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Arid Season Affecting Hamun Lake in South East Iran Water, Fishing and Agriculture Crisis

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Abstract. The main crises of water resources management is climatically changes and appearance of arid season. Hamun lake is located in south east of Iran which a part of it is located in Afghanistan territory. Many rivers join the Hamun lake where their upstream generated by snow melt from top of mountains. Hamun lake constitute in low depth depression that on the basis of structural geology surrounded by many mountains. Most of people living in the areas around this lake live on the bases of agriculture and fishery. Drought caused due to arid season effects on cover crops, enhance of wind erosion, bird migration, destroy of trees and jungles, erase of useful species, decrease of agriculture products and fishery from lake. Therefore the food production reduces to a critical situation which effects the daily life of the people and their migration to more suitable areas and village population reduces day by day. In this paper the effect of draught caused by arid season in south east of Iran on food production reduction has been studied.

Keywords: Hamun lake, Draught, Agriculture, food production, Fishery

1. Introduction

Hamun watershed is one the largest catchments in Sistan and Baluchestan province consisting of three parts: Hamun Puzak, Hamun Saberi and Hamun Hirmand. Hamun Hirmand is located in Iran but Hamun Puzak and Hamun Saberi are between the border of Iran and Afghanistan. The maximum water depth in Hamun Puzak is 4m and adding to Parian common branch originated from Hirmand, it is fed by Khash seasonal river. Hamun Saberi is not a deep one and canals originating from the common Parian are the water resources of Hamun Puzak and Farah river is in its north. Hamun Hirmand is located in the west and south west of Zabol and is not as deep as other Hamuns. Most part of Hamun is in Afghanistan and the part flowing in Iran divides into some sections during dry season. The area's dominant climate is generally cold and more than %70 of the area's climate is dry and the rest %30 is semi-dry. Hamun lake is one the rich water resources in this area as it holds 2 billion cubic meter of water.This lake is such a unique environment for both fish farming and native fishes and is highly regarded as the main resource of the area's underground waters. It is an important environment for the birds migrating there from northern parts of Europe and Asia. Hamun lake embraces lots of economic resources and social benefits and it helps the residents specially the villagers make a living and is so applicable for different touring, training and researching purposes. Hamun Puzak is the seventh and Saberi Hamun and Hirmand Hammun share the tenth position among the 75 top lakes in Iran. The area of Hamun's catchment is 370/000 km^2 and is located 495 m above the sea free level. The area of Hamun lake is more than 570/000 acres in full rain period.

Fig. 1: satellite image of Hamun watershed.

2. Analyzing the Climatic Conditions of Hamun Watershed

Iran is considered as the one of the world's dry regions and scores 250mm as an average annual rain. The amount of rain in Hamun catchment is less than %20 of the whole country's average rainfall in poorly rained areas and scored %65 of the total average of rainfall in mostly rained-parts of the country. It rains the most in January as it features %24 of the whole country's annual average and %92 of the rains fall within the cold months of the year from October to May.[4] Fast winding, increasing temperature, raising amount of evaporation during other months of the year all subject into a reed and dry environment in the region. Flood and drought are the two natural events affecting Hamun catchments within the last years. Hirmand River mainly supplies the regional water resources originating from Baba Mountain in northwest of Kabul and conducting into Hamun Lake. This lake is one of the vastest sweet water ones in Iran.

3. The Effects of Recent Droughts on Hamun Lake

The recent droughts have made undesirable environmental, economical and social consequences in the part of Hamun Lake.

3.1. Environmental Effects

Droughts and its disaffects have caused undesirable consequences both in short and long terms on Hamun lake. For the last 20 year,s there have been remarkable changes in the lake's plant coverage. Straws and reeds are the main plant species of the lake covering nearly 14 to 20 acres of the surface of the lake. Today, salty grasses and tamarisks are replacing as the dominant plants. Within the past few years, most of the mammals highly depending on the water of the lake have moved away or extinct and 7 out o f the 23 species of mammals reported two decades ago are seen. Droughts have subjected into the decrease of the number of the birds meaning that 182 species of different birds were identified twenty years ago in the lake whereas just 47 of them are observed. During the past two decades, 25 kinds of birds were existing in the lake, but 5 of them survive. [2]

Fig. 2: an image of the recent droughts in Hamun lake.

