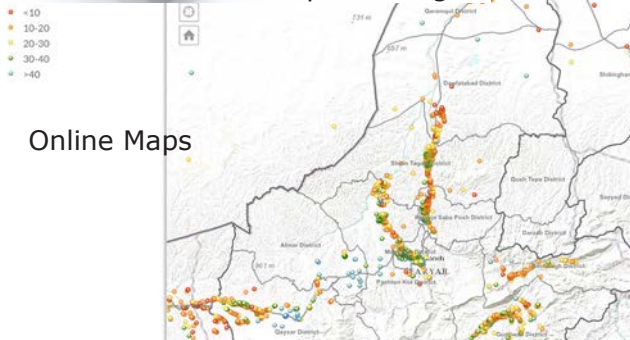




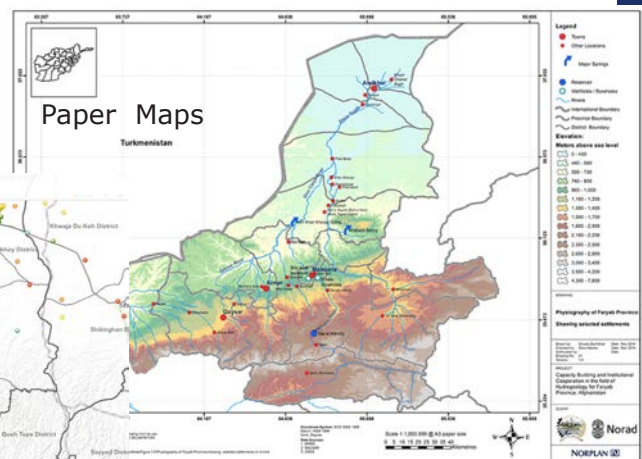
MRRD - RuWatSIP



Data processing



Online Maps



TECHNICAL PAPER:

GIS AND MIS PROJECT COMPLETION REPORT FOR ACHIEVEMENTS, CONSTRAINTS AND LONG TERM FUTURE RECOMMENDATIONS FOR THE GIS/MIS FACILITY TO SHOW ITS OPERATION AND SUSTAINABILITY

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Purpose of the document:

Progress report on completion of planned tasks in the fields of GIS (Desktop and Online), MIS (data clearance and management), trainings (capacity building) and coordination (conferences and meetings) by NORPLAN between 2013 and 2015

The report is according to GIS-MIS Advisor activities.

Personnel involved in this document:

- Prof. Mohammad Naim Eqrar (Trainings Expert, National)
- Andreas de Jong (GIS Expert, International)
- Naqibullah Abrar (Deputy Team Leader, NORPLAN)
- Prof. M Shuaib Zarinkhail (GIS/MIS Advisor, NORPLAN, RuWatSIP, MRRD)

1. Project GIS - Rationale

The NORPLAN Afghanistan project was working in the field of hydrogeological survey in Faryab province in the north of Afghanistan. A geographical information system and data management system was recognized as a requirement for the project to organize project activities and to manage and disseminate survey information. Using GIS is a very good tool for communication and GIS is distinguished as a good way for analyses and contact between technical fellows and planners for natural resource management activities. GIS can be used as one of the best options for technical activities in groups and team work environments.

The NORPLAN role in Faryab province was focusing on field data collection, data management, water quality tests as data organization part, and data analyses and result dissemination to stakeholders. GIS and data management systems directly supported project activities in regard of visibility and information of views for future decision making activities. GIS helped the project to have coordination and contact with key organizations and ministries working in water management and research areas.

Initial work on project GIS was started in early 2012 by project International GIS experts. This was the period of planning project activities (planning phase). A general structure for the project GIS was established. Base layers combining different sources including environmental, geology, hydrogeology, shaded relief, satellite Landsat mosaic, digital elevation model and hill shade data was combined and included. At that stage, project data was not available. Later during the implementation phase, the project data records needed further analyses and quality assurance tests which were later used in project GIS.

