Inauguration of Geographic Information System Cells
(Vehari and Sheikhupura)
March 2015
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Introduction

The governments of Punjab (GoPB) and Khyber Pakhtunkhwa (GoKP) are implementing the Sub-National Governance (SNG) programme (April 2013 to September 2017) with the assistance of UK’s Department for International Development (DFID). SNG aims to improve basic service delivery in twelve pilot districts; six each in Khyber Pakhtunkhwa (KP) and Punjab. The Programme’s goal is to ensure use of evidence in decision making by subnational governments, improve their responsiveness to people’s needs, and enhance their capability to deliver basic services.

Development of district-level Geographic Information System (GIS) capacity is one of the key components under SNG. In order to achieve these objectives, the programme is providing support for the establishment of GIS Cells in SNG districts. These Cells will provide necessary hardware and advanced software tools initially for geo-education and geo-health data analysis in selected pilot districts, primarily through the use of existing datasets. This is expected to improve evidence based planning and effective monitoring of front line service delivery at the district level.

A GIS Implementation Plan was developed that laid out the details of the establishment of GIS cells in the 12 SNG districts. The plan outlined in very specific terms the requirements for GIS personnel, software, hardware, data and work tasks in each year of its implementation. The distinctive selling proposition of the GIS cells is their ownership with district administration, focus on analysis and planning for service delivery, and use of existing databases.

The development of GIS Implementation Plan was the result of a process of extensive consultations. Led by an International GIS Expert, Dr. Bruno Parolin, the first GIS mission was launched in 2013. It was aimed at scoping the potential for district-level GIS initiative. The GIS Expert affirmed the need for building district-level GIS capacity. The mission developed an outline implementation plan for a low-cost model covering basic services.

The second GIS mission, in March 2014, resulted in the development of a draft GIS Implementation Plan report. A significant development at this stage was the decision to outsource the implementation of GIS initiative to Punjab Urban Unit (UU) using a milestone-based contract.

The third mission, in October 2014, fine-tuned the implementation proposal and drew up terms of reference (ToR) for contracting UU to establish and operationalize the GIS
cells. Provincial Steering Committees in both Punjab and KPK approved outsourcing of the GIS implementation plan to UU.

SNG signed a contract with UU, in November 2014, for the establishment of the GIS cells in the four pilot districts of Sheikhupura, Vehari (Punjab), and Haripur and Karak (KPK). The four pilot GIS cells are to be made operational by March 2015, before a decision to rollout the GIS cells to the remaining eight SNG districts is taken based on the observed performance of UU.
2. Key features of the GIS initiative

2.1 Functions and tasks of GIS Cell

The major GIS functions to be undertaken by GIS Cell’s in the pilot districts relate to the following core activities with an initial focus on health and education service delivery, namely:

1) data integration and management
2) spatial analysis and mapping
3) spatial monitoring of databases over time,
4) GIS training for district and provincial government personnel,
5) GIS functions linked to work activities in education and health and to related education and health sector reform programmes in the pilot districts,
6) relevant GIS work for other pilot district departments,
7) responding to GIS requests from the DCO,
8) GIS support to the District Reform Group,
9) liaison with Urban Policy Unit in KPK,
10) updating of GIS data/information for health and education departments as and when required, and
11) supporting education and health departments to collect GIS data of health and education facilities.

2.2 Institutional setting

Changes in district structures following local government elections in Punjab are likely to see the abolition of certain district structures and the establishment of an independent District Education Authority (DEA) and independent District Health Authority (DHA) in each district. The GIS Cell, located in the office of the DCO, will coordinate closely with the staff of the DEA and DHA for service delivery planning and monitoring functions. Continued use of the DCO office-based GIS capability by the autonomous DEA and DHA will be ensured through a monthly District GIS Coordination Forum headed by the DCO (or his successor office). Further assurance
for the collaborative use of the GIS capability is proposed through oversight by the Provincial Steering Committee of SNG and the P&D Department, Punjab.

2.3 Human resource requirement

Each GIS Cell is staffed by one GIS Analyst, with recognised qualifications in GIS such as a Bachelor or Master Degree in GIS. S/he is expected to have demonstrable competence in the use of ArcGIS software, extensive experience in GIS database development and management, imparting GIS training, and excellent GIS based analysis, mapping and cartographic skills.

