Naser AGH. 2014. How to save the dying Lake Urmia. *Acta Geologica Sinica* (English Edition), 88(supp. 1): 178-179.

How to save the dying Lake Urmia

Naser AGH

Urmia Lake Research Institute, Urmia University, Urmia, IRAN

1 Introduction

Lake Urmia in the northwestern corner of Iran is one of the largest permanent hypersaline lakes in the world and the largest lake in the Middle East *(1,2,3)*. The lake was declared a Wetland of International Importance by the Ramsar Convention in 1971 and designated a UNESCO Biosphere Reserve in 1976 *(4,5)*. The lake itself is home to a unique brine shrimp species, *Artemia urmiana*, and along with the surrounding wetlands and upland habitat, it supports many species of reptiles, amphibians and mammals.

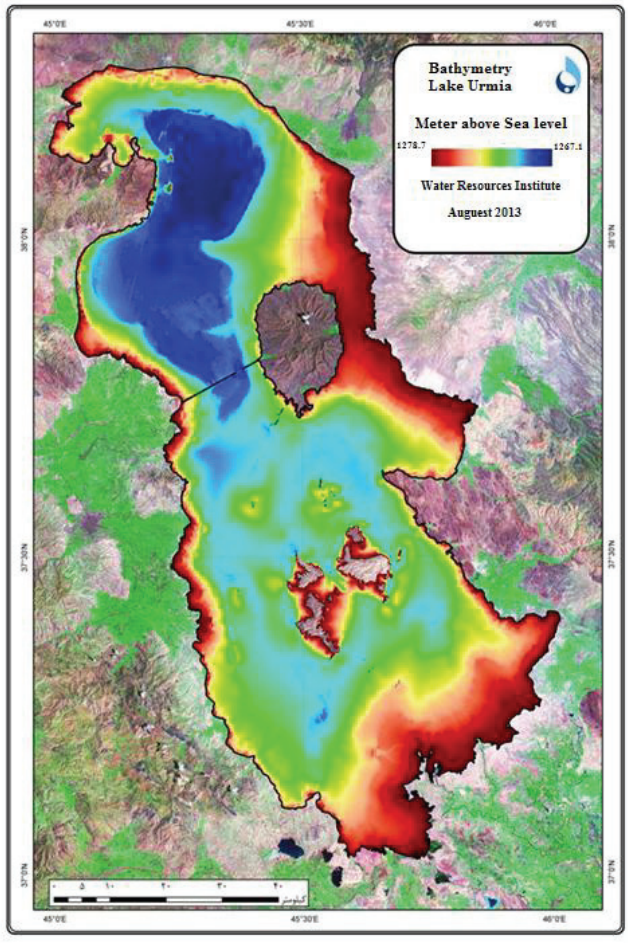

Fig. 1. Bathymetry of Lake Urmia showing flat bottom, conversion of the lake to playa

Table 1 Please replace with your table caption.

Year	Area (Km2)	Dried Area compared to earlier period (Km2)
1976	5266	-
1989	5423	-157
1998	5650	-227
2000	4610	+1040
2003	4241	+369
2005	4049	+142
2007	3841	+258
2009	3106	+734
2010	2005	+1102
2013	953	+1051

The lake's surface area has been estimated to have been as large as 6 100 km² but since 1995 it has generally been declining *(6)* and was estimated from satellite data to be only 953 km² in August of 2013 (Landsat data). The decline is generally blamed on a combination of drought, increased water diversion for irrigated agriculture within the lake's watershed and mismanagement *(2,6)*.

2 Large Lake or managed impoundments

Probably about 10 billion m3 of sediments have filled the lake converting it into a flat Playa. The slope from causeway to south has been determined as maximum 20 cm per 10 Km. Therefore the water making entry into the lake spreads over a huge area with minimal depth, prone to immediate evaporation. Reduction of total water production capacity in the basin on one hand and excessive consumption of water on the other, makes it impossible to restore whole lake. Therefore we propose partitioning into well managed impoundments with both ecologic and socio-economic purposes. Based on our plan a total area of 3800 Km2 could be restored, 100 Km2 reserved for Artemia and birds. Moreover, collection of salts and minerals are proposed from North arm.

Key words: Lake Urmia, Climate change, Agriculture,

* Corresponding author. E-mail: agh1960@gmail.com

Dams, Biodiversity.

References

Zarghami, M. (2011). Effective watershed management; Case study of Urmia Lake, Iran. Lake and Reservoir Management, 27(1), 87-94. doi: 10.1080/07438141.2010.541327.

Hassanzadeh, E., Zarghami, M., Hassanzadeh, Y. (2011). Determining the Main Factors in Declining the Urmia Lake Level by Using System Dynamics Modeling. Water Resources Management, 26(1), 129-145. doi: 10.1007/s11269-011-9909-8.

Karbassi, A., Bidhendi, G., Pejman, A., Bidhendi, M. (2010). Environmental impacts of desalination on the ecology of Lake Urmia. Journal of Great Lakes Research, 36(3), 419-424. doi: 10.1016/j.jglr.2010.06.004.

Ramsar (no date). Ramsar Site List. Accessed 24 January 24, 2012 at: http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?mode=gen&code=IRA+07.

UNESCO (no date). UNESCO-MAB Biosphere Reserves Directory. 24 January 24, 2012 at: http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?mode=gen&code=IRA+07.

Golabian, H. (2010). Urumia Lake: Hydro-Ecological Stabilization and Permanence Macro-engineering Seawater in Unique Environments (pp. 365-397). Berlin: Springer-Verlag. doi: 10.1007/978-3-642-14779-1_18.