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Familiarization with guidelines of optimal utilization of water resources of Doroongar River for rural sustainable development through people participation

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ABSTRACT:-Because of unwise utilization of natural resources during the latest decades, extended environmental destruction has overcome the earth. The main environmental challenges, under environmental effective factors such as population, economy and particularly misleading in management have entered into the Iranian life. In the river basin of dry regions such as Doroongar river in the North eastern part of Iran, unwise utilization of water resources has resulted in imbalance of water demand and water supply and as a result there exist a non-sustainable environment and also a challenge between water users along the river .This paper tries to give a knowledge of the effective factors creating sustainability in human and natural environment in Doroongar water basin and shows the solution through people participation in water management. The results from documentary and field study and its comparison with the existing data and documents, belonging to three decades before, shows that 50% increase in water utilization in upper and down part of the basin resulted in severe fall of the river discharge. Field study particularly measurement of water users views in this part of the basin, shows a severe limitation in using the water resources so that the plantation of summer agricultural products has completely been stopped in recent decades. As a result of water shortage and a change in agricultural activity, and also to reduce the pressure on land, farmers believe that creation of non-agricultural jobs for farmers in this area is necessary.

Key words: village, water users, rural tourism, rural small industries, non-agricultural job, sustainability

I. Introduction

In dry lands of Mediterranean area, water and its management has played a high role in economic and social relations between government and nation's .The main challenge of societies in this region is to supply water for different sections. Archaeologist researches show that the oldest socio – physical structures belong to Middle East area (Mostert, 2003:27).

In recent decades, the majority of countries including I.R.of IRAN have put a developed investment in water section to reduce the problems of water shortage. But recent surveys and investigations on physical structures and management for them in river basin of national level and international level including :WCD,2004;MOSTERT,2003;BALE,1998;IWMI,1994, abroad and Poorzand work,1378 in Iran (national committee for Irrigation and drainage 1380) confirms the existence of issues and problems in different dimensions particularly in management of water resources in the river basins . Based on results of this study, most of problems particularly lack of enough Performance and deficiency in using water structures has been a result of Bureaucratic approach to investments in recent decades (1950-1980).During recent 50 years a great changes in river basins has occurred that the most important one is a diversion in cropping patterns and replacement of agricultural economy based on growing high water need products, instead of common agricultural activity that is livestock and rain fed cultivation.

These changes in cultivation pattern have brought challenges into the life of farmers. So that it created problems in downward of the basin in economy and social life and particularly problems in water management .while people monitoring and people management on water were cut off , the up stream farmers increased water using and created imbalance in water demand and water supply in other part of the basin . During the recent three decades as much as government tries to reduce problems by construction of physical structure such as big dams, but a good result were not achieved and problems are continuing.

Since governments efforts mostly performed without participation of water users, these aimed groups had no interest to follow the government and cooperate with governmental program .From the other side, the world experiences shows that participation of beneficiary groups has been the key factor of success in rural development .Today, social investment particularly people participation, is a column of sustainable development. In Iran too, role of people participation and local societies in local sustainable development is a determinant factor. Both people participation and people investment in providing

and execution of programs would be necessary if a success is expected.

Participation in decision making, responsibility and authority are the most characteristics and sample of real participation (Homayoonpoor, 2001, 3). The management of water resources particularly in Doroongar river basin shows that the people participation has no place in water management here.To describe and analysis the action and social impacts and to understand insight realities and people attitudes toward new phenomena the factors of changes and social reactions will make the issues more clear.

Gairoche believes that technique and culture are the main factors in reaction and changes between social groups. Because of dynamics in population both quantitative and qualitative changes, the other factors change in relation to new conditions. For example in a dispersed population in a natural environment, agricultural activity will continue without any damage to other farmers. But in an area with a concentrated population, in addition to environmental problems, field for social challenges may be created too (Caroche , translation 1994,48).

Providing extended city services to traditional rural societies in Iran , nearly self productive , in the last 30 years particularly in mountainous area , has made the villages societies full consumers of near towns high price products .Road construction in mountainous area and good facilities of farmers to near towns has made all consuming city products available for farmers consumption .from other side ,services such as electricity , roads and etc. has provided the possibility of more resources utilization and destruction of environment . The new modern villagers as a first resolution changed the cultivation patterns and selected products with more benefit and more economical income.

The cultivation pattern is criterion in which, based on its rules, agricultural lands are determined for different agricultural activities. The cultivation pattern mostly depends in social – economic factors which are the determinant of choosing the kind of agricultural activity and the ways how to use the different institutions of production.

