



## Social impacts of dam construction on stakeholders: A case study of Alborz Dam, Iran

Mohammad Komeili<sup>1</sup>, and Jahedeh Tekyekhah<sup>2</sup>

<sup>1</sup>Institute for Humanities and Social Studies, Tehran, Iran

<sup>2</sup>University of Science and Culture, Tehran, Iran

### ARTICLE INFO ABSTRACT

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**\*Corresponding author:**

J. Tekyekhah

 [j.tekyekhah@usc.ac.ir](mailto:j.tekyekhah@usc.ac.ir)

This study explores the social impacts of the Alborz reservoir dam on local communities, particularly focusing on residents living upstream and downstream of the dam. The research emphasizes the role of social capital, communication networks, and local participation in shaping the outcomes of dam construction. Using a qualitative approach and purposive sampling, data were collected through in-depth interviews with 346 individuals, including local officials, knowledgeable informants, and ordinary residents. The data were analyzed through a three-stage coding process, open, axial, and selective coding, and social capital was quantitatively assessed using numerical averaging methods. Findings reveal that residents downstream of the dam experienced predominantly positive impacts, such as increased social trust, enhanced local interactions, and greater social participation. In contrast, upstream residents, particularly those in 18 affected villages, faced significant negative consequences, including a decline in social capital, loss of social networks, and decreased participation in community activities. Additionally, the study highlights the very limited involvement of stakeholders in decision-making processes related to the dam, with their views largely disregarded. The research recommends strategies aimed at mitigating adverse social effects and fostering greater community engagement to promote sustainable and equitable water resource management.

**Highlights**

- Study examines Alborz Dam's social effects on upstream/downstream communities.
- Downstream saw positive impacts: greater trust, interaction, and participation.
- Upstream residents in 18 villages faced reduced capital and community involvement.
- Stakeholder participation in decisions was minimal; their views were ignored.
- Recommends strategies to lessen negative effects and boost community engagement.



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**1. Introduction**

Water, as the fundamental source of life, plays a crucial role in human survival and the development of civilizations. With population growth, climate change, and rising demand, sustainable water resource management has become one of the most pressing challenges of the current century. Beyond its vital importance, water is recognized as a socio-economic factor and a key determinant in achieving sustainable development (Ren et al., 2021; Scanlon et al., 2023; Jain and Singh, 2023). Developed countries have implemented large-scale water infrastructure projects, including dam construction, to strengthen their development foundations.

Dams, as long-lasting structures, offer significant economic benefits but also carry various social, cultural, and environmental consequences (Bhatti et al., 2019; Lucas-Borja et al., 2021). Socially, the displacement of local communities and the alteration of traditional living patterns affect cultural relations and collective identity (Abdullah and Rahman, 2021). Moreover, environmental impacts of dams—such as the destruction of natural habitats, reduction in water quality, extinction of plant and animal species, and disruption of natural river cycles—have raised serious concerns for regional ecosystems (Scanlon et al., 2023).

In Iran, dam development has primarily aimed at securing water supply and fostering economic growth; however, its social, cultural, and environmental impacts have received comparatively less attention. The Alborz reservoir dam, as one of the country's major water projects, has generated significant concerns for local communities and the surrounding environment alongside its positive effects. Studies have shown that overlooking these consequences can result in dissatisfaction, forced migration, weakening of social capital, and environmental degradation (Malek Hosayni et al., 2017; Bárcenas-García et al., 2022). Given the importance of this issue, the present study seeks to identify and evaluate the social and cultural impacts of the Alborz dam on local residents and to propose strategies for mitigating its negative effects.

