Abstract

((Water resource management in arid and semi-arid
Area with emphasis on watershed management projects))

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ABSTRACT

Water resources management refers to a whole range of different activities, monitoring, modeling, exploration, assessment, design of policy, operation and maintenance and evaluation.

It also covers supportive active activities such as institutional reform. Water resources management include local, national and international activities, directed at either the short or the long-term. As such, water resources management includes the whole set of scientific, technical, managerial, legal

and operational activities required to plan, develop, operate and manage water resources.

Obviously the main factor for know water resources is watershed condition and character, and how can we improve the current situation of watershed, In order to decreasing run off and situation water harvesting through the executing, related mechanical, biomechanical and biological operation.

Iran is one of the arid and semi-aria areas in world, so water is important for extending economical and social condition.

In this article our main purpose is demonstration of effecting of variety watershed management project, on water resources and natural environment through a case study which done in one of provinces of Iran. Keywords: watershed management-water resource management- water resource management-arid and semi-arid area-effect of project.

1. Introduction

People from different backgrounds seldom have the same idea about what water resources management implies. To those living in an arid country, it means drought relief, irrigation, food, jobs, law and politics. Generally there is an emphasis on groundwater. To those living in humid areas the emphasis is more on surface water. They are particularly concerned with waterworks, flood protection, navigation, hydropower, treatment plants etc. Also people from

different professional backgrounds tend to view water resources management differently. To the water engineer, water resources management is related to dams, reservoirs, and flood protection. Diversions, canals, water treatment and land reclamation. To the ecologist, water resources management is often connected with the deterioration of ecosystems, land degradation, pollution and destruction of wetlands. To the lawyer, the main issues in water resources management are the ownership of water, the system of water rights (ownership or license to use), the priority of use, the water legislation, and international water law. To the economist, water resources management is connected with water use efficiency, cost recovery, the creation of water markets, tradable water rights and privatization of water supply. To politicians, water resources management means solving conflicts over water and attaining national objectives such as: economic growth, poverty alleviation, employment generation and food security.

In fact, water resources management includes all these points of view. Water resources management is multi-disciplinary, multi-sector, and multi- objective. Management is only effective if all interested parties (both formal and informal) are _ in one way or another _ involved in the process of planning, decision making and implementation. If not all stakeholders feel committed, water projects or policies are likely to fail(1).

2- The Working Field of Water Resources Management

The Working field of the water manager cover those parts of the environment and society that relate to the use of water or the protection against water. The field includes both water resources and water users, the term 'water resources' is used here to refer to a broad range of physical aspects. Water stocks, water infrastructures, water flows and a large amount of processes that affect water quality. The term 'water users' refers to a broad range of societal aspects of water(4).

Beside these activities that use water directly and intentionally, there are activities that affect water unintentionally. Land use changes for instance can affect the water system through changed evaporation, groundwater recharge and erosion. Also activities that contribute to climate change can indirectly affect the availability of water. Finally, people often speak about 'functions' of the water system, not only referring to the societal functions of water but to its ecological functions as well. Therefore, it would probably be better to replace the term 'water users' by the more general description 'actors that have some interest in water and its functions or that affect water somehow'. Insight in this broad field- in both the physical, ecological and societal aspects – is a precondition for effective water resources management. One should have a clear picture or

scheme of the field in order to know where and how management can make things change(3).

3- The process of Water Resources Management

Today it is widely recognized that the management of water resources is a highly dynamic and complex process. The cyclic character is two main components of water resources management are (i) planning and (ii) implementation and control refers to the action itself. In the planning stage policy is being prepared, established and evaluated. The stage of implementation and control includes the actual policy implementation, operation and maintenance, and monitoring. To some extent, different activities are sequential: problem identification comes before finding solutions making comes before actual implementation of measures. At the same time, however, there are numerous places in the management process where feedback occurs, where new information urges new views and where new decisions have to be taken, The management cycle is not to be applied as a rigid framework, but rather as a framework of thinking. Depending on the situation, a step can be bypassed or iterated several times before a next step is taken. For this reason, the management cycle concept should be applied with a high degree of flexibility, allowing shortcuts and feedback loops and continuous involvement of stakeholders(1)(5).

