Lake Urmia

A REVIEW OF
the LAKE URMIA RESTORATION PROPOSALS

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Introduction

A Shallow, High Elevation Lake.

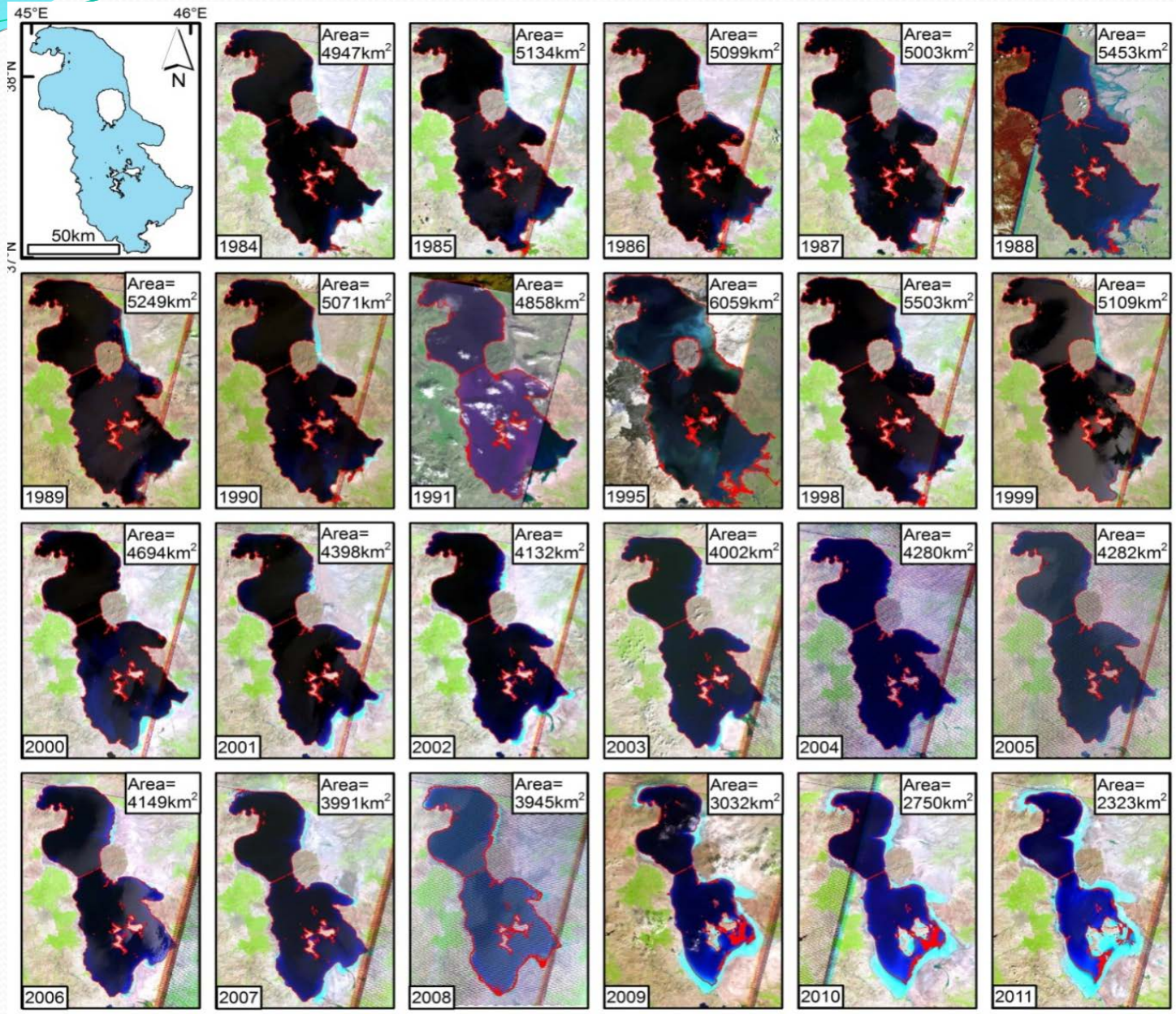
- **Urmia Lake Basin Area: about 52000 Km^2**
- **Lake Volume: 24000 MCM**
- **Lake Area: About 5300 km^2**
- **Lake Depth: About 4.5 m**
- **Normal TDS: About 240 gram/lit**
- **Present TDS: More than 400 gram/lit**