If certain supply of water exist and access to new agricultural institutions let the farmers to replace agricultural plantation with less agricultural actions and more product income, such as three time obtaining products in a year in a field, farmers will benefit more (Seng – 1374:349).existing agricultural patterns and development for the future should be decided so that prevailing environmental and social conditions should be understood and based upon.

Moreover, to understand agricultural pattern to provide a program for development of a modern agriculture, a geographical agriculture specialist should obtain a preliminary data of the natural environment. The discussion is based on three subjects as follows:

A survey of natural environment will provide a suitable framework that in that framework a systematic analysis of cultivation pattern and livestock breeding will be possible.

1- This fact will bring a basic that a general policy could be planned.

2- If the above notes could be done correctly, programming in place of work and use that program in the field could be easily done.

II. Discussion:

Considering all issues mentioned above, the present paper shows factors and reasons for increasing the water utilization in up stream of Doroongar river basin and has explained the result of over water use in this part of the river. In addition to it considering the imbalanced water use in up stream and down stream and over utilization of water in Doroongar water basin , guidelines for balancing the water use with consideration to social justice and sustainable environment is explained too. This has been done through introducing a suitable agricultural pattern with cooperation of water using farmers in the basin. We are also to find answers to the following questions:

1- Which factors is the reason for over use of water in Doroongar up stream?

2- How can we advise a cultivation patterns for optimized water use with considering social and environment justice to be replaced with present cultivation?

3- Considering ineffective governmental managing of water at the present time, which other governmental effective management for optimal use of water resources and creating balance between water supply and water demand can be presented?

III. Method and materials for investigation

Considering the nature of the subject and questions asked for , methods of investigation in this paper is descriptive and analytic .Because of problems and severe imperfection in the field data and documents , gathering data needed and information has been done in two method of field study documentary statistics and field data gathered through two questioners (village and water users).

Project area and general specification of study region.

The study area is doroongar river basin located in Dargaz city in the north eastern part of Iran . mean annual rain in this area is 290 millimeter and river discharge based on 35 years data is 30 million cubic meter . According a general population statistics in 2006, water users in this area were 27 water use village, 4200 families with total population of 18633 persons. Relative pop. Density in the area is 33/7 persons in square Kilometer and the mean of population of each village is 570 persons (data from deputy to state governor of Razavi Khorassan 2006).

IV. Analysis of findings:

The most economic activity of the village's settlements in the area from very past was not constant and farmers under the economic, political and Geopolitics of the region in each historical moment have cultivated different kind of agricultural product. According the survey has been done, approximately half a century ago the poppy and potatoes were cultivated in the up stream villages and also a large extension of the upper part there were canebrake wood lands. In the middle of 1360(year 1981) decade potatoes were omitted from the cropping patterns because of plant pests and diseases .Instead of potatoes, orchards and rice cropping were cultivated.

In the down part of the basin wheat and barley, poppy, cotton, corn and grape were planted. At the present time the prevailing cropping in down stream is wheat and barley and a few summer crops and Alfalfa . in the latest two decades because of draught and excess water use by the up stream water users, the cultivation of summer crops in down stream has been decreased dramatically and grape gardens has been vanished .According to gathered data through field study, prevailing cropping now in the up stream is rice (69.7 %), orchards and grapes (9/1 %) and other products (21.2 %). The total land under cultivation with irrigation in the upstream is 947.45 Hectare .Table No.1 shows the different cropping in the upper lands. In opposition to the upper land of the basin which settlements have access to unlimited water, down part villages are seriously confronted with shortage of water and this makes the cropping patterns of the down stream completely different from up stream villagers. Because of water shortage in down stream the farmers cultivate only one third of suitable lands for irrigated cultivation .Every year one in three fallow lands will be used for cultivation. The prevailing cropping in the downstream are wheat and barley .More than 80% of lands in downstream are used for wheat as 2230 Hectare and barely as 558 Hectare has .Table No. 1 showed irrigated lands with distinction between kinds of cropping in Doroongar River basin.

Table (1) cultivation patterns in up stream and down stream of Doroongar river basin

items	crop	Area under cultivation	
		Upper level of storage dam	From deviation dam to Dargaz city
1	wheat	42/7	2230
2	barely	40/8	558
3	Alfalfa	60/7	174
4	Cotton	56/4	175
5	orchards	86/3	348/9
6	rice	660/7	0
	total	947/5	3485/9

Source: research findings: 2012

The amount of gaining products in different parts of river basin

Considering the kind of cultivation and water utilization, the study area can be divided into three sections as follows:

- Upper part of the dam begins from Mohamad Taghi beyk and finishes in Sang Soorakh village
- Second part begins from upper Zeidanloo and continues to deviation dam of Palkanloo (the lands between storage dam to the deviation dam
- The villages and lands at the down of deviation dam (the lands limited to network)

The kind of crop cultivated and cultivated lands in different part of the area will depend on the amount of water need and access to land. The climate condition, adopted to the region , consumption market needs and the prices of productive crops also are the determinant factors of land under cultivation and the kind of irrigated crops in the region .

