DIGITAL HUMANITIES AND HISTORICAL GIS IN CENTRAL EURASIAN STUDIES: NEW APPROACHES TO THE HISTORY OF THE FERGANA VALLEY

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The application of digital humanities methodologies has been transforming historical research across the globe. This report introduces an ongoing project that applies Geographic Information Systems (GIS) to the socio-economic history of the Fergana Valley during the late imperial and early Soviet periods. Building on earlier Japanese scholarship, especially the "Fergana Project" initiated by Professor Hisao Komatsu, this study reflects broader trends in East Asian digital humanities. The aim is twofold: to present the evolution of historical GIS applications in East Asia and to demonstrate how these methods are expanding the possibilities of Central Eurasian historical research.

In Japan, digital humanities have witnessed significant growth over the past two decades. A representative example is the Center for Open Data in the Humanities (CODH) at the Research Organization of Information and Systems (ROIS-DS), which has pioneered projects that combine AI and historical studies. One of their most prominent initiatives involves the development of AI tools to recognize *kuzushiji* (cursive Japanese scripts) in early modern documents. Notably, this project has engaged the broader public by allowing citizen scientists to participate in the annotation and training of AI models. This "citizen science" approach has made it possible for non-specialists to access and read historical materials that were previously decipherable only by experts[1]. Such initiatives demonstrate that digital humanities can democratize access to historical sources while simultaneously advancing academic research.

A related Japanese effort with particular relevance to Central Eurasian studies is the "Digital Silk Roads" project led by the National Institute of Informatics (NII). This project has digitized a wide array of historical documents, maps, and artifacts related to the Silk Road and Central Asia, making them accessible online for scholarly and public use. In particular, the Digital Silk Roads archive provides high-resolution images of the first editions of major exploratory publications by Sven Hedin, Aurel Stein, Vasiliy Radlov, and Nikolai Przhevalsky, as well as lesser-known Japanese explorers such as Hino Tsutomu. It also includes reports by Central Asian archaeological expeditions sponsored by Hongwanji (a major Buddhist temple in Japan) and reproductions of Dunhuang manuscripts published in prewar China.

These valuable resources significantly enhance scholarly access to rare and fragile materials, supporting both specialized and comparative studies[2].

In the broader East Asian context, Taiwan's Academia Sinica has been a leader in the development of historical GIS. Its "GIS for Historical Studies" project has provided foundational infrastructure for integrating historical data with spatial analysis, covering various topics from land use to demographic change. The methodologies pioneered there have had a considerable influence on the development of historical GIS practices across the region[3].

In the field of Central Eurasian studies, the application of GIS was pioneered by the "Fergana Project" led by Professor Komatsu and Dr. Yutaka Goto as part of the Islamic Area Studies initiative. Their work demonstrated the potential of GIS to spatially reconstruct complex social structures and environmental conditions in the Fergana Valley based on historical data. It should also be noted that in Central Asia, archaeological studies have earlier incorporated GIS and detailed geospatial technologies. Due to the discipline's focus on excavation sites and surveying, archaeology has adopted digital methods more rapidly than traditional historical research based on textual sources.

Building on these insights, my own research expands the use of GIS to analyze the socio-economic transformations of the Fergana region during the colonial and early Soviet periods.

My forthcoming monograph, based on my 2017 doctoral dissertation at the University of Tokyo, investigates how the Fergana Valley's economy shifted from a subsistence-based regional economy to a globally integrated cash-crop economy through Russian colonization. Using GIS, I systematically reconstructed historical irrigation networks, ethnic settlement patterns, and the spread of cotton monoculture across the valley. This spatial approach allowed me to reveal the complex interplay between environmental conditions, ethnic relations, and colonial economic policies – a dynamic that traditional narrative methods alone could not fully capture.

The monograph is structured around several key themes. The first part explores the establishment of cotton monoculture in the Fergana Basin during the Russian imperial period, examining how various ethnic groups adapted differently to the new economic conditions. By mapping irrigation development and settlement patterns, I demonstrate the spatial dimensions of economic change that textual sources only partially suggest.

The second part of the study focuses on the socio-economic dynamics of the foothill regions surrounding the Fergana Basin, where Kyrgyz nomadic groups and Russian settlers interacted in complex ways. Through GIS analysis of land use surveys, I reconstruct patterns of dry farming, livestock raising, and seasonal labor migration, shedding light on the resilience and transformation of semi-nomadic livelihoods.

Finally, the monograph addresses the period of turmoil during and after the 1916 uprising, the Russian Revolution, and the civil war. Spatial analysis of demographic data and refugee movements reveals the massive human dislocation and reorganization of settlements that occurred in the 1920s, culminating in the Soviet efforts to reestablish cotton production and implement national delimitation policies in Central Asia.

Moreover, the GIS-based historical analysis highlights the dual structure of the Fergana region's economy: the intensive cotton agriculture in the irrigated basin areas, and the grain-centered, pastoralist livelihoods in the surrounding foothill zones. By combining narrative historical sources with spatial data, my study offers a more nuanced understanding of how different communities adapted to the globalizing forces of the imperial and early Soviet eras.

Particularly since the perestroika era, academic exchanges and collaborations between Japan and Uzbekistan in the fields of history and archaeology have significantly advanced. The Institute of History and the Institute of Oriental Studies of the Academy of Sciences of Uzbekistan have played central roles by welcoming numerous Japanese historians and providing them with opportunities to engage directly with archival sources and fieldwork. Institutions such as the University of Tokyo and Kyoto University have served as primary counterparts on the Japanese side. My own research on the Fergana Valley owes much to the support I received as a doctoral research student at the Academy of Sciences from 2012 to 2014, during which time I had access to invaluable primary sources from the Russian Imperial and Soviet periods. Moreover, the scholarly achievements of Uzbekistan's ethnological and historical studies, cultivated since the Soviet period, have provided indispensable foundations for my work.

In conclusion, the integration of digital humanities methods – particularly GIS – into Central Eurasian historical research holds great promise. Drawing on the experience of digital humanities in Japan and East Asia, including citizen science initiatives and open-access digital archives, scholars can now approach Central Asia's complex history with new tools and broader public engagement. As digital resources and methods continue to evolve, they will undoubtedly enrich the study of Central Eurasia's past and foster new international scholarly collaborations[4].

REFERENCES

1. https://codh.rois.ac.jp/index.html.en
2. https://dsr.nii.ac.jp/index.html.en
3. https://gis.rchss.sinica.edu.tw/
4. In consideration of forthcoming publication rights, GIS-based visualizations were presented only during the live conference session. For a related study on the GIS analysis of the Sokh Oasis in the Fergana Basin, see Ueda, Akira. "The demographic and agricultural development of the Kokand oasis during the Russian Imperial era: nomad immigration and cotton monoculture." *Central Asian Survey*

38-4, 2019: 510–530.