
بسم الله الرحمن الرحيم

د افغانستان اسلامی جمهوریت
دکلیو د بیارغونې او پراختیا وزارت

جمهوری اسلامی افغانستان
وزارت احیا و انکشاف دهات

Islamic Republic of Afghanistan
Ministry of Rural Rehabilitation & Development

Rural Water Supply, Sanitation and Irrigation Program/RuWatSIP

National Groundwater Conference

Groundwater Management , Challenges, Recommendation

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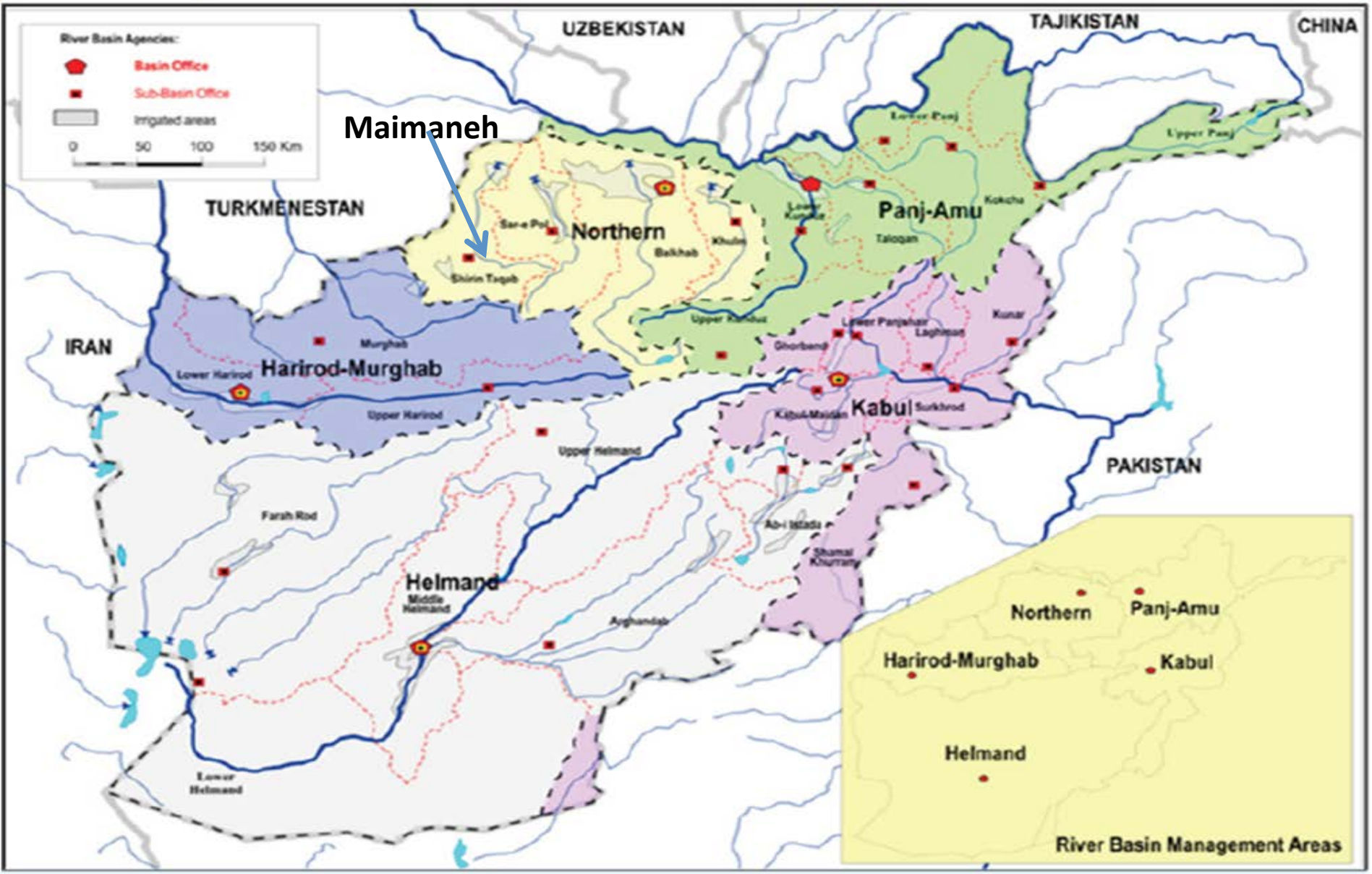
In this Presentation

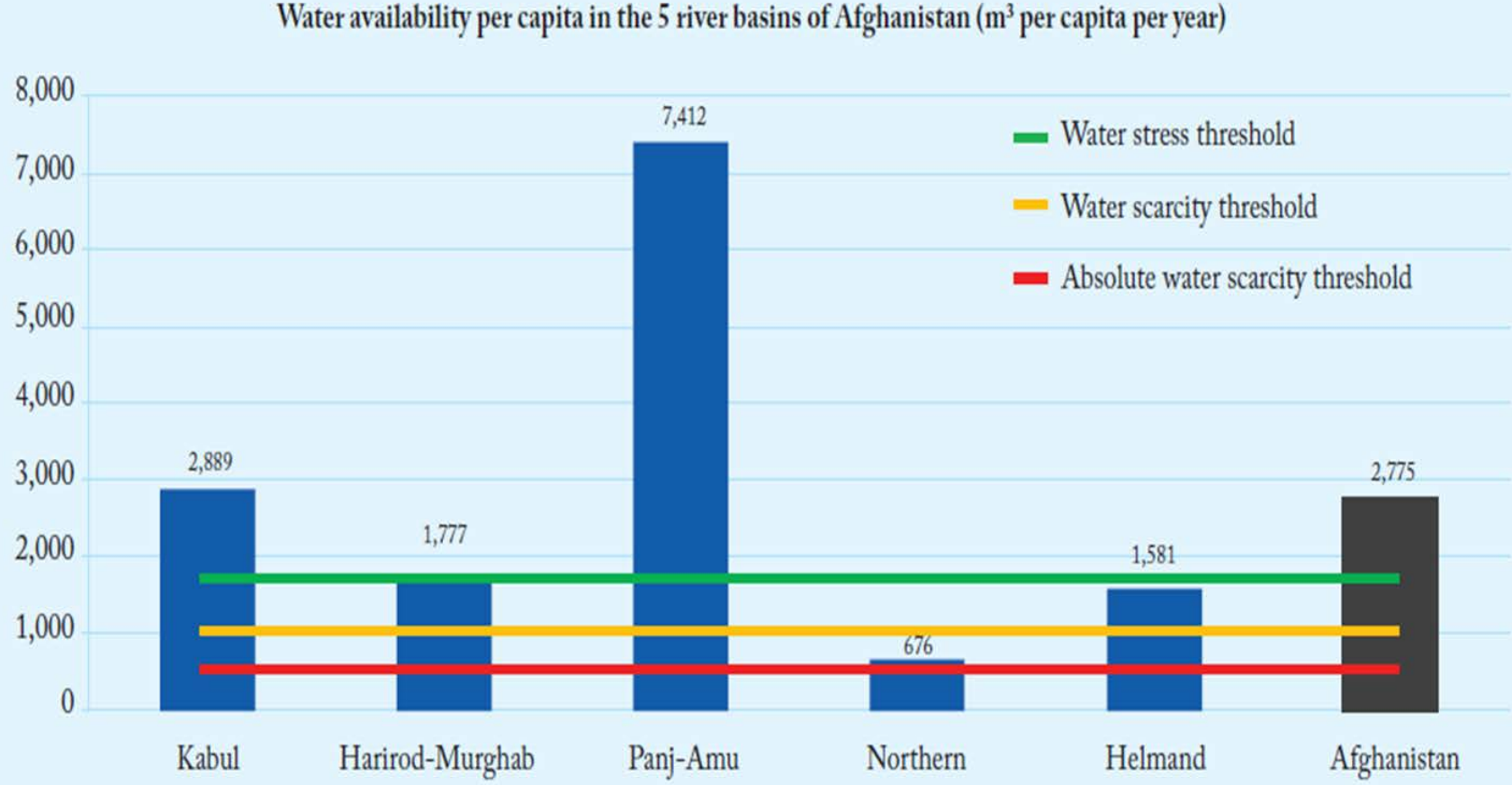
- Hydrographic Setup/River Basins/Water Availability
- Why Groundwater
- Challenges in Groundwater Management Development in Afghanistan
- Pilot project as starting point mainstreaming meta data with the primary data to help address the challenges
- Problem/solution tree Analysis
- Recommendation

