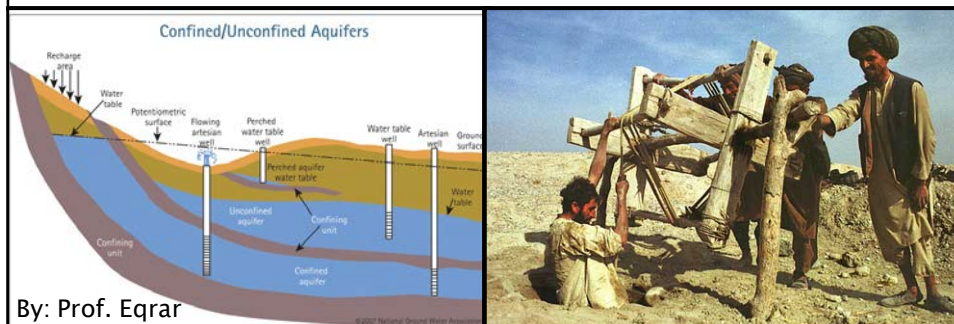


NORAD supported project in MRRD:
Capacity Building and Institutional Cooperation in the field of Hydrogeology for Faryab
Province , Afghanistan

Training Course 1.7
Planning and implementation of Provincial Hydrogeological
Surveys

NORPLAN 

History of hydrogeological surveys in Afghanistan in the past. Methods, organizations, responsibilities



Contents

محتویات

- Objective of groundwater survey
- History of Hydrogeological survey in Afghanistan
- Example of hydrogeological survey in Afghanistan
- Methods of groundwater investigation in Afghanistan
- Preparation of final hydrogeological report and maps

OBJECTIVE OF GROUNDWATER SURVEY

هدف سروی ابهای زیرزمینی

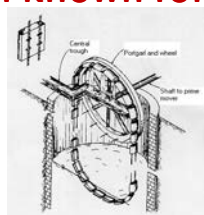
The main objective of these surveys is to study and understand the hydrogeology of the region, to have an overall concept about the type, nature & number of aquifers, the quality and quantity of ground water resources.



History of Hydrogeological investigation in Afghanistan

تاریخچه تحقیقات ابهای زیرزمینی در افغانستان

- **Groundwater development by wells and Karezs has been known for more than 1 500 years.**



- **The first drilled well was started in 1956 in Kandahar provinces**
- **Establishment of Groundwater Branch(1957) under the soil survey Authority Dep.(MoM)**

To be continued...

- With technical assistance of the Institute(SREDAZ-giprovdokhlopok USSR) hydrogeological and Geo engineering investigation in Nangarhar valley 1957-1958.
- Hydrogeological investigation on Jalal Abad main canal 1961-1962
- Hydrogeological and Geo Engineering survey of Kabul river basin 1962-1964

To be continued...

- Hydrogeological and Geo Engineering survey in Northern part of Afghanistan USSR 1964-1965
- Preliminary groundwater investigation of Paktia German 1968
- Hydrogeological investigation of UN in Chare kar and Muqur-Katawaz 1968-1972
- Hydrogeological survey of Harrirud Valley British company ERCON 1973-1974
- Polish hydrogeologist ,Prof.DADAK 1975 prepared the hydrogeological map

To be continued...

- Ring road hydrogeological map, By Prof.Radiochach 1975-1978
- Hydrogeological survey by MoM in south and North of Afghanistan 1974-1976
- Hydrogeological survey of Frah rud valley by French company SOGREAH
- Groundwater investigation projects in Kabul province(Afshor (German),Allauddin (UK), Logar valley (Canada) and AGS hydrogeological survey 35-45 years back
- Feasibilities studies of groundwater investigation in south and southwestern Afghanistan(WAPECA) 1976-1982

One example of groundwater project

نمونه یی از تحقیقات ابهای زیرزمینی

Feasibilities studies of groundwater in south and southwestern part Afghanistan

Water resources for Agricultural purposes

Water and Power Engineering Company of Afghanistan(WAPECA)1976-1982

- 1-OMAKAY project in Qalat province 4000km²
- 2-ZERAY Project in Kandahar province 4000km²
- 3-BAQWA project in Farah province 6000km²