✓ *National Park (since 1971)*

✓ *Ramsar Site (since 1975)*

✓ *UNESCO Biosphere Reserve (since 1976)*

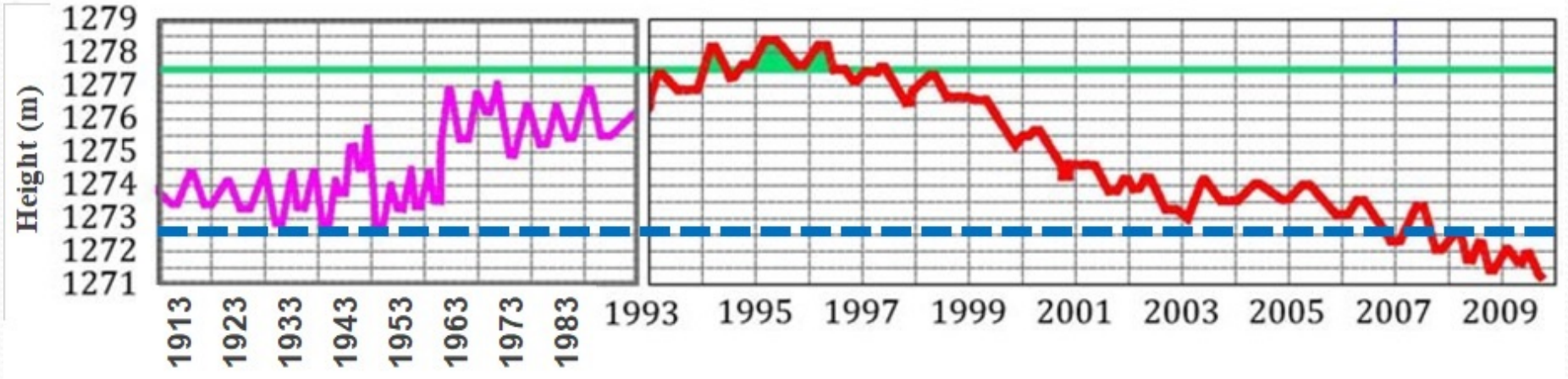
Variation of the Lake's Surface (1984-2011)



Year	Surface Of the Lake (Km^2)
1984	4947
1985	5134
1986	5099
1987	5003
1988	5453
1989	5249
1990	5071
1991	4858
1995	6059
1998	5503
1999	5109
2000	4694
2001	4398
2002	4132
2003	4002
2004	4280
2005	4282
2006	4149
2007	3991
2008	3945
2009	3032
2010	2750
2011	2323

Lake Urmia Water Level Changes:

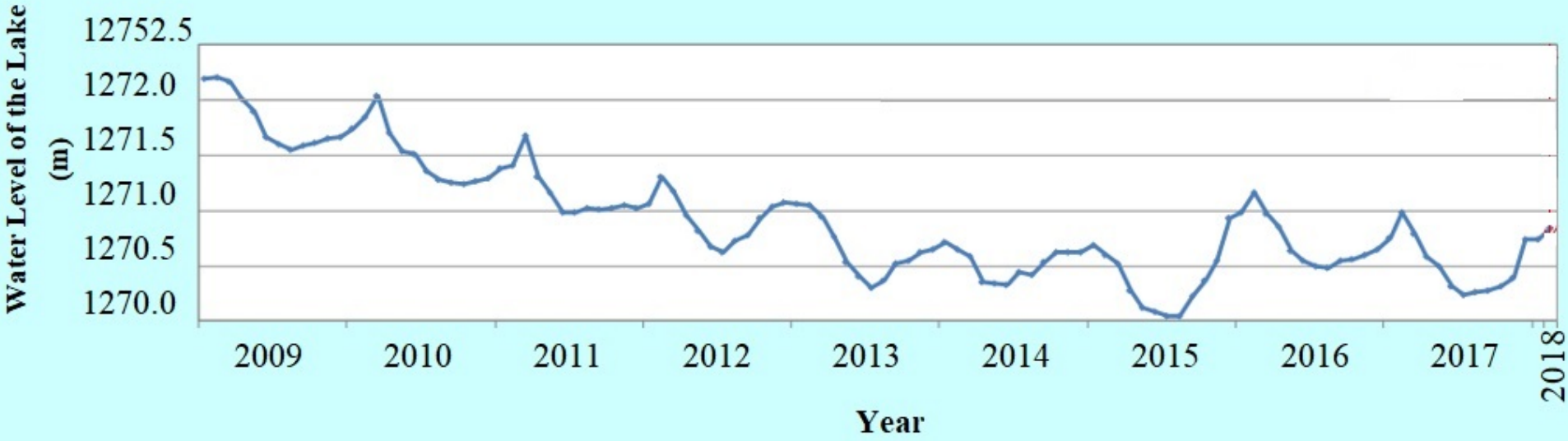
Historical Perspective



Max Level : 1995 ----------1278.40 (m)

