Fine Particulate Organic Matter (FPOM) transport distance in artificial canals and natural rivers estimated by lake originated plankters as a tracer

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The fine particulate organic matter (FPOM : $\Phi<1.0$ mm) plays a key role as energy resources in river ecosystems. Therefore, a well balance of supply, transport, retention of FPOM is required for keeping river ecosystems in a healthy state. However, the transport processes of FPOM in a river channel have never been fully understood partially because of difficulties in tracing FPOM in the field. Recently, previous works have demonstrated that the lake originated plankter was an effective tracer for FPOM transport especially in tailwaters of dam reservoir.

This study aims to estimate the transport distance of suspended FPOM by calculation of the decreasing ratio of the lake originated plankters from dam reservoirs with channel distance. For comparative studies, study sites were established in two artificial canals from lake Biwa and two rivers with below dam reservoir, all of which have different channel morphologies (Table 1).

The transport distance of FPOM in each channel decreased exponentially with channel distance and was estimated as 50% decreasing distances to be 19.1km, 9.8km, 3.1km and 2.0km in Kamogawa canal, Uji River, Kizu River and Sosuibunsen canal respectively (Fig.1). We also found that transport distance had a positive correlation with the hydraulic radius (Fig.2). This indicates increasing complexity of channel geomorphology might increase the FPOM retention efficiency. Further researches on the relationship between complexity of channel geomorphology and FPOM dynamics are required.

Table 1 Hydrologic and geomorphologic properties of channels shown as mean values under ordinary water level.

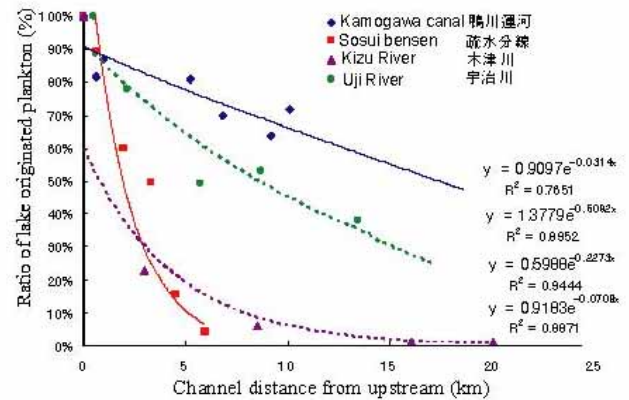|	Width (m)	Depth (m)	Velocity (m/s)	Discharge (m³/s)	Hydraulic Radius(m)
Kamogawa canal	14.93	1.77	0.52	10.71	1.42
Sosui unsen canal	3.40	0.25	0.41	0.27	0.18
Uji River	99.80	2.07	0.90	130.00	1.34
Kizu River	164.58	0.50	1.32	33.60	0.48

Fig.1 Patterns of decreasing ratio of lake originated plankton with transport distance.
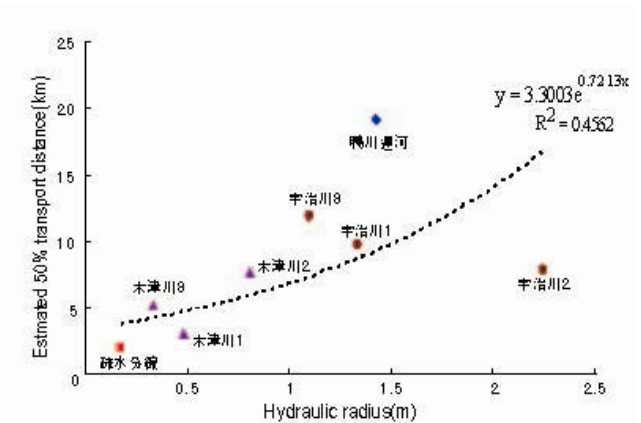

Fig.2 Relationship between FPOM transport distance and hydraulic radius.