

## **The Source and Consumption of Using Water for Irrigation in Rural Area: Study Case of Kurdistan Region, Iraq**

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**Abstract.** Irrigation is the largest abuser of water, accurately fresh water. The scope for further irrigation development have to meet the water needs of rural area of Kurdistan region, however, severely constrained by decreasing water resources and environmental issues in irrigation. While water resources are still ample, serious water shortages are developing in the arid and semi-arid regions as existing water resources reaches full exploitation is the aim for this paper. It presents the particularities of water resources in the rural area of Kurdistan region (North of Iraq) During 17th of June and 15th of September, 2012 a research was conducted in the rural area of the KR, taken into consideration the precipitation zone so it can be done a clear distinguish among the three regions of Kurdistan. The research method used was the survey, based on questionnaire. The total number of questionnaires applies to the farmers was 236 in rural area of KRG. The use of water for irrigation, livestock etc, it is necessary to mention that in the KRG there is no regulation regarding the water consumption for rural area and the water scarce in the area imposes to adopt a proper legislation regarding the water pricing on one hand, and the ethics principals of water consumption on the other hand. Based on this it can be stated that people from rural area have major problem regarding the water availability. The inescapable conclusion is that irrigation has to produce more food with less water.

**Keywords:** Water Demand, Water Shortage, Water Value, Water Policy

### INTRODUCTION

The most significant water user in arid and semi-arid countries is agriculture, and Kurdistan is no exception. It is challenging do gain an overview of water demand for agriculture in Kurdistan (Momt, 2011). Irrigation is the largest abuser of water, accurately fresh water especially in the third countries where the irrigation methods are insufficiently developed. The scopes for further irrigation development have to meet the water needs of rural area of Kurdistan region. While water resources are still ample, serious water shortages are developing in the arid and semi-arid regions as existing water resources reach full exploitation.

Noori (2003) found that the issue in Kurdistan region caused of huge amount of water supply in the past leads to consume the same water in our day, because of the absence of water policy to set up the value of this good.

Heshmati (2009) presented that irrigated agriculture represents a large share of land used in agriculture as well as a large share of gross value of agriculture-related production, and main sector are using water in the region, but the management in the region is preoccupied for electricity and household also in this case is not success.

Kakay (2003) as compared Kurdistan region with other regions in Middle East during two decades while water shortage appeared, non of managing of water resources in the region is going to prohibit agricultural land, especially un-irrigated land still now dry.

Marques *et al.* (2005) underlined that irrigation water demands depend on farmers' decisions on when and which crops to produce, how much water to apply, and which irrigation technologies to use and when water is scarce, farmers seek to optimize water allocation among competing crops and irrigation technologies to maximize production and farm revenue.

Nofal *et al.* (2000) concluded that despite pronounced modernization in Palestine achieved so far in regard to irrigation techniques, there is still a wide scope for further improvement, mainly in promoting modern irrigation techniques, establishing more storage reservoirs to that water which is not pumped directly from wells to farms, effective rehabilitation of distribution networks and complete phasing out of earth canals.

Pulido-Calvo and Gutierrez-Estrada (2009) forecasted consumer demands of an irrigation area using on-farm water-use information and some methods like a hybrid methodology and genetic algorithms in south part area of Spain. This can be very suitable for the development of policies on irrigation water consumption since information regarding water demand, is key to schedule pumping efforts and minimize operation costs of water distribution systems as well as to evaluate the marginal value of irrigation water and the response level to different irrigation water rates.

To ultimate for this case and approved that managing of water is absent in the region, the irrigation land in Erbil is 0.14% of total irrigation land in Iraq, the same for Suleimani less than one (0.99%) and for Duhok is (0.40%) (FAO, 2013).

Based on the facts mentioned above the aim of the paper is to show the shortage of water resources and environmental issues in irrigation in the case of Kurdistan Region.

## MATERIALS AND METHODS

The Kurdistan Region Government (KRG) is located in the North part of Iraq and is generally considered to include the governorates of Erbil, Suleimani, and Duhok. There is bordered by Syria to the West, turkey to the North, and Iran to the East. Based on KRG's Ministry of Agriculture's total land figures and its estimate that in 2010, there were 153,669 farmers in the Region and the average amount of arable land per farmer is approximately 10 hectares. Many concerns confront farmers during the production cycle, among which are water utilization, soil and plant nutrient requirements, pest control, and market competition and policies, all of which interact with, and are impacted by, climatic conditions.

The sources of water in the Kurdistan Region consist of rainfall, the branches of the Tigris River, and groundwater (World Bank, 2006). The Region suffers from "underdeveloped irrigation systems" and "problems caused by variation of rainfall in rain-fed land" like weather and water data. There is also a shortage of quality feed even for livestock in the Kurdistan Region. The International Center for Agricultural Research in Dry Areas (ICARDA) has identified this shortage as the main constraint to the development of main animals like sheep and goat industry in the Region. The shortage of feed stems from poor management and conservation of rangelands (overgrazing) and the lack of proper conservation crops and techniques by farmers.