Figure 5: The five river basins and 34 sub-basins of Afghanistan



Source : Ministry of Energy and Water.

Figure 6: **Afghanistan is not water scarce, but the geographical distribution of water is significantly uneven**



Sources: Adapted from Government of Afghanistan (2008), Favre and Kamal (2004).

Why Groundwater

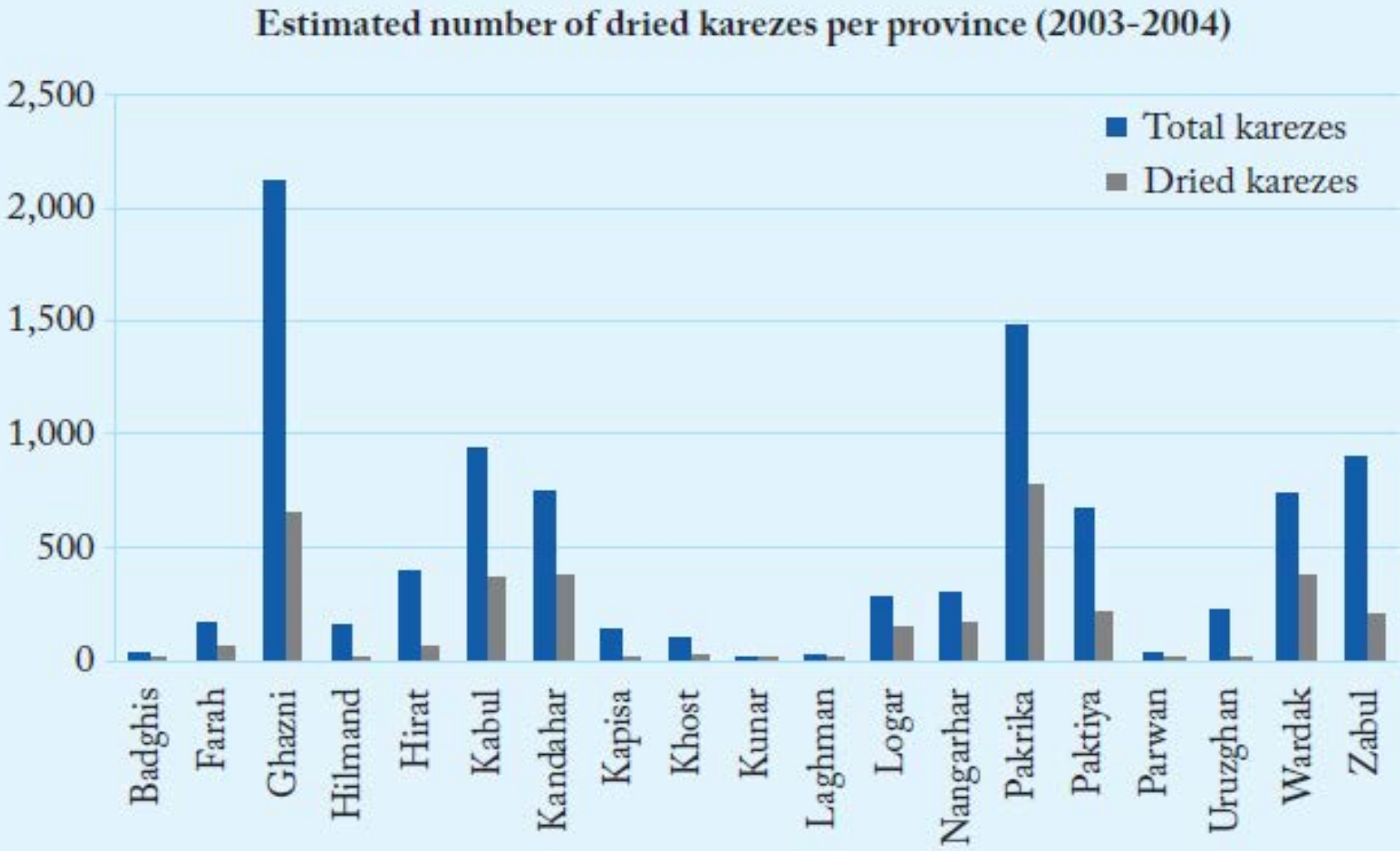
- **Generally speaking communities rely on groundwater as their primary source of water supply.**
- **Because of its protected condition, groundwater is less likely to be contaminated than surface water.**
- **Initiatives that focus on the proper operation, maintenance, and repair of existing wells are not capital intensive .**
- **Local knowledge and scientific expertise can both be used to determine the most likely places to dig or drill**

