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Effects of stream periphyton on the deposition of fine particles from suspension

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Sedimentation ratios of many dams in central Japan are known as very high because of huge sediment supply from surrounding mountain range (Fujiwara et al. 1999). A flood-bypass tunnel was constructed along Mibu River, which is the largest tributary of Tenryu River, to prevent the filling up of Miwa Dam at the middle reach of Mibu River. The tunnel has been tested during heavy rainfall since 2005. Turbid flooding water containing high suspended-load up to 10,000 ppm directly affects downstream when the tunnel is working.
Depositional experiment was done in 2003 during pre-test drain of Takato Dam that is neighboring downstream of Miwa Dam. The results together with those of flume experiment suggested that the deposition from the suspensions were strongly controlled by the physical conditions such as flow velocity and concentration of suspension as well as by the biofilm of stream periphyton draping river-bed gravels. The shape and texture of the biofilm have strong influence on hydraulic condition just above the surface of the bed. Particle trapping due to sieving by the biofilm works effectively under increasing flow velocity, while the deposition decreases with increase of velocity on non-algae surface. Thus the effect of bio-control on the deposition from the high-concentrated suspensions is important in a fluvial system.

Keywords: suspended load, biofilm, Mibu River, flood-bypass tunnel