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Editorial Note on Sediment Delivery Model

Abua Ikem

Department of Agriculture & Environmental Sciences, Lincoln University, USA

Editorial

A new method of mathematical modeling called Sediment Delivery Model (SeDeM) is reviewed. This method is a convenient tool for determining the suitability of powdered material for direct compression. The method identifies unsatisfactory properties of the material and also determines the type and amount of excipients that should be added to the tablet formulation to neutralize the unsatisfactory properties of the active pharmaceutical ingredient (API).

The principles of application of the SeDeM method are considered. The parameters to be determined for application of this method, the equations for calculations, and the constructed diagrams are presented. The methods for application of SeDeM to the pharmaceutical industry and the advantages of such use of the system are described. The SeDeM method is used to optimize and calculate the composition of tablets obtained by direct compression. This system takes into account all the characteristics of the bulk material and provides recommendations for the selection of excipients. The method makes it easier to develop a new drug and simplifies the manufacturing process by eliminating unnecessary excipients. In addition, the method is used for quality control of single APIs and excipients.

The objective of the InVEST Sediment Delivery Ratio (SDR) model is to map overland sediment generation and delivery to the stream. In the context of global change, such information can be used to study the service of sediment retention in a catchment. This is of particular interest for reservoir management and instream water quality, both of which may be economically valued.

The sediment delivery ratio (SDR) connects the weight of sediments eroded and transported from slopes of a watershed to the weight that eventually enters streams and rivers ending at the watershed outlet. For watershed management agencies, the estimation of annual sediment yield (SY) and the sediment delivery has been a top priority due to the influence that sedimentation has on the holding capacity of reservoirs and the annual economic cost of sediment-related disasters.

This study establishes the SEdiment Delivery Distributed (SEDD) model for the Shihmen Reservoir watershed using watershed-wide SDRw and determines the geospatial distribution of individual SDRi and SY in its sub-watersheds. Furthermore, this research considers the statistical and geospatial distribution of SDRi across the two discretizations of sub-watersheds in the study area. It shows the probability density function (PDF) of the SDRi.

The watershed-specific coefficient (β) of SDRi is 0.00515 for the Shihmen Reservoir watershed using the recursive method. The SY mean of the entire watershed was determined to be 42.08 t/ha/year. Moreover, maps of the mean SY by 25 and 93 sub-watersheds were proposed for watershed prioritization for future research and remedial works. The outcomes of this study can ameliorate future watershed remediation planning and sediment control by the implementation of geospatial SDRw/SDRi and the inclusion of the sub-watershed prioritization in decision-making. Finally, it is essential to note that the sediment yield modeling can be improved by increased on-site validation and the use of aerial photogrammetry to deliver more updated data to better understand the field situations.

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Address for Correspondence: *Abua Ikem, Associate Professor, Department of Agriculture & Environmental Sciences, Lincoln University, USA, Email: AbuaIkem234@gmail.com*

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