2. Progress

The NORPLAN had moved from planning phase to implementation phase in February 2013 and continued up to the end of 2015. At that time, a bridging workshop with active participation of project team including national and international staff beside colleagues from partner organizations was held. During that workshop the GIS status and planned activities were presented. Target for project GIS was preparing data management system, developing a desktop solution to project GIS and making data and GIS available online. All the planned activities were achieved by the end of the project.

2.1 Desktop GIS

Project data as the main source to build front layers in GIS needed to be organized. Reports, analyses and representation of data and figures needed to be based on project data. A quality assurance test was required to make the project data legal for using in GIS. This activity was started during planning phase by the project international senior hydrogeologist, Mr. David Banks. The structure of the quality assured data was further analyzed and a database (geodatabase) was developed to store this data. The project quality assured data copied to the database and kept dynamic to the project GIS; every time new data (update or delete) occurred, the GIS automatically show the changes.

Desktop GIS for the project, which was already started with base layers during planning phase, was developed. The GIS is linked with the project database and data layers are built up on data from the database. This relationship between layers and data is dynamic and work as an ad hoc system. The system is capable to produce maps up on need / request. A draft layout was used for the production maps. A standardized layout was developed and used for map products. A paper atlas designed which includes technical maps of Faryab.

The desktop GIS was designed to be used as an outline for the project online GIS. The final product of the desktop GIS is a map atlas for Faryab province. The maps are on regional, provincial and district levels. Map atlas includes location, hydrogeology, geology, groundwater sources, electrical conductivity regions, static water level and physiography maps for Faryab and a selected district of this province. This desktop GIS can further be implemented for other provinces as well.

2.1.1 Deliverable of map products

Paper and PDF Map atlas of Faryab province is one of the planned activities of NORPLAN. Project desktop GIS is developed and ready to produce maps. The required maps distinguished by technical people including 8 provincial maps and 6 district level maps.

Provincial Maps list:

- Faryab_00_Administrative_Map
- Faryab_01_Springs
- Faryab_02_Wells_and_Boreholes
- Faryab_03_Electrical_Conductivity_Map_V2.1
- Faryab_04_Static_Water_Level_Map_bgl_V2.3
- Faryab_05_Physiography_showing_selected_settlements
- Faryab_06_Geological_Map_V05
- Faryab_07_Hydrogeological_Map_V1.3

District Maps list:

- ShirinTagab_01_Springs_V01
- ShirinTagab_02_Wells_&_Boreholes_V01
- ShirinTagab_03_Electrical_Conductivity_Map_V02
- ShirinTagab_04_Static_Water_Level_Map_bgl_V02
- ShirinTagab_06_Geological_Map_V02
- ShirinTagab_07_Hydrogeological_Map_V02
-

2.2 Online GIS

The project online Geographical Information System is another major activity that was needed to become functional during the project life. The online GIS was planned to implement up on completion of project desktop GIS. The purpose behind this was to have data formats and background and foreground layers ready and their formats finalized to

be used in online GIS of the project. Work on the online system had been completed by the end of 2014.

May 24 to 26, a three day workshop session in NORPLAN Emirates, Abu Dhabi office was conducted. The purpose of this workshop was starting work on the project online GIS. Workshop participants were Mr. Tor Gunnar (from Norway), Mr. Runar Bergheim (NORPLAN, Abu Dhabi office), Abrar and Zarinkhail (NORPLAN, Kabul office). During the workshop, project data management system and current data were presented. Project desktop GIS and layers presented and discussed. Comments and observations of experts considered to be added to the structure of the database and desktop GIS to become ready for using in the online maps.

The team discussed and prepared a general layout of the system (how to look and what options and layers to be included). This was also shared with project team including senior hydrogeologists who were not present in the workshop. Finally, an approach on design and layout of the online GIS prepared and Web-GIS expert, Mr. Bergheim started initial design of the system. Later on by joining another GIS expert to the project a new approach to the online GIS proposed.

WebGIS for online maps using ArcGIS Online found a good tool to make maps available online. This worked very well and the same data formats which uses in Desktop GIS worked very well in the ArcGIS Online with free user account. This helped sustainable work using recent technologies. Most of the project desktop maps are added to the interactive online maps and are available via the project website www.norplan.af.

