Islamic Emirate of Afghanistan

Ministry of Energy and Water

General Directorate of Water Resources

Concept Note on:

Water Resources pillar

Water Resources pillar:

Based on Rapid assessment from the different departments of General Directorate of water resources the below issues are listed as of high priority.

- Capacity Building program for River Basin (Local/ provincial) water resources relevant staffs (Groundwater, surface water, climate change, flood and drought)
- Public awareness program for stockholder and communities (proper water usage, flood fighting and climate change responses)
- Support and improvement of the water quality lab and providing regents.
- For better flood and drought management, reliable data collection the spear parts for the hydro-met stations are needed (the proposal and cost estimation already exist)
- For monitoring and assessment of the drinking water geophysics instruments needed (the proposal is already existed)
- Financial support of the fresh graduated engineers (Hydrogeology).

Islamic Emirate of Afghanistan

Ministry of Energy and Water

Deputy of Water Sector

General Directorate of Water Resources

Forecasting of flood, drought and climate change effects on water resources

Concept Proposal for Capacity Enhancement of Climate Change, Flood and Drought department

Part one

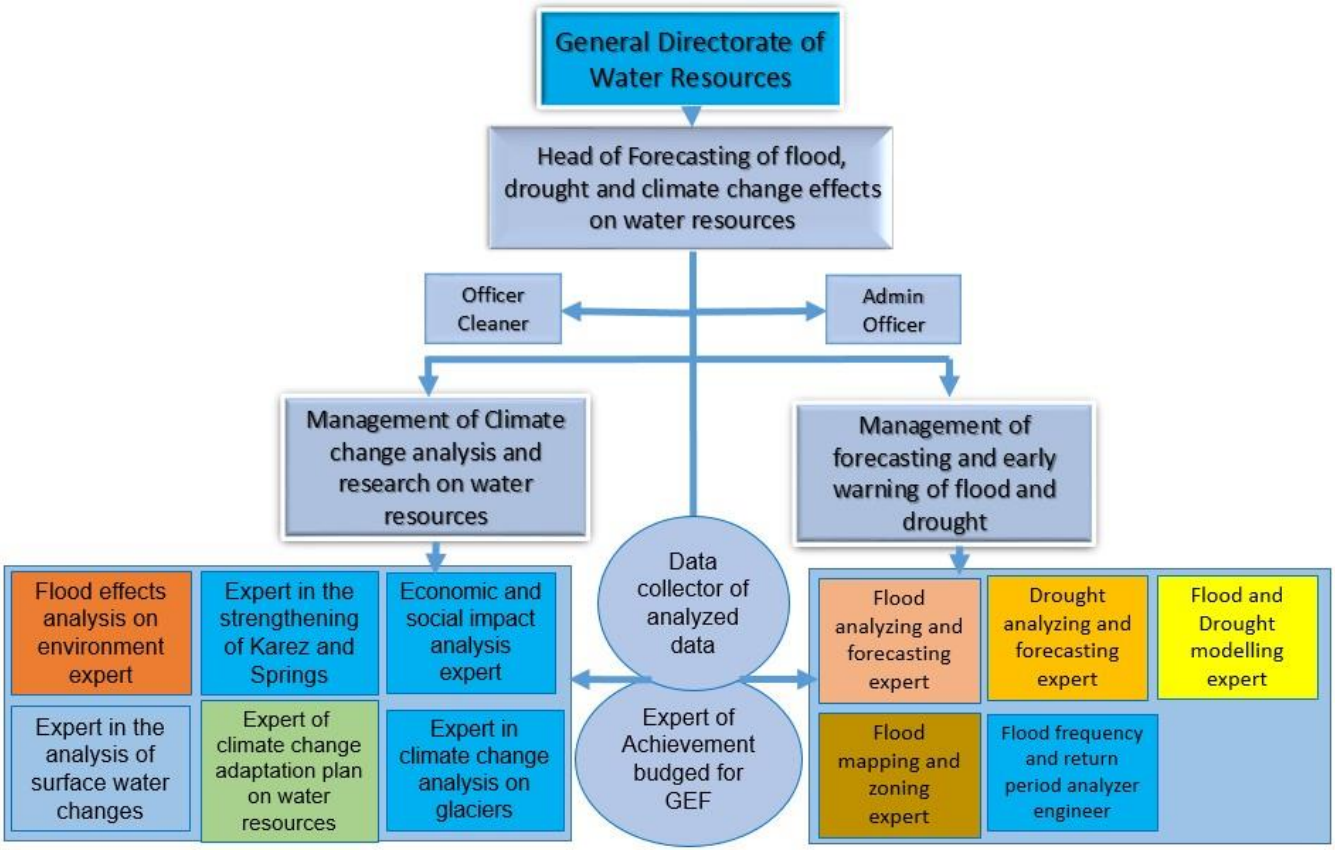
04-October-2022

1. Forecasting of Flood, Drought and Climate Change Effects on Water Resources

1.1 Background

As you know climate change is a global issue and the Effect of climate change is massively dangerous for all living being. in recently years the effect of climate change in Afghanistan are Flood, drought ,melting of glaciates, decreasing of surface and underground water ,desertification, migration of living being & etc.