The shortage of land available for irrigation is a limitation factor while in the lands of the downstream and plain of Dargaz the farmers' access to water is so little that they limit their cultivated land and prefer to cultivate the crops with less water need.

In table (1) the land under cultivation in limited area of the Daroongar river is shown .as shown in the table (1) the total of cultivated land in upper limited part of the basin is 947.5 Hectares. The largest cultivated land in this area is used for rice crop with square area of 660.7 Hectares equivalent to 69.73% of the total under cultivation (see graph No 1) . But the land under cultivation of cereals (wheat and barley) is less than 10%. As it is obvious, the cropping patterns of the upper lands of the storage dam of Daroongar are rice, because in comparison to cereal it needs more water. The reason of rice plantation by farmers is mostly the high income in Hectare of rice.

The area of the down part of deviation dam is about 6000 Hectare of cultivatable land but

practically about 3486 Hectares of land goes under cultivation every year because the limitation factor is water. The prevailing cropping in this area of the basin is usually wheat and barely that takes 80% of cultivation. Because of limitation in water use based for irrigated wheat and barely and not enough irrigation, the amount of product is less than mean product gain.

Diagram (1) shows the land under cultivation of different crops in different parts of Daroongar basin

At present time, considering construction and water utilization of storage dam ,storage of water has created conditions for compensation some amount of water shortage in down part villages in the Basin and this provided some social and environment justice. By storage and supplying a part of discharge from river particularly from the floods it is possible now that stored water be allocated to farmers in summer time. The farmers can now revive the summer cropping in this area.

As a result of this investigation the following crops is recommended for cropping pattern in down part villages:

1- Wheat 43% Barley 26 %
2- Beans 2% Potatoes 3%
3- Alfalfa 5% cotton 3%
4- Grapes 12% orchards 6%
5-
6-
7-
8-

The recommended cropping pattern considering the raw amounts and Hydro Model irrigation is so that its compatibility with mean river run off and its storage in dam is preserved .According to recommended cultivation patterns the peak amount of water occurs in Khordad (June) that is equivalent to 0.78 Liter per second per Hectare. Based on the above table the water need of grapes in Hectare cultivation during the year is nearly 8173 Cu.m that with 20% less watering it would be 6538 Cu.m . It is estimated that considering the data of under cultivation lands in 1383 (2004) that was 3485 Hectares, the water need has been equivalent to 22784930 Cu.m .

According to field study questioner and the result of families data analysis the people believe that reduction in water use and optimal water utilization is necessary .in this relation four attitudes for water users has been chosen as follows:

1- Improvement of the water network and the native streams
2- Creating jobs in non-agricultural section
3- Mechanization of agriculture
4- The change in cropping patterns

The result of questioner is explained in table (2).

Table (2) the result of estimation of people attitudes for the guidelines for reduction in water use in Darongar basin (2007)

Recommended guidelines to reduce water utilization	Frequency of the first priority	%
Creating jobs in non-agricultural business	48	30
Improvement of existing water network and streams	82	51
Agricultural mechanization	21	13
Change in cropping patterns	9	6
Total	160	100

Source: Research finding: 2012

Based on results in table (2) , 51% of respondents has given the first priority for water reduction use to creating non-agricultural jobs. In other parts too, it shows that local attitudes are creation such as tourism, rural small industry and packaging industry of agricultural and livestock breeding.

Table (3) relative frequency of measurement the sample society attitudes toward creating jobs in non-agricultural sections (*chi*-squared *tests*

	Highly agree	agree	No views	disagree	Highly disagree
Tourism attraction	2	8	6	26	38
Increasing income by Packaging of products	0	1	8	21	70
Tourism an income for upper part villages	1	18	9	53	19
Possibility to establish factories for processing agricultural and	2	2	3	23	70

livestock products					
Possibilities for creation of wood factories	4	22	10	27	37

Table (4) the result of Chi-square test in a survey of society attitudes about job creation in non-agricultural bussiness

Possibility of establishment wood factories	Possibilities for establishment factories for processing agricultural and livestock products	Tourism a source of income in upper part villages	Ceating jobs and increasing income through product packaging	Dam's attraction for tourism	
42.021	123.083	77.75	127.250	88.896	Chi-square (a,b,c)
4	3	4	3	4	Df
.000	.000	.000	.000	.000	Asump. sig

Source: research Finding: 2012

Considering the result of tests, the majority of the sample society was in agreement to create job and income in a non-agricultural system. This can be a good source for programming in the region .Of course the views of all sample societies are not the same in all villages but people have said something depending on their present capabilities and limitations for their present life. All views on establishment factories for rural product processing (such as livestock and agricultural products) and also product packaging factories are the same in all villages. But in relation with tourism attractions for dam or in the villages and establishment of wood factories, there are meaningful differences in different villages.

