

## ANALYSIS OF POLLUTANT RUNOFF LOADS FROM NON-POINT SOURCES CONSIDERING THE INTERACTION BETWEEN OVERLAND FLOWS AND ACCUMULATED MATERIALS

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There are lots of closed water bodies as receiving water around us, and it is strongly expected that a sound and sustainable condition could be achieved at present and in the near future. For this purpose, it should be emphasized to carry out the integrated management of river and its watershed. Among all, reduction of pollutant runoff loads from non-point sources has urgently been required, so that we have to know the pollutant runoff mechanism, especially under the wet weather condition. Considering the water bodies, nutrients discharged without any treatment have to be reduced in order to prevent and/or mitigate the damages due to "eutrophication".

In this paper, how to precisely predict the runoff rates of Total-Nitrogen (T-N) under the wet weather condition at urban area has been discussed, carrying out the field observation and the mathematical computation. In order to appropriately predict the runoff rate, mass balance equation of pollutants should be solved at a layer of bed materials as well as in the flows. Considering the mass balance equation, it becomes important to precisely estimate the production term. Here, concept of hardness of detachment has been introduced into pollutants on a bed. And, it has been assumed that hardness, i.e.  $h_a(y,t)$  varies in a vertical direction, following to an exponential function.

$$h_a(y,t) = h_{a,\infty} + (h_{a,s}(t) - h_{a,\infty}) \cdot e^{-\alpha y} \quad (1)$$

Vertical distribution of hardness has been illustrated in Fig. 1.

In order to analyze the pollutant runoff loads from non-point sources under the wet weather condition at urban area, field observation was carried out at the Dejima River basin of Nagasaki, Japan. Comparison between the observed and calculated results has been shown in Fig. 2, illustrating the hyeto-, hydro- and load- graphs on February 22, 2004, as an example. Including another results, agreement of both results is fairly well.

In order to carry out the sound and sustainable water management, it becomes very important to reduce the pollutant runoff loads from a watershed, especially under the wet weather condition. Then, field observation was done several times at the Dejima River, Nagasaki in Japan. Through its observation and also mathematical simulation, the followings were concluded.

- 1) Through a field observation, it becomes apparent that pollutant runoff loads from non-point sources are strongly affected by the geophysical condition of watershed suffered by influences of the antecedent and current rainfalls.
- 2) Temporal variation of T-N loads from non-point sources under the wet weather condition can exactly be predicted, solving the mass balance equation of the bed materials as well as of the flow, simultaneously.
- 3) Other pollutant runoff loads such as organic matters, Total Phosphorus (T-P) and others should be discussed further based on the present results.

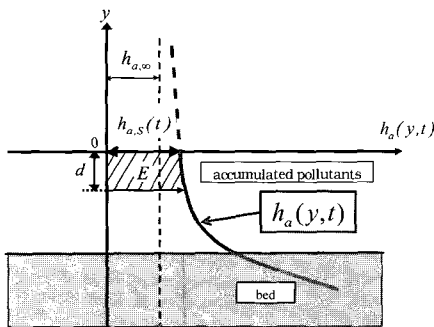


Fig. 1 Hardness for detachment of accumulated pollutants.

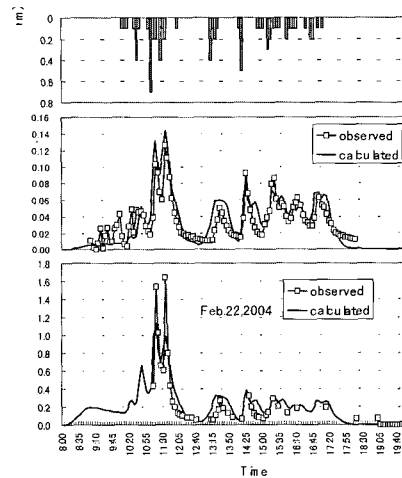


Fig. 2 Hyetograph, hydrograph and loadgraph on February 22, 2004.