OBSERVATION OF SEDIMENT DISCHARGE BY TOTAL LOAD TRAPPING EQUIPMENT IN ABE RIVER

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INTRODUCTION

To resolve the problems resulting from sediment movement, it is required to treat the entire area of sediment movement as the "natural sediment transport system". To enable this, the actual state of sediment discharge at the time of flooding must be grasped first. In the case of mountainous rivers, it is desirable to trap sediment discharge at all depths, because both suspended load and bed load flow down being mixed at all depths. We developed the Total Load Trapping Equipment that can trap all the sediment passing through the unit width of a flood flow which flows the overflow section. We placed it at the Oshima check dam located upstream of the Ave River in Shizuoka Prefecture and measured the actual amount of sediment discharge.

STRUCTURE OF TOTAL LOAD TRAPPING EQUIPMENT

Observations are carried out at the Ohshima check dam (8.8 km²) in Abe river (A=567 km²) in shizuoka prefecture, Japan. To grasp the actual flow rate of sediment during small and medium-scale flooding rationally, we considered that the following points are important.

1. Both the flowing water and sediment at the all depths, from riverbed to water surface, can be sampled.
2. Sampling can be made without disturbing flowing water as much as possible
3. The flowing water in the stream center direction can be sampled. As the equipment enabling such observations, the "Total Load Trapping Equipment" has been developed as shown in Fig. 1.

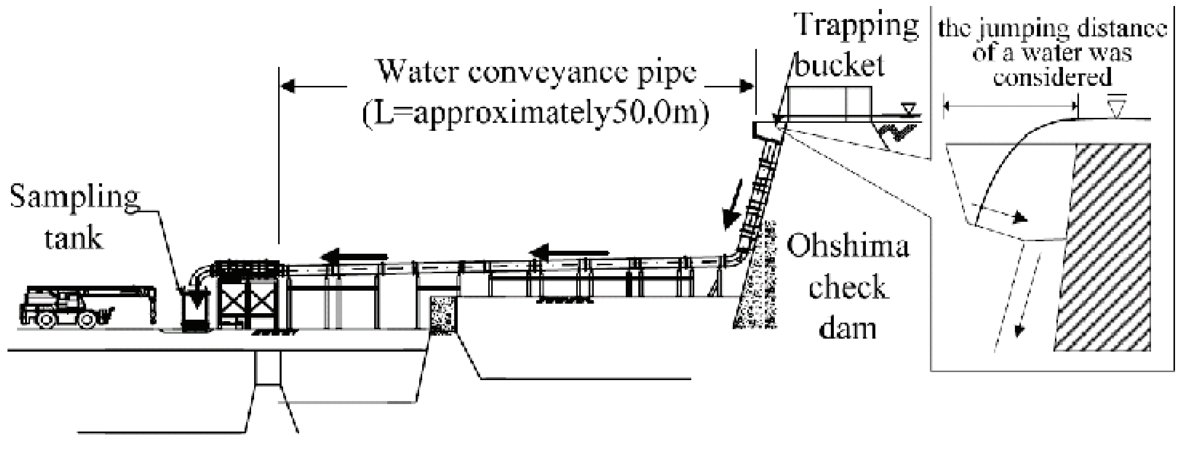

Fig.1 Structure of the Total Load Trapping Equipment

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RESULTS OF OBSERVATIONS

We observed sediment discharge by Total Load Trapping Equipment ten times from 2003 to 2005.We could trap sediment during peak discharge at 4 observations, at Typhoon No. 6, No. 18 and No. 22 in 2004 and Typhoon No. 11 in 2005. Fig.2 shows relationship between flow rate and sediment discharge in four observations, Fig. 3 shows transition of flow rate and sediment discharge at Typhoon No. 11 in 2005.

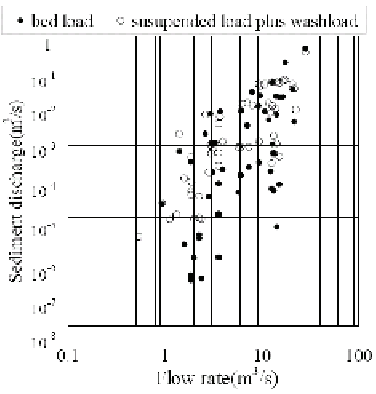

Fig.2 Flow rate and sediment discharge

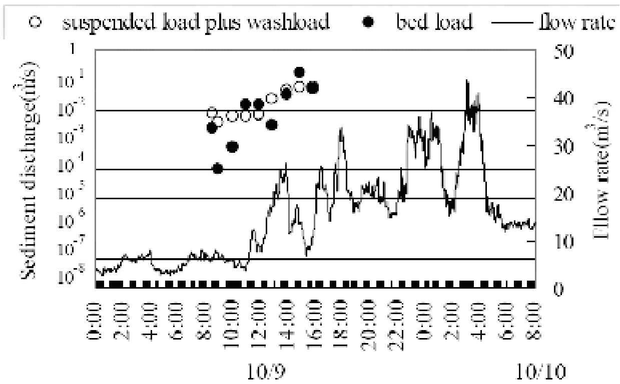

Fig.3 Transition of flow rate and sediment discharge at Typhoon No. 11 in 2005

CONCLUSION

From results of observations, we examined to classify and quantify sediments flow rate by each movement form, and got the following conclusion;

1. In the case of floods of normal year scale, suspended load plus wash load account for a far greater ratio than that of bed load in the total sediment discharge flowing down a mountainous river.
2. The suspended load obtained at this river was greater by one order than those obtained at other rivers.
3. The bed load estimated by the Ashida, Takahashi, and Mizuyama's formula (Ashida et al., 1978) was greater by 3-5 orders than the measured amount in many cases, but the difference was within 1-2 orders in some cases obtained at peak flow rate. The bed load estimated by the Meyer Peter, Muller's formula (Meyer et al., 1948) was generally smaller than the measured amount, but the difference remained within 1-2 orders.
4. The effectiveness of the "Japanese pipe hydrophone" was confirmed as an observation method of grasping bedload.

REFERENCES

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