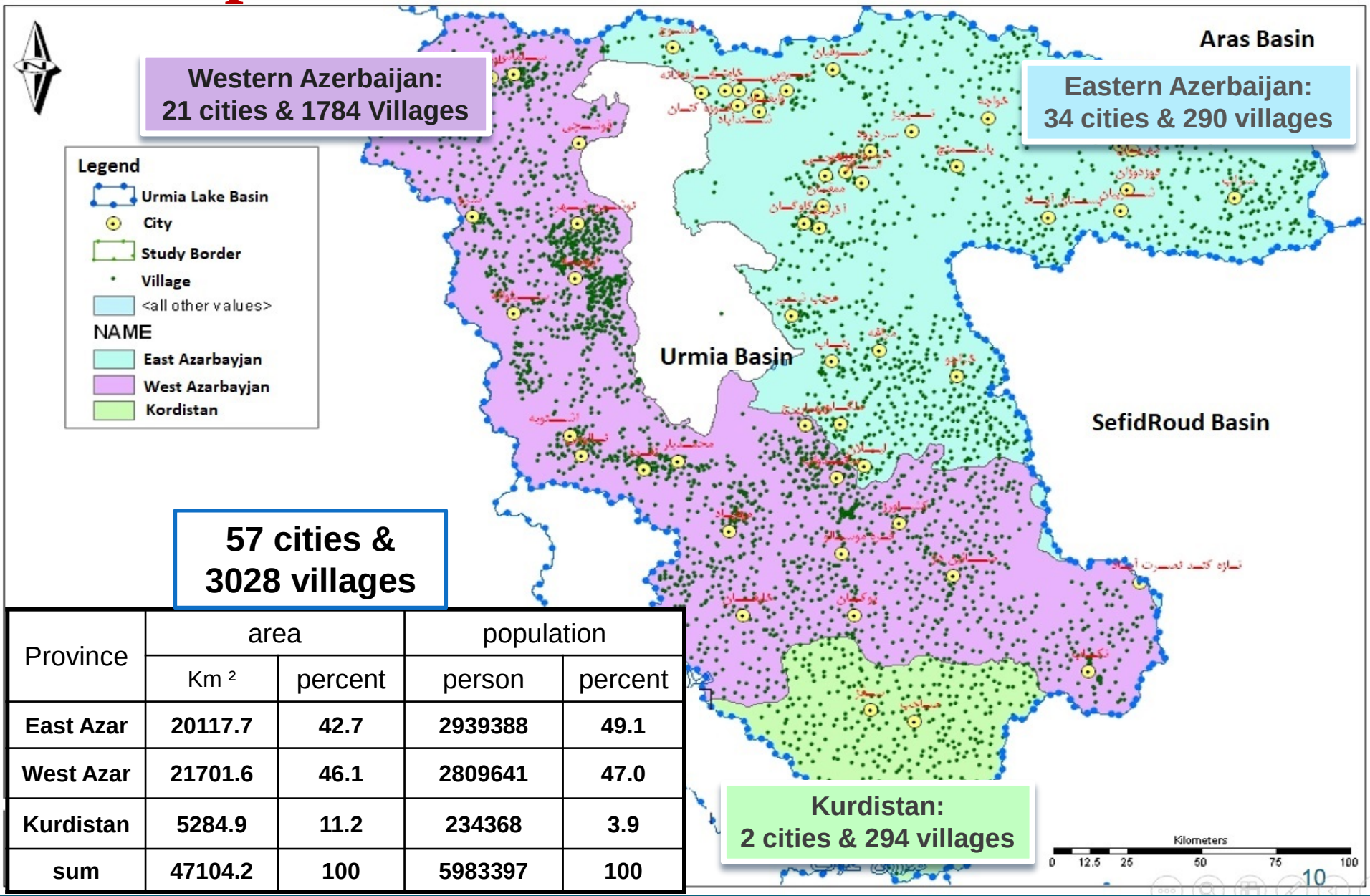
Variation of the Lake Water Level

(Apr 2009 to May 2018)