Challenges

- Water table is dropping all the time.
- Groundwater contamination
- The imbalance between recharge and discharge
- Functionality/sustainability
- Finding and development of groundwater requires skill and experience
- Lack of informed planning and Decision Making
- Groundwater regulation and enforcement of law

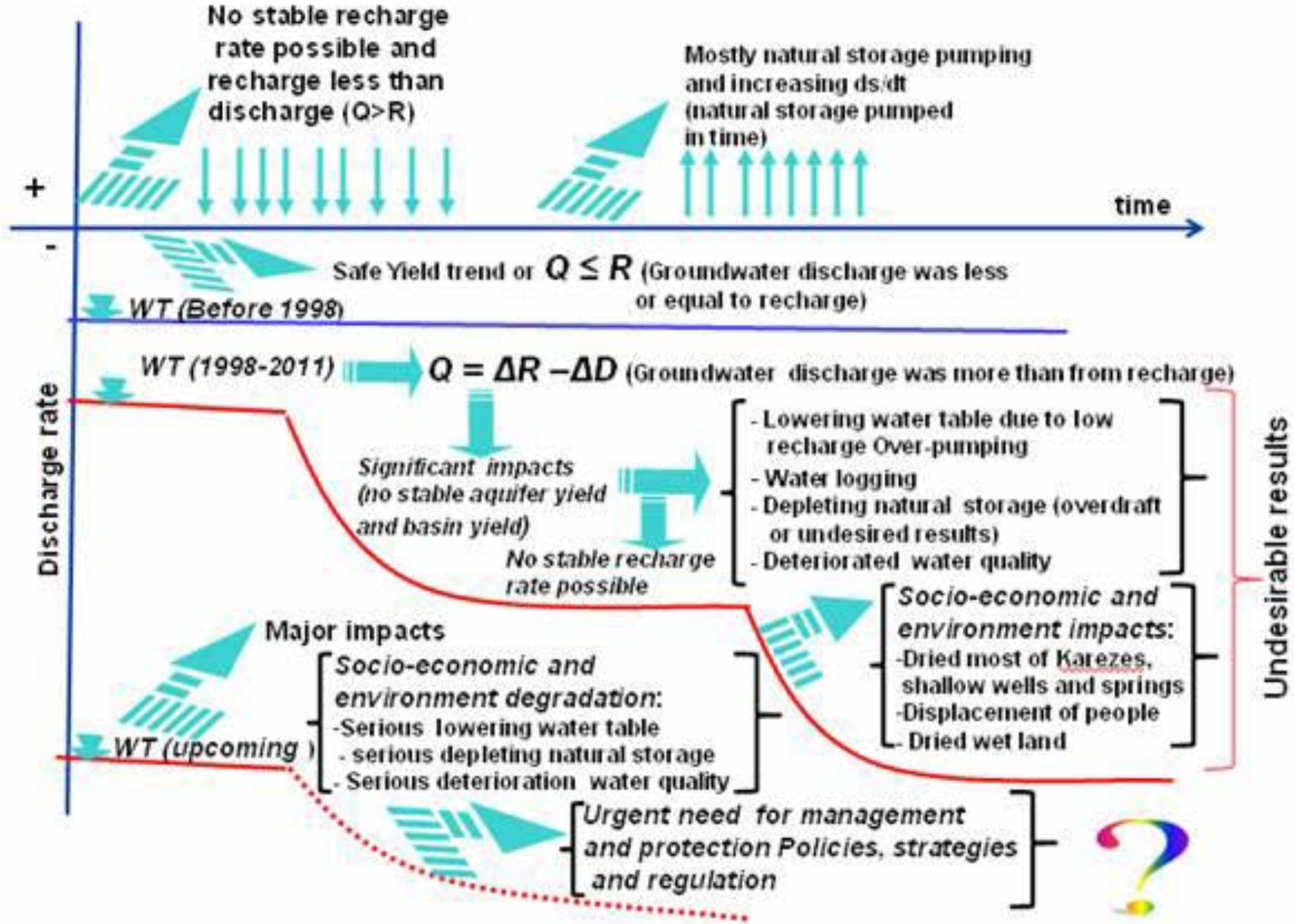
Figure 11

Many karezes have dried up because of drought and the uncontrolled expansion of tube-wells



Source: Data of S. S. Shobair, Food and Agriculture Organization of the United Nations, 2007.

Groundwater table lowering conceptual model and early warning signal in Afghanistan



Functionality/Sustainability

Based on DACAAR Survey :

- **Functionality 65%**
- **Non-Functional 35%**
- **Kunar 7.4% Non-Functional**
- **Mydan -Wardak 77% Non-Functional**

