



Prioritizing Barriers to People's Participation in Soil and Water Conservation Projects (A Case Study: Eastern Iran)

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Abstract

Identifying and prioritizing barriers to people's participation (PPBs) in is a prerequisite for implementing participatory soil and water conservation projects (SWCPs). Comparison evaluation of the local community and experts perspectives on the PPBs has rarely been investigated. Therefore, in the current study the level of agreement on the PPBs importance from the perspectives two groups were examined. For this purpose, Dastgerd, Asadli and Emarat watersheds, eastern Iran, with different socio-economic conditions were selected. In the current study the 13 important PPBs in implementation of SWCPs were identifying, which can be used as a model in future studies of other watersheds. Then the indicators were prioritized using Friedman Test. Finally, the two-sample Kolmogorov–Smirnov Test was also used to examine the agreement of the two views on the importance of the items. The results of PPBs prioritization based on 215 local people and 51 expert's viewpoints showed that lake of participatory guidelines, expert oriented decision-making process and lack of incentives economic in implementation of SWCPs are the most important PPBs. The results of two-samples Kolmogorov-Smirnov test show that the opinions of people and experts regarding the importance and role of 65% PPBs have a significant difference. The disagreement between the opinions of the two groups is a barrier to achieving the goals of participatory SWCPs. Also, removing barriers related to economic-executive factors has a high effect on increasing the level of participation and encouraging voluntary participate in SWCPs.

Keywords: Collaborative watershed management, Integrated watershed management, Participatory decision-making, Planning indicators.

1. Introduction

The need for the people participation in the management of natural resources is widely recognized and its implementation is considered as an indicator of sustainable development (Buono et al., 2012). In this regard, the shift in development thinking over the last decades represents a significant change from the technology-oriented approach to a more people-oriented approach in natural resource management (Bagherian et al., 2009).

Therefore, sustainable watershed management must evolve from traditional and expert-oriented policy making to the collaborative management through participation of all stakeholders in decision

making (Enquist et al., 2017; Fatemi et al., 2021; Roba Gamu et al., 2022).

Considering the opinions of local communities in in different stages of the SWCPs (design, implementation and maintenance) has many benefits (such as Supports democratic processes, Use the intellectual, executive and indigenous knowledge potentials, effective implementation, cost reduction and etc.).

Many researchers have identified and introduced the factors influencing the participation of local residents in SWCPs from different aspects (Faham et al., 2008; Bagdi and Kurothe, 2014; Davudirad et al., 2021; Noor et al., 2022; Roba Gamu et al., 2022).

In this regard, some previous studies (Agidew and Singh, 2018; Powlen and Jones, 2019; Roba Gamo et al., 2022) predicted the level of participation of local residents in SWCPs using regression methods. Also, Mohammadi Golrang et al., (2017), Noor et al., (2018), identified the factors affecting the beneficiaries' participation level in SWCPs, using factor analysis (FA).

Also, the effective factors on the level of people's participation in the WMPs were identified using correlation analysis (Cullen et al., 2020). Finally, Mosaffaie et al., (2020); Davudirad et al., (2021) prioritize of factors preventing participation of local residents in SWCPs using statistical methods (such as Friedman test) and multi-criteria decision-making methods (AHP).

Literature review shows that in addition to various research methods, several indicators have been considered by researchers as people's participation barriers (PPBs). Overall, these studies showed that indicators related to demographics and planning can have a role of barrier or incentive-stimulator on people's participation in SWCPs. In these researches, low literacy and awareness (Welu and Solomon, 2015), gender of residents (Faham et al., 2008), low income of local residents (Joshi et al., 2008), lack of financial benefits for rural residents (Was et al., 2021), ignoring people's opinions (Webler and Tuler, 2001), lack of people's trust in government organizations (Mosaffaie et al., 2020; Davudirad et al., 2021), lack of people's trust in project results (Powlen and Jones, 2019) and inadequacy extension and educational (Was et al., 2021) were investigated as the most PPBs.