The study was conducted in the rural area of Kurdistan region (North of Iraq), during 17th of June and 15th of September, 2012. The research method used was the survey, based on questionnaire. The total number of questionnaires applies to the farmers was 236 in rural area of KRG.

Taken into consideration the precipitation zone so it can be done a clear distinguish among the three regions of Kurdistan, as shown in Fig. (1).

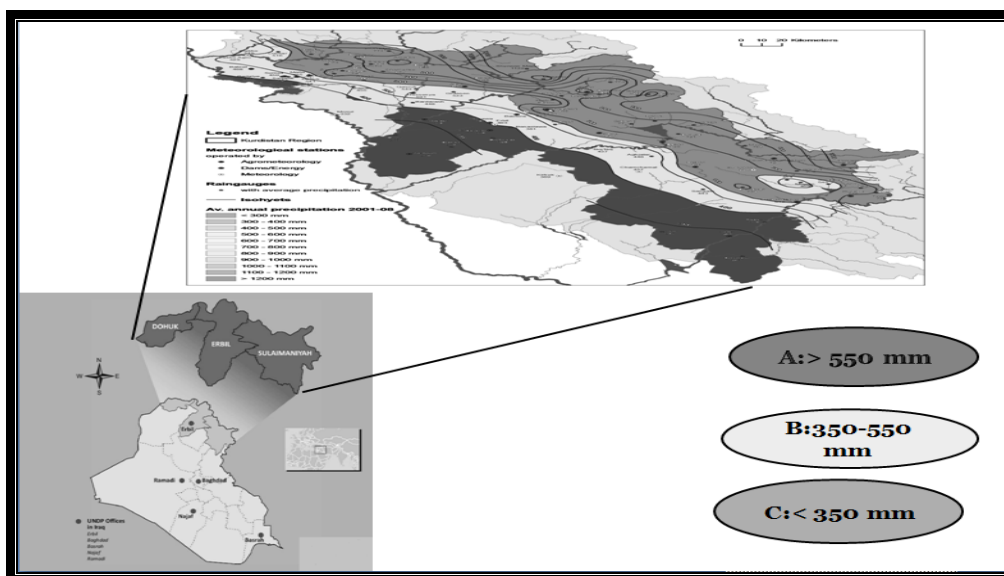


Fig. 1. Kurdistan region (North of Iraq) and classify for zones according precipitation  
Source: MOAWR, 2010

Based on the precipitation quantity the region is divided into three sub region like A, B, and C zone. The annual precipitation for (A) zone is more than 550 mm/year, for B zone is between 350-550 mm/year and for C zone is less than 350 mm/year (Ministry of Agriculture, 2007). The distribution of the sample based on the precipitation area reveals the fact that 50.00% (118 farmers from of total of 236) of the farmers are located in the A area, 27.97% (66 farmers) in C area, while around one quarter (22.03% - 52 farmers) are located in the B area. For the analysis of the data SPSS var. 20 was used.

## RESULTS AND DISCUSSIONS

The use of water for irrigation, livestock etc. it is necessary to mention that in the KRG there is no regulation regarding the water consumption for rural area and the water scarce in the area imposes to adopt a proper legislation regarding the water pricing on one hand, and the ethics principals of water consumption on the other hand.

In order to establish proper development strategies for irrigation in Kurdistan region is very important to know the main sources of water used in the farm (Fig. 2), on one hand, and to know the sources of water for irrigation on the other hand (Fig. 3).

As it can be observed in Fig. 2 the main source of water for the farmers is the precipitation (74.58%), followed by springs (32.63%), while the last use source of water is waste water (2.12%). Analysing this data at the level of the three regions it can be observed that on the first place as source of water is the precipitations (79.66% in zone A; 61.54% in zone B; 75.76% in zone C). In zone A another important sources of water mention are the springs (60.70%) and the streams (37.39%). These sources are less used in zone B and zone C, because of the decrease quantity of the precipitation and increase of the temperature.

In order to survive and practice the agriculture in can be observed that in zone B (40.38%) and zone C (34.85%) the well is more used than in zone A. From here it can be concluded that in these two zones the ground water is an important source of water for the farmers. At the same time it can be observed that in zone C quite often 36.36% is use the tanker. Zone C represents an area with more difficulties in the water supply.