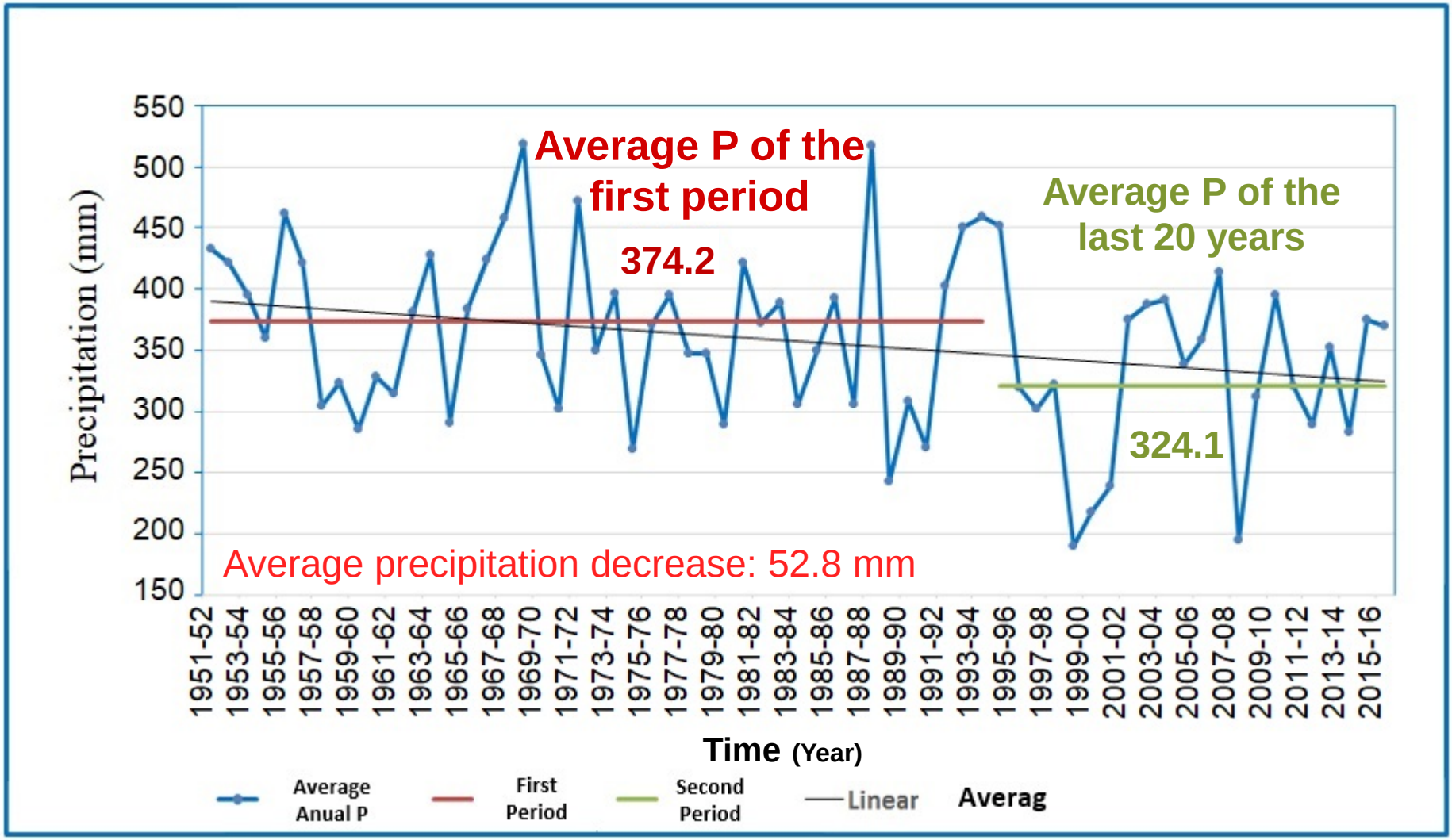
Parameters	June 08			Variation According to	
	Water Year		50-year Average	Last Water Year	Long Term Average
	2016-17	2017-18			
Water Level (m)	**1270.86**	**1270.84**	**1274.67**	**-0.02**	**-3.83**
Surface Area (Km^2)	**2414.22**	**2391.33**	**4526.7**	**-22.89**	**-2135.37**
Volume of the Water (MCM)	**2.28**	**2.23**	**16.27**	**-0.05**	**-14.04**

Population Distribution in the Basin



Province	area		population	
	Km ²	percent	person	percent
East Azar	20117.7	42.7	2939388	49.1
West Azar	21701.6	46.1	2809641	47.0
Kurdistan	5284.9	11.2	234368	3.9
sum	47104.2	100	5983397	100