Bhatti et al. (2019), in their study on the Nagarparkar dam in Sindh, Pakistan, applied a descriptive-statistical approach using data collected from 250 individuals through interviews, focus groups, and questionnaires. Their findings indicated that dam construction can induce positive changes in economic and social indicators. Specifically, access to water improved, and the average cultivated area expanded by 26%, although this increase may intensify water consumption, necessitating stricter water resource management. Agricultural yields grew by an average of 55% over two growing seasons, with cropping patterns shifting toward higher-value, market-oriented products. Additionally, migration rates declined, incomes rose, and groundwater levels and water quality improved. Ahmadvand et al. (2023) assessed the social impacts of the Evshan dam on surrounding villages in Lorestan Province through a survey involving 90 households. Their results demonstrated an overall positive social effect,

particularly in reducing conflicts and disputes (correlation coefficient = -0.318). The analysis also revealed varying levels of dam impacts across different villages. Besides broad social consequences such as population displacement and changes in local social structures, dam construction causes significant environmental disturbances, including hydrological alterations, biodiversity loss, habitat degradation, and changes in water quality. These environmental effects can, in turn, lead to secondary social consequences, underscoring the need for an integrated and comprehensive approach in dam impact assessments.

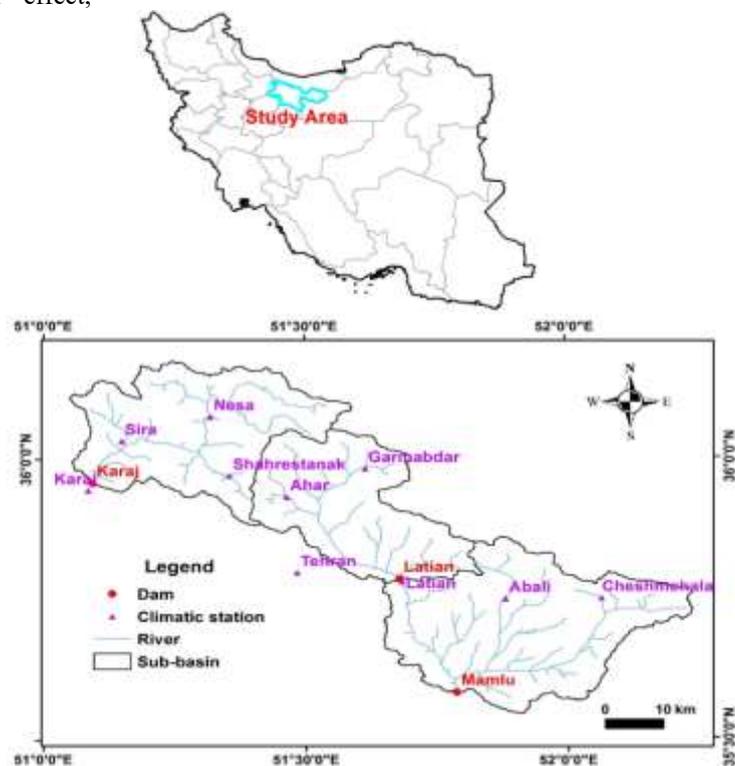
This study aims to investigate the social impacts of the Alborz reservoir dam on local communities living upstream and downstream, focusing on the roles of social capital, communication networks, and local participation. Using a qualitative approach, the research collects data through in-depth interviews and analyzes differences in social outcomes between upstream and downstream residents. It also addresses the limited stakeholder involvement in decision-making and suggests strategies to mitigate negative social effects while promoting inclusive and sustainable water resource management

## 2. Materials and Methods

### 2.1 Study Area

The Alborz reservoir dam is located on the Babol River at the confluence of the Gazo and Karsang (Chakhani) tributaries. It is situated approximately 45 km southeast of Babol city, 50 km southwest of Qaemshahr, and 269 km northeast of Tehran, Iran. Its geographical coordinates are 36°14'N latitude and 52°48'E longitude (Fig. 1).

**Fig. 1** Geographical location of Kurdistan province, Iran



## 2.2 Research Design

This study adopts a qualitative research design aimed at systematically identifying and analyzing the social impacts associated with the Alborz reservoir dam.

