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Integrated Water Resource Management of Panjshir River Basin

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ABSTRACT
In recent years, integrated water resource management has attracted the attention of policymakers and experts in the water sector. This method, which is very effective, faces many challenges in developing countries such as Afghanistan. The following research is based on the field method, which has been used for information from books, journals, and reliable scientific sites, and to collect basic information from a questionnaire that has been interviewed with 103 residents of Panjshir province, as well as from the analyzed data. The National Water Resources Authority has also been used. The findings of the research show that in the Panjshir river basin, only a foundation has been laid in the form of policies, strategies, and laws, but there are deficiencies in the fields of regular institutional framework and tools needed to perform tasks in this river basin. One of the departments of integrated water resource management has not been formed, and there are still few hydrological and hydro meteorological stations in this field. On the other hand, according to the respondents to the questionnaire, the role of women as a huge group of society in decision-making is also weak. Therefore, we conclude that the effectiveness of applying the principles of integrated water resource management in the Panjshir river basin is low due to the above reasons.

Keywords: Integrated Water Resource Management, River Basin, Water Scarcity, Panjshir

INTRODUCTION
Water as the basic element of life and the common facet of the challenges of sustainable development is one of the biggest challenges of this century, which can be the source of many positive and negative changes in the world. The importance and role of this life-giving substance in the lives of humans, animals, and plants. On the one hand, secure access to it, which is a primary and basic condition for social, economic development and the sustainability of culture and civilization, on the other hand, forces us to change our attitude about water, because sustainable social and economic development requires attention to development and management. It is the infrastructure of each country's water resources (Nab, 2014). The system of regulation and management of water resources in the world has been exposed to fundamental changes, and today the world has come to the conclusion that it is not possible to meet the increasing needs of mankind in order to access safe water only through water supply. Besides, he paid a lot of attention to another point of view based on the improvement of water supply and demand management (Mahmodi, 2016). This new perspective, which considers the improvement of water supply and demand management, is integrated water resource management. Fortunately, this new perspective is currently attracting the attention of policymakers and planners in the regulation and administration departments in order to address the increasing needs of the people. The water sources of our country are located here (Mahmodi, 2016).

The main purpose of this research is to evaluate the applicability of the principles and rules of all-round management of water resources in the Panjshir river basin, to analyze the situation of this basin based on the SWOT analysis model, according to its management and governance structures in the Panjshir river basin, and to consider social, economic, and environmental issues, as well as the position of stakeholders, to introduce the main components that should be considered in this type of management. The importance of this research is that it is field-based, because this research, taking into account the current situation regarding water in terms of quantity and quality, has provided solutions to overcome the problems that exist in this direction, and an attempt has been made to prove the basic hypotheses. It is scientific for rightful activities that can reduce the negative effects of our destructive activities and better use of water resources that we have in this area. This research can also raise the level of awareness of people and institutions that work in this direction. They believe that it has a

valuable role and can be material for those who want to conduct research in other fields and pave the way for them to integrate their activities and step more purposefully in this field. According to the analysis of figures and observation of the studied area, we conclude that the Panjshir river, which is considered one of the permanent streams of the country, is of vital importance for the residents of this place and the Kabul river basin. Because most of the residents of this area are engaged in agriculture, livestock, and gardening, on the one hand, the population of this area is increasing unprecedentedly, which increases the need for water in all areas of life in this area several times. The data, on the other hand, based on the analysis of the figures obtained from the analysis of Tangi Golbahar, shows that this area has been exposed to the increasing effects of climate change, as a result of which the temperature has gradually increased and the amount of rainfall has also decreased.

MATERIALS AND METHODS

In the present research, in the first part of the collection of information on the theoretical foundations of the subject and research records using the library method, the required information was collected from Panshir province, which was collected from the field several times during the research period. It has been observed that the stream of panjshir river water flow, water speed, water discharge and face-to-face interviews with the residents of this province have been conducted, which are used to collect information from quantitative (data and figures) and qualitative (library, journals and Internet) and descriptive (data and figures analysis) have been used, SPSS25 software was used for data analysis and Excel software was used for drawing graphs and tables, also for face-to-face interviews with the residents of Panjshir Province, a comprehensive questionnaire containing 22 questions (the first part of demographics, the second part of two-choice questions, and the third part of four-choice questions) were used, and a total of 103 questionnaires were administered to the residents of Panjshir province, which constitutes the statistical population of the research, in a simple random. Distributed to determine the number of interviewees from the formula (sample size calculator) whose confidence level is 95 percent and confidence interval is 10; used.

RESULTS

Based on the information recorded by the Tangi Golbahar station, the water flow regime in this area can be examined in two time periods: from 1960–1980. In this period, the highest amount of water flow was in 1960, which was 2536 million cubic meters per year, and the lowest amount of flow was in 1977, which was 1070 million cubic meters per year. While the average amount of water flow in this time period (1960–1980) reached 1673 million cubic meters, from 2008–2017, the highest amount of water flow was in 2015, which was 1814.6 million cubic meters, and the lowest amount was in 2008. It was the year 2008 when its amount reached 1086.7 million cubic meters, while the average amount of flow in this time period (2008–2017) reached 1499 million cubic meters. From the analysis of the above information, we conclude that from 1960 to the latest information obtained in 2017, it is clear that the average amount of flow in the first period (1960–1980) was 1673 million cubic meters, and in the second period (2008–2017), it reaches 1499 million cubic meters. This shows a huge difference of 154 million cubic meters, which shows the vulnerability of this area to the effects of climate change while the population graph in this area continues to rise.

