Vulnerability Assessment of Urmia Lake Crisis in the Agriculture Sector and Rural Community Resilience Challenges

Ehsan Pashanejad-Silab[a1], Mojtaba Rafieian[b], Siavash Shayan[c]

[a] *Department of Geography and Planning, Tarbiat Modares University, Tehran, Iran.*
[b] *Department of Urban Planning, Tarbiat Modares University, Tehran, Iran*
[c] *Department of Physical Geography , Tarbiat Modares University, Tehran, Iran.*

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1. Introduction

The concept of vulnerability is used widely in many different contexts, from medicine to the poverty and development literature. Vulnerability and resilience assessment in the field of environmental planning is one of the most remarkable discussions. The vulnerability is defined a degree to which a system, subsystem or component is likely to experience harm due to exposure to a hazard, either a perturbation or stress. In another word, vulnerability is a function of character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

The widespread concern over the overwhelming effects of climate change, particularly in the agriculture sector, has become very serious. Climate variability impacts on agriculture sector have been mostly harmful. For instance, staggering impacts such as droughts and floods threaten the livelihood of rural people who are dependent on agriculture. The vulnerability in agriculture is not just limited to production losses, but also, it has major socioeconomic and environmental impacts. Agriculture is closely linked to climate change. However, vulnerability to climate change should be seen in the context of existing broader socio-economic and environmental conditions. Agriculture is the primary occupation in a rural area and a source of livelihood for one-third of the study area in the East Azerbaijan province.

Urmia lake is one of the most biotic and valuable ecosystems and it is registered as a national park in Iran. It is also, listed as a biosphere reserve by UNESCO. Despite the allegation for 25 years vision of Urmia Lake that has been mentioned in *Integrated Management plan for Urmia Lake Basin*, the lake will have an attractive landscape and rich biodiversity. The crisis during the recent years particularly in September of 2012 has become more serious and 70% of the lake has dried up. It is ironic that the collapse of Urmia Lake in the country like Iran the 1971 Ramsar Convention was signed. Continuation of the current trend of lake drying from now after a couple of years a vast

1 Corresponding author: Ehsan Pashanejad-Silab. Tel: +989149089113 E-mail: ehsanpasha90@gmail.com

amount of salt will be released into the surrounding region which means resulting in an ecological, agriculture, and social tragedy not only in the northwestern region of Iran but also in neighboring countries. Therefore, the main premise of this research is that agriculture sector is more sensitive and vulnerable due to Urmia lake crisis.

2. Material and Methods

In this paper, the role of Urmia lake disaster on agriculture function and structure changes and resilience of rural communities in the eastern region have been analyzed. The method of this research is quantitative. For this propose, new approaches in vulnerability assessment have been applied. Based on the comprehensive methodology of this study to assess the vulnerability related to Urmia Lake disaster in agriculture system and rural community resilience, spatial analysis and GIS-based techniques by using remote sensing method were implemented. In this sense, in order to gain insights into the spatial distribution of Urmia lake disaster, vulnerability assessing of agriculture sector has been done. Criteria for vulnerability assessing were as follow in three main indices: exposure, sensitivity, and adaptive capacity. In the first section, lake surface change, temperature trend, precipitation, relative humidity and L.Q were selected. Sensitivity indices of this study include land use and land cover change and agriculture production change trend. Finally, in adaptive capacity section, NDVI, Tasseled Cap, salinity index, rural population density and the density of employees in rural areas were selected.

The selected case study sites Azarhsar, Osku, Ajabshir, Shabestar, Malekan and, Bonab counties are located beside the southeastern region of Lake Urmia and encompasses 22 rural administrative units. Also, 199 rural points are located in the study area among which Ajabshir county has the highest rural point density. The rural population of study area totally is 232925 people.

3. Results and Discussion

We report the result of data analysis for agriculture of the study region in three parts, which are presented below focusing on exposure index of Urmia lake crisis then application of exposure indicator in the term of ecosystem changes particularly aquatic one indicate that Urmia lake disaster is a main driving force in agriculture function and structure changes. Moreover, land use and land cover change analysis have approved that Urmia Lake is inevitably more effective on agriculture section. Eventually, utilization of remote sensing index presents environmental capacity of agriculture section that tremendously is in the low rate.

Landsat image classification to obtain land use and land cover change detection by using multilayer perceptron was conducted. The finding from this section showed that there was a dramatic change especially in a water body, irrigation and dry farming classes in which these are strongly related to ecosystem changes. The issue of land degradation is further contributing to the loss of production. The statics shows that during the last decade horticultural products have been faced with negative growth rate.

Finally, in the adaptive capacity analysis of agriculture sector utilization of remote sensing index present a spatial capability of agriculture resilience

4. Conclusion

The result of vulnerability assessment has been useful in generating planning measures which can increase the resilience of rural communities of eastern regions agriculture sector to impact Urmia lake crisis. The vulnerability process among index method identified the major drivers of vulnerability. The result of assessment process indicates that there is a top priority for the local government to generate measures reduce the vulnerability of agriculture sector. Finally, this study highlights resilience is not based on a single factor, nor is it related to climate change, environmental change or issues such as Urmia lake crisis separately. Rather, this analysis has suggested that the origin of success to deal with Urmia lake disaster is promoting of rural communities

Key words: Vulnerability, Urmia lake crisis, Agriculture, Rural resilience.

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