Chapter 11
Smart GIS-Based Water Information System

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ABSTRACT

Water management is one of the important aspects and a matter of concern for the current world. Geographic Information System (GIS) is one of the important and effective tools that can be used for storing, management, and display of spatial data for water resource management. This chapter primarily focusses on water management. Managing of water resources has become a challenging task these days. There are many natural water resources available on Earth, but correct information about these resources is required. This chapter focuses on a collaborative, localized system capable of answering user queries. The system will work on GIS platform. The system will be beneficial for local governments for planning and management purpose by finding suitable location for the water resources by means of a GIS-based tool.

INTRODUCTION

Since the water supply available to us is limited, so development of water management is necessity of the current world to solve the problem of water deficiency and proper management of water. Land use, topography, soil and geology characteristic are some

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of the factors which influence the level of water of a particular location. There are substantial challenges with a wide range of solutions for managing the available water resources. Our chapter focuses on one of these solutions for efficient management of water resources by means of GIS application by using example of geographical aspect of state of Uttarakhand in India.

Uttarakhand is located to north-east of India. It has a total area of 53483km^2 with a population of 84.89 lakhs (as per census 2001). The rain parameters for Uttarakhand shows that the rainfall is very poorly distributed. The geographic composition is mainly consist of Terrain Mountains and store insufficient ground water to stabilize the base flow of rivers. Erosion is endemic and aggravated by poor land use practice in developing areas. Taking the interior of Uttarakhand state, the local resources are either fully utilized or overdrawn.

Water management can be factorized by three major factors as supply and demand, geopolitical aspects and socio-political aspects. The discrepancies between water needed and its availability specify the problem of supply and demand for efficient water management. In some areas, the demand for water is exceeds to the limit to what is economically locally exploitable. Geopolitical aspect deals with the geological surrounding of the area whereas the socio-political aspects includes factors like migration of population etc. which results in different pressure for social upliftment of underprivileged communities.

The recent development in the field of computer science has made possible to develop a computer application that can be used for addressing the problem of storing, manipulating and analyzing large amount of spatial data by means of GIS application. The same mythology will be used for water management. Since there is need for spatial data, GIS can be efficiently and effectively used for water resource modeling.

Efficient management of water requires better understanding of geographical space and related spatial information which include terrain structure, land use, land fill, water resources, temperature, humidity environment data, geology etc.

The management of water resource has been a critical need for Uttarakhand state due to hilly terrain structure and water deficit despite of being occurrence of multiple natural resources. Hence, Proper Planning should be performed for efficient use of water through better management at different level.

For efficient and accurate management of water resources, our chapter proposes the association of database of all the values associated with static and dynamic information excluding real time information that should be linked to corresponding geographical locations. Necessary tools should be developed in order to process or interface with management and planning model.

For managing the information regarding water resources, the information of location of resources is needed. Water resources like river, lake, hand pump, well