WPs Functional

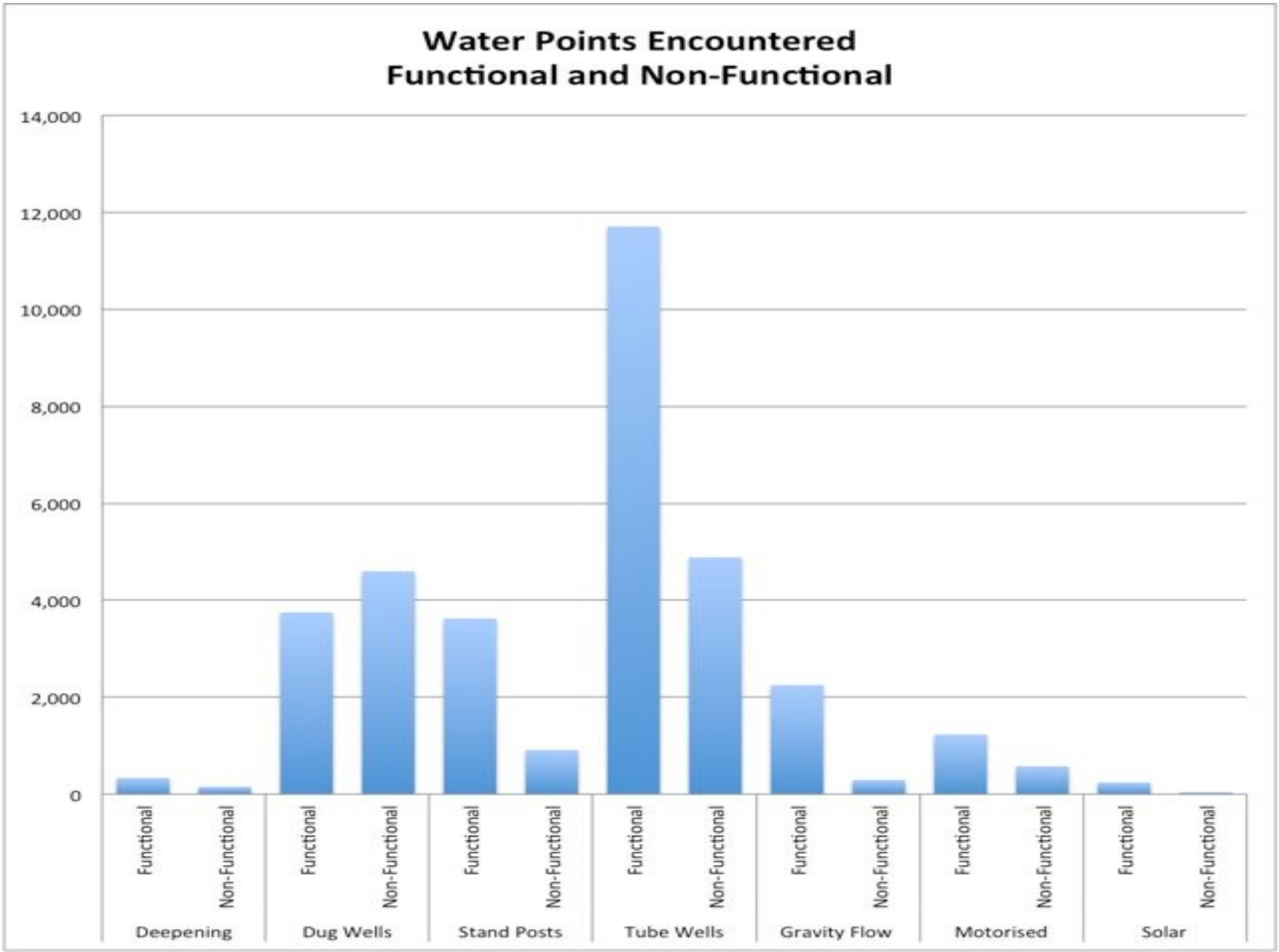
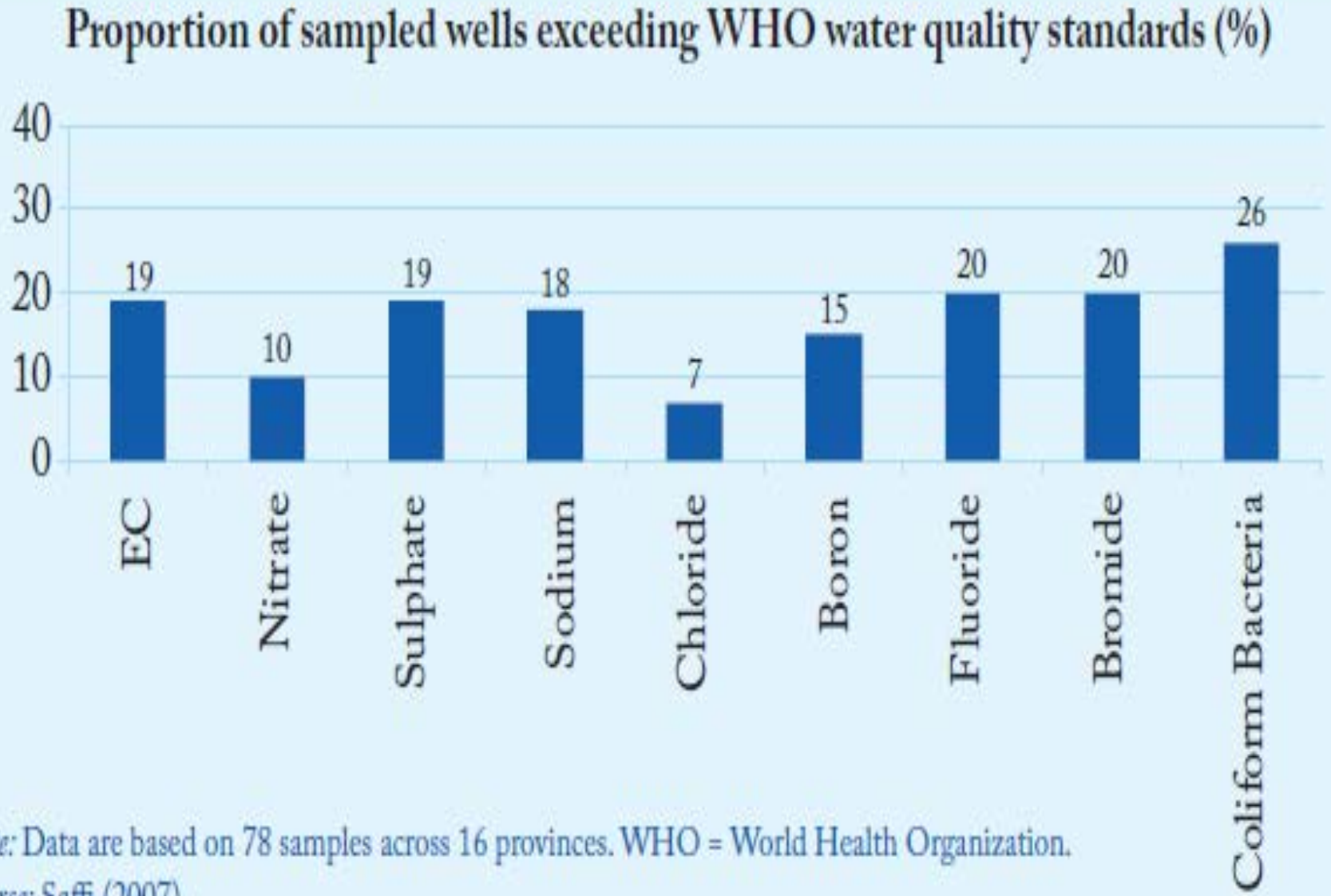