Methods of Groundwater investigation in Afghanistan

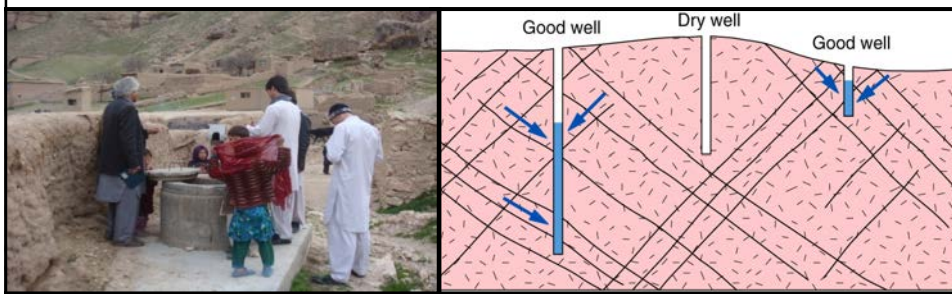
First stage

- Topographic survey
- Geological mapping based on Arial photos
- Collecting of hydrological data
- Collecting of meteorological data
- Collecting of Agronomical data
- Groundwater monitoring program



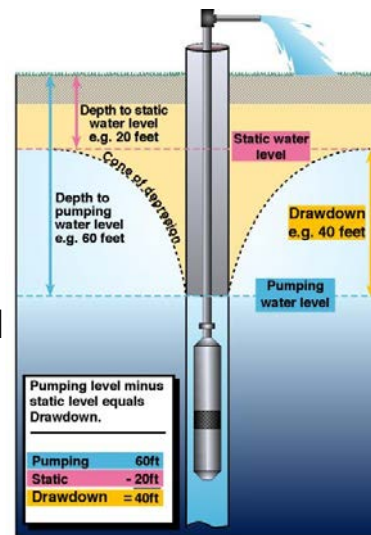
To be continued....

- Geophysical survey
- Drilling of Piezometric wells (Small size 2-3 inch)
- Drilling of Key wells, Test wells and Observation wells
- Well Design, Construction and Development
- Pumping test
- Analyzing, interpretation and preparing of final Hydrogeological report



–Groundwater monitoring program

- 1–location, coordinate,
- 2–Name province, district ,village , well owner name
- 3–Type of the water point
- 4–Well depth
- 5–lithological log
- 6–Well diameter
- 7–Gravel packed or not
- 8–Static Water Level(SWL)m agl
- 9–Well capacity
- 10–Drawdown m bgl



To be continued....

- 11–pip and filter type, interval installation ,diameter, slot size
- 12–Water pump types(Diesel engine ,submersible ,hand or....
- 13–Inside dia,out side dia, electrical phase,TDH, pump capacity min and max



- 14–Area of irrigated land, crop pattern, settlement of population
- 15–Groundwater sampling for chemical and isotopic analysis
- 16–Physico–chemical analysis in the field(WT,AT,EC,pH)
- 17–Flow estimation of Kareze , Spring ,Dug well , Hand pump well and Arhat

Selection the site for drilling Second stage

Proposed well drilling specification report

- Types of drilling rigs
- Drilling depth, diameter
- Collecting of lithological, time logging, drilling action logging
- Well designing based on different logs including geophysical logging and sieving analysis
- lowering of pip ,filter and gravel packing



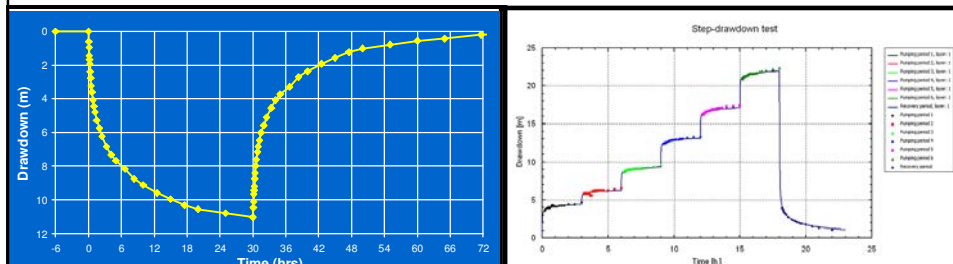
Well completion

- Cleaning by bailers or nipple
- Air compressor development
- Air position and lifting position to become free from sand ,silt and clay
- Appox.estimation of well capacity and well drawdown by compressor development test



