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The Status of the Principles of Land Ethics in Monitoring the Eco-Hydrological Effects of Civil Projects

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Abstract

The main source of environmental challenges relates to the moral thinking of humans towards the earth. Therefore, the present study aims to investigate the role of the principles of the theory of land ethics in monitoring the environmental impacts of civil projects. The present study is a field study. The research community includes all human communities, water resources and ecosystems (vegetation, animals, etc.) within the boundaries of the Ghomroud tunnel project site. The data was collected using a field observations method and a series of field visits of site design (geological survey in the city of Aligoudarz). Data analysis has been done with the help of descriptive statistics that have been interpreted in terms of land's theory of ethics. The results of the studies indicate that the Ghomroud tunnel excavation operations, to changed the hydrology regime (the reduction dubai of springs and wells), migrating villagers , Weakening of agriculture and the local economy network, Impact on the habitat of plant-animal species, the impact on the region's image (the potential of the geotourism industry) led. Hydrogeological regime change in the region and social consequences, was related by geological conditions during excavation (existence of crushed zones, folding, slope of layers, lithological changes, etc.) in site design (geological zone of Sanandaj, Sirjan). Other implications of the project are also indirectly related to the geological conditions of the region. According to the results, it can be said that thinking of preventive measures to control the environmental consequences of such a project depends directly on the way of thinking and ethical planning of planners (relative to the environment). Developing the scope of geological studies at the stage of site exploration of these projects can be used as the first major policy (within the framework of the theory of land ethics) to control the risks and to adapt the project to the environment. In this regard, a compensatory plan (use the pumping station and construction of three dams on the Gheshlagh, Darsefid, Anoj rivers) has been proposed to compensate for the loss of water resources in the rural areas of Aligudarz (due to the excavation of tunnels).

Keywords: *Land Ethics, Eco-Hydrological, Sanandaj Sirjan Zone.*

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Extended Abstract:

1. Introduction

The main source of environmental challenges relates to the moral thinking of humans towards the earth. Therefore, the present study aims to investigate the role of the principles of the theory of land ethics in monitoring the environmental impacts of civil projects.

2. Materials and methods

The present study is a field study. The research community includes all human communities, water resources and ecosystems (vegetation, animals, etc.) within the boundaries of the Ghomroud tunnel project site. The data was collected using a field observations method and a series of field visits of site design (geological survey in the city of Aligoudarz). Data analysis has been done with the help of descriptive statistics that have been interpreted in terms of land's theory of ethics.

3. Results

The results of the studies indicate that the Ghomroud tunnel excavation operations, to changed the hydrology regime, the reduction dubai of springs and wells (Fig. 1), migrating villagers , Weakening of agriculture and the local economy network, Impact on the habitat of plant-animal species, the impact on the region's image (the potential of the geotourism industry) led. Hydrogeological regime change in the region and social consequences, was related by geological conditions during excavation (existence of crushed zones, folding, slope of layers, lithological changes, etc.) in site design (geological zone of Sanandaj, Sirjan). Other implications of the project are also indirectly related to the geological conditions of the region (Table 1).

4. Conclusion

According to the results, it can be said that thinking of preventive measures to control the environmental consequences of such a project depends directly on the way of thinking and ethical planning of planners (relative to the environment). Developing the scope of geological studies at the stage of site exploration of these projects can be used as the first major policy (within the framework of the theory of land ethics) to control the risks and to adapt the project to the environment.In order to compensate for the undesirable consequences of the project (reduction of groundwater resources in the villages), a proposed scheme (based on the idea of using the emergency pumping station of Ghomroud tunnel) for the purpose of exploitation of other water sources in Aligoudarz (Darsefid, Gheshlagh, and Anoj rivers) Provided. Based on this plan, in the future, with the allocation of funds, dams (dams of Darsefid, Gheshlagh, Deh Jani) will be constructed on rivers around the pumping station (outside the rivers basins of the Ghomroud project). Preliminary geological studies of reservoir dams and distribution of water resources have been carried out. Using the emergency pumping station and transmission lines, the water reservoir of these dams will be used to irrigate damaged areas in the tunnel route. The scheme is presented in Fig. 2.

