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By Hong Guo

1,Title and Author

Title: First flush in a combined sewer system

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2. Summary of Paper

This paper examines the pollutant first flush in an urban catchment with area of 12.7 ha and grained by a combined sewer system located in northern Italy. The selected quality parameters were BOD, COD, SS, settle able solids, TP, TN, ammonium nitrogen, lead, and zinc, specific conductivity and hydrocarbons.
The analysis shows that treating the maximum amount of the early part of the runoff is a better strategy than treating a constant flow rate.
As we know there are many definitions for the first flush ideas. In this paper the author use the MFF (magnitude of the first flush), the MFF ratio to calculate as a function of surface slope, antecedent dry day ends and storm duration.
The MFF describes the fractional mass of pollutants emitted as a function of the storm progress. It can be defined as follows:

$$MFF_n = \frac{\dfrac{\int_0^{T_1} c(t)q(t)dt}{M}}{\dfrac{\int_0^{T_1} q(t)dt}{V}}$$

Where n is the index or point in the storm, and corresponds to the percentage of the runoff, ranging from 0% to 100%, M is the total mass of emitted pollutant, V is the total runoff volume, c(t) and q(t) are the pollutant concentration and runoff volume as functions of time. By definition, the MFF is equal to zero at the storm beginning and always equals 1.0 at the end of the storm. And the Values greater than 1 indicate first flush. Here we also know that the MFF20 equal to 2.5 means that 50% of the pollutant mass is contained in the first 20% of the runoff volume.
The target of the developing the MFF is not only provide a quantitative measure of first flush but also to quantify the possible benefits of the first flush when doing the BMP (Best Management Practice) technology. If the cost of BMPs is proportional to volume treated, then parameters and storms with the highest MFF ratios will be most economical to treat. This is a very important concept for selecting the BMPs
3. Contribution:

This paper shows that treating the maximum about of the early part of the runoff is a better strategy than treating a constant flow rate. The first flush concept is very important for the CSOs experiment and now, we have done about 3 times of those experiments. We will use this paper to calculate the trend of the first flush for our data.

I also hope this paper also can help the lab members' future work.