An in-depth literature review shows that in these researches, important factors affecting the participation of all stakeholders have been studied, however, the results of these researches are based on one of the two perspective of local people (Bagherian et al., 2009, Mohamadi Golrang et al., 2017; Powlen and Jones, 2019; Noor et al., 2022; Roba Gamo et al., 2022; Von Hagen et al., 2023) or experts (Salehpour Jam et al., 2021; Mosaffaie et al., 2021). Therefore, it can be concluded that the simultaneous comparative evaluation local community and experts perspectives about PPBs in implementation SWCPs has rarely been studied.

In recent decades, natural resources in Iran have been severely degraded. Accordingly, the average of soil erosion and sediment yield in Iran are about 15 and 7 t ha⁻¹ in a year. Also, about 90 million ha of Iran are susceptible to flash floods. This rate of soil erosion indicates the need for SWCPs in Iran's watersheds (Noor et al., 2016, Sadeghi and Hazbavi, 2022). In this regard, Natural Resources and Watershed Management Organization (NRWMO) as responsible for water and soil conservation in Iran, several strategies have been established for integrated SWCPs during the past decades (Salehpour Jam et al., 2021).

One of the main challenges of NRWMO in Iran is to improve the level of participation of people in SWCPs (Bagherian, 2009; Noor et al., 2018). In this regard, it is necessary to identify and specify incentives and barriers to participation of watershed resident in SWCPs.

Literature review showed that comparison evaluation of local community and experts perspectives on PPBs on SWCPs implementation has rarely been studied.

It should be noted that expert opinion is an important influence on decision makers in proposing participatory SWCPs. Therefore, their wrong point of view can cause undesirable outputs in participatory SWCPs planning. Also, centralized decision-making by experts and the lack of convergence between these two views can barriers the achievement of participatory projects. This issue is important in regions where people's participation in SWCPs is low (such as Iran).

Therefore, it can be expected from the results of this research that leads to identify the perspectives of two different groups and, facilitate the convergence of local people and experts and group decision making in the future participatory SWCPs. The current study aimed to identifying and prioritizing the barriers to local communities' participation in SWCPs in the Dastgerd, Emarat and Asadli watersheds, eastern Iran. Also, in this study, the level of agreement on the PPBs importance from the perspectives of people and experts were examined.

2. Material and Methods

2.1. Study Areas

This research was carried out in three watersheds, Asadli, Dastgerd and Earat,

located in North Khorasan, South Khorasan and Razavi Khorasan provinces in eastern Iran. These watersheds had problems in terms of floods and accelerated soil erosion. Therefore, during the past years, various SWCPs such as check dams, terraces, rangeland improvement and contour furrow have been carried out in them. Table 1 shows some characteristics of the studied watersheds.

2. 2. Methods

This study aimed to identifying and prioritizing the PPBs in SWCPs based on

experts' and local people's perspectives. Also, the level of agreement on the PPBs importance from the perspectives two groups were examined. Figure 1 shows the study flowchart.

Table 1. Some Characteristics of the Asadli, Dastgerd and Emarat watersheds

Watershed	Area (ha)	Average of Rainfall (mm)	Number of households
Asadli	4920	322	77
Dastgerd	11732	170	123
Earat	6129	375	285