Due to the bad effect of climate change the being of a regular formation to control climate change effect is an urgent necessity, the Ministry of water and Energy have a department under name of forecasting of flood, drought and clime change Effect on water resource. Especially in our country Afghanistan Flood and drought are the natural disasters . Recently, the effects of climate change have affected all living being lifestyle . As we know Afghanistan have an arid and semi-arid climate and the variation of meteorological elements cased the variation of rainfall based on intensity and term which due to this variation massively flash floods happen ,also cased drought ,effected water potential and water quality which we face to utter scarcity , it caused the economic, social and different environmental impacts. Recognizing of these Phenomenon will be useful and effective in developing detailed plans to reduce disaster and will be very efficient. In cause importance of flood and droughts and their severity in the country which are the examples of the climate change effectives, for this reasons the high authority of the Ministry of Energy and Water on 2008 decided to establish a an office about servicing of flood and drought forecast , So it started on 2008 and slowly and the framework completed in 2011, this unit continued their activities independently and directly under the Department of Water Resources up to end of 2019, according to the reform of Ministry of Energy and Water which have been changed to National Water Affair Regulation Authority In 2020 the framework also have been expanded this office renamed from Flood and Drought Forecasts to Protection of Flood and Drought in cause of Climate change organization and it and reported directly to the Directorate General of Water Resources. At the end of 2020 up to date the title of this unit have been change to Forecasting of flood, drought and climate change effects on water resources(FFDCCEWR). The framework chart shown as below :



2.1 Main Activity of Department

The main activity of Forecasting of flood, drought and climate change effects on water resources summarizes as below:

- Study of climate change effects on (hydro-meteorological elements, effects flood and drought).
- Analysis of water availability in the river basin, based on snow full and snow coverage area.
- Flood forecasting and early warning in five (5) major river basin, based on short term(1-3 days) and long term.
- Analysis of flood frequency and return period, based on hydrological stations.
- Drought forecasting and early warning in five (5) major river basin, based on seasonally (one year).
- Analysis, flood zoning and hydrological modeling in river basin.
- Analysis of climate change effects on glaciers and glaciers lakes.
- Analysis of climate change effects on spring and Karizes.
- Proposal writing to attract financial opportunity from climate change relative organization inside or outside the country like (GCF,GEF,AF….).
- Climate change Adaptation plan for water resource.

- Analysis of Economically , Environmentally ,and socially for all river basins.

3.1 Objective of the proposal

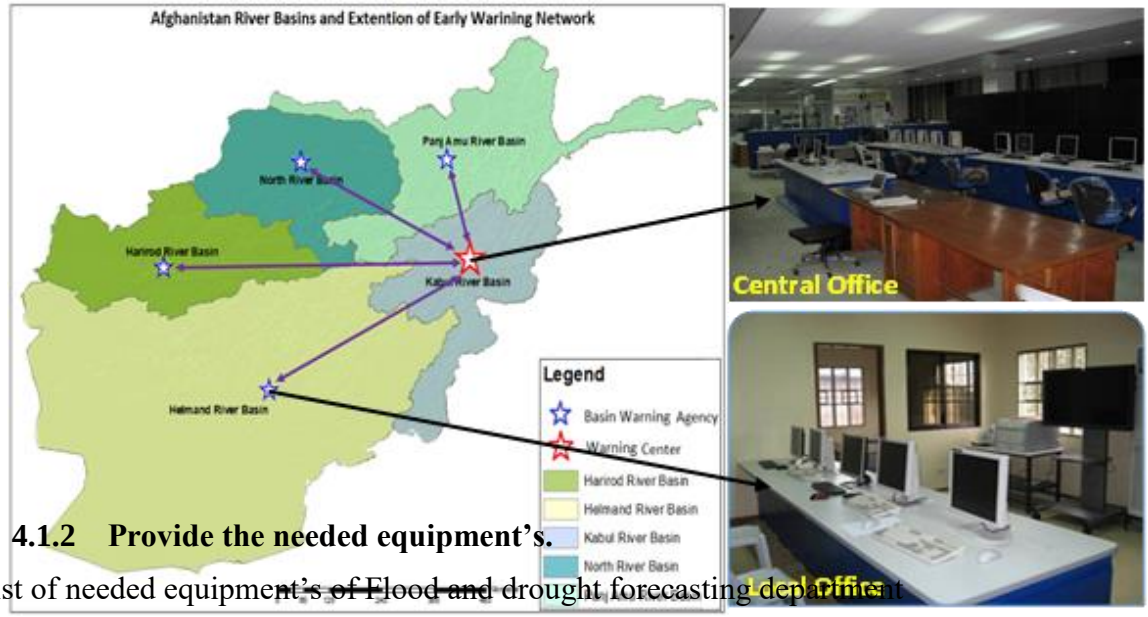
The main purpose of this concept proposal is Improving the capacity enhancement and strengthening of Forecasting flood, drought and climate change effects on water resources department. The specific objectives are summaries as below:

- Capacity enhancement training staff of FFDCCEWR.
- Provide the needed equipment's.
- Connection of the technical team of FFDCCEWR with Satellite for better forecasting and early warning survives.
- Financial support (10 person as a counterpart).

4.1 The way forward

4.1.1 Capacity enhancement training inside of country or outside of country.

- Flood inundation modeling and zoning.
- Drought analysis and forecasting molding.
- Snow milt runoff model (SMR).
- Training of (GIS,HEC-RAS,HEC-SSP) program and model.
- Public awareness of the effects of climate change, occurrence of flood and drought and its damage.
- Proposal writing to attract financial opportunity from climate change relative organization.
- Assessing Climate Change Impacts and Adaptations.
- Projection of climate change scenarios.