Variation of Precipitation



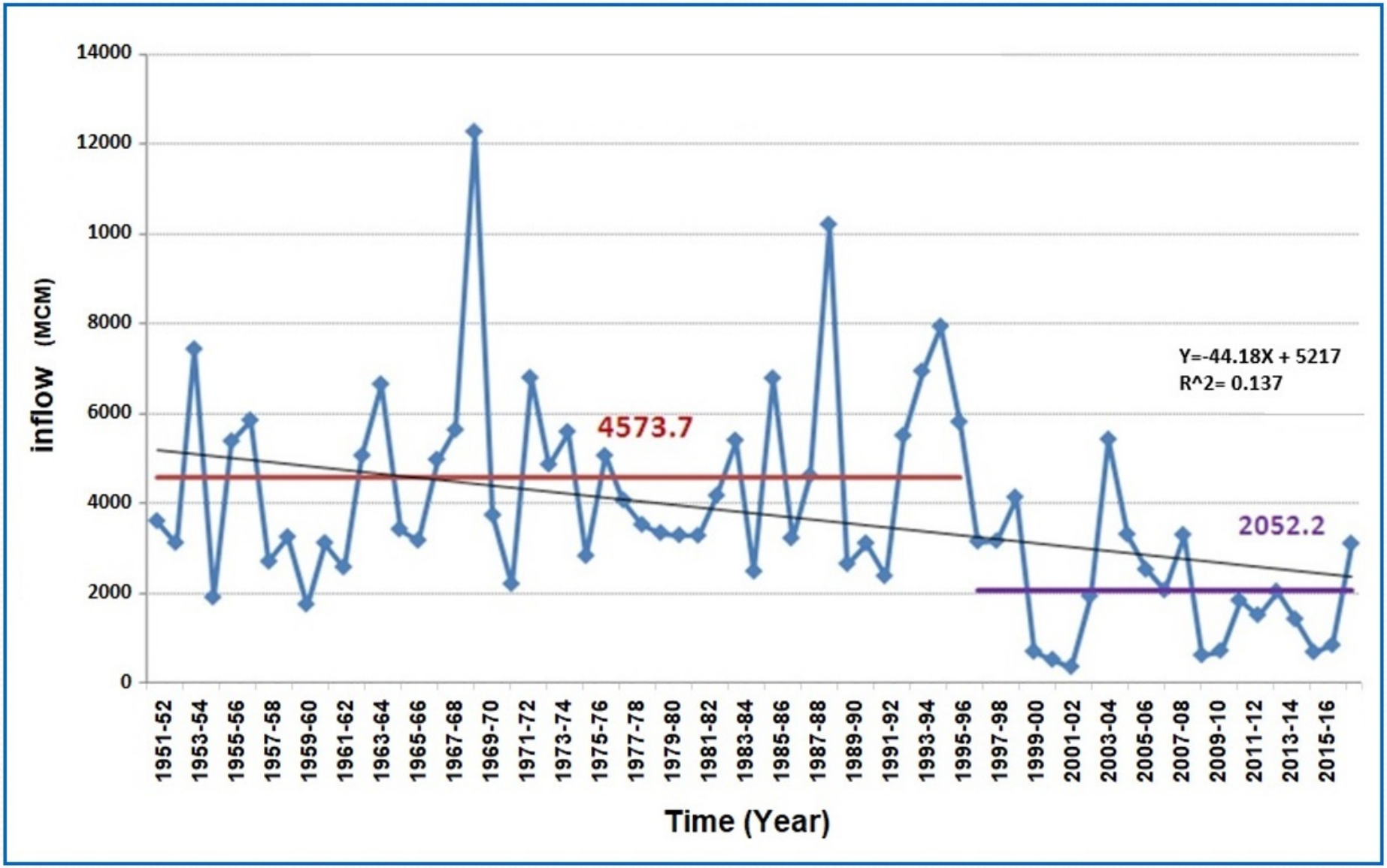
- Period of Record: 65 years
- Decreasing precipitation period: 20 years

Variation of Renewable Water

- Renewable water resources potential of the basin has been evaluated using the precipitation and temperature data of the basin.
- During stable period (1951-52 to 1994-95): **8876** MCM
- During the last 20 years: **7136** MCM
- Average of decreased renewable water resources potential: **1734** MCM (about 20%)