Figure 13

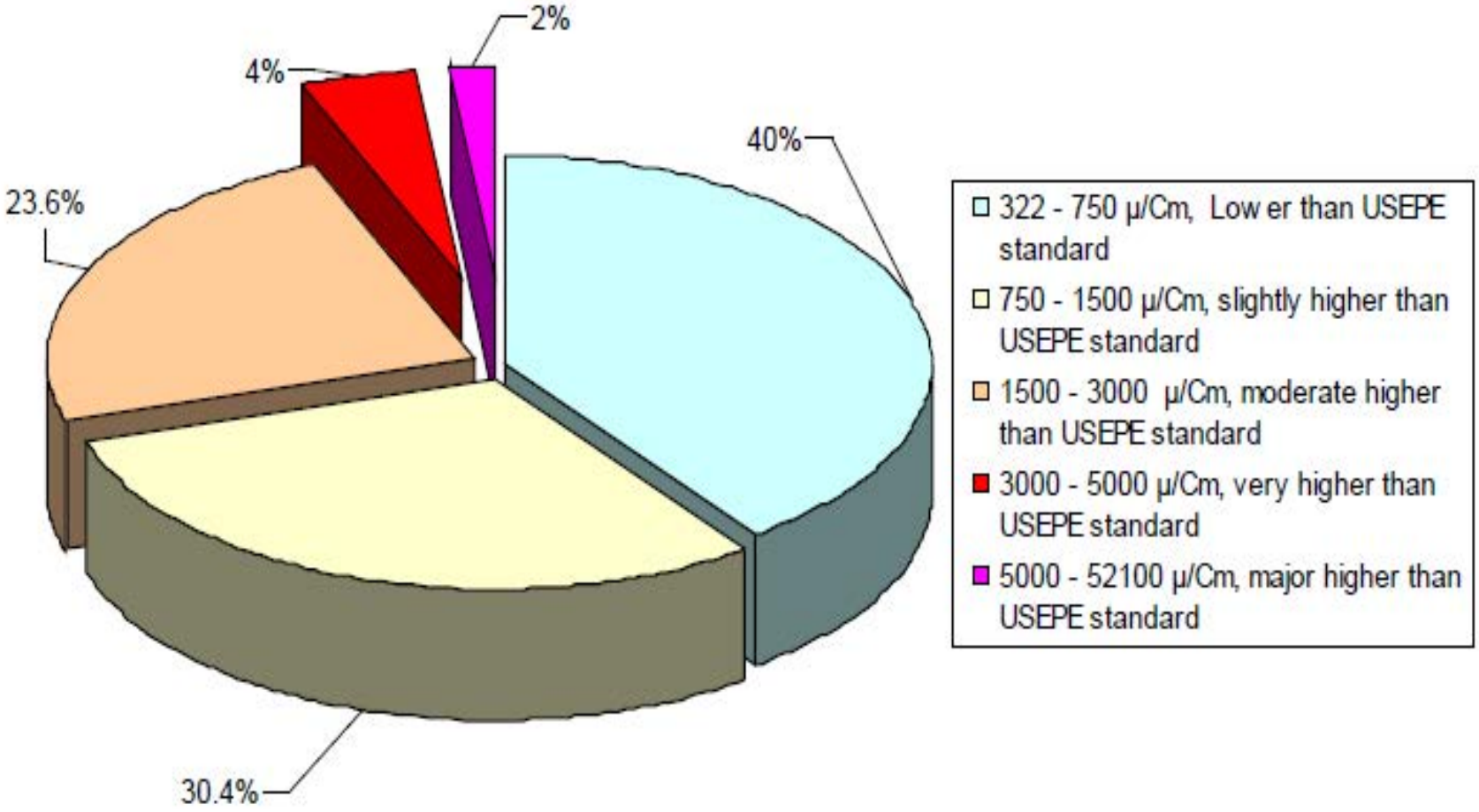
A large share of wells in 16 provinces are contaminated



Note: Data are based on 78 samples across 16 provinces. WHO = World Health Organization.

Source: Saffi (2007).

Percentage of EC spatial distribution levels in the groundwater of Afghanistan (23,800 water points tested data)



CBIC Project as an Entry Point to Address the Challenges

- Management and Coordination
- Basic Concept on Hydrogeology
- Applied Geophysics on Groundwater Exploration
- Well Hydraulics
- Field Exercise on Electrical Sounding and Resistivity
- Well Drilling, Sampling, Logging and Geological Section
- Precipitation, soil and water sampling
- Water Quality Tests: Physical, Chemical and Biological
- GIS/MIS Training

Management and Coordination

The Project Brought together Participants from Sector Ministries Universities and INGOs to be exposed on-job training on Geophysical Investigation, Hydrogeology, Water Quality Test, Water and Sanitation and GIS for informed Decision Making and Planning in the sector of Water Supply and Sanitation

Training on Hydrogeology

Basic Concepts of Hydrogeology from Class Down to Field Observations, Water Sampling and Testing

Training on Applied Geophysics



Applied Geophysics in Groundwater Exploration: from Class down to Field Works, Data Collection, Data Processing and Interpretation



Well Hydraulics

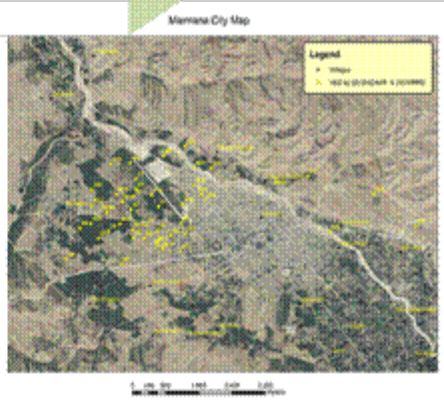


Well Hydraulics: from Theory (Confined and Unconfined Aquifers) Down to Group Works and Practice Calculation of Discharge Based on Pump test



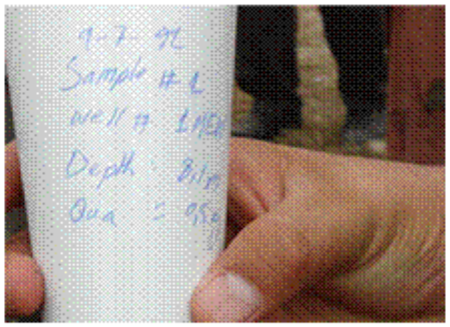
Electrical Sounding in Groundwater Exploration

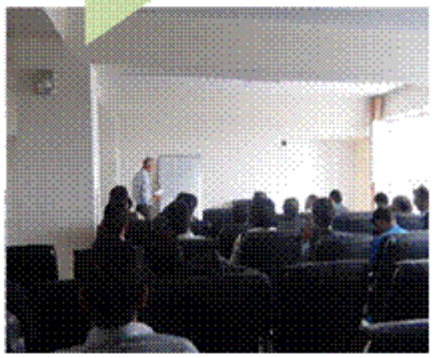
Applying Electrical Sounding in Groundwater Exploration in Faryab: from Preparation down to Setting up profiles, electrodes, Reading and Plotting Data on base Map



Well Drilling Training

Hydro-geological Investigation Through Well Drilling (Rotary Rig) from Rig Installation Down to Drilling, Geological Logging, Sampling and Data Plotting and Sketching Geological Section