4.1.2 Provide the needed equipment's.

List of needed equipment's of Flood and drought forecasting department

List of needed eguipments for forecasting department

No	Type of Equipment	Equipment Number	Description	Price in ($)	Total Price $
1	Computer Lap tab	10	Dell XPS 17 9700 17.0 Inch 4K UHD+ Laptop, Intel Core i9-10885H(10th Gen), 16 GB RAM, 1 TB SSD, NVIDIA GeForce RTX 2060, Infinity Edge Touch Anti-Reflective 500-Nit, Fingerprint Reader, Win 10 Home, 1000 GB space	1500	15000
2	Digital printer (black and Wight) desk top	2	HP LaserJet Pro - M1536DNF	300	600
3	Projector.	1	Onn ON19C902 720P Portable Projector with Roku Streaming Stick White-Manufacturer Refurbished	150	150
4	LCD. TV monitor	3	60" TV Prop Plasma-LED-LCD TV in Gloss Black with Removable Stand, Black Gloss Finish Front Bezel, Stand Included (can be removed for wall mounting), Gloss Finish Off-Position Screen, TV Prop Dimensions & Specifications, Outer Dimensions (wall mount & no base): 55" W X 31 3/8" H X 1 1/2" D, Outer Dimensions (table mount with base): 55" W X 33 3/7" H X 6 7/8" D, Visible Screen (picture area): 51 3/4" W X 29" H, Weight of prop TV for wall mounting: 11 pounds, Weight of prop TV for table mounting with base: 12 pounds	700	2100
5	Internet system for the flood and drought department.	1	DSL Modem ,DSL/Broadband Filter ,Firewall and NAT Router ,Hubs, bridges and switches ,Wireless Access Point ,PoE Injector ,Home Routers, Wi-Fi Range Extender/Repeater, Mi-Fi –Broad Band Wi-FI Hub, UTP (Unshielded Twisted Pair) Cables, Ethernet Crossover Cable, Cable Coupler/Extender and Splitter and other related devices	100/month	1200
6	Connection of flood and drought	3- person	RIMS (Indian Satellite)	500/month	6000
7	UPS power supply	6	Original-ups-power-saver-650va-for-daily-use (3 hours power sever)	300	1800
8	Camera with GPS	2	Canon digital camera with GPS and Geo-tagging capabilities (24PX)	500	1000
9	GPS	2	Garmin GPS Tracks (GPSMAP® 60)	300	600
10	Arc-GIS Pro	5	Original with license	1000	1000
11	office disk	5	office desk	40	200
12	Anti-virus	20	Kaspersky 4pc	50	1000
13	office chairs	10	Ergonomic Office Chairs.	100	1000
14	Plotter	1	HP Design Jet 500 plus A1 Plotter is made for architects, interior designers and professionals in engineering, construction and mechanical design, working from home, high quality, large format plotting and printing from A4 - A1+ size.	1000	1000
total				11560	38650
Remark		All given prices are approximately but near 90 % is ok			

4.1.3 Connection of the technical team with Satellite for better forecasting and early warning survives

The connection of the technical team with satellite is necessary issues for monitoring and observation of real time weather condition and forecasting & warning for flash flood, receiving the imaginary of glaciers and lakes for monitoring and observation.

4.1.4 Financial support for Provincial training

Training for capacity building of provincial staff members.

As you know the effect of climate change day-by-day become intensive. people throughout the country received massively damage from flood and drought specially recently months also after coming of Emirate Islamic Afghanistan many new Employees are starting work in ministry of water & energy framework in center and provincial Departments due to this tow cause , the technical team of FFDCCEWR, prepare awareness, technical and educational trainings and presentation for 5 river basins to Enhancement the capacity of provincial staff

members and share essential awareness information to locally people. The agenda and estimation of training are listing bellow :

Table of Trainers and participants in all basin

Name of River Basin	Number of Sub basin	Number of participants	Trainers	user Water association	Remark
Panj-i-Amu	7	16	2	7	
Kabul	12	26	2	12	
Helmand	10	22	2	10	
Hariroud-Murghab	4	10	2	4	
North	5	12	2	5	
total		86	10	38	

Estimation cost for two days Stationary

Name of material	Number of items	price (AF)/Per one piece	Totally price (AF)	Remark
Notebook	140	50	7000	
Pen	140	20	2800	
A4 Paper Package	10	500	5000	
Water Package	50	120	6000	
Total			20800	

Estimation cast of expenditure for all basin

Item	Number of Trainers and participants	Cost (AF)/ Person	Total cost (AF)	Remark
Travel Expenses by car or plane	10	10000	200000	2 Expert Select for each River basin and two side fare counted
DSA for Trainers	10	8000	160000	Tow working day
Number of participants for Transportation	124	1000	248000	Tow side trip
Coffee	140	100	28000	Tow working day
Launch	140	450	126000	Tow working day
Stationary			20800	
Total			782800	
Totally Expenses after 5 % increased			821940	Remarkable

Ministry of Energy and water

Deputy of Water

General Director of water Resources

Groundwater Resources Department

Concept note of Groundwater Monitoring well

Part (2)

Year:2022

Executive Summary

Islam Emarat of Afghanistan wants to install and implements some impotent tools to well for better observation and supervision with the financial assistance from the concept and technical assistance of groundwater resources department.

However, at this situation, there is a serious need to further support the ministry of water and energy and the groundwater resources department in management of ground water resources, and hence this Concept Note has been developed.