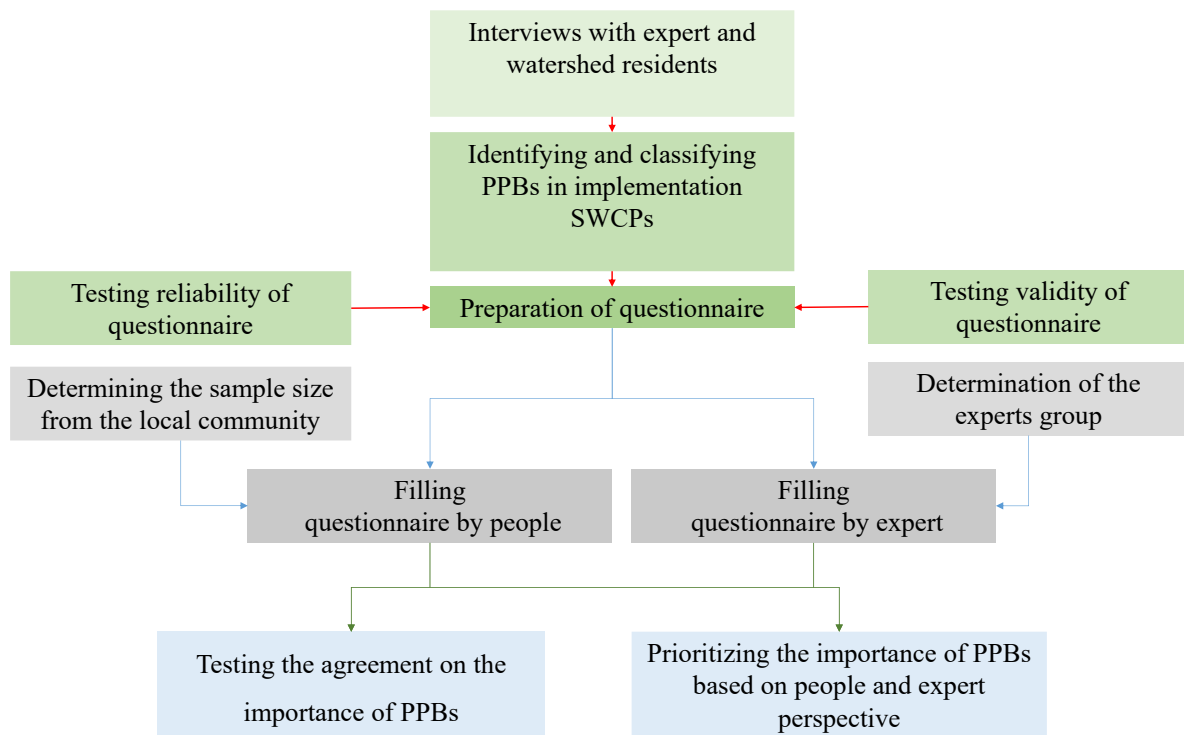


Fig. 1. The study flowchart

2. 2. 1. Identifying PPBs

As stated before, it is necessary to analysis the role of demographic and other indicators (such as executive, educational and economic indicators) in the participation of local communities in SWCPs (Faham et al., 2008; Gebretsadik and Debara, 2017; Powlen and Jones, 2019). In this research, after literature review, and residents and experts interviews (Bagherian, 2013; Agidew andSingh, 2018; Mosaffaie et al., 2021; Noor et al., 2022), 14 indicators were selected and then classified into 4 groups (see table 2) as the most important factors can constrain participation of people in SWCPs.

Therefore, in this study, in addition to demographic component (i.e. social-economic

items), there are also items related to planning indicators (i.e. educational, economic, executive). The indicators identified and classified in this research can be used as a model in future studies of other watersheds.

After identifying the barriers to the participation of watershed residents in SWCPs, they can be ranked based on the viewpoint of people and experts in study watersheds. The following steps have been taken to prioritize PPBs.

2. 2. 2. Preparation of questionnaire

In order to prioritize people's participation barriers in SWCPs, a questionnaire with a Likert scale was used as measuring tool (Mosaffaie et al., 2021). Then, the reliability

and validity of the questionnaires were examined using Cronbach's alpha test and by experts group, respectively. Cronbach's alpha has been used to measure the reliability of the questionnaire in many studies (Georg and Mallery, 2010; Bagherian et al., 2009, Mohamadi Golrang, 2017; Powlen and Jones, 2019; Eslami and Noor, 2022).