Table 1 . Geological survey results at the construction site of Ghomroud water transfer tunnels.

No.	Eco-Hydrological and environmental consequences	Role of geology
1	Changing the hydrology regime of the area during excavation of tunnels: leading to a drop in the groundwater level,reduction of groundwater resource (wells, springs, subterranean canals) and reducing water Is superficial.	Direct Effect
2	Dehydration of a significant part of agricultural land and gardens: reducing crop and livestock production (weakening the local economic network).	Indirect Effect
3	The migration of villagers to the city of Aligoudarz and its social consequences (rising unemployment, false occupations, etc.).	Indirect Effect
4	Damage to habitats associated with surface water: threatening ecological balance of plants and animals in the region.	Indirect Effect
5	Changing the regime of the rivers of Sarab Sardab, Dareh Leko, Dareh Dozdan, Dareh Daei in the downstream of the rivers deviation structures adjacent to the water transfer tunnels: After the phase of water exploitation and transfer of rivers, despite the allocation of water rights for the lower areas of tunnels, the hydrological equilibrium and marginal lands of the rivers in these areas have been affected by the decrease of the base flow.	Indirect Effect
6	The weakening of the potential of the geotourism and ecotourism industry: due to the effects of the Project on the natural landscape of the region.	Indirect Effect
7	Damage to rangelands: changing the region's image and soil erosion.	Indirect Effect
8	Damage to the vegetation of the region during the construction of tunnels and rivers deviation structures (especially through the establishment of communication routes, roads and other side activities): At the time of implementation of the plan, due to the large volume of activities (excavation, Cementing materials depot, etc.), the dust caused by the operation and passing of vehicles caused the wilt of the plants, the destruction of soil texture and the negative effects on the habitat of some species in the project area.	Indirect Effect
9	Entry sewage flow of tunnels and rivers deviation structures in surface water: causing pollution and increasing the turbidity of rivers in the region and damage to aquatic and fish species.	Indirect Effect
10	Noise pollution of operations in the area (especially during the excavation of traditional tunnels) and its adverse effects on the distribution of animal species.	Indirect Effect