2.3 GIS National Conference

Two national conferences in GIS and Hydrogeology were planned by the project to publicize project achievements and make an environment to bring technical people together to share their knowledge and findings up to date. Fortunately, we succeeded on both events (details on the Hydrogeology conference can be found in a different report and are also available on the project website). The GIS conference took place on the 10th and 11th of November in MRRD main conference room. There was a fair participation from technical people with very good inputs. The conference was mainly on use of the modern IT tools in GIS. A variety of participants from key government and nongovernment organizations were there.

Very good and impressive presentations from AGCHO (Afghanistan Geodesy and Cartography Organization), MRRD (RuWatSIP GIS Unit, WASH, NSP GIS Unit), DACAAR, MEW, MAIL, UNEP, FAO, and Kabul University were presented in this conference. The NORPLAN technical people shared what they did and what technologies were used in Faryab via this project. In the administration part, deputy minister of MRRD and RuWatSIP Director Eng. Qader were participated the conference.

There was a group discussion at the end focusing on what should be done in the future to make the use of GIS with modern technologies sustainable in Afghanistan. Out from the group presentations and findings a declaration note prepared and issued. Following activities similarly should take place to bring GIS users community closer. As a first following step the GIS day (18th of November) ceremony will be a following of this event and most of participants of this conference were invited for that event in a week time. The GIS day workshop was planned by UNEP, announced during the conference, and

took place in Kabul University. Some key presenters from this conference were invited to have inputs in that workshop.

Conference outputs, photos, documents including invitation letter, list of participants plus all the presentations and declaration note are available in the project website (www.norplan.af).

3. Software

GIS in Afghanistan government is mostly used as desktop versions. ESRI technology is using widely in Afghanistan for desktop geographical information systems. For the first approach of the project which was developing a desktop GIS, ESRI products were selected as a better option. Using ESRI software enabled the project to find local expertise and make the project team to develop a sustainable desktop GIS for the future. Besides, data sources for Afghanistan were easily found for this software.

ESRI ArcGIS with Spatial Analyst extension recognized as the required software for designing of the project GIS. A one user concurrent-use license was purchased by the project. For online GIS, there were different options. Out of many, free ArcGIS Online was selected. Using this technology, no special software is required. The only requirements for it is having high speed Internet connection and a browser through which a user account and use of system can take place. The end product of the online maps can be directly viewed in web browsers or be embedded into web pages.

The ESRI software for the desktop GIS is working well and for the future sustainability of GIS related activities, this is a good option. According to plan, ArcGIS desktop was purchased. License for one extension of this software which is Spatial Analyst was also purchased.

4. Equipment

A unit to manage GIS and MIS activities of RuWatSIP was established in RuWatSIP, MRRD. NORPLAN as donor to the Government of Afghanistan took responsibility to support this unit in regard of preparing equipment and materials and to make the unit functional. Four people are working in the MIS-GIS Unit of RuWatSIP. The NORPLAN GIS-MIS Adviser is partly working in that unit and act as focal person for Government activities and coordination with other stakeholders.

The MIS-GIS unit is fully equipped by the NORPLAN. Major equipment such as electronic machines including 2 PCs (one laptop and one desktop), A3 printer, paper shredder, and office furniture were prepared by the project. A server computer and its peripherals are quoted, purchased and set upped in RuWatSIP Server Room, MRRD. This server is used for the RuWatSIP MIS and GIS which is mainly dealing with ground water, surface water, hygiene and sanitation data over the country.

5. Trainings and capacity building

NORPLAN has wide support functionality to MRRD on capacity building of staff and technical people. Technical trainings cover GIS and data management topics in RuWatSIP and stakeholder organizations including Ministry of Energy and Water (MEW), Ministry of Agriculture, Irrigation and Livestock (MAIL), Ministry of Mines (MOM), CACAAR and universities. Central GIS & MIS unit of MRRD was also considered to participate in capacity building trainings conducted by NORPLAN.