Variation of Inflow to Lake Urmia

in a 65-Year Period



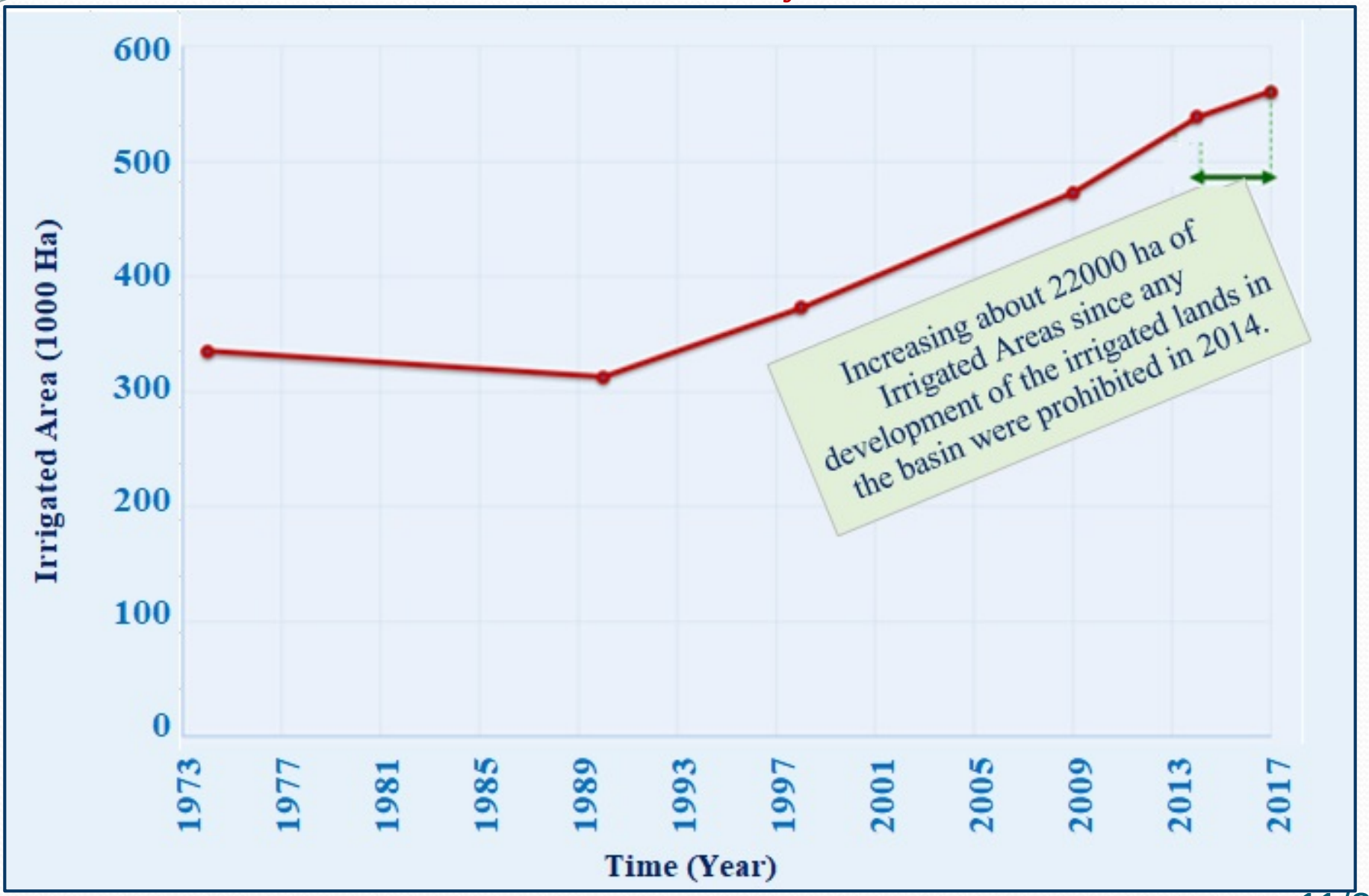
Water Consumption

Water Resources	Water Consumption (MCM)			
	Domestic	Industry	Agriculture	Sum
Surface Water	351	25	3088	3464
Groundwater	180	33	1504	1717
Sum	531	58	4592	5181

- ✓ 66% from Surface Water and 34% From the Groundwater
- ✓ More than 88% of Water Consumption is in the Agricultural Sector