The planning phase

Water resources planning refers to the planning of the development, conservation and allocation of a scarce resource, matching water availability and demand, taking into account the full set of national objectives and constraints and the interests of stakeholders. It includes:

- evaluation of existing water management practices and previous strategies,
- analysis of the present situation and possible policies to improve this situation, and
- Decision-making on the policy to be adopted.

The stage of implementation and control covers all efforts needed to carry out a certain water management strategy. It includes the detailed design of measures, the implementation of these measures, operation and maintenance, monitoring and enforcement of law and regulations. Some of the activities in this phase are a one-time exercise, such as the building of a certain physical structure or a certain institutional reform, but other activities require continuous effort over time(3).

4- Introduce of watershed management projects for protection of water and soil:

Soil and water are one of the natural resource and perhaps importance infrastructural factor in each country.

Principles of exploitation of this natural resource infarct, determine progress or descent of each community.

Between from methods for conservation of soil and water and management of erosion and sediment, execution integrated management of watershed for main and long-term effect is important and higher method. Sum of this action's that nomination watershed management, categorization and classification into method: mechanical and biological.

Selection of this method for soil and water conservation in watersheds must be consideration with emphasis on social, economical, managical and technical. But for successful operation of this method, must to perform the exact studies of situation's, correct planning and finally regular and correct execution of compilation program's and use the powerful management(5).

5- STUDY AREA

((Anbaran)) watershed area is 67.80 km2, located in following coordinates: Geographical longitude 48˚, 24' to 48˚,30'

Latitude 38˚, 28' to 38˚, 35'.

It limits northerly to "Azarbaijan Republic", easterly to "Naminchai" area, westerly to "Pirzan" area and southerly to "Qareh soo" river.

There are minimum height mounts to 1487 meters in south and the maximum is 2323 in north. In order to study climatologically and hydrological parameters, this area is divided into 14 discrete hydrological units and 8 compound ones.

The size of area and perimeter of it has been studied using the district 1: 50000 topographical maps.

Length of Anbaran River main waterway mounts to 13.5 km and the average inclination of water way under the areas Fluctuates between 2 to 6%.

The distance between Topographic lines of the considered area and sub areas has been calculated using planimeter .The most distance is located between lines 1700 to 1800 meters and the least on is seen in height 2300 meter(2).

5-1-CHARACHTERISTICS OF WATERSHED MANAGEMENT OPERATION IN THE REGION:

This operation has been implemented in "mechanical" and "biological" structures from 1998 to 2003. In former structure, the main factors include check

dam and mostly Gabion which has been installed from the area source to main stream and great waterways.

Biological method, which is also known as indirect attempt against erosion and sediment, has been summarized in 3 parts: fertilizing, arborization, alfalfa cultivation.

(Planting)

Today this issue is one of fundamental aspects of plans and projects in developed countries; it is used as a tool to evaluate the effectiveness of those plans given the considered goals(2).

5-2-Evaluation on saved water gained from watershed management.

Reserve water in any case of surface or depth situation in each limits are calculation with different method.

For estimate of reserve water amount on different condition, use from balance sheet hydro climatology formula.

$P=E_2+R+I+\Delta s$

Table 2-Amount of saved water gained from watershed management operations.

Sub area	Area in km^2	Rainfall rate	Run off rate	Evaporation and perspiration	Post-operation saved water	Pre-operation saved water	Saved water gained from operation
A	7.068	440.00	90.56	192.80	156.64	17.40	139.24
B	4.505	500.00	133.35	207.60	159.05	-21.20	180.25
C	5.442	460.00	163.44	153.30	143.26	-84.10	227.36
D	8.497	450.00	61.65	163.40	224.95	-37.60	262.55
E	5.82	490.00	83.90	177.90	228.20	-63.00	291.20
F	8.49	480.00	86.08	174.30	219.62	-50.10	269.72
G	1.61	460.00	132.35	179.50	148.15	-49.30	197.45
H	3.734	460.00	69.64	153.30	237.06	-93.20	330.26
I	3.264	435.00	95.98	169.80	169.22	-26.10	195.32
L	7.101	460.00	126.51	191.00	142.49	-1.50	143.99
M	2.251	430.00	121.78	188.40	119.82	3.10	116.72
N	3.2	420.00	105.79	184.00	130.21	10.40	119.81
O	2.887	450.00	130.38	186.80	132.82	-13.80	146.62
P	3.826	410.00	121.78	179.70	108.52	14.80	93.72
Total	67.7	490.00	95.98	163.30	230.72	-40.00	270.72

In the chart 1, you see a comparison between saved water gained from watershed management before and after this operation.