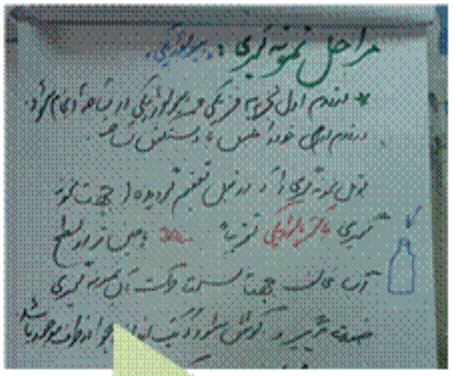




Training on Soil, water and Precipitation Sampling

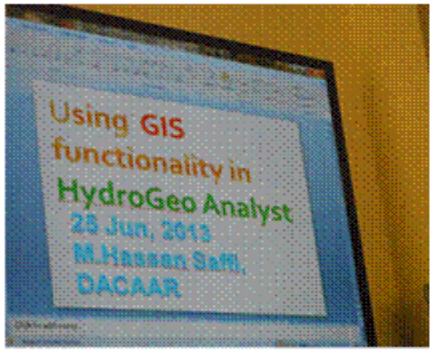
Field Survey: Precipitation sampling, Soil sampling, Water sampling from Wells and boreholes and River : Temperature, PH and Electrical Conductivity Tests in Faryab Province by DACAAR

Training on Water Quality Test and quality Control

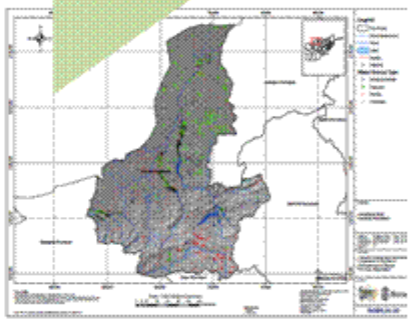


Training on Water Quality (Bacteriological, Chemical and Physical) Test Taking into Consideration of Steps of Sampling and Sources of Errors and Quality Control

Introduction to GIS/MIS



Introduction to GIS/MIS: The facilitators explained how hydro-geological data can be made very accessible and useful on hydro-geological maps whether one is a planner, water engineer, driller, data processor or health inspector.



Hydrologic Implication of Isotopes of d ^{2}H and d^{18}O in Faryab

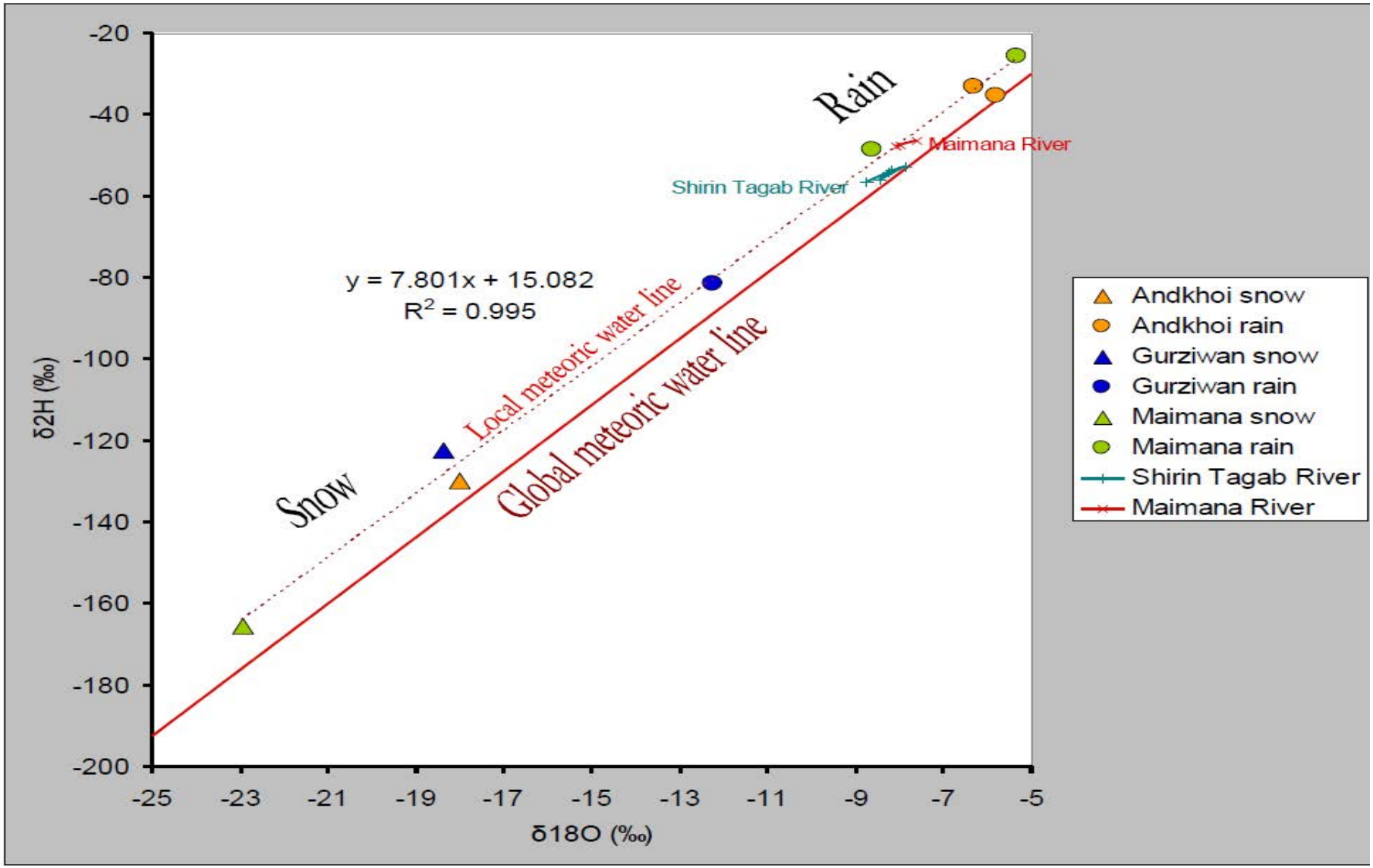


Figure 11.2. Stable isotope diagram comparing the isotopic composition of precipitation samples (from Figure 2.8) with river water samples from May 2013, described in Chapter 3. The GMWL is taken as $\delta^{2}H = (8.13 \times \delta^{18}O) + 10.8$ (Clark & Fritz