### 2.2.1 Population and Sampling

The study encompasses two distinct demographic cohorts: upstream households located proximate to the reservoir

(including villages such as Shalizar, Garmab, and Dizmar), among which approximately ten villages have undergone partial or complete depopulation due to forced migration; and downstream households encompassing villages like Zarchal, Klarstaq, Kandelous, as well as the urban centers of Chalus and Nowshahr. A purposive sampling framework was employed, applying inclusion criteria such as a minimum age of 25 years, literacy, and direct experiential knowledge or awareness of the dam construction project. The final sample consisted of 346 participants, including 266 individuals from downstream settlements (comprising 53 local administrative officials and the remainder as residents and key informants) and 80 individuals from upstream communities (including 24 officials and other residents and informants).

### 2.2.2 Data Collection Tools

Data were collected through in-depth, semi-structured interviews with local officials, experts, and residents. The interview questions were designed based on previous scholarly studies, focusing on social consequences of dam construction such as forced displacement, dissatisfaction, disconnection from native lands, and changes in social capital.

### 2.2.3 Measured Variables

The study assessed multiple constructs indicative of social capital and community participation, including: interpersonal trust levels; prevalence of dishonesty and fraudulent behaviors; mutual financial lending practices; trust in local governance councils; confidence in law enforcement agencies; trust in governmental officials; frequency and quality of interactions with neighbors and kinship networks; reciprocity in times of hardship; shared emotional and ideological bonds; membership status in cooperatives, civic organizations, and paramilitary Basij units; degree of engagement in neighborhood governance; perceived influence on dam-related decision-making processes; actual participation in policy deliberations; and levels of trust in mass media sources including radio, television, and satellite broadcasts.

### 2.2.4 Data Analysis

Quantitative data were subjected to inferential statistical analysis employing independent samples t-tests and Pearson correlation coefficients within SPSS software to delineate variations in perceived dam impacts across upstream and downstream populations. Qualitative data underwent systematic thematic coding following the grounded theory approach, encompassing open, axial, and selective coding stages. Interviewees from local institutional bodies represented stakeholders such as the Mazandaran Regional Water Authority, Environmental Protection Agency, and related government entities. To quantify social capital indices, a numerical averaging method was applied: each variable was rated on a Likert-type scale ranging from 1 (no presence) to 4 (high presence), with mean scores computed independently for upstream and downstream groups to facilitate comparative analysis.

## 3. Results and Discussion

### 3.1 Rural Residents' Perceptions

A synthesis and comparison of upstream and downstream villagers' opinions revealed that among the 15 measured

variables, downstream residents evaluated 11 variables as having positive impacts and 4 as negative. Conversely, upstream villagers identified 14 variables as negatively impacted and only one with a positive effect. These differences indicate a marked disparity between the positive and negative social effects of dam construction on upstream and downstream communities. The classification of impacts as positive or negative was based on economic, social, and environmental indicators related to the quality of life in the local populations. The results demonstrated that downstream villages benefited from the project's advantages such as improved water access and infrastructure and experienced predominantly positive effects, whereas upstream communities, affected by forced migration and loss of agricultural lands, were subject to largely negative outcomes.

