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Water Resource Issue and Solution in Helmand – Afghanistan

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Abstract*: *Water is flattering more and more scares and precious resources as population and utilization hike. Elevation of those elements as well as technology and action to support fine water supplies is obligatory to get control of the condition. Agriculture usage of water consumption is almost 70 % of the water used throughout the world and more than half of this water is used for irrigation purpose.For solving the problem of water scarcity in agriculture, it is important to expand water saving irrigation which has become the need of the time. Currently there are varying types of water saving methods include drip irrigation, sprinkler irrigation. Between these irrigation system drip irrigation system is the most successful way in arid and semi-arid areas and its make use of rate can get up to 90 %. Drip irrigation also known as trickle irrigation is a method which minimizes the use of water and filterers by admitting water to drip at a slow and steady pace to the plant root, rather onto the soil surface or openly onto the root zone, a network process of pipes, valves, emitters and tubing.Water is one of the most precocious assets that we have . The level to which water is abundant or hard to get, polluted or clean, advantageous or devastating, deeply effect the size and standard of human life. The relentless elevation in population and the resulting spurt in the request for water and the need to be cautious in organizing and the management of the restricted water resources.

Key words: Drip Irrigation System, water saving irrigation, Chah-i-Anjir, Helmand River

I. INTRODUCTION

Afghanistan is pinpointed amid 29°35’ -38° 40’ latitude and 60°31’- 74° 55’ of longitude. It is a hurdle by Uzbekistan and Tajikistan in the north China to the northeast, Pakistan to the east and south and Iran to the west. Afghanistan is identified by its jagged mountains with vast snow spread over, peaks of high altitude up to 7500m raised over sea level, productive valleys and desert plains. Lowlands include river valleys and desert regions are pointed in the western, northern, south-eastern and south western portion where elevated lands are mainly pinpointed in the middle portion of the country. From topographical point of view the country can be classified into three classes. Low lands with 300-500 m raised over sea level and medium land with 500-2000 m raised over sea level high land between 2000-7500 m raised over sea level almost half of the country has an altitude of further than 2000 m raised over sea level.

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CLIMATE AND PRICIPATATION IN HELMAND PROVIENCE

The climate of Helmand valley region is hot and very arid, particularly at the lower elevations where precipitation is less. Summers are really hot especially during June, July and August, and in the lower section of the basin maximum of above 52°c have been reported. The winter is mild, with minimum temperature not usually below freezing. In general, the days are bright and sunny and cloudy days generally occur in the winter. There is one drawback of this climate phenomenon of the Helmand region and that is the sand and dust storm which may occur at any time throughout the year, but are most common in spring and fall. These storms are usually of local origin and are caused by winds which pick and coarser particles from the desert floor and sweep them along, which is life threatening sometimes severely limiting visibility for several hours. Water Resource of Helmand province: The 1300 km lengthy Helmand’s River which comes from the middle Hindu Kush’s mountains and very near to the headwaters of the Kabul’s River. The Helmand’s River flows south-westerly and then westwards to its destination in the Seistan Depression alongside the border of Iran. The flow of the Helmand’s river is mainly stored by the higher catchment areas that collect snowfall in the winter months. The key branch of the Helmand’s River is the Arghandab as well as its tributaries, the Arghastan, Dori and Tarnak Rivers. The Arghandab and its tributaries emerged in the southern foothills of the Hindu Kush and in the Balochistan Mountains that form the border with Pakistan.

II. REVIEW OF LITERATURE

Literature review was to look and read a number of papers and books and journals and research papers in understanding with irrigation problems in common, particularly drip irrigation motivations. These literatures containing internet, analysis permitted me to have details and understanding the topic, subject of our study in all parts.

III. STUDY AREA

The study area of Marjah district 31°31’N 64° 07’E located in Helmand province Afghanistan.

Figure 1: Location of Marja District

Climate in Marjah district the data was collected in the 1950 in Marjah/Chah-i-Anjir. Data displayed mean of above 1inch per month from December thought March, peaking in January at 2.46 inch. Rest of the year experienced short or no rainfall. And in addition January. There was a lot of water loss evaporation in June, July and August. It also experienced high temperatures of above 40°c to 48°c although the average lows in winter bottomed out at fair high up freezing in December and January. This is a routine.

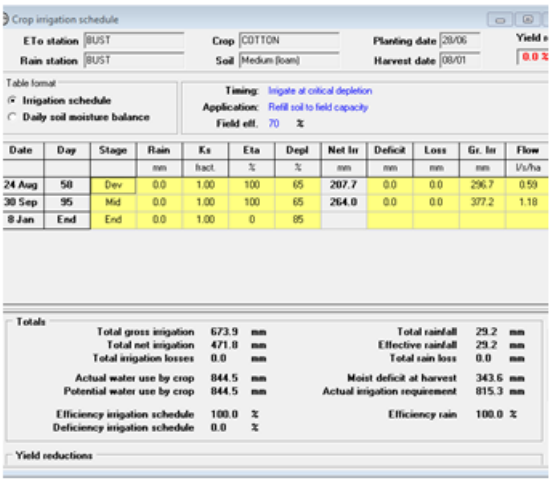


Figure 1:Crop irrigation scheduling from crop watt for cotton - (Crop Watt)

Objectives of the study

Present objectives of the study are:

- Designing drip irrigation system.
- To find quantity of water we can save after the design. By delivering the precise amount of required water by the plant directly to the root zone where it is most needed.

