

USE OF GIS AND WEB MAP SERVICE IN HISTORICAL RESEARCH: CASE STUDY OF THE MONIES, MARKETS, AND FINANCE IN CHINA AND EAST ASIA 1600 - 1900-PROJECT

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BACKGROUND AND OBJECTIVES

While some years ago working with historical data almost exclusively meant using traditional methods, meanwhile the potentials of geoinformatics are known also to historians (GREGORY and ELL 2007). But still these methods are seldom used.

An objective within the Monies, Markets, and Finance (MMF) research group (www.monieseasia.uni-tuebingen.de) is to share competences and facilities to gain better research results. Geographers are applying geoinformatics methods; GIS-analyses, different visualization methods, and a Web Map Service (WMS) were implemented.

The MMF-project is supported by the German Research Foundation (FOR 596) and deals with monies, markets and finance in a historical and East Asian perspective.

GIS & WMS FOR HISTORICAL RESEARCH

An important starting point for the research activities of the MMF-research group was the analysis of extensive archive material. This resulted in two databases (DB) of particular importance:

- The geo-DB with information on copper mines and land copper transport routes in Yunnan Province (SW-China).
- The transport DB with information on the water transport of coinage metals to the mints.

As the content has a clear spatial component, the use of geographic information systems (GIS) for analysis and a Web Map Service (WMS) for further analysis and visualization was requested.

For the analysis and visualization, GIS data sets were created and combined with data from other sources. An invaluable basis is the China Historical GIS which provide a database of populated places and historical administrative units.

For transport route analyses, SRTM (Shuttle Radar Topography Mission) and ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) digital elevation models were used.

Maps from Qing time China are extremely rare and hardly usable in a GIS, even obtaining large scale maps of modern China is a difficult task for Westerners. Historical military maps from the Soviet army and the U.S. Army proved to be a useful basis. The project group could also get hold of Chinese provincial atlases of Yunnan and Sichuan (Yunnan/Sichuan sheng dituji). These atlases are classified as "secret" and contain maps of scales ranging from 1:150.000 to 1:350.000.