#### 3.1.1 Downstream villagers

The research findings showed that the majority of the sampled population downstream of the Alborz dam perceived the dam's effects as largely positive. Among 266 respondents, 15.8% acknowledged negative effects from the dam's construction, while 84.2% considered the benefits to outweigh the drawbacks. These findings generally align with studies by Malek Hosseini et al. (2017), who highlighted the positive social impacts of dams, including improved livelihoods, increased life expectancy, enhanced social cohesion, infrastructure development, regional sustainability, flood damage prevention, creation of new landscapes, and establishment of local institutions. A review of the literature indicates that dams constructed in Iran have exerted substantial positive effects, including increased access to dam water downstream (Yaghoubi Farani et al., 2016), formation of local organizations post-construction (Malek Hosseini and Mirakzadeh, 2015), and an enhanced role for local communities in water utilization (Ritchie et al., 2021; Malek Hosseini and Mirakzadeh, 2016; Gebreyes et al., 2020). These outcomes clearly demonstrate the positive influence of dams on improving socio-economic conditions in various regions of Iran, consistent with the present study's results. However, it should be noted that assessing dam impacts solely from the perspective of downstream communities does not provide a comprehensive picture. This research, alongside similar studies, indicates that although some downstream populations have gained benefits, the overall appraisal of dam projects in Iran tends to be negative when considering the serious damages inflicted upon upstream communities—such as forced migration, loss of farmland, weakening of social capital, and rising dissatisfaction. Therefore, comprehensive evaluation and responsible policy-making in dam construction require simultaneous consideration of all stakeholder groups and their often conflicting outcomes to prevent extensive social harm and widespread discontent.

#### 3.1.2 Upstream Villagers

These households were categorized into two types of villages: the first comprised those whose lands and properties had been purchased by the government due to dam construction and whose villages were partially submerged, forcing them to relocate to cities such as Qaemshahr, Shirgah, Savadkuh, and other areas. The second group included villages where portions of land were submerged, but the residential areas remained

intact, and residents continued to live there, albeit in proximity to the dam. Respondents were asked whether the construction of the Alborz dam had more positive or negative effects on themselves and their families. Results from Table 1 show that an overwhelming majority of upstream respondents (88.8%), unlike their downstream counterparts, believed the dam’s effects on them were predominantly negative. From their perspective, adverse consequences included loss of villages, farmlands, and agricultural income, job losses, and a shift from producers to consumers, all of which contributed significantly to deteriorating their socio-economic conditions.

Furthermore, through detailed coding and analysis of interviews and open-ended survey responses, residents of 18 upstream villages extensively described both positive and negative impacts of the Alborz dam. Among the negative effects, social isolation, the erosion of local traditions, and damage to economic, social, and cultural life were identified as the most critical detriments to the livelihoods of upstream villagers. These findings are consistent with those of Sayektiningsih and Hayati (2021). Weak engagement between project implementers and upstream residents during dam construction led to deep mistrust. Moreover, the negative

effects varied among social groups within the area, with female-headed households, entirely dependent on agriculture and livestock, identified as the most vulnerable segment. This characterization was based on indicators such as income levels, educational attainment, access to alternative employment opportunities, and availability of social support. Due to their strong reliance on agricultural lands and lack of alternative resources, this subgroup suffered the greatest harm and also exhibited the most resistance against dam construction. This highlights the severe economic and social hardships uniquely experienced by this demographic.

### 3.2 Social Impacts of the Alborz Dam among Villagers

The study’s findings demonstrate a significant decline in social capital and its related indicators during and after the dam’s construction process in upstream villages. Analysis of questionnaire data shows that 88.8% of the upstream communities believed dam construction resulted in predominantly negative outcomes. Conversely, only 3.8% acknowledged notable positive impacts, while 7.5% rated the positive and negative effects as balanced. Table 1 illustrates the status of social capital components among upstream rural respondents before and after the construction of the Alborz dam.