Groundwater use in Afghanistan is not new; Kareez and springs have long been used for both agriculture and domestic purposes in Afghanistan. Water supply in major cities like Kabul is depended on groundwater resources. Likewise dug wells and shallow wells have been promoted by several donors and NGOs for rural water supply schemes. However, the context of groundwater use is changing rapidly driven by economic growth, population expansion, and rapidly growing urbanization. Groundwater use for agriculture is expected to rise rapidly due to diversification, intensification and commercialization of agricultural as need for more flexible demand driven water control increases. The importance of groundwater will further increase within the context of future climate change impacts. Sustainable management of this precious resource is crucial for meeting future water demand in all sectors: agricultural, industrial and domestic.

There are however, no systematic planning, regulation and control mechanisms for sustainable management of this resource. There is a lack of capacity within the ministry of water and energy for monitoring, regulation and control of groundwater resources. This concept is targeted to fill this gap.

The **overall objective** of this concept is sustainable management of groundwater resources in Afghanistan. With increasing economic activity, industrialization, urbanization, and diversification and commercialization of agriculture, the use of groundwater is expected to rise exponentially in future. In addition, the future impacts of climate change demands

increase in water storage and groundwater has a crucial role to play in this as surface reservoirs confronts several economic and environmental challenges.

The **purpose** of this concept is to monitor and observe wells, as well as management and planning of groundwater resources. It aims to do so by evaluating the groundwater resources, identifying development options, updating and upgrading of the hydro-geological map and developing the capacity of the MEW to plan, regulate and control groundwater resources in the country. This concept will also help to prepare policy and regulatory framework in the field of groundwater development and management.

The above objectives are realized through generation of the following outputs:

Output 1: Hydrogeological investigation , Rapid water resources assessments of sub-basins and upgrading of groundwater database

Output 2: Preparation of national hydrogeological maps, Preparation of groundwater availability maps at the whole country and upgrading.

Output 3: Staff capacity development in planning, monitoring and regulation of groundwater resources and long term support of groundwater monitoring plan.

The outputs above will provide necessary framework and capacity for long term monitoring, regulation and control of the groundwater resources. This however, will provide necessary data and information in preparing groundwater development plan for both industrial and domestic sectors.

The total budget proposed for the project is USD 1,971,200. for a timeframe of 60 months (Jan. 2023 – Dec. 2026). The project will work at all provinces and some districts with coordinate of unit offices to identify the gaps in hydro-geological information and coordinate for the inputs from groundwater related government and non-government.

Participants and other Stakeholders; the main stakeholders are the Government institutions engaged in groundwater planning and use in Afghanistan. According to article number 11 of water management regulatory law, Ministry of water and energy is the main beneficiary of all water related issues and will be therefore the main beneficiary of this concept as well. In addition, Ministry of Rural Rehabilitation and Development (MRRD), Ministry of Urban Development Affairs (MUDA), Ministry of Mines (MoM), Ministry of Agriculture, Irrigation and Livestock (MAIL), Ministry of Public Health (MPH) and

National Environmental Protection Agency *(*NEPA) have been working in this sector will also be affected from the result of this concept. While NEPA and MPH are more engaged in quality and environmental aspects of the groundwater; the rest are linked largely with the utility sector of the resources.

Expected Results

The overall objective of this project is sustainable management, observation and monitoring of groundwater resources in Afghanistan. With increasing economic activity, industrialization, urbanization, and diversification and commercialization of agriculture, the use of groundwater is expected to rise exponentially in future. In addition, the future impacts of climate change demands increase in water storage and groundwater has a crucial role to play in this as surface reservoirs confronts several economic and environmental challenges.

The purpose of this project is to cover all wells and prepare a groundwater management plan in Afghanistan. It aims to do so by evaluating the groundwater resources, identifying development options, updating and upgrading of the hydro-geological map, creating a national groundwater master plan and developing the capacity of the staff to plan, regulate and control groundwater resources in the country.

Impact and Outcome are accordingly stated as below:

Impact: Sustainable Observation, Monitoring and Management plan for Groundwater Resources in Afghanistan

Outcome: Access to all wells for data gathering and creat of management plan

The above project objectives would be achieved through generation of following outputs and activities:

Goods

All the drilled monitoring wells of this project are designed to be equipped with real time telemetry system. Therefore, the data loggers are proposed for each site to get a real time

data in the system and collecting the standard real data on the central data base. For better maintenance, the data loggers will be connected to central data base located at the hydrogeology department.

Geophysical survey equipment is important for hydrogeological investigation at the site, therefore a geophysical seat is required to be preparing on this project.

For monitoring the groundwater quality there is a need of laboratory at each river basin. Therefore a laboratory of water quality is proposed for five river basins to check the water quality at the field and send it to hydrogeology department to be saved on central data base. To check the old and drilled wells and the casing and filters status there is a need for procurement of a video logger for hydrogeology department.

Technical Assistance

Hydrogeology department of NWARA will perform baseline studies and technical assessments at all sites including site selection and priorities the cities according to plan and goals of the department.

Monitoring wells:

Monitoring Well							
No.	**River Basin**	**Province**	**Number of Monitoring well**	**Well depth(M)**	**Drilling diameter(inch)**	**cassing /filter diameter(inch)**	**Remark**
1	General Kabul	Paktia	10	200	14	8	
		Paktika	10	200	14	8	
		Ghazni	10	200	14	8	
		laghman	10	200	14	8	
		Maydan Wardak	10	200	14	8	
2	General Shamal	Samangan	10	200	14	8	
		jawzjan	10	200	14	8	
		Faryab	10	200	14	8	
3	General Helmand	Zabul	10	200	14	8	
		Uruzgan	10	200	14	8	

Monitoring networks or monitoring wells are designed to observe, monitor, measure groundwater level, physical, chemical and biological parameters of groundwater.

