concentrations in the sediment is increasing with time. The floodplain sediment is deposited by major floods. Such large magnitude floods can release large amounts of sediment and associated contaminants that have been stored in upstream river channels and floodplains. The increase in copper concentration towards the surface sediment indicate that a downstream dispersion take place and that the major floods play an important role in this process.