Table 2. Classification of PPBs in SWCPs

indicator (main- indicator)	Item	Symbol
Economic (Demographic)	Low income of the rural household	X1
Economic (Planning)	Ignoring people's benefit from the project	X2
Economic (Planning)	Late projects profitability	X3
Social (Demographic)	local and Ethnic disputes	X4
Social (Demographic)	Lack of people's trust in government organizations	X5
Social (Demographic)	Lack of people's trust in project results	X6
Social (Demographic)	Lake of indigenous knowledge	X7
Executive (Planning)	Centralizing power of decision-making at the NRW	X8
Executive (Planning)	Lack of people consultation and attention to their suggestions	X9
Executive (Planning)	Lack of employing local labour in project implementation	X10
Executive (Planning)	Lack of specific laws in the field of supporting people's participation	X11
Educational (Planning)	Lack of training rural residents regarding the project goals	X12
Educational (Planning)	Lack of indigenous facilitators and promoters	X13

The value of Cronbach's alpha was calculated using SPSS software. Generally, Cronbach's alpha coefficient value of more than 0.7 indicates that the questionnaire has acceptable reliability and internal consistency (George and Mallery, 2010).

Before prioritizing PPBs, the sample size should be calculated. In this research, the sample unit is a rural household and Cochran's formula (Equation 2) was used for determining the local community sample size (Shil et al., 2022).

According to the household population in three watersheds and Cochran's formula, the sample size was determined to be 266 people (head of the household). Of these, 87, 53, and

126 people were interviewed (and questionnaires completed) in Dastgerd, Asdali, and Emarat watersheds, respectively. This number was determined according to the ratio of the population of each watershed to the total population.

In order to get the opinion of experts, a group of 45 experts with at least 10 years of experience in government organizations related to NRWMO of South, North and Razavi Khorasan Provinces, was formed. Expert group include different parts of watershed studies and engineering, soil conservation, forestry and afforestation, rangeland and desertification, flood control and extension departments.

2. 2. 3. Prioritizing the importance of PPBs

In this research, Friedman's test (a two-way variance analysis test), which is a non-parametric test, was used to test the difference in the PPBs items priority at a significance level of 5%. Friedman test is most common methods for prioritizing items in Likert scale (Safdari et. al., 2018; Karimi Sangchini et al., 2022). In this test, H0: no significant difference between the PPBs priorities and H1: significant difference between the PPBs priorities. In this research, the ranking of PPBs was done using Friedman test in SPSS software package.

2. 2. 4. Testing the level of disagreement about PPBs priority

Two-sample Kolmogorov-Smirnov test (two-sample KS test) was used to test of significant difference between different perspectives on the priority of PPBs. two-sample KS test evaluate the distance between the empirical distribution functions derived from 2 different samples of data (Lanzante, 2021; Moustakis et al., 2022).

Since this method is non-parametric, it makes no assumptions about the distribution of the samples (Lanzante, 2021). In two-sample KS test if accepted H0, mean that two data series follow a same distribution.

3. Results and Discussion

Cronbach's alpha was 0.785 and 0.757 for experts and local people, respectively (Table 3).

According to previous research (George and Mallery, 2010; Bagherian, 2013, Mosaffaie and Salehpour Jam, 2021), Cronbach's alpha higher than 0. 7 indicates the acceptable reliability and internal consistency of the research tool (i.e. questionnaire). In the following, the questionnaires filled by the expert and people, were analyzed using the Friedman test. Table 4 shows the results of

experts' and people perspective on the priority and importance of PPBs.

Table 3. Results of Cronbach's alpha to test the reliability of the questionnaire

Questionnaire	Number of items	Cronbach's alpha	Reliability
Experts	13	0. 785	Acceptable
Local community		0. 757	Acceptable

Table 4. The results of experts' and people perspective on the prioritization of PPBs.