Table 1

Manual Groundwater-Level Meter

The manual groundwater level meter shall be a robust and accuracy device to detect easily the water levels in wells, boreholes and standpipes. The groundwater level meter shall include a sturdy frame and reel, a non-stretch flat tape. The groundwater Level meter shall be powered by one 9V battery, and include a light and buzzer to be activated when the probe reaches water, completing an electrical circuit. Table 4 illustrates the technical specifications of the manual groundwater level meter.

Table 2: technical specifications of portable groundwater level meter

Number	Parameter	Brief Description
1	Cable Length	100 m (or 150) m depending on well depth
2	Tape	double wired and marked the entire length 1 cm resolution
2	Signal	Led and acoustic
2	Tape Materials	PVC or stainless steel
2	Power supply	9 Vdc battery
2	Winch / reel	PVC winch coil with stop and probe holder, painted iron frame

PORTABLE GROUNDWATER-QUALITY PROBES

To verify the presence of ionic compounds and understand the seasonal or cyclic variations, the portable groundwater quality probes shall measure key water quality parameters, in particular pH and Electrical Conductivity.

The market offers a wide range of portable groundwater quality probes including smart sensors with wireless bluetooth conection, the probe shall be robust and accurate for field monitoring. Table 5 illustrates main technical specifications of water quality probes.

Table 3: technical specifications of portable water quality probe

Number	Parameter	Brief Description	
Water Quality Multi-parameter Probe	Type	Single or multi-parameter probes	
	Parameters	Temperature pH Electric Conductivity	
	Measuring Range	Temperature	-5 to 50°C
		pH	0-14 pH units
		Conductivity	1 to 30 mS/cm ** (to be confirmed)
	Accuracy	Temperature	±0.2°C
		pH	≤ 0,02 pH
		Conductivity,	≤ 0.5 %
	Display	LCD display	
	Protection degree	IP 68, weatherproof	
	Material	High-impact plastic + carrying case, accessories and standard solutions	

Budget and Price

The budgetary prices for the implementation of the (Manual Groundwater Level Meter, pH, Electrical Conductivity) based groundwater monitoring system.

Item	Description	Unit Price ($)	Q.ty	Sub-Total ($)
1	Manual Groundwater Level Meter (100 m)	1000	50	50000
2	Portable Groundwater Quality Probes (pH, Electrical Conductivity)	800	50	40000
3	Manual Groundwater Level Meter (150 m)	1500	50	75000
	Total			**165000**

the budgetary prices for the Drilling

Item	Description	Unit Price ($)	Q.ty	Unite	Sub-Total ($)
1	Geophysical Survey	100	400	vs	40000
2	uPVC Casing	18	20000	m	360000
3	Electro logging	25	20000	m	500000
4	Drilling 14 (inch)	40	20000	m	800000
5	Well Development	33	600	hour	19800
6	Hourly rate for hire of pump-testing unit, all equipment and crew during pumping and recovery test.	36	2400	hour	86400
	Total				**1806200**

ISLAMIC EMIRATE OF AFGHANISTAN

MINISTRY OF ENERGY AND WATER (MEW)

GENERAL DIRECTORATE OF WATER RESOURCES (GDWR)

SURFACE WATER RESOURCES DEPARTMENT (SWRD)

Proposal of Procurement for Spare Parts of Hydro-met network

Part three

Date: October 4, 2022

Background:

Hydro-met network of Afghanistan has been developed and enabled to provided Hydro-met information services by international organizations likewise; World bank and UN-FAO, ADB, JICA and others technically and financially support under the management of Ministry of Energy and Water since 2007 to 2020. Usually for sustainability of these services there are necessary a compatible and enough spares and tools to be operated and maintained regularly for continuous operation.

Currently the spares and tools facilities are not available in this organization, and the supporter for providing these facilities are not accessible in Afghanistan. The General Directorate of Water Resources (GDWR) under the Ministry of Energy and Water (MEW) of Islamic Emirate of Afghanistan are enable to prosed the Operation and Maintenance of the network technically, this Authority is looking for an organization to financially support us in this section to sustain the network through the country.

Objective

The objective of providing the tools and spares for operation and maintenance of hydro-met network is to regularly operating of the hydro-met network and provide the data and information services to the public users and academic researches. These services are included river basin, flood and drought, avalanches and some other natural hazard would be impacted the human life in habitat.

Scope of Services

The scope of services for O&M shall consist of routine and emergency maintenance including all labour, materials, shifting and reinstallation of stations, replacement/ repair of defective parts, consumables and provision of necessary on-the-job training and natural hazard information sharing to the society as well as the technical groups, assigned personnel of Water resources and River basins authorities.

In particulars the services shall include but not limited to the following activities:

O&M Activities

1. Visit of every stream gauge stations (Automatic Hydrologic station or AHS) in every cases (malfunctioning) for Operation and Maintenance and downloading of all data from the data logger during the visit and submit to office for further analyses.

2. The O&M team should carry all relevant equipment with all required calibration equipment and other materials for resolving problems during the visit of the stations.

3. Sharing the analyzed data and information obtained from the stations to the public and peoples living the rural area for their life and properties saving.

4. Capacity training to the local people living along the rivers in the rural areas for enhancing their capacity and knowledge of natural hazard and useful of efficiency of hydro-met information.