IV. METHODOLOGY

The methodology used for this study consists of three stages.

1 Selection of the project, thesis and the site of study

For good water resource management applying (Drip Irrigation System) is an excellent way for saving water. The site of the study is a part of Marja district, Helmand province, Afghanistan this portion of the land which is under the surface irrigation.

2: Subclass of the study area into blocks and plot

For designing of "DRIP IRRIGATION SYSTEM" dividing the land into (10) blocks and plots and designing the system for a single plot and verifying on each blocks. Where all blocks own the identical (area, outside, and water requirement)

3: Selection of Data collection and Working gadgets

The literature and software really helped me to collect data with common data regarding to irrigation .As will it assets to give an overview of irrigation in Marja district. As for practical data was taken by different software used in this study. In this study we are using "Google Earth" for finding the area. Google earth is a computer program that provides a 3D representation of earth based primarily on satellite imagery. The program maps the earth by superimposing satellite images, aerial photography and GIS data onto a 3D globe allowing users to see cities and landscape from various angles.

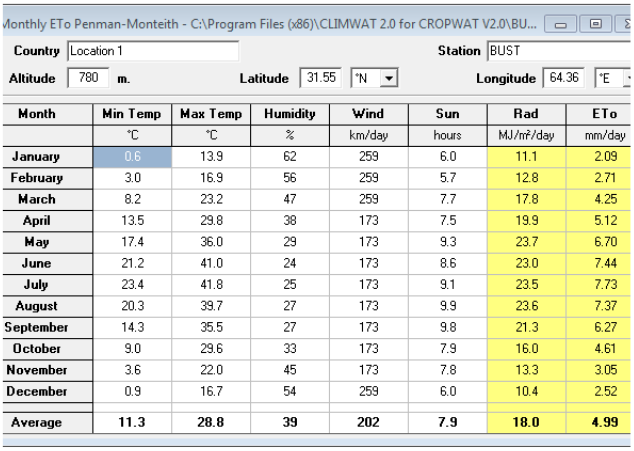
CROP WAT 8.0 SOFTWARE

A crop wat 8.0window is a computer program for the calculation of crop water requirements and irrigation requirement based in soil, climate and crop data.

However, the software admits the evolution of irrigation schedule for different management and the calculation of the plan water supply for differing crop motifs. Crop wat 8.0 can be used for elevating farmers' irrigation and to approximation of crop performance under both rains fed and irrigates condition.

V. RESULT

The result of the study by applying drip irrigation we can grow more or less no matter your crop, climate patterns, soil type or topography. It's about delivering the perfect amount of water and nutrients straight to the root zone of each plant. Here we also save, a big deal on water, no evaporation, no runoff, and no waste. The water used by surface water irrigation **30000m^3/hectares/year** from surface water resource where the same amount of water was discharged from



Month	Min Temp	Max Temp	Humidity	Wind	Sun	Rad	ETo
	°C	°C	%	km/day	hours	MJ/m²/day	mm/day
January	0.6	13.9	62	259	6.0	11.1	2.09
February	3.0	16.9	56	259	5.7	12.8	2.71
March	8.2	23.2	47	259	7.7	17.8	4.25
April	13.5	29.8	38	173	7.5	19.9	5.12
May	17.4	36.0	29	173	9.3	23.7	6.70
June	21.2	41.0	24	173	8.6	23.0	7.44
July	23.4	41.8	25	173	9.1	23.5	7.73
August	20.3	39.7	27	173	9.9	23.6	7.37
September	14.3	35.5	27	173	9.8	21.3	6.27
October	9.0	29.6	33	173	7.9	16.0	4.61
November	3.6	22.0	45	173	7.8	13.3	3.05
December	0.9	16.7	54	259	6.0	10.4	2.52
Average	11.3	28.8	39	202	7.9	18.0	4.99

Figure 2:The monthly ET0 data from BUST station - (Crop Watt)

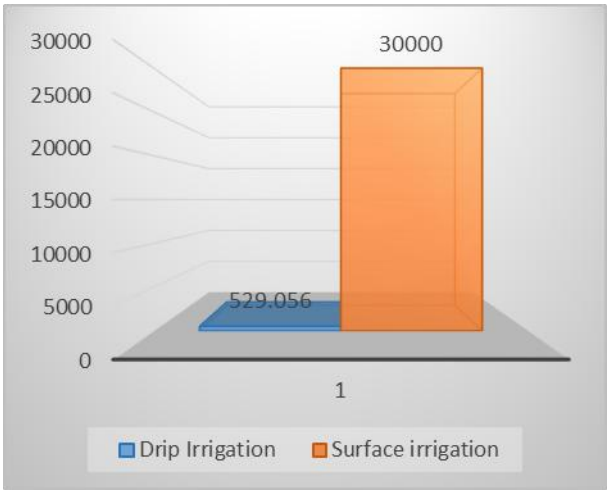
ground. The amount of water used by drip irrigation is **529.056m^3/hectares/years.** For total **63.5** hectares' surface water use **1905000 m^3** and for drip irrigation for the total **65.3** hectares is **34547.356m^3.** water saved **1870452.644m3.**