Symbol	Item	Local community		Experts	
		Mean rank	Asymp. Sig.	Mean rank	Asymp. Sig.
X1	Low income of the rural household	5. 42	0	8. 36	0
X2	Ignoring people's benefit from the SWCPs	9. 97		4. 74	
X3	Late SWCPs profitability	4. 14		4. 28	
X4	local and Ethnic disputes	2. 26		3. 86	
X5	Lack of people's trust in government organizations	4. 09		2. 86	
X6	Lack of people's trust in SWCPs results	8. 76		7. 06	
X7	Lake of indigenous knowledge	4. 02		8. 32	
X8	Centralizing power of decision-making at the NRWM	9. 28		9. 66	
X9	Lack of people consultation and attention to their suggestions	9. 40		5. 96	
X10	Lack of employing local labor in project implementation	8. 46		9. 52	
X11	Lack of specific laws in the field of supporting people's participation	9. 34		10. 08	
X12	Lack of training rural residents regarding the SWCPs goals	8. 62		8. 28	
X13	Lack of indigenous facilitators and promoters	7. 26		8. 02	

The results of ranking the indicators indicate the difference in their role on participation of local resident in SWCPs. In other words, results show a significant difference (at the 5% level) in the PPBs importance. Also, based on material and method section, the KS test was used for testing the difference of the importance of PPBs from the people and experts perspective (Table 5).

Based on perspectives of local communities, "Ignoring people's benefit from the SWCPs" is the most priority of PPBs in the SWCPs implementation. In line with this finding, Bagherian et al., (2009), Rai and Hamraz (2014), Salehpour Jam et al., (2021) and Noor et al., 2018, state that the effectiveness of SWCPs on the economic benefits of local residents is insignificant in Iran. Therefore, it was expected that based on people view points, an economic factor was chosen as an important PPBs in SWCPs (in this research the most important).

Experts believe that the implementation of SWCPs has economic benefits for the people. While SWCPs have an indirect effect and late profitability on people's economic benefits (Davudirad et al., 2021). Also, in Iran, there are

several legal barriers to use the benefits of SWCPs. For example, used of pastures, biological projects and water stored in small dams are restricted and prohibited (Salehpour Jam et al., 2021). In this case, the SWCPs do not create an economic incentive for the local people, and they are not as a stimulus to promote voluntary participation. In this way, Bagherian et al (2009) introduced that people have certain beliefs about what a program should provide to them as a participant in exchange for their efforts. In other words, people who have more economic benefits from the previous programs are more likely to participate in new projects.

Therefore, it is necessary to pay special attention to multi-purpose SWCPs that will create economic benefits for the people in the short term. On the other hand, it is suggested to remove legal barriers or provide new laws, in order for people to use the benefits of the SWCPs (Salehpour Jam et al., 2021; Davudirad et al., 2021).

Also, detailed review of table 4 showed that from the point of view of the people, the next three important indicators in people's non-participation in SWCPs, are related to the executive indicator, which includes "lack of

specific laws in the field of supporting people's participation", "centralizing power of decision-making at the NRW" and "lack of people consultation and attention to their suggestions" respectively. This result shows that in addition to economic factors, current approaches in the watershed studies and the implementation of SWCPs in Iran also are as barrier to people's participation (Noor et al., 2018).

Meanwhile, the factors of "lack of specific laws in the field of supporting people's participation" and "centralizing power of decision-making at the NRW" as executive

factors were among the barriers that two groups pointed to their importance in people's participation. These results indicate it is that both groups are of the opinion that the decisions about the projects are made in the government headquarters and the local communities are not involved in decisions making, which causes the lack of participation of the residents in the various stages of the projects. Also, In Iran, there is no law or even a guideline for the participation of all available stakeholders in the decision making, design and implementation of SWCPs (Eslami and Noor, 2022).

