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Assessment of Watershed Management Performance on Flooding Status in Sivand Dam, Fars Province

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Abstract

In Iran, in spite of five decades of implementation of watershed and soil conservation plans, a quantitative and qualitative assessment method has not been provided to investigate these measures.. The Aim of This research was assessment the performance of projects (management, biological and structural) on runoff and water resources in Khorrambid watershed in Fars province. Using SCS method and regional analysis of runoff volume for different sub-basins were extracted after watershed operation. The results showed that the watershed projects led to an increase in the variables such as the time of concentration and the length of the main river, and a decrease of 41 and 72 percent in annual flood volumes in sub basins A and C respectively. Also, if there is 24-hour rainfall, due to the increase in the use of rangeland lands (from poor to good condition) and the construction of watershed management structures, flooding in the region has decreased.

1-Introduction

Floods have historically been the most common, deadliest and most expensive hazards among natural hazards. The risk of flooding has increased over time, especially since countries have allowed changes in the land uses and land coves in floodplains and plains. In Iran, like the

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other flood-prone areas of the world, the severity of floods and the extent of their damages have increased dramatically in recent decades. Land use and vegetation play an important role in the production of runoff due to its effect on infiltration, erosion, evapotranspiration and transpiration.

2-Methodology

Khorrambid watershed having an area of 88.7 km is a part of the Sivand Dam watershed. The average rainfall of this basin is 228 mm and it has a semi-arid climate in the view of Domarten. Khorrambid metropolitan basin consists of 12 smaller sub-basins in the study area with three main waterways named A, B and C that cross the city upstream of Khorrambid and pass through the city. In this study, the design, purpose, and efficiency amount of the flood and runoff output amount have been evaluated and finalized from the hydrographic network. The set of Management, Biological and Structural works carried out in the Khorrambid urban basin of the Sivand Dam Branches include: management excavation, piling, seeding, Dry working forage, Dry Stone Structures, rock and PVC mesh, rock and earth dams. Detailed studies and implementation of Khorrambid urban watershed was carried out in 1999 and the implementation of watershed management projects started in 2002 and by the end of 2010 about 33 %of the projects were implemented in the study phase. At the same time, the evaluation process regarding the effect of these projects on flood and runoff control took place. This study aimed to evaluate the performance of projects (management, biological and structural) on the runoff and water resources in Khorrambid watershed in Fars province. In this study, first, the height of the dams, the length of the reservoir and the slope of the canals were measured under the basins where structural projects were carried out to determine the route of the new water movement. Then the new concentration time was calculated using the Branse-Williams method. In the next step, soil cover layer data such as the percentage of canopy cover, hydrological groups and vegetation status were obtained to determine the number of curves and maximum holding and infiltration

potential in the soil. Then using SCS method and Hyfa software, modeling the flood volume and outflow runoff for sub-basin were estimated.

3- Results and Discussion

By analyzing the results of statistical analysis of changes it can be said that there were many changes in all land use and land cover as well as the implementation of structural and biomechanical projects in the studied area. To investigate the effect of land use and structural changes on the hydrological regime of the studied basin, SCS method was utilized. This model was formulated using GIS techniques. The results showed that due to the increase in rangeland land use (from poor to good condition) and the construction of watershed structures, flooding in the area has decreased in case there were 24-hour rainfall. This amount of runoff reduction in the basin A and C was 41 %and 72%, respectively.

4- Conclusions

It is suggested that by evaluating the projects, if the performance of these projects could be evaluated in appropriate ways and from various technical and engineering aspects, the results would lead to finding the causes of the proposed operation failure and presenting appropriate solutions to address them. On the one hand, this could improve the quality of implementation of watershed management activities, on the other hand, it would increase operational efficiency, and the learnt lessons would enhance future plans. On the other hand, it is recommended that since watersheds are in fact considered as a natural-human system as well as a planning and work unit, comprehensive management of these watersheds is essential for achieving sustainable development goals. Watershed management is a complex process whose practical goals should be in line with the promotion of stakeholders` interests and stakeholders` engagement at all levels of planning and decision making. Integrated Watershed Management requires a flexible process that taking into account the challenges and constraints of the

Watershed System, makes good use of its opportunities and potential conditions to ensure the social and economic well-being of its stakeholders while maintaining the security of water, food and environment in order to meet its goals of sustainable development.

Keywords: Watershed management projects, Assessment, Flooding, Time of concentration, Sivand Dam, Fars Province

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