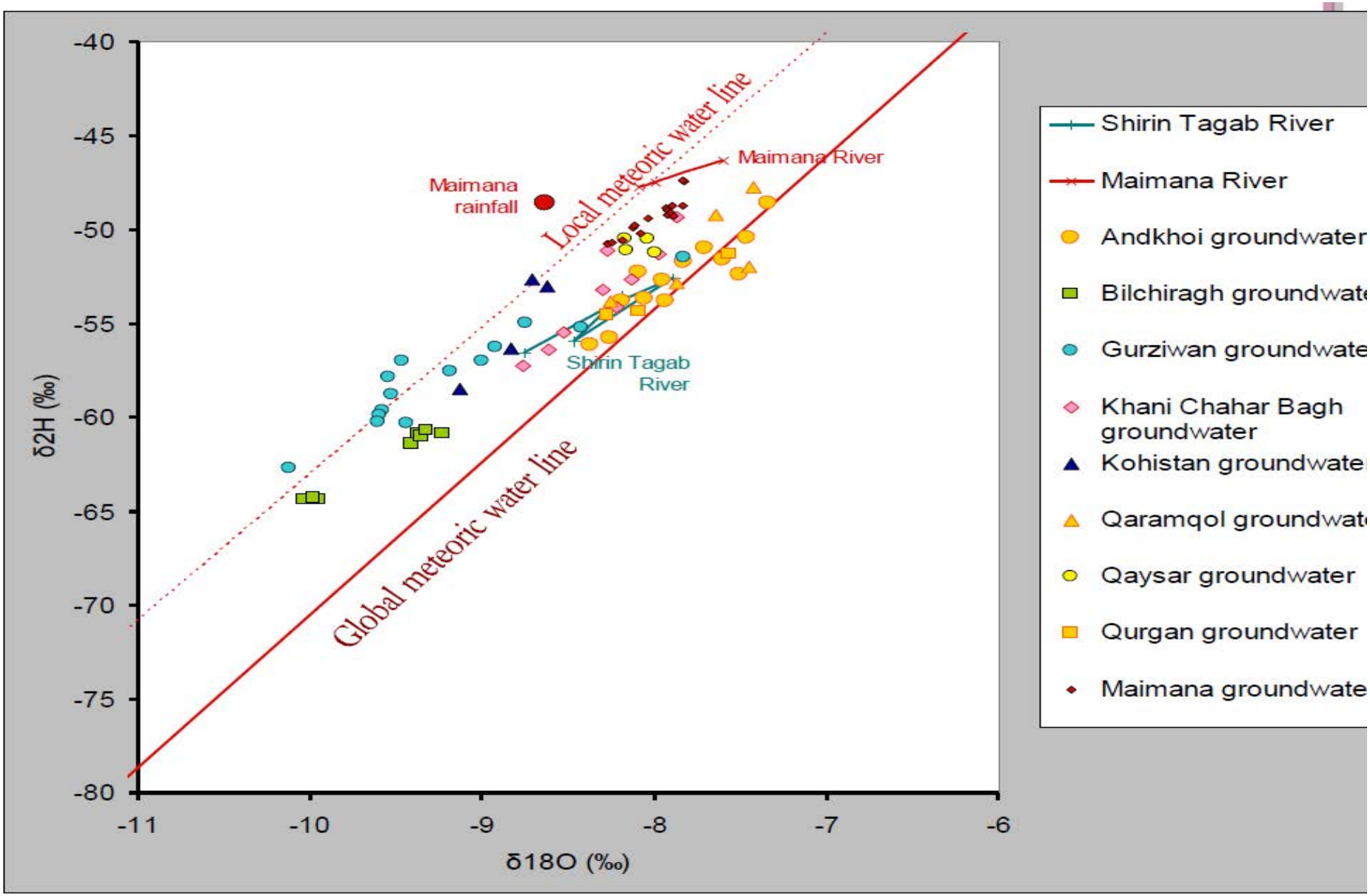


Figure 11.4. Stable isotope diagram comparing the isotopic composition of groundwater samples with river water samples from May 2013 and Maimana rainfall. The GMWL is taken as $\delta^2H = (8.13 \times \delta^{18}O) + 10.8$ (Clark & Fritz 1997). The local meteoric water line is taken from Figure 11.1 and equation 11.2.

Outcome/Outputs

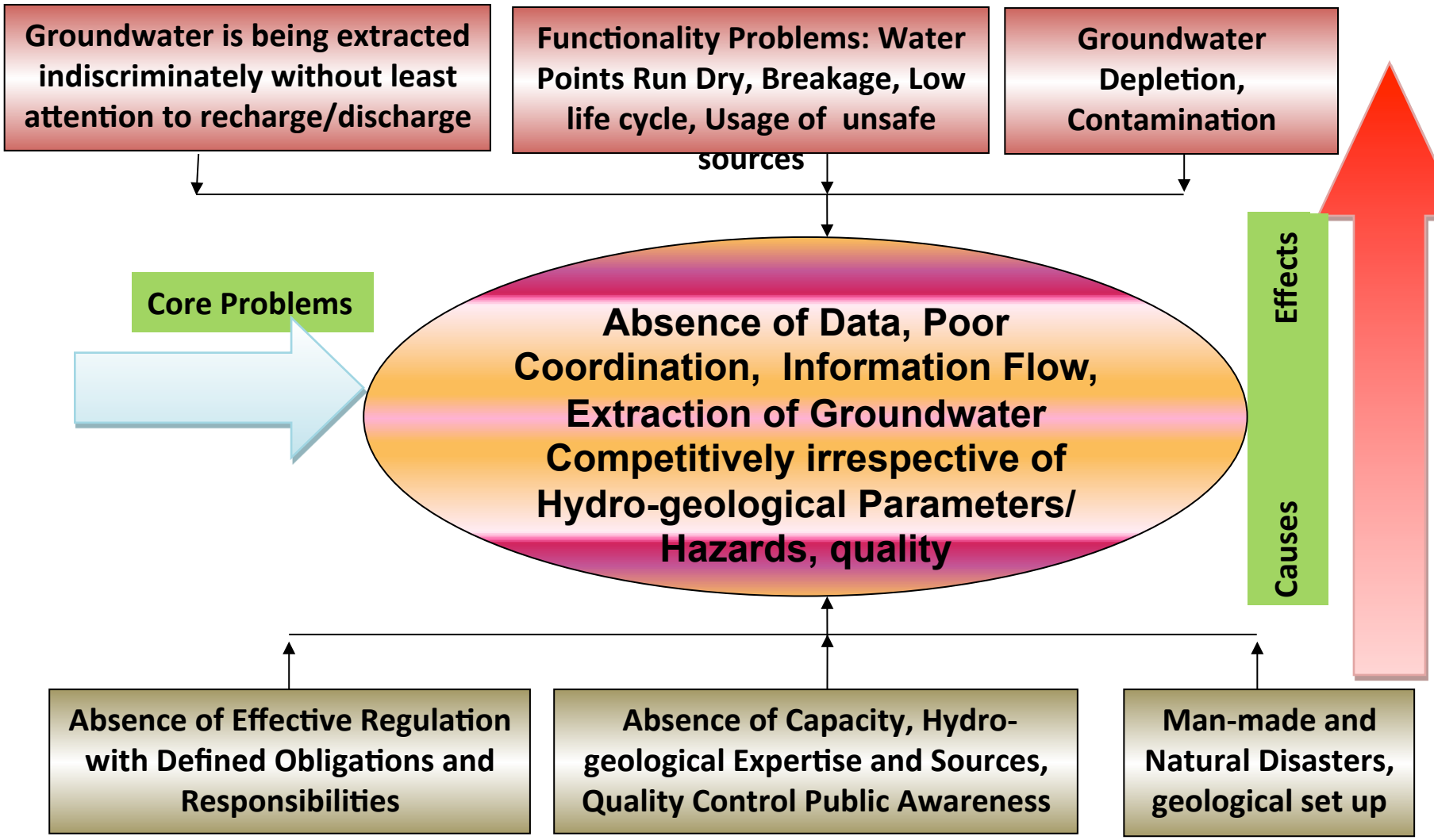
1. Staff training in Hydrogeology and relevant sub-disciplines

