

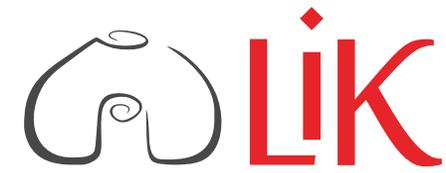


# GIS FOR RESILIENCE: UNLOCKING THE POTENTIAL OF DIGITAL TRANSFORMATION IN KYRGYZSTAN



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# GIS for Resilience: Unlocking the Potential of Digital Transformation in Kyrgyzstan

## Cases from Naryn, Kyrgyzstan

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# Outline

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1. Background on Digital Transformation in Kyrgyzstan
2. The importance of GIS for urban resilience
3. Case study: GIS approaches for Naryn
4. Toward Feasible GIS Implementation at the Local Level



- Concept on Digital Transformation for 2024–2028
- Action Plan focused on improving public services:
  - Opportunities for municipal GIS
  - Streamlining NSDI at the national level
  - Supporting GIS development at the municipal level

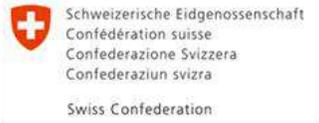


*Image source: Internet*

- Municipal governments in Kyrgyzstan struggle to deliver efficient and equitable services at the local level due to fragmented data systems, limited institutional capacity, and poor ICT infrastructure (Siegel, 2022; Junussova et al. 2023).
- Geographic Information Systems (GIS) offer significant potential to improve decision-making, optimize resource allocation, and strengthen resilience at the municipal level (UN Habitat, 2013; Esri, 2020), yet GIS adoption remains constrained by financial, technical, and organizational barriers (Baud et al., 2018).
- Considering a rapid growth of information technologies, artificial intelligence, and machine learning, the integration of GIS and data analytics into public governance is no longer optional but a necessity for building resilient, efficient, and sustainable urban environments (Atah et al., 2024).
- Nevertheless, efficient deployment of GIS requires geospatial data, which is usually not available in place, but could be crowd-sourced through Open Geospatial Data platforms available in Central Asia (Strobl et al., 2014).

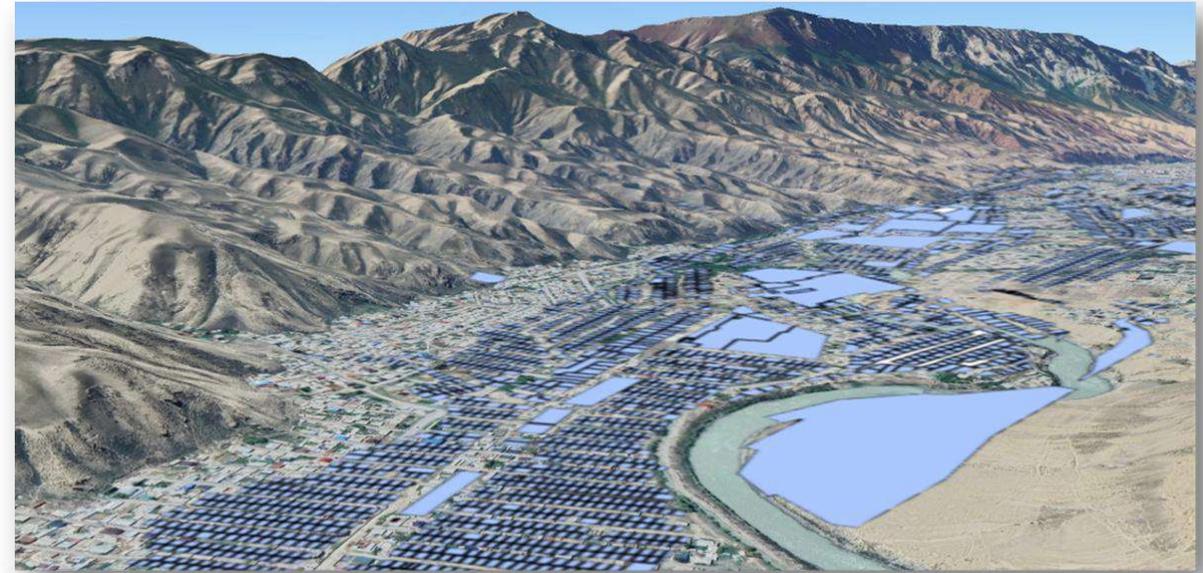
- Global-wide, the municipal GIS has been explored by numerous distinguished academic researchers and practitioners in terms of its costs, benefits, opportunities and associated challenges (Campbell, 1995; Obermayer, 1999; Uchenna et al. 2024).
- GIS has been reviewed as collaborative and participatory tool for smart cities (Esri, 2022; Liu et al., 2019; Chelly et al., 2025; Coutts et al., 2022) suggesting online solutions and web applications (Tureka et al. 2021), as well as a government platform for decision making and public policy (Alikhanov et al.2018; Mehta, 2025).
- Yet, certain researchers stated that the adoption of GIS hardware and software are likely to be quite different in Eastern Europe and the former Soviet Union than in North America and Western Europe (Stanley et al. 1998).
- The uniform frame of the structure of GIS for the needs of small municipalities can't be defined easily, because each municipality has different requirements for the content of the system depending on the position, historical and industrial specifics of the municipality (Opatřilová et al., 2011).