Table: 1 list of Hydro-Met Stations in Five River Basins

S.No	River Basin	Number of Automatic Hydrological statoin	Number of Snow Survey Station	Number of Cableway Station	Total of the stations	Remarks
1	Kabul	50	9	18	77	
2	Helmand	42	4	14	60	
3	Harirud Murghab	21	2	6	29	
4	North	18	2	8	28	
5	Panj Amu	41	13	27	81	
Total No of Stations		**172**	**30**	**73**	**275**	

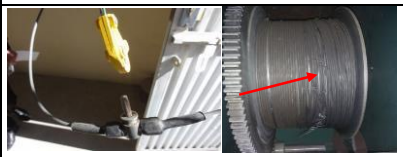
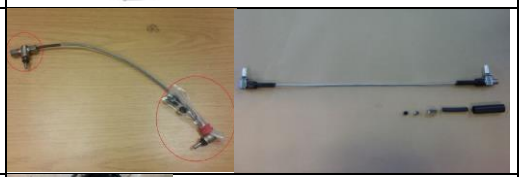
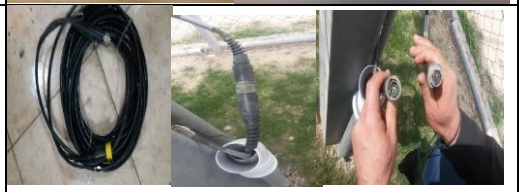
Required Saper parts

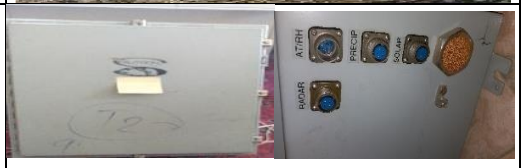
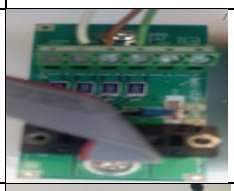
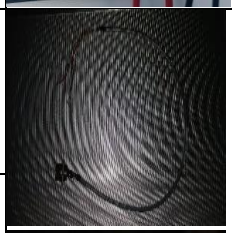
Most of this equipment are not available in the national markets to be procured easily, in the other hand these are more expensive. Therefore, procurement of the tools and spares thus regularly operating of the hydro-met network will be possible through the international markets and financially supported by donors for sustainable services of data and information. These spares and tools shall properly operate the network and get the reliable data regularly by replacing/ maintaining while the filed team visiting the stations.

Table2: List of required spare parts for installed hydro-met network

S.No	Items	number	unit	unit prise	total prise	*Pictures*

1	Radar Level Sensor with Mounting Enclosure and 150M Cable	5	No	$3,500.00	$17,500.00	
2	Accubar Sensor IC Plate (6461-1203)	50	No	$95.00	$4,750.00	
4	MS-Connector for Radar Sensor and NEMA4 (SUTRON)	20	No	$96.00	$1,920.00	
5	Barometric Pressure Sensor, SDI-12	2	No	$1,200.00	$2,400.00	
6	Raingauge Cable, 10 meters & Conector	50	No	$129.00	$6,450.00	
7	Cable Assembly, Power with fuse-built in	20	No	$13.00	$260.00	
8	Staff gauge	100	No	$30.00	$3,000.00	
9	9210/BXlite Date Logar	10	No	$3,015.00	$30,150.00	
10	Solar Regulator inside NEMA Enclosure	30	No	$138.00	$4,140.00	

11	Laufrihtuung clutch (movement)	10	No	$25.00	$250.00	
12	Winch Counter/Vertical Meter and Horizontal Mater	25	NO	$85.00	$2,125.00	
13	wheel shog with handle	50	No	$5.00	$250.00	
14	Cable 6mm	5000	mt	$2.00	$10,000.00	
15	Cable 3mm	6000	mt	$20.00	$120,000.00	
16	AT/RH whit cables and connecters	50	No	$488.00	$24,400.00	
17	Counters prise AA	50	No	$900.00	$45,000.00	
18	Rain Gauge	10	No	$4,000.00	$40,000.00	
19	T- and Angle Plug (including waterproof rubber washer)	100	No	$71.61	$7,161.00	
20	Water Quality Cables including (30M complete including M/S connector and 5m joint cable to be connected with water quality cable and NEMA4 box)	10	No	$1,000.00	$10,000.00	

21	Radar Cable	500	M	$10.00	$5,000.00	
21	Conector	50	No		$0.00	
22	NEMA-4 Enclosure Steel 24X20X10 (including all connector)Type II	10	No	$1,250.00	$12,500.00	
23	Power conneting com connection Board	20	No	$55.00	$1,100.00	
24	Regulator	10	No	$65.00	$650.00	
25	MS-Connector for Precipitation Sensor and NEMA4 (SUTRON)	100	No	$100.00	$4,600.00	
26	MS-Connector for Radar Sensor and NEMA4 (SUTRON)	50	No	92	$10,000.00	
27	Silica Gel (Desiccant Cannisters) - 5 pound Containers	200	con	75	15,000.00	
Total				**$13,741.00**	**$363,606.00**	

Outcome and effectiveness of Hydro-Met Network

Availability of the required tools/ spares in the warehouse of the related authority would enable on time operate the stations while malfunctioning through a comprehensive O&M plan and the network will be continuously and properly function. Thought the hydro-met

network can access to the surface water resources information and the services are included river basin, flood and drought, avalanches and some other natural hazard would be impacted to the human life in habitat.