As you see, most areas experienced water shortage before this operation where as after an increase in water rate is seen(2).

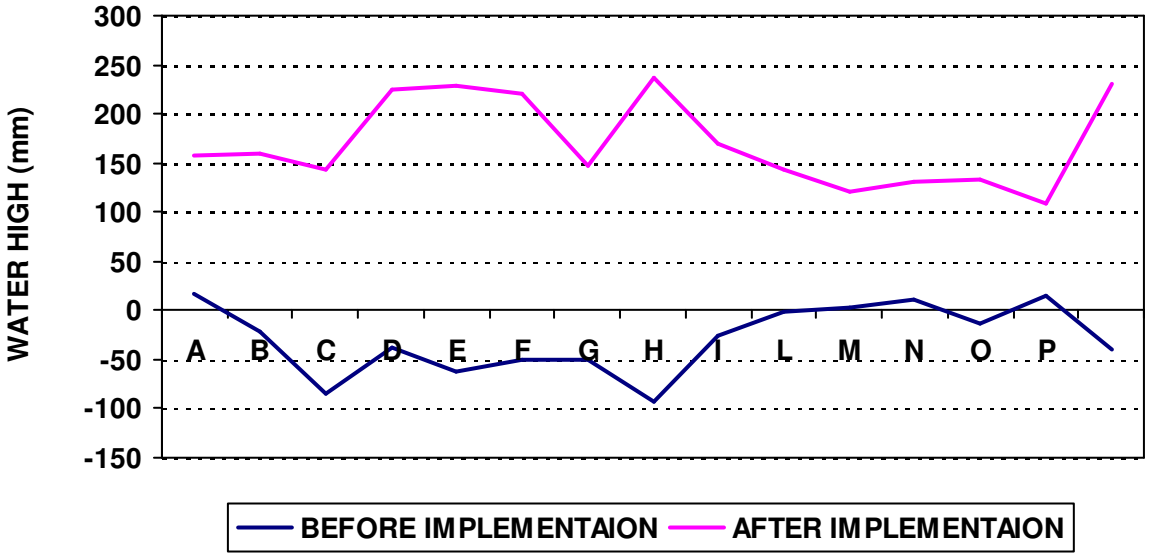

Chart 1: comparison quantities of saved water gained before and after this operation (watershed management)

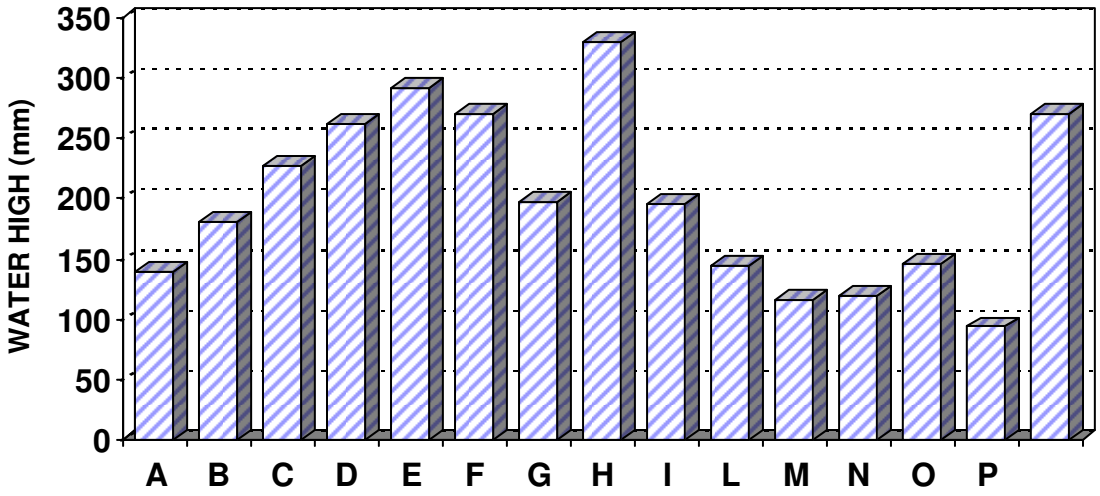

Chart 2: Total saved water after operation in the sub areas.

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