A series of capacity building trainings in the field of GIS and data management was planned. By the end of the project, the

series included 16 trainings; their list and calendar is available online in the project website (www.norplan.af). Training list updated based on needs and observations from experiences gained from courses that were already completed. Finally, a total number of 15 training courses with 253 participants were completed.

5.1 Training focus on MIS-GIS unit

GIS and data management trainings are planned to keep the MIS-GIS unit staffs in a special focus and to build their capacity for keeping the unit sustainable and operative for the future. There are 4 people working in this unit of RuWatSIP: one MIS developer, one MIS-GIS senior assistant and two people working with data management and monitoring activities. Three of them are well familiar with recent technologies in the field of MIS and GIS. And the other one is dealing with data monitoring and data reporting in governmental old formats.

The staffs of the MIS-GIS unit who are familiar with recent technologies are a good source to be worked on their capacity building and let them keep our system's functional in long term. Therefore, we kept them participated in all the trainings and used their assistance during some of the trainings. In some training we used them as co-trainers with their good roles.

6. Coordination

NORPLAN was functional in RuWatSIP, MRRD. RuWatSIP is the leading program in water sector in rural Afghanistan. Line ministries and partner organizations plan and implement water related activities in rural areas by coordination with RuWatSIP. NORPLAN was an active project in the field of research on underground water

resources in Faryab province. Therefore, coordination with RuWatSIP and via RuWatSIP with other stakeholders who have projects in Faryab province was one of the key activities of NORPLAN.

The focus of NORPLAN was basically on hydrogeological data and underground water sources survey, analyses, and reports. RuWatSIP role was to organize and coordinate activities on both underground (ground) and surface water records in the whole country. Additionally, RuWatSIP works with hygiene and sanitation data and their related activities in rural area. Therefore a unit to store, control, analyze, and disseminate sector data needed to establish in RuWatSIP. A GIS and MIS were also required to make this unit functional.

6.1 RuWatSIP MIS - GIS

NORPLAN had financially supported the RuWatSIP MIS-GIS Unit. Development of a GIS and MIS for this unit is basically funded by UNICEF. The system covers surface water, hygiene, sanitation and financial and administrative attributes of assets. A limitation of the RuWatSIP general MIS and GIS was recognized by NORPLAN during requirements analyses period and that was the system limitation to one language (English).

The mini language shortcoming of the RuWatSIP MIS and GIS was resolved by coordination between NORPLAN and RuWatSIP. NORPLAN covered additional charges to make the system in 3 languages. Three interfaces are in the system; one in English and two in local languages. This can help the system to be sustainable for the future and is easily used by locals who could not communicate in English.

7. The way forward

Project GIS is completed for one province. This can be extended to other province of the country. Groundwater mapping can help planners to allocate fund and assign projects according to needs and further activities only when mapping completed for the whole country. Web GIS should be extended in similar manner.

7.1 Desktop GIS

The project desktop GIS initially used a layout which was drafted for this purpose to show maps. A new layout developed and replaced for future map products. The new layout was shared with the NORPLAN technical team and was used as standard layout for paper atlas.

Hydrogeological paper atlas needed some technical discussions from the point of hydrogeology features which needed to be included or excluded from the final map products. The discussion took place in September 2013.

Metadata to some important GIS layers were added. This data describes the data source, how the data has been processed and by whom.

The working files were numbered in a logical manner. For instance, a map project having several updates; each one was named as a different version starting from its previous version starting from version zero. The Desktop ArGIS software license is upgraded to 10.2. To keep compatibility between files in different systems, the working project files were kept and used in 10.0 version.

7.2 Online GIS

The online GIS approach using ArcGIS online with a free account worked very well. Currently, Faryab web maps are available online. These maps are embedded into the project web site which sounds good. Besides draft web maps for two more provinces names Balkh and Nangarhar were also developed and are active in the same place (www.norplan.af). Since the project website is public, everybody everywhere can have access to the project site and they can view these maps in an interactive manner. Another positive point is that every time maps getting updated, the update versions automatically take place and are shown in all places where they embedded. The online maps with these specific map formats can be expanded to other provinces of the country.

Complete GIS progress report prepared by
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