2.4 Software requirements for a GIS cell

The ArcGIS Desktop Basic 10.2 plus the two extensions (Spatial Analyst and Network Analyst) have been purchased from the official vendor of ArcGIS products in Pakistan – one licence for each GIS Cell. Additionally MS Office Professional 2013 licences have also been purchased for the laptop to be used in each GIS Cell.

2.5 Hardware requirements for a GIS cell

Every GIS cell has been equipped with hardware of approved specifications. This includes:

- One laptop computer
- A4 printer Black and White
- A3 scanner
- A3 color laser jet printer
- GPS device
- EVO internet wireless connection
- DSL 4MB internet connection
- LCD Screen 46"
- External hard drive 2 TB
- Replacement cartridges
The DSL bandwidth connection (4 MB) has been arranged with a suitable service provider in the districts.

Other equipment comprises an air conditioner (1.5 ton unit) and office furniture (office style table set, visitors’ chairs and a lockable filing cabinet).

### 2.6 Data requirements

One of the most important elements for the proper functioning of a GIS Cell is the availability of quality data to develop geo-education and geo-health layers that are the foundations for most GIS based analysis and the development of needed software applications. Important considerations in identifying the required data were, consistency, standardisation, map scale and resolution. Some of the basic GIS layers, to be made available by UU for each GIS cell are:

- roads at district level
- rivers/streams
- settlements as points and boundaries (built up areas)
- estimated population or mauza level demographic data
- school locations (public and private)
- health facility locations (public and private)
- administrative boundaries (district, tehsil, mauza, union council, etc)

### 2.7 Capacity building – training requirements

An essential requirement for the successful operation of the district based GIS Cell is building capacity of personnel across key district departments in the use of GIS technology in their work enabling them to deliver high quality outputs, i.e. planning options and monitoring information. Given that SNG activities are focused on education and health initiatives, these departments have been given priority in training programmes. The UU delivered training programmes for the first 4 pilot districts in February 2015. The modules included:

- Introduction to GIS (Track 1)
- Mid-level and Advanced analysis with GIS (Track 2)
- Education and Health Mapping and Planning Short Course (presented by Dr Parolin)
2.8 Current Implementation Status

GIS cells have been established in all four pilot districts (two in KPK), complete with staff, hardware and software, with the exception of the data to be retrieved from the PITB and MEAs. UU has been asked to expedite retrieval of the data from these sources. Training has been imparted to GIS analysts and the relevant district staff. The GIS cells have been made operational in pilot districts. Following is a brief account of the inaugural ceremonies in Vehari and Sheikhupura districts.
3. Proceedings of Inaugural Ceremony of GIS Cell Vehari

The inaugural ceremony of GIS cell Vehari was held on 17th February 2015 in the District Coordination Officer’s (DCO) office in Vehari. It was attended by DCO, District Police Officer (DPO), Syed Sajid Shah, MNA from Vehari, SNG Team, District Forest Officer, District Information Officer, EDO (F&P) and other district officials (officers in charge of the IT Cells in the DCO and DPO Offices, and the GIS Analyst). The GIS Cell was formally inaugurated by DCO Vehari by unveiling the inaugural plaque. After the inauguration a formal briefing and discussion session was held on GIS.
The GIS Analyst briefed the participants about the functioning and utility of GIS. Some initial work on GIS done by GIS Analyst was presented to the participants. It was interesting to note that the DPO had attended a GIS course during his master’s degree abroad. He specially asked if Police Department could use the GIS facility as it would help them to understand crime patterns in the district and formulate their deployment plans. He explained in detail how GIS is being used as an aid to modern policing. He specially thanked SNG for establishing GIS Cell in Vehari.

DCO was equally enthusiastic. He was shown some locations of schools and health facilities along with population density maps. He was surprised to see that some of the
education and health facilities were located at quite a long distance from population clusters. He appreciated the GIS initiative and was eager to see the use of GIS in planning and monitoring in all sectors, and not restricting its use to Education and Health sectors alone. For this purpose, he had also invited ACs and TMOs for participation in the GIS orientation session, as he saw a wider use of GIS in future public sector management.