**Table 1** The Status of Social Capital Components among Respondents from the Upstream Villages of the Dam

no	Social Capital Factors	Before Dam Construction (in Previous Village)%				After Dam Construction (in New Location)%			
		High	Somewhat	Low	Not at all	High	Somewhat	Low	Not at all
1	Level of Trust in People	97.5		2.5			23.8	58.8	15
2	Level of Lying and Fraud	6.2	5	47.5	41.3	54.5	33.8	7.8	3.9
3	Lending Money to Each Other	72.5	22.5	5			3.8	68.8	27.5
4	Trust in Local Council	66.7	30.8		2.6	2.7	17.8	63	16.4
5	Trust in Law Enforcement	54.5	37.7	3.9	3.9	19.5	40.3	27.3	13
6	Trust in Government Officials	53.8	32.5	13.8		3.9	32.5	36.4	27.3
7	Interaction with Neighbors and Relatives	88.5	11.5			23.8	63.8	12.5	
8	Helping Each Other in Difficulties	95	5			37.5	56.3	6.3	
9	Shared Feelings and Beliefs with People	71.3	26.3	2.5		6.3	41.3	35	17.5
10	Membership in Cooperatives, Organizations, etc.	35	51.3	11.3	2.5	15	25	20	40
11	Membership in Basij (Volunteer Forces)	44.4	25	15.3	15.3	15.8	28.9	31.6	23.7
12	Level of Activity in Neighborhood Affairs	66.2	29.9	3.9		12.9	30	40	17.1
13	Level of Influence of Your Opinions on the Dam		3.9	24.7	71.4				
14	Level of Participation in Decision-Making for the Dam	3.9	3.9	14.3	77.9				
15	Level of Trust in Radio and Television News	27.5	55	7.5	10	20	35	27.5	17.5
16	Level of Trust in Satellite News	6.3	71.3	6.3	7.5	13.8	57.5	16	

In contrast to upstream communities, the findings of this study indicate a significant enhancement of social capital in

downstream villages following the construction of the Alborz dam (Table 2).

Table 2 The Status of Social Capital Components among Respondents from the Downstream Villages of the Dam

no	Social Capital Factors	Before Dam Construction (in the Previous Village) %				After the Dam Construction (in New Location)%			
		High	Somewhat	Low	Not at all	High	Somewhat	Low	Not at all
		1	Level of Trust in People	15	60	20	5	75	20
2	Level of Lying and Fraud	5	30	45	20	12.50	25	42.50	20
3	Lending Money to Each Other	20	45	25	10	80	15	3.80	1.20
4	Trust in Local Council	25	50	15	10	82.50	12.50	3.80	1.20
5	Trust in Law Enforcement	30	45	15	10	85	10	3.80	1.20
6	Trust in Government Officials	20	50	20	10	75	15	7.50	2.50
7	Interaction with Neighbors and Relatives	35	50	10	5	90	7.50	2.50	0
8	Helping Each Other in Difficulties	45	40	10	5	92.50	5	2.50	0
9	Shared Feelings and Beliefs with People	50	35	10	5	95	3.80	1.20	0
10	Membership in Cooperatives, Organizations, etc.	25	40	25	10	60	30	7.50	2.50
11	Membership in Basij (Volunteer Forces)	15	35	30	20	30	40	20	10
12	Level of Activity in Neighborhood Affairs	20	40	25	15	65	25	7.50	2.50
13	Level of Influence of Your Opinions on the Dam	10	30	40	20	70	20	7.50	2.50
14	Level of Participation in Decision-Making for the Dam	5	15	40	40	50	30	15	5
15	Level of Trust in Radio and Television News	10	30	40	20	80	15	3.80	1.20
16	Level of Trust in Satellite News	10	30	40	20	20	35	30	15

Table 3 Overall Social Capital Index

No	Social Capital Factors	Upstream Villages of the Dam		Downstream Villages of the Dam	
		Average Before Dam	Average After Dam	Average Before Dam	Average After Dam
		1	Level of Trust in People	3.95	2.91
2	Level of Lying and Fraud	1.76	3.39	2.2	2.3
3	Lending Money to Each Other	3.68	2.65	2.75	3.74
4	Trust in Local Council	3.64	1.93	3	3.77
5	Trust in Law Enforcement	3.43	2.66	3.05	3.79
6	Trust in Government Officials	3.4	2.13	2.8	3.63
7	Interaction with Neighbors and Relatives	3.89	3.11	3.15	3.88
8	Helping Each Other in Difficulties	3.95	3.31	3.25	3.9
9	Shared Feelings and Beliefs with People	3.69	2.36	3.3	3.94
10	Membership in Cooperatives, Organizations, etc.	3.19	2.15	2.85	3.48
11	Membership in Basij (Volunteer Forces)	3.09	2.37	2.45	2.9
12	Level of Activity in Neighborhood Affairs	3.62	2.39	2.7	3.53
13	Level of Influence of Your Opinions on the Dam	1.33	-	2.3	3.58
14	Level of Participation in Decision-Making for the Dam	1.34	-	1.85	3.25
15	Level of Trust in Radio and Television News	3	2.58	2.3	3.74
16	Level of Trust in Satellite News	2.84	2.98	2.3	2.5
	Total	3.19	2.59	2.69	3.5

