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Extending a Distributed Hydrological Model to Use Globally Available Topographic Data

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Understanding hydrological response and quantification of available water in a basin is essential for proper management to cope with possible water related disasters and to limited water resources. With regard to this, distributed hydrological models play an important role as it is capable of incorporating the basin heterogeneity. The *KsEdge2D* model is a distributed hydrological model developed at Kyoto University and it has been well studied and successfully applied for many basins in Japan. As the model was initially developed to utilize the Japanese topographical and river network data, it is not possible to apply for international basins due to the differences of input topographical and river network data formats. This study presents the extension of the *KsEdge2D* model to use globally available topographic data.

The *KsEdge2D* model requires basically two files to represent the topography and the stream network of the basin, one with coordinates and the elevation of grid cells *(NodeV0)* and the other having the connection details of grid cells *(EdgeV0)*. Therefore, X, Y and Z coordinates of the center point of all cells, the flow accumulation and the flow direction of the required basin are derived using the globally available Digital Elevation Model *(DEM)* with the help of GIS software. A computer model, referred as *DEM-V0-Maker* is developed to generate two files having the same data structure as the *EdgeV0* and the *NodeV0* files, using the above mentioned data derived from the *DEM*. The cells having flow accumulation value grater than a threshold are treated as streams.

The *Mae Chaem* basin in Thailand is selected as a case study basin to apply *KsEdge2D* model using global topographic data. The *DEM (GeoTOPO 30)* and hydro-meteorological data are obtained from the research project, "*PUB-JP Blind Test in Mae Chaem Basin"*. Then the *EdgeV0* and *NodeV0* data files for the basin are obtained using the *DEM-V0-Maker* programme developed under this study and the *KsEdge2D* model is successfully applied to the basin. The Figure. 1 shows the graphical representation of the *Mae Chaem* basin's *EdgeV0* and *NodeV0* data obtained from the *DEM-V0-Maker* programme.

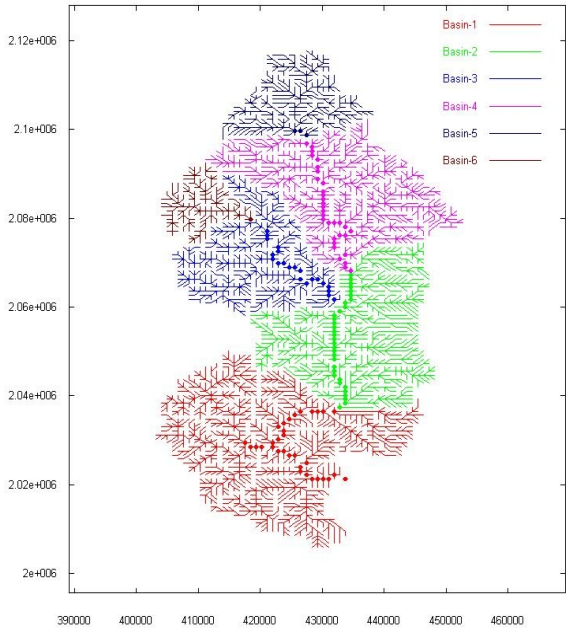

Figure-1. Plot obtained from the *EdgeV0* and *NodeV0* data of the *Mae Chaem* basin, Thailand.