The Grand Canal of China, a masterpiece by ancient Chinese similar to the Great Wall, stretching from Hangzhou in the south to Beijing in the North, is the world’s longest and oldest man-made waterway. It is 1,794 kilometers long, and connects five major water systems, including the Yangtze and the Yellow River. As a whole, The Canal was built, section by section, in different areas and under different dynasties, started form 5th century B.C. and complete by the year 1327. The Grand Canal of China, as the main transportation linking the nation’s capital city in the fertile northern region to its most affluent territory in the southern region, promoting economic and cultural exchanges and strengthening the unification of the country, played a significant role in the history of China. With a profound history more than 2400 years, a unique culture and folk customers, associated with the canal’s evolution, formed. Along the canal, there are countless magnificent cultural relics, and the canal has been hailed as “a long corridor of ancient culture”, and “a show room of folk customs”.

In the year of 2006, State Administration of Cultural Heritage added the Grand Canal of China on the list of heritages to apply for World Cultural Heritage to UNESCO. Series research projects were carried out to strengthen the preservation of the canal, one of them was using spatial information technology to backup the preservation because of the canal’s unique spatio-temporal characters. This project applied spatial information technology in the whole process of cultural heritage conservation, including resource investigating, field archaeology, value evaluating, conservation planning and implementing, management and feedback adjusting, aiming to help general peoples, professionals and governments enhancing their realization, research and management of the canal, especially to support it’s applying for world cultural heritage with detailed cultural heritage document and excellent spatial information management.

Totally the content contains three parts. The first one was to study and set up necessary standards for the application of spatial information technology. The second part was the research of key technologies involved, including cultural relics investigating with remote sensing, reconstruction and 3D modeling of the canal and spatial analysis utilized in field archaeology. The final one was research and development of spatial data base, geography information system, conservation planning support system of the canal, and spatial data collecting system based upon GPS and PDA. The project is ongoing now.

This paper was concerning about the above project, concluded the results having been achieved, discussed the approaches in detail. At first an integrated framework for the application of spatial information technology in conserving cultural heritage was conceived, based upon the analysis of conserving process, information transferring, and domain model. The technical system included mobile GIS, remote sensing, GPS, VR, WebGIS and so on. Then some standards were established with the effort of domain experts including the standards for metadata, classifying and cataloging of cultural heritage, acquiring of spatial data, according to the related standards. Besides that a spatial data base was developed using the ArcSDE and Oracle 10g. The spatial data were organized into three levels with different scales (macro, meso and micro). At the macro-level, ETM (14 scenes) is used, together with the DLG at the scale of 1:250,000. At the meso-level, they were SPOT 5(42 scenes) and DLG with the scale of 1:50,000(105 pages). All the spatial data at the above two levels respectively covers the extent of the canal. At the micro-level, QuickBird are used for seven important historical sites or cities along the canal, Beijing(214km2), Tianjin(836km2), Cangzhou(410km2), Jining(215km2), Liaocheng(3km2), Pizhou(925km2), Hangzhou(321 km2), together with DLGs at the scale of 1:10,000(392 pages) which also covered the region of the canal with a given
buffer. Except for data at the three levels, there are many precious old panchromatic airphoto taken by American air force during the period of World War 2.

Some necessary pre-processing measures are taken to deal with the images and datasets, while some methods were employed to improve the efficiency of the spatial data base, both of them would be explained particularly in the paper.

Then some practices were reviewed about discovering the disappearing channels of the Grand Canal based on images from SPOT5 and QuickBird. Because of its evolutions in a long period, the channels of the Grand Canal have been changing now and then. An experiment was tested on certain parts of the canal which is nearby Weishan Lake, Shandong province. Firstly strengthening and fusing approaches were imposed on images from SPOT5, then information of channels were retrieved through classifying, extracting from certain spectra, which can’t be recognized on the ground. Finally the results were compared to old literatures about the canal and examined through field investigations.

In order to facilitate investigating of cultural relics along the Grand Canal, the PDA for data collecting was developed, combining mobile GIS and GPS. Also the GIS system for the canal has been developed to manage spatial and non-spatial information, some functions were available through Internet; advanced functions will be added later. Both of them have been used by professional workers from Institutes for Cultural Heritage Conservation in Beijing and Shandong, and they are trying to use them in the National Cultural Heritage Investigating (Apr. 2007).

According to the opinions brought out by the experts specialized in cultural heritage conservation, this paper appraises the project’s established results objectively, present the research plan in the following time.

**Keywords**: Spatial information sciences; cultural heritage; Grand Canal of China; research; application;

**REFERENCES**


