

# Hydroinformatic system (implementation in Thailand)<sup>#</sup>

H Vathananukij\* and S Malaikrisanachalee

Faculty of Engineering, Kasetsart University, 50 Paholyothin Rd., Bangkok10900, Thailand

## Abstract

The first hydroinformatic system in Thailand originated from the National Water Resource Strategy of 2007. In order to manage different hydrological data format in text file, html file, access file and spreadsheet file from different institutes, an interactive data assimilation system was introduced. Acquisitive data from 1 150 major hydrological stations were inspected, verified, reformatted and statistically analysed. This research performs processes of two successful versions of the Thailand Hydroinformatic System. Virtual mechanism can, however, increase public participation to attain and utilise both information and metadata under open source licence. At the time of publication, the effective utilisation of the international standard format (ISO19115) is implemented through the public domain system. This hydroinformatic system enlarges potentiality of national communities to truly realise the potential of their natural water resources and tangibly understand their water environment. This system is regarded as a nationally sustainable prototype system to improve water resource management capability.

**Keywords:** hydroinformatic system, public domain model, virtual system

## Introduction

The Kingdom of Thailand is situated in the heart of the South-east Asian mainland, occupying 513 115 km<sup>2</sup>. The geographic form is composed of four natural features, namely mountain; plateau; central plain; and coastline and island. Thailand is a warm and humid tropical country which is influenced by monsoons in both wet and dry seasons. The country has faced serious disasters in terms of both flood and drought at times. Over the past 10 years, expansive droughts have occurred in the mountainous area (northern region) and the plateau area (north-eastern region) during the dry season. During the rainy season flash floods and landslides in the upper basins accumulated in and overwhelmingly inundated the central plain during the same drought year. Faced with serious disasters in terms of drought and flood especially during 2002 and 2006, the Thai government was extremely concerned and fully realised the national urgency in addressing these important problems.

In the past, research on vertical resolution and the effect of map scale digital elevation models on parameters has been focused on hydrology and hydrological processes (Gyasi et al., 1995). Furthermore, the geographical information system (GIS) becomes an important tool of water resource management (Tsihrinzis et al., 1996) and the system of geographical information can be based on hydrological and hydraulic engineering applications (Olivera et al., 1999). Merging the geoinformatic system into the Thai database systems needs national standard format in each map scale and layer (Vathananukij, 2003) and network flow analysis is also very important in engineering management (Malaikisanachalee et al., 2005). Therefore, in 2007, the Thai-

land National Strategy stressed the need for hydroinformatic systems to support the national decision in an effort to address flood and drought problems. Complexity among numerous data, several formats, lack of available models and strategies could not effectively deal with the catastrophe. Fundamental difficulties lay mostly in the fact that initial inputs were both in hard copy format and analog systems. Hence, the Thailand Hydroinformatic System Prototype Project was initialised with precipitation data acquired by more than 1 000 observation stations between 1994 and 2005.

## Research processes

The processes were accomplished through:

- Standard database assimilation
- Interactive systems for community engagement strategy.

**Standard database assimilation:** The Thailand Hydroinformatic System maintains hydro-meteorological data from 1994 to 2005. Data retrieved from 1 150 stations were inspected, verified, reformatted and statistically analysed. The historical precipitation and discharge data are from two departments, namely the Thai Meteorological Department (TMD) and the Royal Irrigation Department (RID). The TMD provides not only daily data but also geographical locations as well as descriptive information of data-gauging stations. The data from RID, however, are more difficult to process because they are encoded in a number of separate text files that complicate content structure. Although both departments maintain more than 1 000 hydrometeorological gauging stations all over Thailand, many of them are not consistently functioning. Hence, initial inspection (quality processing) is required for discriminating stations with questionable reliability. The research objective is to study and develop all data into standard format as ISO19115 which could inspect and access data in terms of an interactive geoinformatic system on public domain system (International Standard 19115 Geographic Information-Metadata, 2003; Vathananukij, 2005; Malaikisanachalee et al., 2007). In order to reduce data-processing time as well as minimise human errors during data processing, a custom-made Java Script program is introduced to develop the semi-automatic

<sup>#</sup> Revised version. Originally presented at the International Conference on Integrated Water Resource Management (IWRM) entitled: *Lessons from Implementation in Developing Countries* which took place from 10 to 12 March 2008 in Cape Town, South Africa, at the Cape Town International Convention Centre.

\* To whom all correspondence should be addressed.

☎ +662 942 8555 ext 1912; fax: +662 942 8555 ext 1912;  
e-mail: [hansa.v@ku.ac.th](mailto:hansa.v@ku.ac.th)