

# Land Use Changes of the Coastal Zone of Old Tainan City in the Past Hundred Years by Using Temporal Spatial Information

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## ABSTRACT:

Tainan, the earliest developed city in Taiwan, was the origin of Taiwan's culture. Nearly 400 years ago, the coastal zone in Tainan connected a large lagoon, called Tai-Jiang Inner Sea. However, the environment was changed during the 400 years. The inner sea became land gradually and then the land was extending to the west for a few kilometers. Such changes affected many human activities such as the social activities, economic activities and land use. To comprehend the relation between the changes and the human activities, temporal spatial data was considered as a favorable data source for studying.

The temporal datasets used in this study were collected from 1904 to 2011, which include: (1) ancient topographic maps; (2) historical aerial images; (3) economic planning and development topographic map; (4) satellite images; (5) ortho-images. These precious temporal datasets provide us the possibility of building the temporal spatial information. However, in order to retrieve these spatial information from the historical images, image registration and rectification should be done. In this study, we present a methodology of processing multi-temporal datasets during 100 years employed by commercial software (SOCET GXP 4.0) and a coordinate transformation of six parameter method. The accuracy of the transformation results and the limitation of each dataset for doing transformation were also assessed and discussed respectively in this paper.

In the past, maps were rarely produced because of the lack of efficient mapping technology. The landscape of the history described in the literature is usually in characters. Combining temporal spatial information and historical literatures is therefore considered great improvements on the changing analysis. Hence we built a web-based viewing system for the comparison of multi-temporal data. In this study, we additionally focused on land use changes in the coastal zone of old Tainan city. The land use are classified into 9 categories and the changes are evaluated based on the land use categories. A transition matrix is also utilized to conjecture and explain the land use changes.

The results showed that the most significant change was fish ponds that were drastically decreased. Water zone, salt fields, and sand bars also decreased. On the other hand, those disappeared land use area was replaced rapidly by buildings since 1970s. The results demonstrate that the long-term change analysis is benefited from the temporal spatial information retrieved from the temporal datasets by our methodology.