Fig. 3: a picture of birds migrating from cold areas of Europe to Hamun lake.

3.2. Social and Economical Influences

Recent droughts have made agricultural, animal husbandry and fishing products decline and also caused the following problems:

- decreasing income and life quality
- increasing unemployment among villagers and those living around the lake
- raising fake jobs

Flowing sand has made pulmonary diseases and endangered the people's mental and physical health. Some troubles brought up by droughts are as below:

- decreasing the under planting fields
- immensely reducing the production efficiency
- enormously lowering the farmers' income
- growing up the cost of watering
- invading of the plant destructive insects

Losing domestic animals and losing weights of alive ones have significantly reduced their productions because drought has excessively lessened the natural grasses in this area. 118160 acres of lands of Sistan's pastures can grow different farming and gardening crops under suitable conditions and the total production was 633724 tons in 1994-95that as the result of drought, the average of crops has declined %30 in 2005.[2]

Hamun Lake contains 80 islands holding 80000 head of cows, 550000 head of sheep and 150000 head of goats and animal husbandmen used to make a living out of them. The extreme decrease of aquatics has urged 1500 families living around the lake to immigrate or leave their jobs for fake ones. They used to earn a living by governmental hunting or usual hunting before the drought. More than 1500 hunters hunted 9 to 12000 tons. Drought and reduction of water resources have decreased the natural grasses as the main source of nourishment directing into lowering the number of birds and other animals and consequently, the dramatic decrease in the income of farmers, hunters and fishermen.

Fig. 4: the consequences of drought on those living around Hamun lake and increase of fake jobs.

4. Optimized Management of Human Lake

Optimized management plays an important role in controlling and distributing water resources. If the decisions are not taken based on logic, knowledge, foresightedness and experience, they will follow up grave problems and troubles. Unfortunately, Hamun lake hasn't been effectively managed at the fully water times and shortly ones. Adding non-native fishes can reduce both the ability of native fishes'reproduction and fading the native species of fishes away. Deepening the flowing mouth of Shileh river which directs the lake water out and it has made changes in the region in richly water year of 1985. During drought, the movement of flowing sands has been stopped by building stable walls of flowing sands through tamarisk plant coverage which is very useful and has saved villages from being burried under sands, however, it ended to settling down 6 million tons of sands at the lake bed, lowering the depth, hastening evaporation at the rich water times and speeding up cooling. In addition, more water is needed to cover the mounted sands with the height of 105m at the lake bed and conclusively, more water is required to revive the lake. Therefore, wiser decisions should be taken to resist against drought and decrease undesirable effects. Since the water resources of Hamun lake are supplied by abroad, political factors are more influential than meteorological and hydrological ones. Drought is always accompanied by economical and social consequences. Synergistic management of soil and water resources beside training and culturalizing are the agents reducing the losses of this type of drought.

5. Conclusions

- Hamun watershed is considered as one of the dry areas in Iran. It also scores %92of water in cold seasons from October to May and it juggles with water shortage in hot seasons.
- Recent droughts have made undesirable environmental,economicaland social effects in Hamun lake including: withering straw plantations of the lake and replacing them by grass lands, dramatic decrease of aquatics, birds, mammals and destroying the region's wildlife.

- Droughts have damaged agricultural, animal husbandry and fishing products along with unemployment and residents' immigration.Flowing sands have caused pulmonary and eye diseases. More over, many of the fields have been burried by sand storm.

- Continual and foresighted management can perform effective role to control and decline the losses made by drought in the area. Giving an exact consideration to building the appropriate and right water reserviors can be influential to reduce the damages occurred by drought in Hamun catchment.

Fig. 5: the image of Hamun lake at full water condition.

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