The results presented in Table 3 indicate that the overall social capital index in upstream communities declined from 3.19 to 2.59, reflecting an 18.8% decrease. The most pronounced reductions were observed in trust towards local institutions (47%) and government officials (37%). Conversely, downstream villages experienced a 30.1% increase in social capital, with their average index rising from 2.69 to 3.50. Significant improvements were recorded in public participation (a 56% increase), trust in law enforcement agencies (24%), and mutual aid (20%). These findings highlight the differential impacts of large-scale infrastructure projects on local communities; while upstream populations faced considerable social challenges, downstream communities benefited from the project. The results underscore the imperative for more nuanced planning aimed at mitigating the adverse social effects of such developments.

These findings are consistent with those of similar studies conducted in other regions examining the social impacts of large-scale water projects. According to Arthur et al. (2020), involuntary displacement and alterations in livelihood patterns have been among the primary factors contributing to the decline of social capital in upstream communities, whereas improved access to water resources and enhanced economic conditions have played a crucial role in strengthening social capital in downstream populations.

#### 4. Conclusion

This study examined the social impacts of the Alborz reservoir dam on upstream and downstream local communities. The results revealed that, although downstream communities have benefited economically and socially from the dam to some extent, upstream communities have experienced significant social harm due to forced displacement and the loss of agricultural lands. The main findings of the study are as follows:

1. Social capital in upstream communities significantly declined following the construction of the Alborz dam. Forced displacement, weakening of social networks, and diminished trust in local and governmental institutions led to the erosion of upstream social structures.
2. In downstream communities, social capital markedly increased after the dam's construction. Improved access to water resources, enhanced social interactions, and greater trust in local and government bodies contributed to better social and economic conditions downstream.
3. Local participation and public awareness in the dam's decision-making processes were notably weak. The views and needs of local communities were often overlooked, resulting in dissatisfaction and poor engagement between project implementers and residents.
4. Female-headed households upstream suffered the most severe economic and social impacts

#### Statements and Declarations

##### Data availability

The data used in this research are provided in the text of the article.

#### Conflicts of interest

The author of this paper declared no conflict of interest regarding the authorship or publication of this paper.

#### Author contribution

M. Kamili: Initial investigations and draft writing; J. Takieh-Tekiekhah: Final manuscript preparation, revision, and editing.

#### AI Use Declaration

During the preparation of this manuscript, the authors utilized ChatGPT for language translation. All content has been thoroughly reviewed and revised by the authors, who take full responsibility for the final version of the manuscript.