Syed Sajid Shah, MNA Vehari also commented on the presentation that reflected on school locations vis-a-vis population clusters. He stated that the issue he was facing in his constituency was that often girls’ schools were 5 km away from population centers whereas boys’ schools were located in the center of the village. He cited this as a major reason for drop out of girls. He keenly observed how GIS functions and appreciated it as a major contribution by SNG.
4. **PROCEEDINGS OF INAUGURAL CEREMONY OF GIS CELL SHEIKHUPURA**

Inaugural ceremony of GIS cell Sheikhupura was held on 23rd February 2015 in the committee room of District Coordination Officer’s (DCO) office, Sheikhupura. Mr. Omar Mukhtar Khan (DFID), Dr. Bruno Parolin (GIS Consultant), Mr. Hamed Yaqoob Sheikh (Team Leader, SNG) and Mr. Naveed Saleh Siddique (Governance Advisor, SNG) were greeted by a large gathering of the district officers, including all the members of the District Reform Group (DRG). GIS Cell was formally inaugurated by DCO Sheikhupura by unveiling the plaque. After the inauguration a formal session on GIS was held in the committee room of the DCO office.

Dr. Bruno Parolin briefed the participants about the Cell’s functioning, capabilities and its critical role in planning and monitoring of service delivery. There was great interest in GIS and its uses in all spheres of district administration. DCO Sheikhupura displayed his understanding of the GIS technology by showing different layers of GIS data available with Sheikhupura GIS Cell. The use of GIS for monitoring in health and education was illustrated through examples by showing different data layers on the two sectors.

**SNGL launches GIS based monitoring to enhance the adoption of evidence-based decision-making processes at district level**

**Discussion on uses of GIS for monitoring and planning in health and education**

**Health facilities along with population density maps**
DCO, ADC/Administrator TMA Sheikhupura, District Transport Planning Officer, Assistant Commissioner (Sheikhupura), EDO Health, EDO Education, Rescue 1122 District Officer, Senior Network Administrator (SNA) and several other participants asked questions and offered comments. Most of the questions related to the capability of the cell, its extension to sectors beyond health and education, and sustainability of the cell, etc.

It was evident that there were high hopes and expectations from GIS Cell, which will have to be managed over time. Some participants thought that one GIS Analyst was not enough and his time would be monopolized by senior district officers, such as DCO and EDOs and he will not be available to work on transport planning or on Rescue 1122 etc. They wanted nodes/access for all sectors with license and trained manpower.

The Provincial Team Leader Mr. Hamed Yaqoob Sheikh acknowledged the efforts of Mr. Shoeb (DTL), Mr. Arshed (PFM Advisor-North) and Mr. Fazal (RA Sheikhupura) for their tireless work to make the GIS Cell functional and in creating ownership of the initiative in such short time.
5. Way forward

GIS can be used for carrying out spatial analysis of health and education service delivery and assessing progress against SNG log frame indicators and milestones

GIS is a monitoring and planning tool that can be used for a number of core activities. These involve carrying out spatial analysis and generating maps using data from an available MIS. GIS will also help assess progress against SNG log frame indicators and milestones.

Currently, as a pilot, SNG has established the GIS cell in two of its districts i.e. Vehari (PRSP district) and Sheikhupura (non-PRSP district) to examine its impact on planning of the district activities. The future plan in Punjab is to extend the GIS facility to the remaining four SNG districts i.e. Sahiwal, Mandi Bahauddin, Hafizabad and Bhawalnagar. Further, SNG intends to increase the scope of GIS use from health and education to other sectors as well. For example, GIS can facilitate district managers in flood monitoring and agriculture planning.