Changes of the Irrigated Lands in the Basin

Over the Past 40 years



Factors Affecting the Shrinkage

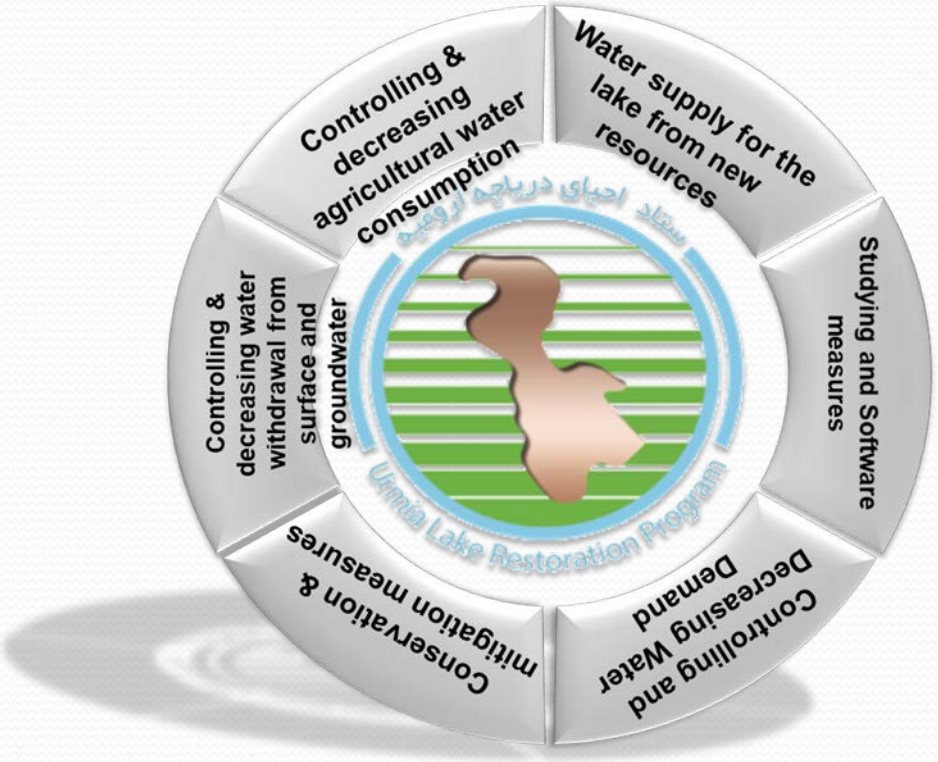
- Decrease in precipitation
- Increase in temperature
- Increase in overdraft
- Altered crop pattern

- Poor level of efficiency in water consumption
- Change in land use: Pastures to orchards
- Expansion of irrigated lands
- Construction of hydraulic structures
- Increase in population

Measures to Revive the Lake

✓**Measures:**

- Structural
- Nonstructural
- Combined



✓**Target:** To approach the ecological water level

✓**Target Year:** 2023

Measures to Revive the Lake

Structural

- Water transfer to the islands and littoral wetlands & water body of the lake
- Water transfer to the wet part of the lake

Nonstructural

- No new water consumption and development
- Developing a decision support system (DSS)
- Land cadaster
- Organizing the wells and installing smart metering on pumps
- Creat job opportunities and alternative livelihoods
- Planting halophytes in the dried parts of the Lake
- Temporary restriction of cultivation in exchange for compensation
- Monitoring of implementation of plans

Measures to Revive the Lake

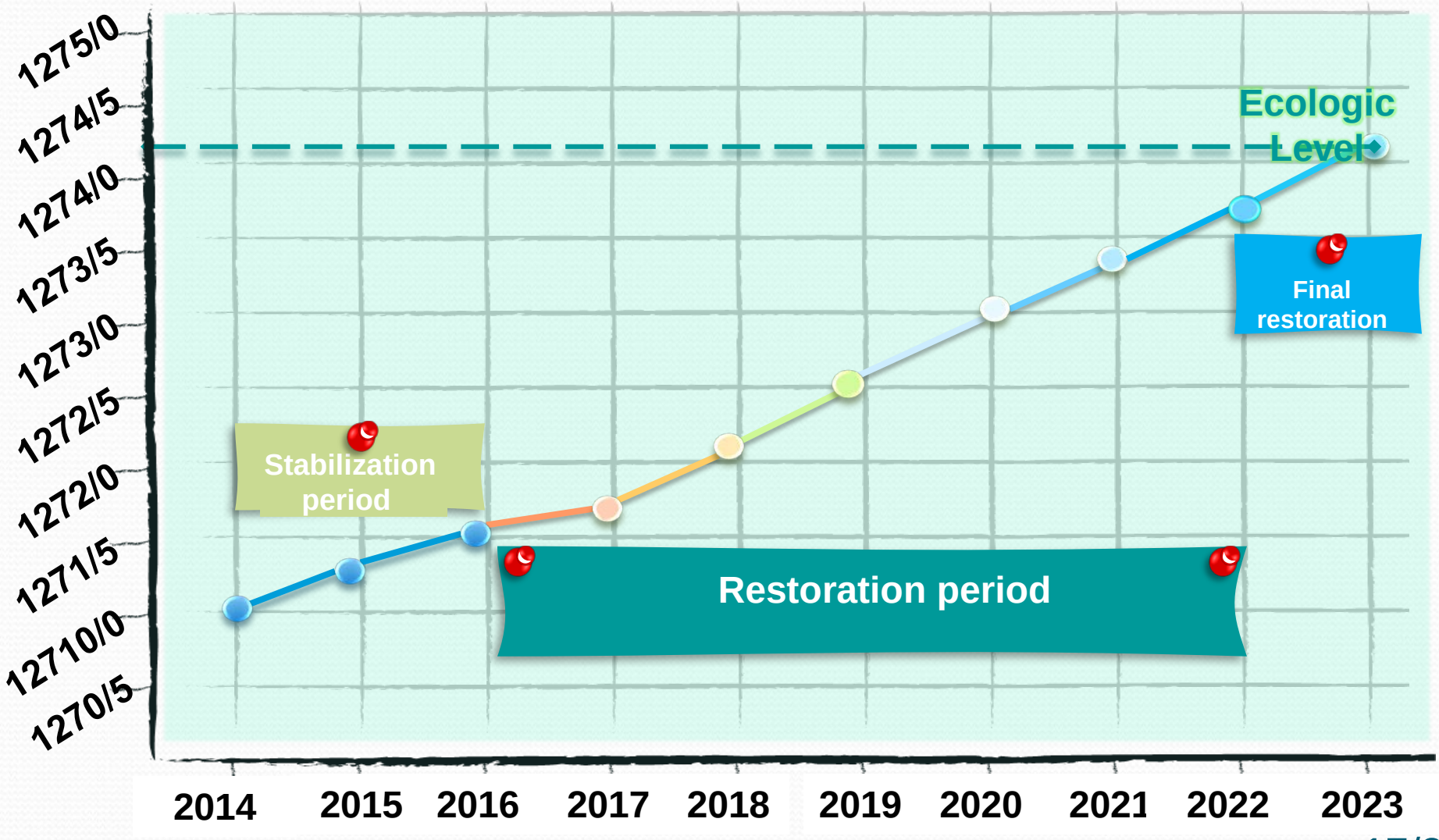
Combination of Structural and Nonstructural Measures