The number of population and the number of jobless people is effective in over using of the natural resources and push pressure on nature. the result of Spearman test shows that there is a meaningful relation between the number of population in rural society and their views on creation non-agricultural jobs and creation new incomes .From the views of sample society in villages with more condensed population due to ecological problems and increasing of jobless people, investments and programming on non-agricultural jobs is more necessary and more useful (table No. 7)

Table (5) the correlations between number of population in villages and creation of non-agricultural jobs (upper part of dams)

Source: research findings (2012)

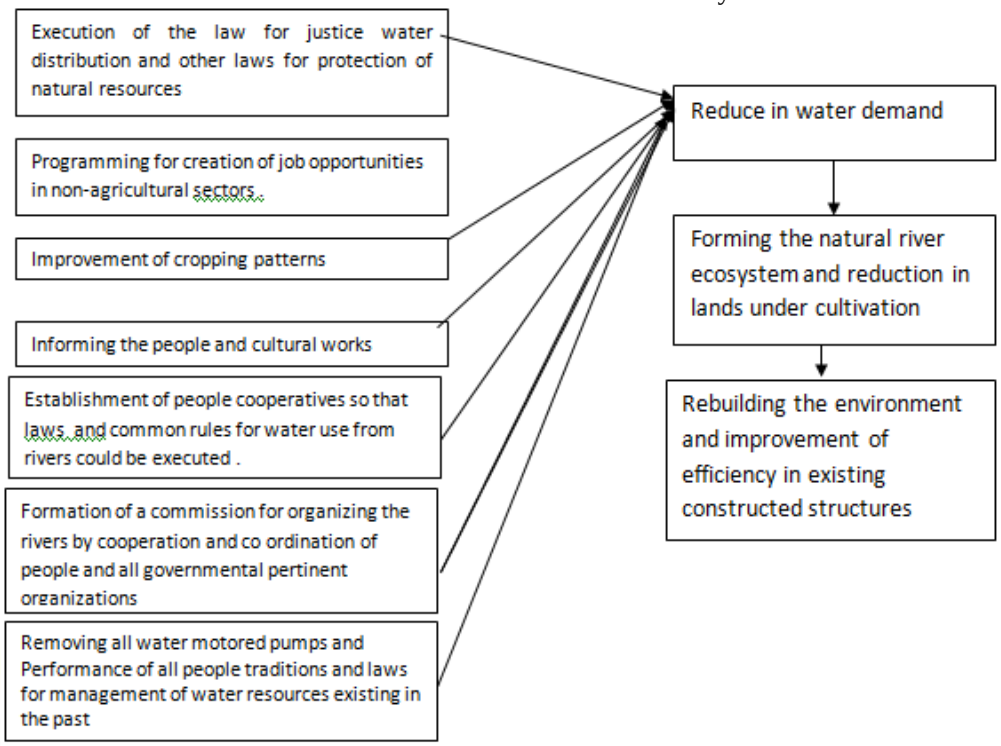
Possibility for wood work factories	Possibilities for establishing factories for processing live stock and agricultural products	Tourism ,the income for people in upper part	Creating job and packging products	Tourism attraction		
.236(*)	.228(*)	.130	.292(**)	-0.85	Chi-Square (a,b,c)	population
					Df	
96	96	96	96	96	Asymp. sig	
.020	.026	.208	.004	.408		

V. Conclusion

With attention to questions planed for and total issues were discussed in this paper, creation of a balance and sustainability in river basins of semi arid regions such as Darongar river basin. It is necessary to make situation for reduction in water demand and water utilization.

To reduce the water demand it is necessary to create non-agricultural jobs for villager's .there is some fields for non-agricultural jobs such as rural tourism and dams attraction, establishing packaging industry for agricultural and livestock products and also the industry of changing the products. In addition to creation of jobs there is also needs for returning water balance between demand and supply of water in the basin area. The following idea could be presented: since governmental control on water resources has created problems and government is unable to improve present situation, a change in water management approach is necessary. Considering the people experience of water management in the past and water users' readiness in present time for some management issues, it is best to create a participatory management instead of present governmental management.

A model of reduction in water demand in study area



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