Rainwater Harvesting for Wildlife (A case study: Urmia Lake's Islands, Iran)

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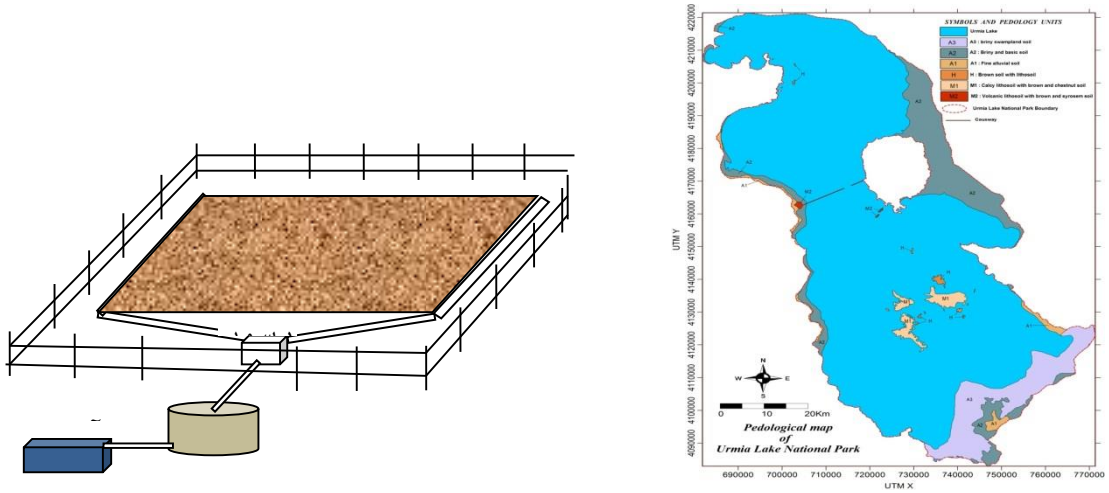
Introduction

Wildlife is one of the most important elements of biodiversity in the natural ecosystems. During the time, Islands of the Urmia Lake having considerable water and food availability used to be very safe place for enormous number of wildlife including birds and quadruped mammals. Although the Urmia climate is virtually classified as semi arid zone, however it is only during the last decay that prolonged drought caused water shortages endangering Urmia's wildlife diversity. The problem is being amplified because the Urmia Lake is about to be completely dried so that many precious animals species could be scattered around looking for water and food. Occasional counter measures have been undertaken by local authorities including water transformation by ship and helicopter which could not be considered to be a sustainable solution in the long term scale. One should note that apart from water scarcity, animal forage has been also affected by recent drought. Therefore, any solution proposed for providing animal drinking water, should consider a sustainable planting practices at the same time.

Material and Method

Rainwater harvesting (RWH) is a modern solution for collecting, conducting and storing rainfall induced runoff from natural and artificial impermeable surfaces. This method is particularly useful for remote area where usual water supply systems may not be applicable (Russell et al, 2006). Rainwater harvesting systems is composed of a catchment, conveying devices and storage facilities. Catchment should be almost impermeable and large enough to provide required amount of water during individual or several consequent rainfall events. Catchment surface may be naturally impervious or can be artificially isolated for maximum runoff production using different material types such as cement, bitumen or PVC membranes. Later one is the most common material used for waterproofing the natural slopes where the ground surface is not enough impermeable. Provided that it is properly installed, 80% runoff coefficient with minimum of 20 years lifetime has been reported from previous cases. Runoff generated by impervious catchment can be conveyed into a downstream reservoir using a pipeline or low height ditches. Reservoir capacity should be tailored with respect to the long term average or minimum monthly rainfall using frequency analysis. Other important criterion for selecting reservoir capacity is that the water storage should serve for the whole dry season lasting more than 5 to 6 month with no rain at all. Reservoir can be constructed in situ by locally available crushed rocks or one can use prefabricated reservoir with appropriate capacity (Oweis et al, 2009). In case that water is harvested for plant production, runoff produced from catchment may not be stored and can be conducted directly into the plant root zone. A simple connection between reservoir and watering point will be established via a pipeline and a floating valve.

Some sort of filtration is inevitable to avoid entering any debris and birds waste into the reservoir. Water quality can be further guaranteed by regular cleaning the reservoir and preventing animal trespassing by fencing the catchment area. Water circulation and aeration can be observed by proper installation of intake, outlet and ventilation openings.



Map of Urmieh Lake and a schematic layout of Rainwater catchment System

Results and Discussion

A prefeasibility study shows that in three out of four important Urmia islands (i.e. Espir, Kaboodan and Ashk) there exist long slopping rock surfaces with a good distribution along the area which can be used as impervious catchment for runoff collection. It is only in the Arezoo Island that contains more gentle topography and is covered with a weathered surface layer so that artificially constructed impervious catchment may be needed. In order to avoid any pasture damage resulting from prolonged animal grazing, watering points should be located within appropriate distance from each other.

The construction costs of proposed rainwater catchment system include catchment isolation, cistern, fencing, accessories and installation cost that can be estimated as follows:

Subject	Quantity	Unit Cost (USD)	Total Cost (USD)
PVC membrane	150 (m^2)	10	1500
Precast Cistern	15 (m^3)	4500	4500
Accessories	10 (%)	600	600
fencing	50 (m)	15	750
Installation		1000	1000
Total			8350

References

Ali, A., Oweis, T., Salkini, A.B. & El-Naggar, S. (2009). Rainwater Cisterns: Traditional Technologies For Dry Areas. International Center For Agricultural Research In The Dry Areas (ICARDA), Aleppo, Syria.

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