Districts may in future increase the scope of GIS beyond health and education sectors

GIS mapping can facilitate the district managers in flood monitoring, agriculture planning and monitoring of development activities

It can also help in monitoring progress under DDCF grants; plan, budget and monitor public sector development activities; prepare district education and health reports; carry out health and education needs assessments; and coordinate with partners, donors and other stakeholders.
## Annexures

### Annex I. List of Participants at inauguration ceremony of GIS cell Sheikhupura

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Designation</th>
<th>Department</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Rashid Kamal</td>
<td>DCO Sheikhupura</td>
<td>District Government</td>
</tr>
<tr>
<td>2</td>
<td>Sidra Saleem</td>
<td>AC Sheikhupura</td>
<td>District Government</td>
</tr>
<tr>
<td>3</td>
<td>Saira Omar</td>
<td>ADC Sheikhupura</td>
<td>District Government</td>
</tr>
<tr>
<td>4</td>
<td>Asifa Murtaza</td>
<td>DMO Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>5</td>
<td>Zubaira Yasmeen</td>
<td>DEO (WEE) Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>6</td>
<td>Dr. Muhammad Azam</td>
<td>DEO (1122) Sheikhupura</td>
<td>District Government</td>
</tr>
<tr>
<td>7</td>
<td>Mushtaq Shah</td>
<td>CRI (1122) Sheikhupura</td>
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<tr>
<td>8</td>
<td>Mian Tariq</td>
<td>DO (P) Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>9</td>
<td>Rafid Ahmed</td>
<td>EDO (F) Sheikhupura</td>
<td>District Government</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Muhammad Saeed</td>
<td>SMO DHQ Hospital Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>11</td>
<td>Dr. Dildar Ahmed Khan</td>
<td>DOH Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>12</td>
<td>Maryam Nawaz</td>
<td>Secretary DRTA Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>13</td>
<td>Raja Fakhar Bashir</td>
<td>DSP City Sheikhupura</td>
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<tr>
<td>14</td>
<td>Sarfraz Ullah Khan</td>
<td>Deputy Director (Public Relations)</td>
<td>District Government</td>
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<td>15</td>
<td>Sardar Abdul Waheed</td>
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<td>16</td>
<td>Anwar-ul-haq Faisal</td>
<td>Editor</td>
<td>Daily Moqadas</td>
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<tr>
<td>17</td>
<td>Dr Rana Imran Khan</td>
<td>EDOH Sheikhupura</td>
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<td>18</td>
<td>Fazaz Abbas Shah</td>
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<td>19</td>
<td>Jhangir Gulzar</td>
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<td>20</td>
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<td>21</td>
<td>Aqeel Abbas Shah</td>
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<td>22</td>
<td>Muhammad Mansha</td>
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<tr>
<td><strong>SNG Punjab Team</strong></td>
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<tr>
<td>23</td>
<td>Hamed Yaqoob Sheikh</td>
<td>Provincial Team Leader</td>
<td>SNG</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
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<tr>
<td>22</td>
<td>Shoeb Iqbal Syed</td>
<td>DTL-North</td>
<td>SNG</td>
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<tr>
<td>23</td>
<td>Muhammad Arshad</td>
<td>PFM Advisor-North</td>
<td>SNG</td>
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<tr>
<td>24</td>
<td>Omer Mukhtar Khan</td>
<td>Governance Adviser</td>
<td>DFID</td>
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<tr>
<td>25</td>
<td>Naveed Saleh Siddique</td>
<td>Governance Adviser</td>
<td>SNG</td>
</tr>
<tr>
<td>26</td>
<td>Dr. Bruno Parolin</td>
<td>GIS Consultant</td>
<td>SNG</td>
</tr>
<tr>
<td>27</td>
<td>Khadija Marryam</td>
<td>Research Analyst</td>
<td>SNG</td>
</tr>
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</table>
# Annex II. List of Participants at inauguration ceremony of GIS cell Vehari

<table>
<thead>
<tr>
<th>Sr. No.</th>
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<tbody>
<tr>
<td>1</td>
<td>Syed Sajid Shah</td>
<td>MNA Vehari</td>
<td>National Assembly</td>
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<tr>
<td>2</td>
<td>Jawad Akram</td>
<td>DCO Vehari</td>
<td>District Government</td>
</tr>
<tr>
<td>3</td>
<td>Sadiq Dogar</td>
<td>DPO Vehari</td>
<td>District Government</td>
</tr>
<tr>
<td>4</td>
<td>Muhammad Riaz</td>
<td>EDO (F&amp;P)</td>
<td>District Government</td>
</tr>
<tr>
<td>5</td>
<td>Tariq Mehmood</td>
<td>DO (Forest) Sheikhupura</td>
<td>District Government</td>
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<tr>
<td>6</td>
<td>Khuram</td>
<td>System Network Analyst</td>
<td>District Government</td>
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<tr>
<td></td>
<td><strong>SNG Punjab Team</strong></td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Usman Ahmed Chaudary</td>
<td>District Team Leader (South Punjab)</td>
<td>SNG</td>
</tr>
<tr>
<td>8</td>
<td>Sohail Tipu</td>
<td>Challenge Fund Coordinator (South</td>
<td>SNG</td>
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<td>Punjab)</td>
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<td>9</td>
<td>Anum Hussain</td>
<td>PFM Advisor (South Punjab)</td>
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Annex III. Presentation at inauguration ceremony of GIS cells at Sheikhupura and Vehari

