Desalination and Water Treatment
www.deswater.com
19 (2010) 184–190
July
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doi: 10.5004/dwt.2010.1911

Calculation of diffuse pollution loads using geographic information

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Received 24 September 2009; Accepted 22 February 2010

ABSTRACT

The first grade Korean TMDL (K-TMDL) Master Plan for 2005–2010 has been established by the Ministry of Environment with statistical data from local governments to get the land-coverage information and calculate the discharged non-point source (NPS) loads from land coverage. The statistical information is easy to obtain but is not consistent with real land-coverage and can cause a considerable number of errors when calculating the watershed based pollution loads. As requests for GIS-based data processing are getting increasing, various approaches for calculating each land use have been considered. In this study three kinds of data resources such as SPOT5 remote sensing image, registration map and cadastral surveying result were used. This study mostly focuses on the comparison of area calculation results between existing cadastral surveying and registration map referencing of SPOT5 satellite and GIS digital map. Mostly, differences of NPS loads are caused by procedural changes of basin area calculation. It was converted into basin pollution loads after calculating loads based on the municipal administrative unit before, however, when using GIS-based method, conversion process from municipal based result to basin based result is not required. Basically, conventional text-based method apply the specific formula, building area + road/2, to get sewage collection area estimate while GIS-based method calculate the sewage collection area directly by the GIS overlay analysis. As a result of that, the larger sewage collection area has, the greater sewer inflow pollution loads are generated. And this causes less discharged pollution loads. On the contrary, the less sewage collection area calculated the greater individually discharged pollution loads are generated, which induce higher discharged pollution loads. Those generate the changes of basin and river purifying parameters of the water quality simulation model, which will affect the attainable pollution loads for development in the future.

Keywords: TMDL; NPS load; GIS; SPOT5 image; Land registration map; Cadastral surveying

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