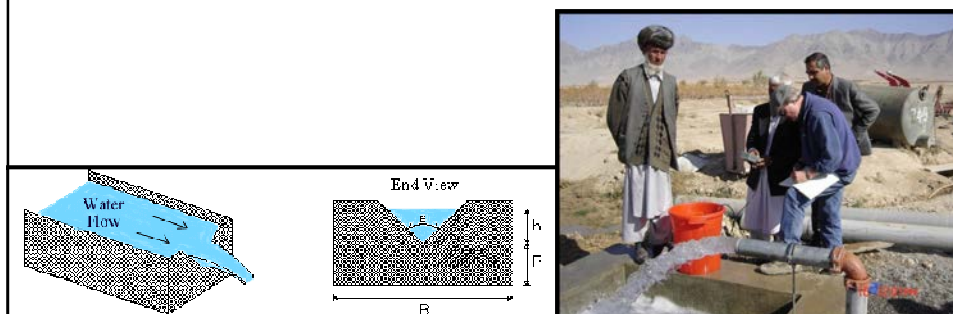
Well pumping test

- Multiple Step Drawdown Test(MSDT) with variable pumping rate
- Aquifer Performance Test(APT) plus observation well with constant pumping rate for at least 24,48,72... hrs.



To be continoud

- Collecting continuously Static Water Level(SWL),Pumping Water Level (PWL),measuring well capacity with different tools V-notch plate, orifice plate ,trajectory methods , bailer test in main well.

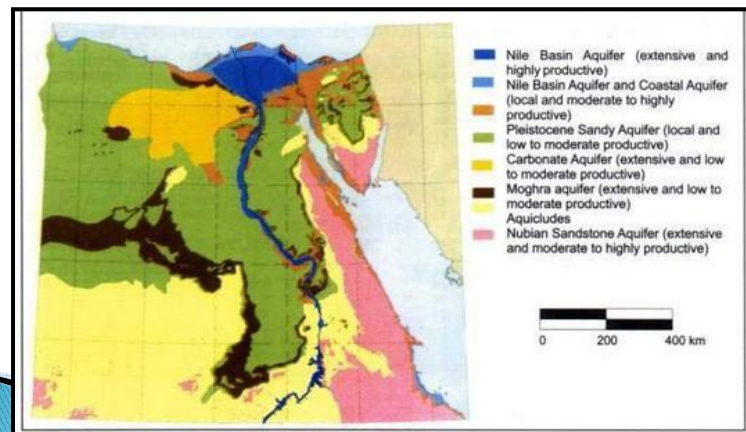


To be continued....

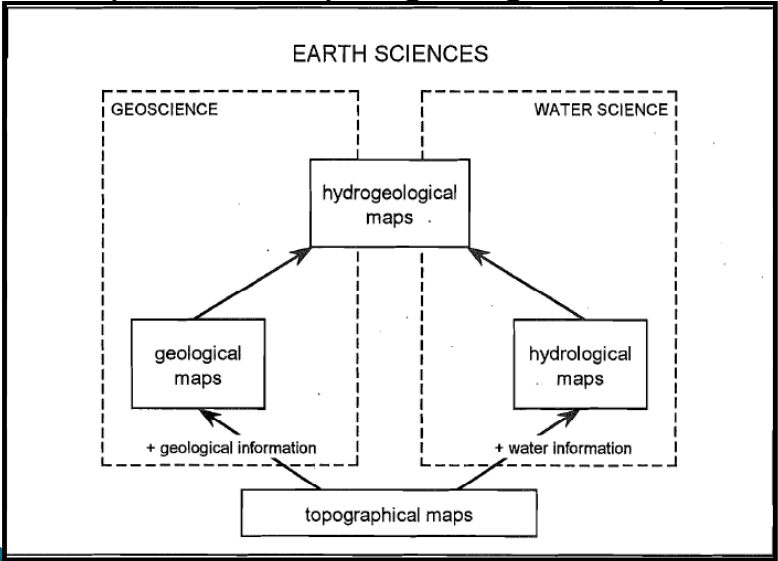
- Collecting Static Water Level and pumping water level from observation wells based on main well collecting data.
- Collecting of groundwater samples for chemical and microbiological analyzing

Final stage

- Analyzing of data
- Process of data
- Interpretation of data
- Preparing of final hydrogeological report and development of hydrogeological mapping



Main points for hydrogeological map



Hydrogeological survey conducted by foreign companies