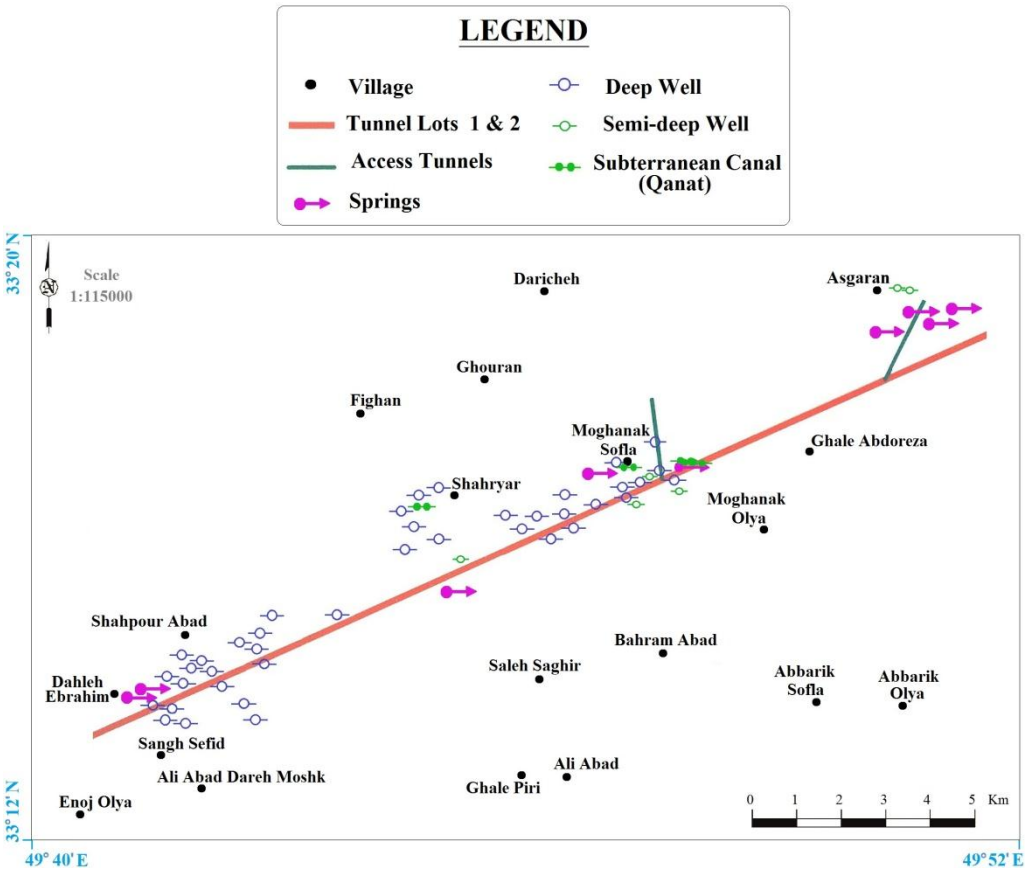

Fig. 1. The location of wells, springs and damaged subterranean canals (Qanat) due to tunnel excavation.

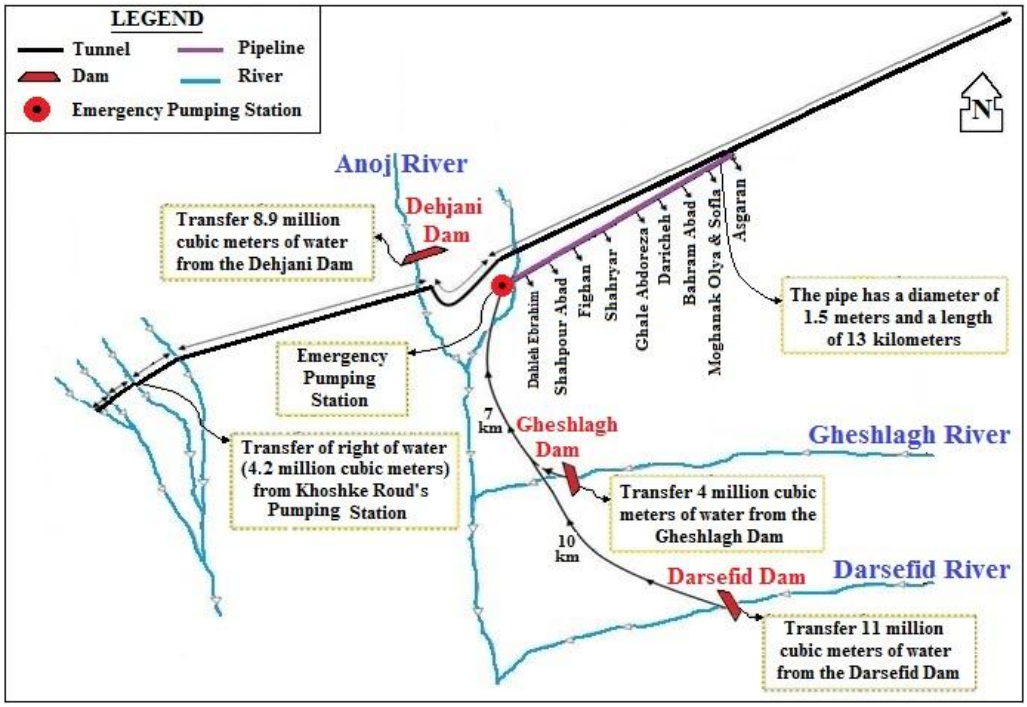

Fig. 2. Compensation project for the negative effects of Ghomroud tunnel. for supplying water resources and agricultural lands revitalization (adapted from Arvand Water and Energy Consulting Engineers Co., 2013).

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