#### References

- Abdullah, A. N., & Rahman, S. (2021). Social impacts of a mega-dam project as perceived by local, resettled and displaced communities: a case study of Merowe Dam, Sudan. *Economies*, *9*(4), 140. <https://doi.org/10.3390/economies9040140>
- Ahmadvand, M., Karami, A. and pirdadeh beyranvand, K. (2023). Assessing the Social-Economic Impacts of Dam Construction on Surrounding Villages (Case Study: Eyvashan Dam, Khorramabad County). *Journal of Rural Research*, *14*(2), 362-379. doi: 10.22059/jrur.2023.92924
- Arthur, J. L., Murray, G., Rollins, R., Dearden, P., & Stahl, A. (2020). Differential impacts of dam construction on livelihoods in Ghana. *African Geographical Review*, *39*(3), 267-281. <https://doi.org/10.1080/19376812.2020.1719367>
- Bárcenas-García, A., Michalski, F., Morgan, W. H., Smith, R. K., Sutherland, W. J., Gibbs, J. P., & Norris, D. (2022). Impacts of dams on freshwater turtles: a global review to identify conservation solutions. *Tropical Conservation Science*, *15*, 19400829221103709. <https://doi.org/10.1177/19400829221103709>
- Bhatti, N. B., Siyal, A. A., Qureshi, A. L., & Bhatti, I. A. (2019). Socioeconomic impact assessment of small dams based on t-paired sample test using SPSS software. *Civil Engineering Journal*, *5*(1), 153-164. <https://doi.org/10.28991/cej-2019-03091233>
- Gebreyes, M., Bazzana, D., Simonetto, A., Müller-Mahn, D., Zaitchik, B., Gilioli, G., & Simane, B. (2020). Local perceptions of water-energy-food security: livelihood consequences of dam construction in Ethiopia. *Sustainability*, *12*(6), 2161. <https://doi.org/10.3390/su12062161>
- Jain, S. K., & Singh, V. P. (2023). *Water resources systems planning and management*. Elsevier.
- Li, J., Liao, L., & Dai, X. (2022). Economic and Agricultural Impacts of Building a Dam—Evidence from Natural Experience of the Three-Gorge Dam. *Agriculture*, *12*(9), 1372. <https://doi.org/10.3390/agriculture12091372>
- Lucas-Borja, M. E., Piton, G., Yu, Y., Castillo, C., & Zema, D. A. (2021). Check dams worldwide: Objectives, functions, effectiveness and undesired effects. *Catena*,

- 204, 105390. Existing research and future opportunities. *Frontiers in Water*, 3, 651954. <https://doi.org/10.1016/j.catena.2021.105390>
- Malek Hosayni, A., Mirakzadeh, A. A., & Lioutas, E. (2017). The social impacts of dams on rural areas: a case study of Solaiman Shah Dam, Kermanshah, Iran. *Sustainable Rural Development*, 1(2), 189-198. <https://doi.org/10.29252/jsrd.01.02.189>
- Malekhoseini, A., & Mirakzadeh, A. A. (2014). Assessment of social impacts of Sonquire's Soleimanshah dam on the regions that are under influence of irrigation and drainage network of dam. *Journal of Rural Research*, 5(3), 589-610. (In Persian)
- Ren, X., Zhao, Y., Hao, D., Sun, Y., Chen, S., & Gholinia, F. (2021). Predicting optimal hydropower generation with help optimal management of water resources by Developed Wildebeest Herd Optimization (DWHO). *Energy Reports*, 7, 968-980. <https://doi.org/10.1016/j.egy.2021.02.007>.
- Ritchie, H., Eisma, J. A., & Parker, A. (2021). Sand dams as a potential solution to rural water security in drylands: Sayektiningsih, T., & Hayati, N. (2021, October). Potential impacts of dam construction on environment, society and economy based on community perceptions. In *IOP Conference Series: Earth and Environmental Science* (Vol. 874, No. 1, p. 012013). IOP Publishing. <https://doi.org/10.1088/1755-1315/874/1/012013>
- Scanlon, B. R., Fakhreddine, S., Rateb, A., de Graaf, I., Famiglietti, J., Gleeson, T., & Zheng, C. (2023). Global water resources and the role of groundwater in a resilient water future. *Nature Reviews Earth & Environment*, 4(2), 87-101. <https://doi.org/10.1038/s43017-023-00418-9>
- Yaghoubi Farani, A., Izadi, N., & Ataie, P. (2016). Assessment of ecological and social impact of Fadami Dam construction on agricultural development of the area. *Geography and Development*, 14(43), 91-112. <https://doi.org/10.22111/gdij.2016.2480>
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