From the table below, it can be concluded that the total amount of annual rainfall from 2010–2017 is drastically decreasing. The figures obtained from Umarz station show that the total amount of annual rainfall in 2010 was 396 mm, and in 2017, it has decreased to 288 mm, which shows the vulnerability of Panjshir river anemone to climate change because one of the consequences of climate change is the change in the season and place of rainfall. These consequences can lead to unpleasant consequences in the long run, such as reducing water resources, increasing floods, and finally droughts.

Table 1. Total yearly precipitation in (mm) per year based on data recorded by Omerz Station

Years	2010	2011	2012	2013	2014	2015	2016	2017
Total yearly precipitation	396	278	288	271	386	350	359	288

Therefore, in order to better manage the water resources of the Panjshir river basin, it is recommended to implement the rules and principles of Integrated water resources management, which is a global method, to create a river basin council, to involve stakeholders in decision-making, especially women, and to create

hydrological and hydro meteorological stations in this The field and increasing the level of knowledge of water sector employees in the field can help in better water management.

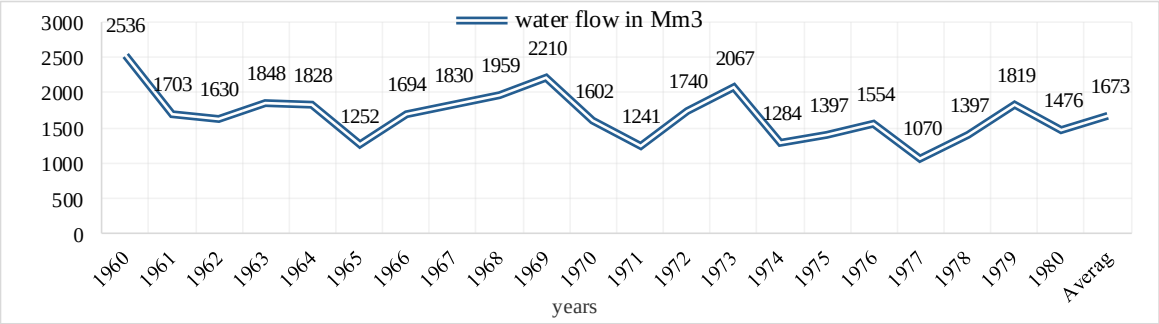

Figure 1: shows water flow in Mm3 based on data recoded by Tangi Gulbahar Station during 1960 - 1980

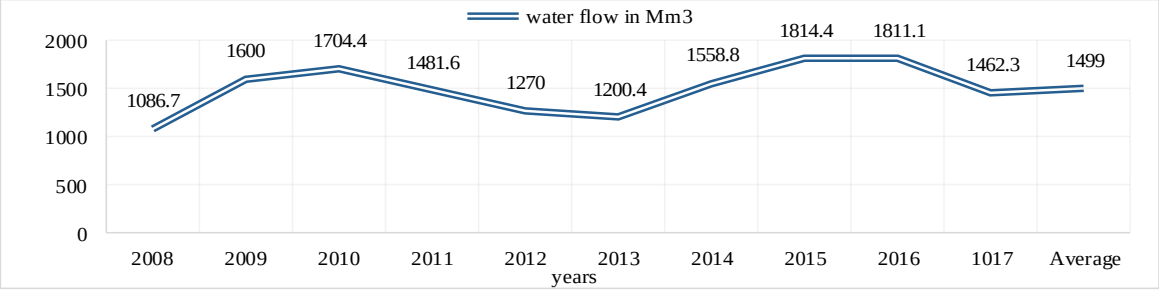

Figure 2: shows water flow in Mm3 based on data recoded by Tangi Gulbahar Station during 2008 - 2017

DISCUSSION

The method of integrated water resource management, capacity development, is considered an important component because the integrated management of water resources is a new method, while the number of people working in this field is limited and the participation of all stakeholders is small due to low understanding. In this sense, for success, integrated water resource management requires the participation of stakeholders at all levels, which can be done by motivating them to ensure that integrated water resource management can proceed without government interference. According to the above, it can be said that water security is provided as a result of the implementation of integrated water resource management, which connects economic dynamism with social and environmental stability (Global Water Partnership, 2014).

The implementation of the reform guidelines for the integrated management of major water resources has remained on paper; the implementation of this management method, which has many benefits, is progressing very slowly, while the organizational structure recommended by the water law in none of the river basin has not been completed, and community-based organizations such as water user associations and irrigation associations have only been completed in a limited number of river basins. The failure in implementation is mainly due to a lack of coordination, limited financial resources, and security conditions (Ahmadzai, 2017).

CONCLUSION

The water of the Panjshir river basin is of great value and importance. If these resources are developed and managed in a sustainable manner and are exploited and used properly, without any doubt, the watersheds of the country will witness positive changes and developments in the economic, social, and environmental fields.
For this reason, in order to make reasonable use of water resources and water energy in this area, the process of integrated water resource management, which is one of the most effective processes according to global experiences and has good effectiveness for the development of water resources and proper management of the Panjshir watershed, has been selected and is now under implementation.

Failure to establish and strengthen the maritime domain council to strengthen the collaborative method between the stakeholders in integrated water resource management resulted in a lack of standard figures and information. Still, the lack of capacity (capacity building) for all stakeholders and the weak role of women in decision-making are among the issues that stand against integrated water resource management in this area, and

there is a need for water resources management departments and institutions, including the government, and people pay a lot of attention to it.

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