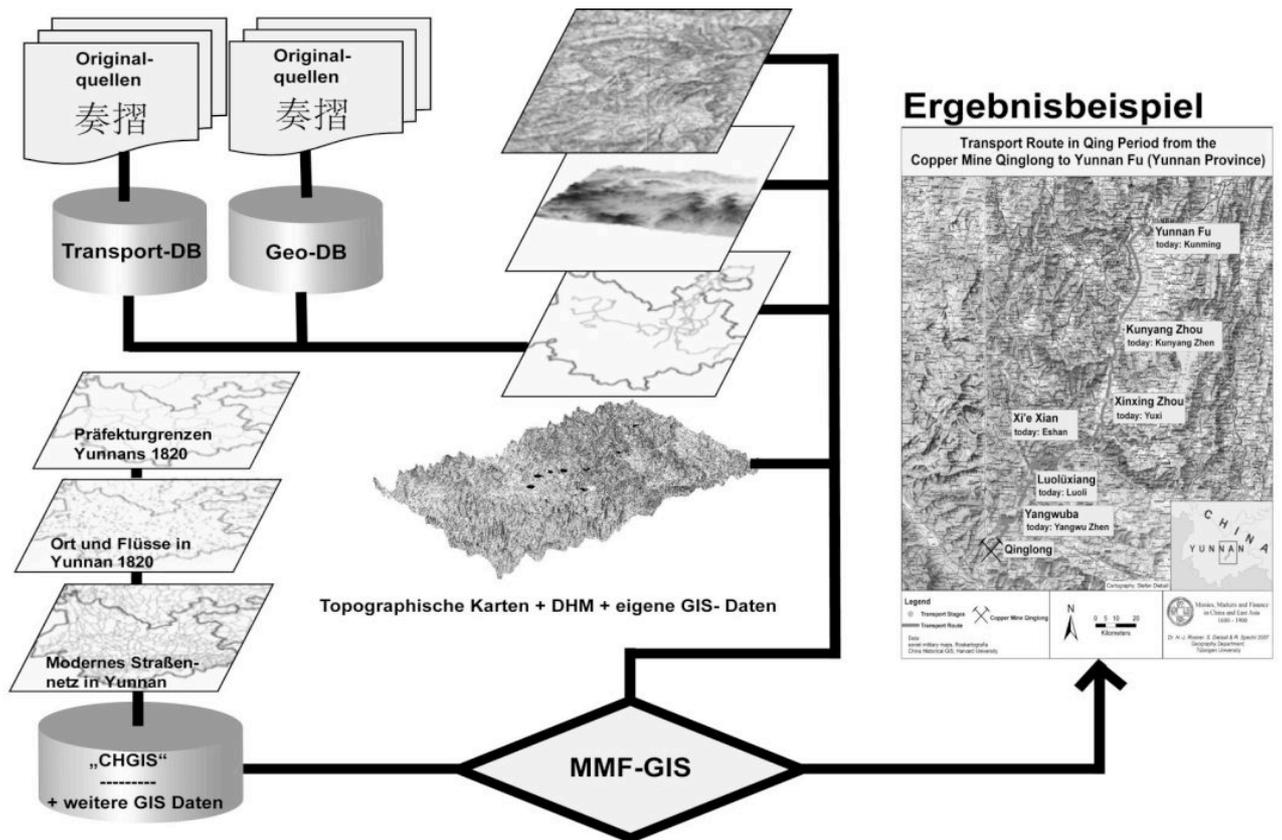


Fig. 1: The MMF-GIS

MMF-WMS

WMS allow a worldwide access via a standard interface, and play an important role when spatial data applications must be made available to others.

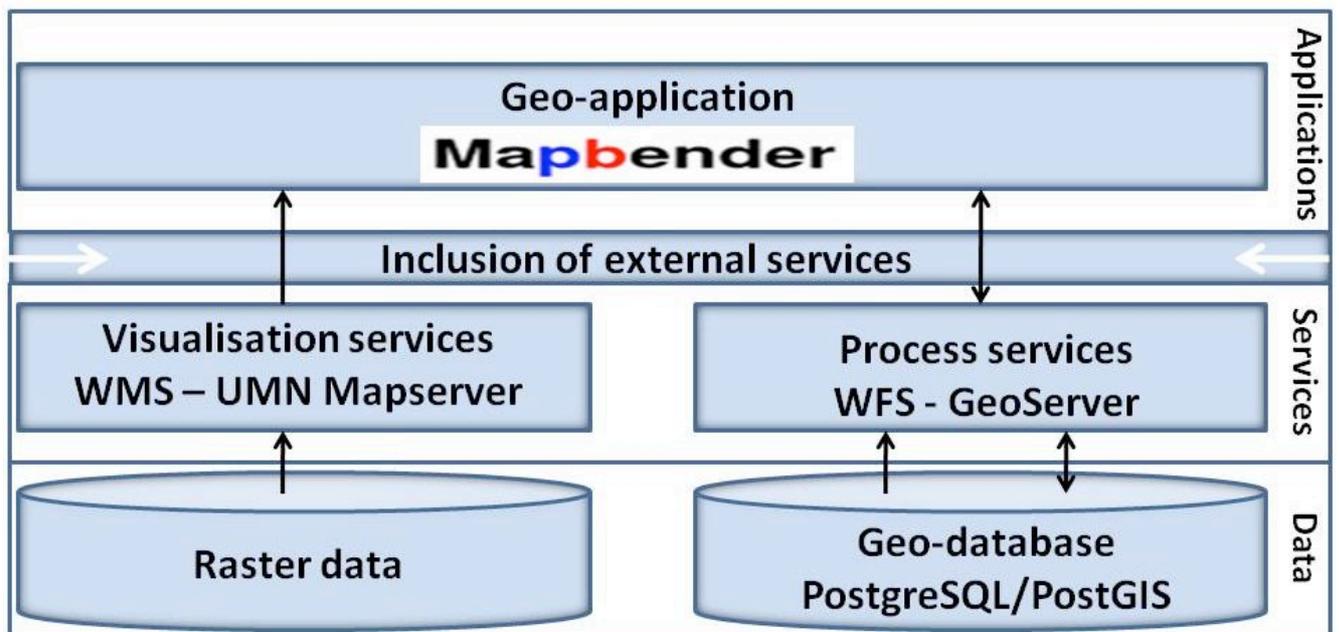


Fig. 2: The project-WMS

In this project, the spatial data is delivered through the *UMN Mapserver*. For access via a browser the preconfigured Webmap client *Mapbender*, a development environment implemented in PHP, Javascript and SQL for map applications, is used. Because of its large number of administration option, it is very suitable for administrating a WMS. The software is run client- and server-side and provides every function

the server offers. A big advantage is in the fully web-based configuration of the *Mapbender*. It allows a fast configuration of the interfaces and services.

Mapbender makes it easy even to navigate through maps. It allows compiling maps with self-selected topics and offers zoom, pan and basic GIS functionalities. Objects can be linked with other data, such as photographs of field research.

Because most of the data is taken from SQL databases, the system can also be used for queries (such as searching for place names).