Dr Bruno Parolin SNG, Ehsan Saqib Urban Unit
18 February 2015

What is a GIS?

Definition of a Geographic Information System

GIS is a **System** of computer software, hardware and data, and personnel to help manipulate, analyze and present (visualize) information that is tied to a spatial location:

- **Spatial location** usually a geographic entity/location
- **Information** visualization of analysis of data (e.g. EMIS)
- **System** linking software, hardware, data
- **Personnel** an analyst who is key to the power of GIS
Multiple map layers

- GIS layers which are aware of each other, are seamless, integrated, at any scale (local to global), on a common coordinate system, with data attached to each layer and to the map.

GIS cell functions

- Needs based planning and budgeting.
- Linking of spatial data with EMIS, DHIS, MEA etc. No new data generation. Focus is on analysis of existing data.
- Spatial analysis of data
- Monitoring of data – mapping
- Generating spatial layers (if required)
- Assisting DCO in providing maps in flooding, boundary demarcation etc.
- Capacity building: GIS training of education, health and planning officials, etc., for the district.
Possible Uses of GIS in a District

- Mapping, understanding and explaining Education/Health indicators in the light of GIS.
- GIS based needs analysis. E.g. New school/hospital planning, rationalizing over crowded schools.
- GIS based school/health facility accessibility analysis.
- Teachers accessibility analysis to aid in transfers.
- Spatial distribution of schools. Identifying settlements without schools.
- Catchment area analysis.

Possible Uses of GIS in a District (Cont)

- Identify problematic schools clusters.
- Help in school closure or mergers decision.
- Moving students and teachers from over-crowded to under-crowded schools.
- Monitoring budget spending for upgrade of facilities in school.
- GIS for pattern analysis for identifying schools with facility and maintenance problems.
- Monitoring of other district level assets.
- Land use development and monitoring.
Possible Uses of GIS in a District (Cont.)

- Planning for vaccination campaigns.
- Locations of crimes.
- Analysis of accidents and other safety problems.
- Monitoring of agricultural production and outputs.
- Mapping flood prone or flood affected areas.
- Assessment of proposed new developments.
- Assessment of sanitation and water services.

GIS = Analysis and Planning Across all Sectors of a District

The Old Way. Or the Present Way?

Source: www.lums.edu.pk/tpi
Evidence-based Policing
Crime against property

Source: www.lums.edu.pk/tpi
Data capturing process

British Era Land-Revenue Map

Stored

District Jhelum — Record Room
(Built 1860)

Scanning of 5000+ sheets

New Way - GIS

Source: www.lums.edu.pk/tpi
Understanding and explaining Education/Health indicators in the light of GIS. – Student Teacher Ratio

Catchment area analysis – Health Facilities
Identifying schools with facility and maintenance problems – Toilets needing repairs

Identifying schools with sports facilities
Vacant teaching positions

GIS based needs analysis
Inauguration of Geographic Information System Cells

Example Case Study
— Travel of Patients to Community Health Centres

Lahore Dengue Outbreak
Lahore Dengue Patient Mapping

Flood Damage Assessment

<table>
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<th>Mouza</th>
<th>Apoth Jamiyana</th>
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<tr>
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<td>Shadam Hussain</td>
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<tr>
<td>Father name</td>
<td>Shair Khan</td>
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<td>CNIC</td>
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<td>Damage %</td>
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Crop Damage Assessment

Wheat Procurement Monitoring System