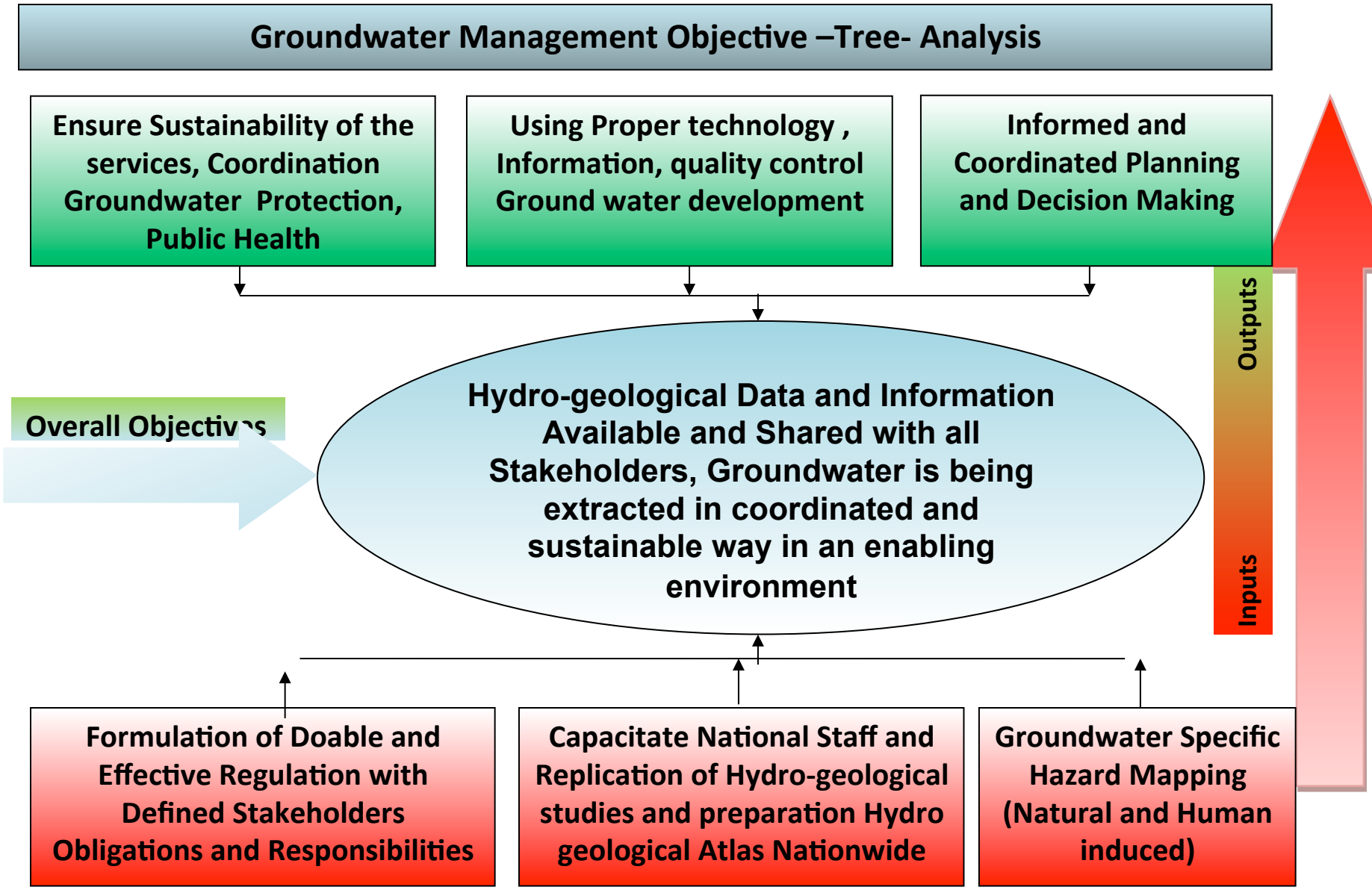
- Technical Outputs/Product:

✓ GIS /MIS System is in Place

✓ Hydro-geological Atlas of Faryab

Ground-water Management Problem –Tree- Analysis




Groundwater Management Objective –Tree- Analysis
Ensure Sustainability of the services, Coordination Groundwater Protection, Public Health
Using Proper technology , Information, quality control Ground water development
Informed and Coordinated Planning and Decision Making
Outputs
Inputs
Overall Objectives
Hydro-geological Data and Information Available and Shared with all Stakeholders, Groundwater is being extracted in coordinated and sustainable way in an enabling environment
Formulation of Doable and Effective Regulation with Defined Stakeholders Obligations and Responsibilities
Capacitate National Staff and Replication of Hydro-geological studies and preparation Hydro geological Atlas Nationwide
Groundwater Specific Hazard Mapping (Natural and Human induced)

Recommendations

- Formulation of doable regulation for groundwater with defined obligation and responsibilities of the relevant ministries and stakeholders.
- Based on the meta data and primary data, replication of the piloted project is recommended nationwide.
- The pilot project to be used as entry point for the replication process.
- Close Coordination among Water Sector Stakeholders
- Due to the Limited Capacity and Sources, Funding to be Sought for the Continuation of the project and replication process

Thanks