Islamic Emirate of Afghanistan

Ministry of Energy and Water

Directorate General Water Resources

Concept Note

Water Technology and Research Laboratories

Part four

2022

introduction

The water research and technology division established in (1979) under the framework of the Ministry of Energy and Water and practically started its activities in (2008) and its coherent management began in (2020) under the organizational chart of the General Directorate of Water Resources, and currently this command operates in the following sectors.

- ❖ Water quality laboratory
- ❖ Soil Mechanics laboratory
- ❖ Geotechnical laboratory
- ❖ Construction materials laboratory
- ❖ Dam prototype modeling laboratory
- ❖ Library

Objectives

- Carrying out research and lab investigations on the water quality including surface and groundwater.
- Experiment and testing of geotechnical soil mechanics and construction materials physically and mechanically to enhance the quality of water facility projects.

Status of water technology and Laboratories

The below table (1) shows the Laboratories current conditions along with its urgent requirements.

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No	Available laboratories	active	semi-active	Inactive	Necessity to	
1	Water quality laboratory				Chemical	
2	Soil Mechanics laboratory					Equipment and calibration
3	Geotechnical laboratory					Equipment and calibration

4	Construction materials					Equipment and calibration
5	Library				Digitalize and more Engineering book	

Soil Mechanics

Water

Construction materials

Geotechnical

Library

chemical reagent

chemical reagents listed in the table below (2) are an absolute necessity for the water quality laboratory's thorough investigation of water quality including biological, chemical and physical pollutants and contaminations.

The list of reagents required by the water quality laboratory of the Research Directorate of the General Directorate of Water Resources

No	Description	Qty/Unit	Specification	Estimated Unit Price in (AFN)	Estimated Total Price	Remarks
1	Murexide also called Ammonium purpurat or MX (NH4C8H4N5O6 or C8H5N5O6·NH3)	6	VWR BDH, 25gr/Bottle	3015	6030	Available in Afghanistan
2	Hydrochloric acid (HCl)	2	LABSCAN 2.5 liter/Bottle	9715	9715	Available in Afghanistan
3	EDTA (Ethylenediaminetetraacetic acid)	2	MERCK 500gr/Bottle	5963	5963	Available in Afghanistan
4	Ammonium chloride (NH4Cl)	2	MERCK 500gr/Bottle	3484	3484	Available in Afghanistan
5	Sodium hydroxide (NaOH) Method, Without expiry date	2	MERCK 1kg/Bottle	2345	2345	Available in Afghanistan
6	Methyl orange indicator	3	MERCK 100gr/Bottle	8500	17000	Available in Afghanistan
7	Ammonium hydroxide (NH4OH)	2	MERCK 2.5liter/Bottle	5896	5896	Available in Afghanistan
8	Sodium chloride (NaCl)	2	MERCK 1kg/Bottle	5365	5365	Available in Afghanistan
9	Magnesium sulphate (MgSO4.7H2O)	2	VWR BDH 1kg/Bottle	5365	5365	Available in Afghanistan
10	Eriochrom black T	3	MERCK 100gr/Bottle	6566	13132	Available in Afghanistan
11	Sodium sulphide Hydrate (Na2S,9H2O)	2	VWR BDH 500gr/Bottle	9800	9800	Available in Afghanistan
12	Phenolphthalein Indicator	4	MERCK 100gr/Bottle	7370	14740	Available in Afghanistan
13	Sodium carbonate (Na2CO3)	2	MERCK 1kg/Bottle	6800	6800	Available in Afghanistan
14	Ethanol 95%	2	LABSCAN 2.5liter/Bottle	5025	5025	Available in Afghanistan
15	pH Buffer tablet for 4 pH, for the calibration of pH meter, Expiry date up to 2020	4	VWR 50/pk	2211	4422	Available in Afghanistan
16	pH Buffer tablet for 7 pH, for the calibration of pH meter, Expiry date up to 2020	4	VWR 50/pk	2211	4422	Available in Afghanistan
17	pH Buffer tablet for 10 pH, for the calibration of pH meter, Expiry date up to	4	VWR 50/pk	1474	2948	Available in Afghanistan
18	Electrolyte solution 3mol/1 KCl, model KCl-250	2	HACH, 250ml/bottle	1675	1675	Available in Afghanistan
19	Standard Solution 0.01 mol/1 KCl	2	HACH, 500ml/bottle	4020	4020	Available in Afghanistan
20	Sulfa Ver® 4 reagent powder pillow, For sulfate, HACH	3	HACH, 100pillow/pkg	2010	4020	Available in Afghanistan
21	SPADNS reagent solution, for fluoride, HACH	4	HACH, 500ml/bottle	1876	3752	Available in Afghanistan
22	CuVer® 1Copper reagent, for Copper, HACH	3	HACH, 100pillow/pkg	2814	5628	Available in Afghanistan
23	Ascorbic acid reagent powder pillow, for Aluminum, HACH	3	HACH, 100pillow/pkg	1675	3350	Available in Afghanistan
24	AluVer® 3 Aluminum reagent powder pillow, for Aluminum, HACH,	3	HACH, 100pillow/pkg	7973	15946	Available in Afghanistan
25	Bleaching 3 reagent powder pillow, for Aluminum, HACH,	3	HACH, 100pillow/pkg	2278	4556	Available in Afghanistan
26	Ferric Ion solution, for Chloride, HACH	3	HACH, 100ml/bottle	1541	3082	Available in Afghanistan
27	Mercuric thiocyanate solution, for Chloride, HACH	3	HACH, 100ml/bottle	4221	8442	Available in Afghanistan
28	DPD total chlorine powder pillow, for Total Chlorine, HACH	3	HACH, 100pillow/pkg	1407	2814	Available in Afghanistan
29	PhosVer®3 phosphate reagent powder pillow, for phosphate, HACH	3	HACH, 100pillow/pkg	3484	6968	Available in Afghanistan
30	Potassium Reagent Set, for Potassium, HACH	3	HACH, 100 tests/set	1072	2144	Available in Afghanistan
31	Nessler Reagent, for Ammonia, HACH	3	HACH 500ml/bottl	4087	8174	Available in Afghanistan
32	Mineral Stablizer, for Ammonia, HACH	3	HACH, 50 ml SCBD	1273	2546	Available in Afghanistan
33	Polyvinyl alcohol dispersing agent, for Ammonia, HACH	3	HACH, 50 ml SCBD	1072	2144	Available in Afghanistan
34	NitriVer®3 Nitrite reagent powder pillows, for Nitrite, HACH	3	HACH, 100pillow/pkg	2546	5092	Available in Afghanistan
35	NitraVer®5 Nitrate reagent powder pillows, for Nitrate, HACH	3	HACH, 100pillow/pkg	2948	5896	Available in Afghanistan
36	FerroVer®Iron reagent powder pillows, for Iron, HACH	3	HACH, 100pillow/pkg	1608	3216	Available in Afghanistan
37	Buffer powder pillows, citrate type for manganese, HACH	3	HACH, 100pillow/pkg	2680	5360	Available in Afghanistan
38	Sodium periodate powder pillows for manganese, HACH	3	HACH, 100pillow/pkg	1675	5350	Available in Afghanistan
39	CyaniVer® 3 cyanide reagent powder pillow, HACH	3	HACH, 100pillow/pkg	2144	4288	Available in Afghanistan
40	CyaniVer® 4 cyanide reagent powder pillow, HACH	3	HACH, 100pillow/pkg	2144	4288	Available in Afghanistan
41	CyaniVer® 5 cyanide reagent powder pillow, HACH	3	HACH, 100pillow/pkg	2144	4288	Available in Afghanistan
42	Methanol	2.5 Litter *2 Bottle				Available in Afghanistan
43	Lauryl Sulphate Broth for Bacterial test	1 Bottle/500gr	Merck			Merck or other international company