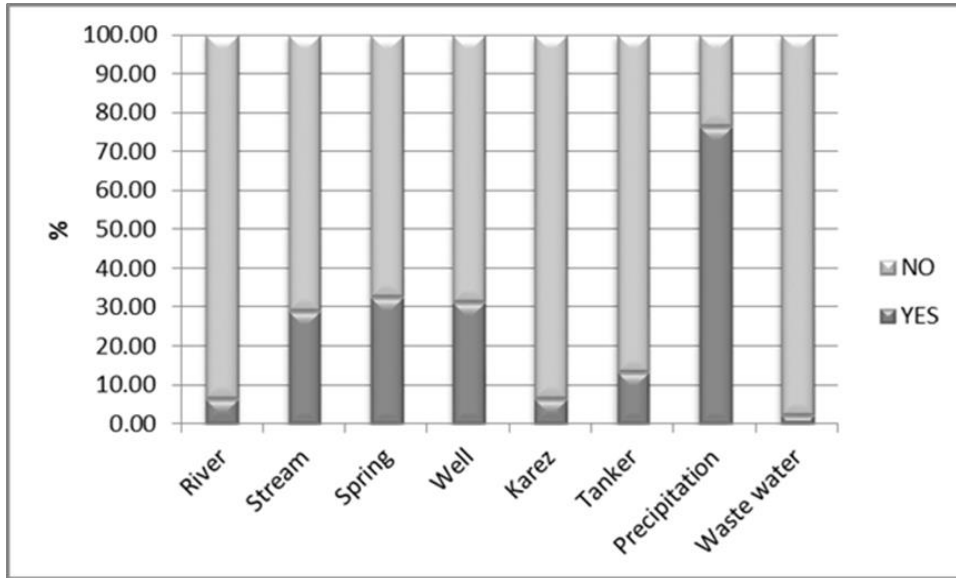


Fig.2. Distribution of the farmers based on the main source of water

To complete the image of the water problem in Kurdistan rural area, the sources of irrigation was analysed. The Fig. 3 reveals the fact that the main source of irrigation is the canal 46.19% in the total area. The situation is not the same in all three zones. For the zone B and zone C the main source of irrigation is represented by the private tube, because of climate drought periods are really appeared in both zones B and C. This phenomenon was shown for more than ten years ago, even saw for A zone. The effects of climatic drought are “buffered” in watersheds with significant groundwater storage whereas flow may be reduced to zero where the storage capacity is small or where groundwater is drained to other watersheds due to the geological situation, especially in low land plains like C zone, the range of precipitation less than 350 mm/year, (e.g. Garmian district of Suleimani, Dashty Hawler of Erbil and Batel area from Duhok).

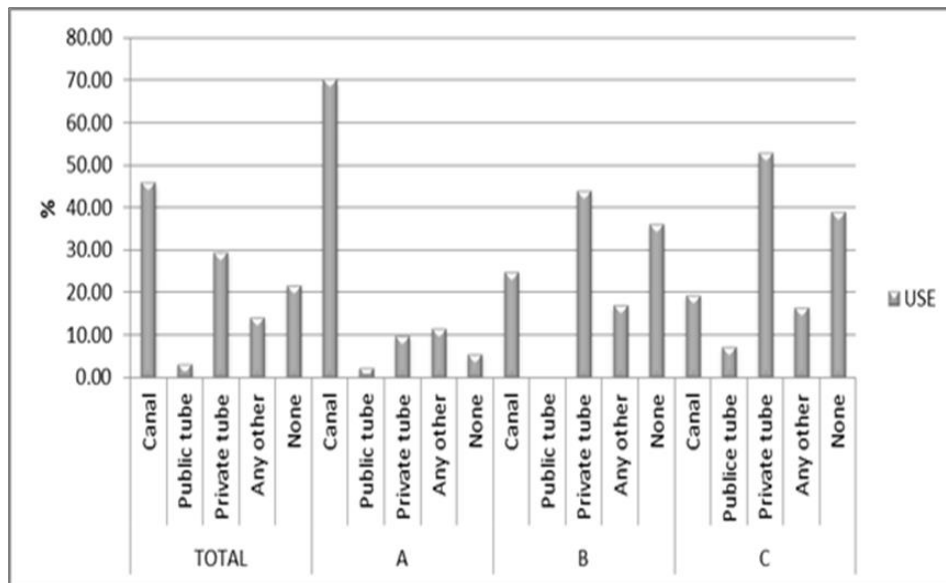


Fig.3. Distribution of irrigation sources in Kurdistan

Generally, the climate of study area is depict by warm, dry summers and cold winters and the periods of in spring and autumn are removed and very short period. In the summer maximum temperatures in the lowland areas exceed 45°C and dust storms are a common original sin. As explained above, in zone C, almost 40% is the highest percentage of farmers who use no source of irrigation for agriculture.

## CONCLUSION

Based on this, it can be stated that people from rural area have major problem regarding the water availability. Beside that irrigation is the largest abuser of water, accurately fresh water; the inescapable conclusion is that irrigation has to produce more food with less water. As conducted in the survey, more than two third of the farmer are gambling with agriculture, because of lacking of strategic policy of the water in the region also the absence of education belonging farmers to know how to abuse the water, especially ground water. The scope for further irrigation development have to meet the water needs of rural area of Kurdistan region, however, severely constrained by decreasing water resources and environmental Issues in irrigation, also need to have a strategic plan to make a modern system of irrigation network in study area to improve that who says drop per crop. While water resources are still ample, serious water shortages are developing in the arid and semi-arid regions as existing water resources reach full exploitation, but it is necessary to make a regulation regarding the water consumption for rural area, and the water scarce in the area imposes to adopt a proper legislation regarding the water pricing and the ethics principals of water consumption belongs to consumer is willing to pay for that amount of water as the value. Ultimately, to make a balance between demand and supply of water by organization and administration of water policy, give rise to decrease the bulk money when went out because of more than 90% of agricultural and animal commodities in Kurdistan are imported.

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