Therefore Afghanistan has limited water resources;

- It doesn't make effective usage of what is accessible. Farmers are untrained of confirmed crop water demand and irrigation programming patterns are still mostly based on the highest quantity of water a farmer can arrest. Therefore current irrigation operation of farmers involves a leaning to over irrigate, whereas the opposite should be satisfied. To address this most main problem, investigation and studies concentrating on the rewriting of irrigation arrangement found on maximum water saving should be originated.
- Communities of interests should be straight associated in the campaign of unnaturally recharging the aquifers and in the conjunctive use and management of surface and groundwater resources.

Irrigation Method	Water Requirement (m^3/hectare/year)
Drip Irrigation	529.056
Surface irrigation	30000

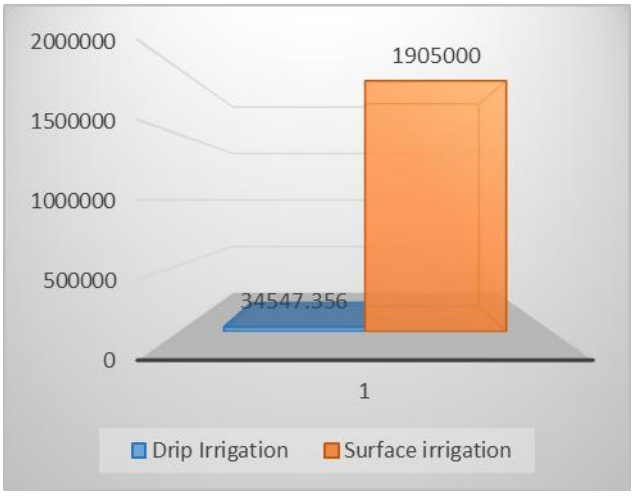
Table 1:Drip Irrigation and Surface I.W.R Requirement



Graph 1:Result of Comparison for one hectares

Irrigation Method	Water Requirement (m^3/65.5hectare/year)
Drip Irrigation	34547.356
Surface irrigation	1905000

Table 2:Drip Irrigation and surface I.W. Requirement



Graph 2:Result of Comparison for 65.5 hectares

VI. CONCLUSION

Water is a valuable resource, and it is getting hard to get it, as population and consumption are on an alarming rise. Elevation of these elements, as well as technology and action of backing healthy water provision, it is essential that we get control of the condition. Agriculture usage of water accounts for almost 70 percent of the water used throughout the world, and the more than half of this water is utilized for irrigation. In order to explain the problem of water scarcity in agriculture, it is important to enlarge water-saving irrigation. At present there are different kinds of water-saving methods including drip irrigation, sprinkler irrigation. Between this irrigation drip irrigation is virtually successful way in arid and semi-arid areas and its usage rate can get up to 90 percent. This study organized in condition of our master degree project. The analyze is supported to cover a piece of the area of Marja district the part of Helmand province, Afghanistan. Indeed the aim of the study is to save enough water and to apply drip irrigation system (63.5) hec of operable piece of subsets surface irrigation program and to provide irrigation water management on the location in order to rise efficiency, standard and profitableness in the context of the fight against food poising and water scarcity. To attain these goals, we suggest drip irrigation system design. For the analyze of the design, the total area is divided into (10) blocks. The design of the irrigation system has been organized alone in one plot (6.3) hec and which is downstream of the plan. All blocks and plots having identical (areas, external surface, and requirement of water). Even though in the carrying out of the project on all (63.5) ha of the place, the practical data of the considered plot will be repeated on other (10) plots. The study will have double objectives because it will permit us to distinguish in many levels the two systems of irrigation practiced in the plan, the surface irrigation and new drip irrigation program. That is the time to prepare drip irrigation system for the farmers in Helmand province as current situation farmers are using surface water irrigation method and flood irrigation method. For the current situation in the study area drip irrigation is very suitable system for water saving. Drip irrigation can help us to utilize water expeditiously. An excellent planed drip irrigation system particularly doesn't lose water to runoff, evaporation and deep percolation in salty soil. Drip irrigation decrease water contact with crop leaves, stems and fruit. Thus condition may be less favorable for disease development.

The water used by surface water irrigation **30000m^3/hectares/year** from surface water resource where the same amount of water was discharged from ground water resource. The amount of water used by drip irrigation is **529.056m^3/hectares/years.**

For total **63.5** hectares surface water use is **1905000 m^3** and for drip irrigation for the total **65.3** hectares is **34547.356m^3** saved **1870452.644m^3.**

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