- Reclaimed waste water allocation and transfer to the lake
- Control and reduction of agricultural water use
- Stopping all dam consecution activities
- Inter-basin water transfer projects
- Identification and stabilization of dust storm sources

Quantitative Objectives in the Lake Urmia Restoration Schedule

Year	Level (m)	Area (km^2)	Volume (MCM)	Volume (%) to ecologic volume (%)	Area (%) to ecologic area (%)
2014	1270/6	2146	2584	22	50
2018	**1272/05**	**3330**	**4685**	**44**	**75**
2019	1272/53	3676	8290	56	85
2020	1272/9	3875	9960	67	89
2021	1273/37	3980	11593	78	93
2022	1273/69	4266	13205	89	98
2023	1274/1	4307	14721	100	100

Predicted Variation of the Lake Urmia Water Level through Restoration Program



Strengths of the Restoration Process

- ✓The government's special attention.
- ✓A suitable platform for the interaction of stakeholders and decision-makers
- ✓ Concentrating all tasks under the supervision of a designated organization
- ✓Using the country's engineering expertise, universities, research institutes and national information centers.
- ✓Studying relevant global experiences
- ✓Identifying the main water consumer in the basin
- ✓Reaching an agreement on reducing water use in this sector
- ✓Providing a roadmap as an operational program

Weaknesses of the Restoration Process

- Need to strengthen the role of experienced practitioners in the implementation and supervision Lake Urmia restoration
- Uncoordinated bureaucratic procedures within executive organizations:
  - Weakness in the structure and plans of the RBO and IWM
  - Domination of the provincial governors on the actions of the local organizations
- Lack constructive interaction with members of the Parliament representing affected communities
- No specific strategy to use the capacities of cooperative companies, professional societies, and stakeholder participation
- No integrated approach in watershed management and planning
- Lack of attention to the social and economic capital within the basin

Weaknesses of the Restoration Process

- Inadequate attention to livelihoods and alternative employment: Rural economy has always relied on agriculture and no measures have been taken to reduce this dependence.
- Costly plans in the face of national economic hardships
- Focusing on inter-basin water transfer projects as quick fix solutions without a comprehensive analysis and evaluation of alternative solutions
- Lack of transparency and public awareness mechanisms: This has allowed the working group to insist on incoherent policies despite poor outcomes in other parts of the country (e.g., inter-basin water transfer to the central plateau of Iran).
- Lack of enough attention to the past actions to restore the lake
- Failure to provide infrastructural prerequisites for reducing water use in the agricultural sector

Weaknesses of the Restoration Process

- Overlooking opportunities in cropping change and cultivation methods to improve agricultural economics while saving water
- Need to take into account ethnic differences and different levels of development in the basin
- Lack of proper monitoring and tools to allow assessment of actions and executive plans to ensure complete, timely implementation in accordance with planned goals
- Failing to propose a finalized plan on how to implement a variety of the presented research projects

Thank you!

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