- One of the key stakeholders in GIS, Esri (2022) reported that geospatial capacity is not spread evenly among municipalities. Usually, it takes different forms between
  - large municipalities (>500,000 residents),
  - mid-sized municipalities (>50,000 residents), and
  - small municipalities (<50,000 residents).
- The latter have minimal to no in-house GIS capacity.
- Strobl et al. (2014) argue that since many countries move into Spatial Data Infrastructures, geodata like many other infrastructures need to be available as an open-source data.



Автоматизированная кадастровая ГИС для управления земельными ресурсами органами местного самоуправления (ГИС МСУ)

Naryn Urban Resilience Programme – 2022-2026



## NURP

GIS inventory at:

- Zelenkhoz - *urban greening assets*
- Ministry of Emergency Situations for Naryn town - *hazard areas*
- Taza Naryn – *waste collection routes, traffic lights, electric poles*
- Municipal Property Management Office – *commercial lands*

## GIS LSG

Piloting in Naryn and Sokuluk for:

- land registry
- document flow
- procedures for collecting, processing and regulating the land management activities
- digital maps and databases

## NURP

- Develop a modular, open-source GIS decision-support system prototype.
- Pilot the GIS based decision-support system in Naryn and evaluate its effectiveness
- Suggest a policy and implementation guidelines for wider adoption.

## GIS LSG

- Replication in all 267 municipalities across Kyrgyzstan
- Integration with national systems:
  - НИКС,
  - ГИСАР,
  - «Земельный баланс»,
  - «Санарип аймак»,
  - СМЭВ «Тундук»

- **Primary sources of qualitative data:**
  - Stakeholder consultations,
  - Semi-structured interviews,
  - Observational analysis of GIS training sessions, and
  - Technical assessments of existing business processes



*Image source: GIS consultation workshop in Naryn, NURP*

## Capacity and Training Gaps:

- Very basic to no prior experience with spatial data, mapping tools, or digital workflows.
- Outdated ICT infrastructure
- Inquiry for additional, hands-on support to apply GIS tools for:
  - Land management,
  - Utility services
  - Urban Infrastructure mapping



Image source: GIS trainings in Naryn, NURP

## Institutional Readiness and Awareness

- Public acknowledgement of strategic value of GIS.
- GIS remains a low priority and a standalone technical task.
- Lack of formal mandates / internal policies for GIS
- GIS is considered as a highly specialized tool, disconnected from their daily planning or service delivery responsibilities.
- Need for stronger policy directives and cross-departmental coordination mechanisms.



Image: Naryn Town Council's resolution on GIS positions

## **Opportunities:**

- Digital Transformation Concept for 2024-2028 is a timely and strategic opportunity for local governments to adopt GIS and other ICT tools.
- Political will at the national level and acknowledgement of the importance of SDI
- A policy foundation for building GIS-related projects, potentially with support from donor organizations and central agencies.

## **Gaps:**

- Rural and small-size municipalities remain ill-equipped to take full advantage of this technology.
- Insufficient technical expertise and limited institutional capacity pose significant barriers to effective implementation of the Digital Transformation in the country.

## *Recommendations:*

- Establish Dedicated GIS Units in the existing municipality structure
- Develop a National GIS Capacity-Building Framework
- Introduce Legal and Regulatory Instruments
- Ensure Sustainable Financing Mechanisms
- Promote Inter-Municipal Cooperation and Knowledge Sharing
- Support the Integration of GIS in Urban Planning and Service Delivery

# Thank You!



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