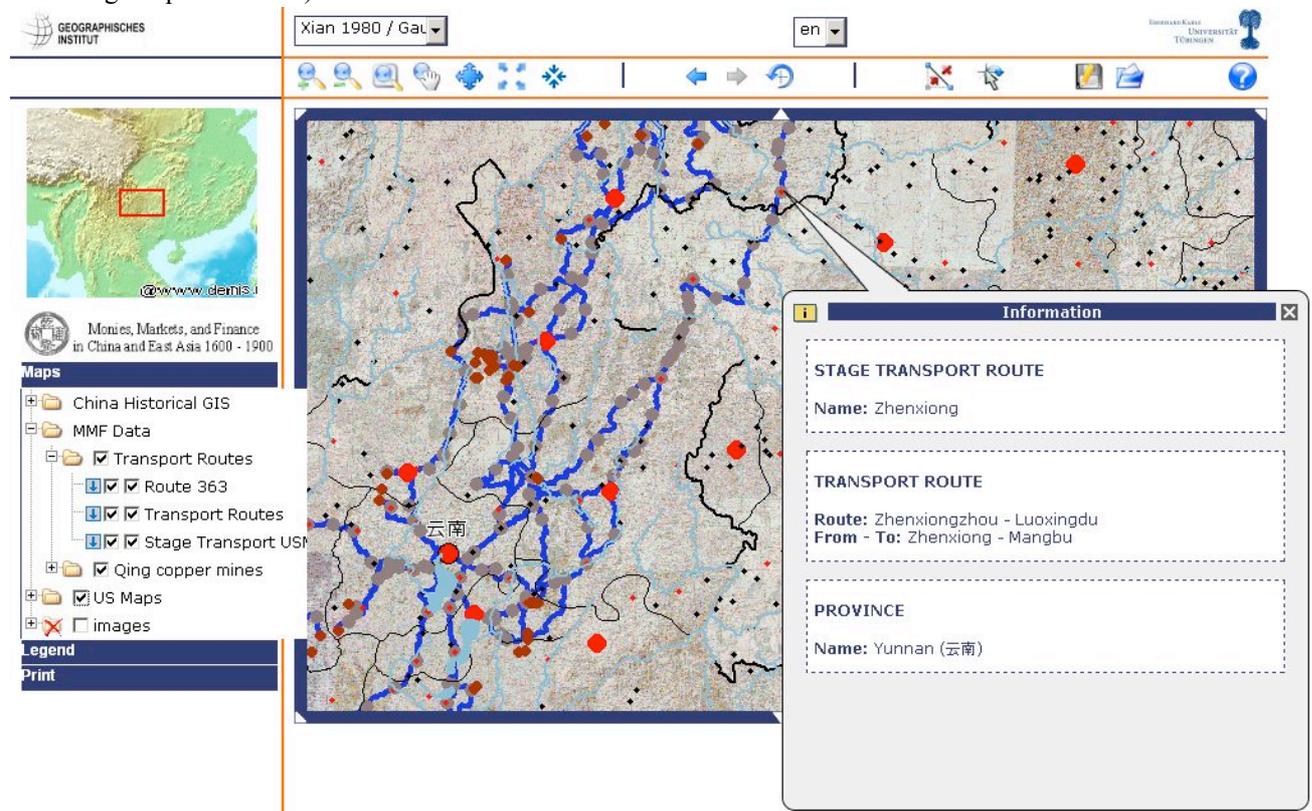


Fig. 3: Query in the MMF-WMS

CHALLENGES

Using GIS for historical research, some problems still arise as historical data is frequently incomplete and errorprone (GREGORY & ELL 2007).

Finding precise information for locating places appeared to be a challenge, uncertainties and problems remain. This can result in big mistakes doing an analysis. Problems are e.g.:

- historical large-scale maps of China are rare,
- descriptions in historic documents about locations are unprecise,
- the name of some settlements changed over the time,
- the same place name can appear several times in close vicinity,
- some places shifted to other locations,
- the same settlement appeared on different maps on different locations.

RESULTS

GIS can be used for sophisticated analyses for historians and can help understanding infrastructure, methods, and daily transportation performances in Qing China. 3-D analysis, for example, showed that distances in official Qing documents also took the difficulty of a transport route into account. This implies that the Chinese mile *li* was a kind of effort unit, not a pure distance measure (Dieball et. al. 2011).

WMS are unrivaled in the capacity to reach many users at minimum costs and they allow a dynamic and interactive dissemination of data. Changes can be visualized in a much better way than with static maps, and change plays an important role in the project. By adding new data layers with different information, and by making individual compositions of different data, users can get new insights and new coherences, e.g. clusters of shipwrecks on the Yangtze River or the impact of height became obvious.

More and more data will be added and more information can be taken out. After the project being finished, the WMS will be made accessible to the public.

LITERATURE

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