Geotechnical and soil mechanical Lob

To activate and equip the geotechnical and soil mechanical Lob in order to conduct on integrator investigation for the water relate projects including dams and reinforcement walls the below listed tools which is showed in the table (3) are very important to be proved.

NO	Device name	Required number	Estimated unit price in $	Total price in dollars
1	Boring Machine XY3	1	22000	22000
2	SPT	1	500	500
3	Direct shear ELE	1	2000	2000
4	Direct shear 30*30	1	9500	9500
5	Triaxial Digital	1	5000	5000
6	Digital Consolidation	1	1500	1500
7	Unconfined Compressive Strength	1	1000	1000
8	Digital Oven	1	1500	1500
9	Standard Proctor	3 site	100	300
10	Modified Proctor	3 site	100	300
11	Schmitt Hammer	1	100	100
12	Permeability	1 site	1200	1200
13	Lefranc	1	1000	1000
14	Lugeon	1	1000	1000
15	Polarized Microscope	1	1500	1500
16	Canada Bolsom Glue	5 kgr	100	500
17	Rock Cutter for Thin section	1	3000	3000
18	Sample box	40	30	1200
19	Digital scale	1	100	100
20	Hexa Meta Phosphate Sodium	5 bottle	50	500
21	Casagrande	2	30	60
22	Paraffin	10 kgr	5	50
23	Hydrometer 152	20	10	200
24	Direct shear for Rock	1	2000	2000
25	UCS for rock	1	1200	1200
26	Slake durability	1	1000	1000
27	Brazilian	1	800	800
28	Point Load	1	1000	1000
29	Geological Hammer	5	100	500
30	Safety Shoes	12	50	600
31	Safety Hats	12	50	600
32	Air condition	5	800	4000
33	Air Cleaner	15	100	1500
34	Laptop	3	1000	3000
35	Printer	1	700	700
36	Black and white printer	1	500	500
37	Filter	10	50	500
Total price				71,910$

Tools required for the hydraulics modeling

All water facilities that are constructed at a great cost require study and analyses based on analogies before they are put into operation (modelling). The best option in this situation is chosen after testing and evaluating many options on physical models in order to minimize costs.

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No	Equipment	Estimated price	considerations
1	Equipment for measuring flow in open channels	1200$	
2	Instruments for measuring flow in channels under pressure	1000$	
3	Tools for monitoring the rate of water flow in fast-paced situations	1350$	
4	equipment for gauging water flow in a quiet environment	600$	
5	Equipment for measuring water speed in turbulent environment	600$	
6	device that measures the water pressure dynamically	200$	
7	Piezometric instruments for measuring	150$	
total price	5100$		

Suggestions(way for ward)

1- Purchase and Preparing the equipment and chemical materials listed in tables (2-3-4) to achieve the objectives.

2- Conduct capacity Enhancement training program for Lob Engineers in the topic of (water quality, geotechnics, construction materials and soil mechanics.

3 – provide and conduct training specially in the field of Engineering software and programing including geo studio, plaks, flak, SPS .Energy , Hydrology , Hydrogeology design and GIS .

4 -Purchase and support books in the library relevance to water management and Engineering, construction, electricity and technology section.