Table 5. Results of testing the agreement on the importance of PPBs

Symbols	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
Most Extreme Differences	0.522	0.66	0.08	0.13	0.367	0.19	0.388	0.15	0.809	0.487	0.15	0.18	0.18
Asymp. Sig. (2-tailed)	0	0	0.633	0.235	0	0.012	0	0.128	0	0	0.125	0.019	0.015

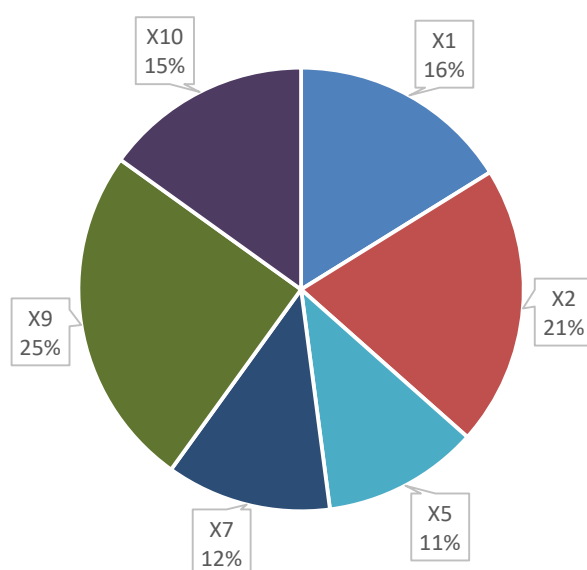


Fig. 2. PPBs with significant differences between perspective of local community and experts (label: symbols of items; relative frequency percentage)¹

The results of Table 5 show that the opinions of people and experts regarding the importance and role of some PPBs have a significant difference (at a significance level of 1%). However, there is a great difference between the perspective of expert and people about the importance "lack of people consultation and attention to their suggestions" factor. According to experts view point, X9 is ranked 9 while the people ranked it as the third

the most important PPBs. Although both groups agree on the importance of "centralizing power of decision-making at the NRW" (X8) factor as barrier to people participation, however, experts do not believe in the role of public consultation and use of their opinions in promoting voluntary participation of local residents in SWCPs. To understand the reason for this contradiction, the opinions of experts should be carefully

study. Detailed review of the experts' opinions shows that they consider the people to lack indigenous knowledge (rank 5) and therefore do not consider it necessary to consult with them. In confirmation of this finding, experts' opinions shows that the "lack of employing local labour in project implementation" factor is more important than the "lack of people consultation and attention to their suggestions" item. Therefore, expert believe that the people do not have enough knowledge and consequently do not consult with the people. In other word, according to expert perspective "centralizing power of decision-making at the NRW" as most important PPBs, but on the other hand they believe that decision-making and policy-making should only be done by experts (Not based on participatory decision making) and people should only implement their plans as labor force.

Contrary to the expert's perspective, the findings of Roba Gamo et al (2022) highlighted the importance of demonstrating the positive impacts of community development interventions as early in the program as possible to ensure more and continued participation in relevant development projects. Also, Bagharian et al., (2017) state that people have a great desire to participate in the pre-implementation decision-making phase of SWCPs, and if people are not present in the initial planning and decision-making, they will definitely not be willing to participate on implementation and maintenance of SWCPs.

Also, based on the opinion of experts and people, educational-extension variables including (X12) and (X13) are not placed in the first 6 priorities which are among the indicators of medium importance. Previous researchers have declared educational-extension activity to be effective in improving people's attitude towards project goals and subsequently increasing their participation in SWCPs. (Mohamadi Golrang, 2017; Agidew and Singh, 2018). The current findings, does not indicate the lack of importance of these indicators, because their mere identification shows an effective PPBs. However, the results show that they are less important than the executive indicators in study watersheds.

There has been a growing consensus in the literature that expert-driven approaches cannot

be solved environment problems (Simpson et al., 2020). Therefore, to converge the views points of local people and experts through a participatory approach is necessary, for problem-solving, decision-making and implementation of SWCPs. Simpson et al., (2017) states in the necessity of a collaborative approach that a public or private actor alone does not have enough expertise to solve watershed issues. Therefore, collaborative approach is suitable way to integration of different (and sometimes conflicting) points of view (Von der Porten et al., 2016).

A fundamental part of collaborate management is to involve all available stakeholders who have an interest in SWCPs to incorporate locals and experts knowledge during processes of problem solving. (Simpson andde Loë, 2020). Boossabong et al. (2017), Simpson et al. (2020), Vasileiou et al. (2022) state that the disagreement between knowledge of different stakeholder is a common and important issue. In this regard, creating think tanks and brainstorming plays an important role in reducing mutual understanding and converging the views of local people and experts and making decisions to solve problems (Boossabong, 2017; Eslami and Noor, 2022).

The participatory approach in the SWCPs has led to the improvement of the local people's attitude towards watershed management, and also led to the convergence of the local people's and experts' viewpoints. Finally, the adoption of the participatory approach has led to the removal of social-demographic, executive and educational-extension barriers and led to increase participation level of the local community in SWCPs (Mosaffaie et al., 2020).

In this regard, it is important to develop and use local facilitator groups. These groups are among the most trusted people in the village and can play the role of native promoters for the local resident. In addition, local facilitation groups and non-governmental organizations, on the one hand, make people aware of the goals of the projects, and on the other hand, they can help to formulate and modify participation watershed management guidelines (Noor et al., 2022).

Finally, in the country with low people participation, it is necessary to change the

approach from non-participatory to participatory by amending the laws, guidelines and directives of watershed management and ultimately increase the level of people's participation in SWCPs.

4. Conclusion

The current research was designed with the aim of finding answers to the following questions.

-What are the most important PPBs in SWCPs according to people and experts?

-Also, do people and experts agree on the importance of PPBs in SWCPs?

In this research, after literature review and interviewing experts and people, PPBs in SWCPs were identified. After that, the PPBs were prioritized from the point of view of people and experts. In general, it can be said that based on the most opinions of the residents of study watersheds, they no participated in the SWCPs because: These projects have no economic benefit for them and decisions about SWCPs have been made in government offices and without consulting them. Also, from the point of view of the experts and people, most of the executive indicators were given the first priority in the lack of people's participation in the SWCPs. Therefore, it can be concluded that in the studied watersheds, according to the opinion of both groups, the main PPBs are related to economic-executive indicators.

At the time of project design, one should pay attention to the economic factor related to the planning component. Because they can be considered as barriers or incentives for people participation. The late SWCPs profitability and the legal barriers on using their benefits are an important PPBs. On the other hand, however, considering the economic issues in the projects and removing the mentioned economic barriers at the time of design will improve the income of rural households and will act as a stimulus for participation.

The factors related to the executive indicator also refer to changing the centralized decision making and top-down approach to the collaborative management approach and consulting with all stakeholders in identifying the problem, problem solutions, and implementing the SWCPs. Therefore, removing these barriers leads to voluntary

participation of people in watershed management projects.

The results show that the opinions of people and experts regarding the importance and role of some PPBs have a significant difference (at a significance level of 1%). The difference of opinion between the two groups is very important regarding the role of barriers X2 and X9 in people's participation in SWCPs. Because these factors are important and effective from the perspective of the people (who barriers to their participation in projects should be identified and removed), while experts consider these indicators to be less important than other indicators.

A fundamental part of collaborate management is to involve all available stakeholders who have an interest in SWCPs to incorporate locals and experts knowledge during processes of problem solving. Therefore, to converge the views points of local people and experts through a participatory approach is necessary, for problem-solving, decision-making and implementation of SWCPs. opinions of people and experts regarding the importance and role of 65% PPBs have a significant difference. Finally, the following practical suggestions are provided:

To remove the economic barriers related to the planning (X2), multi-purpose projects that have short-term profitably (or combined with long-term profitably) should be used. Also, if there are legal barriers to use the benefits of these plans, they must be removed before the project is implemented and also the relevant regulations should be developed. In this regard, creating think tanks and brainstorming plays an important role in reducing mutual understanding and converging the views of local people and experts and making decisions to solve problems.

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6. Conflict of Interest

No potential conflict of interest was reported by the authors.

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