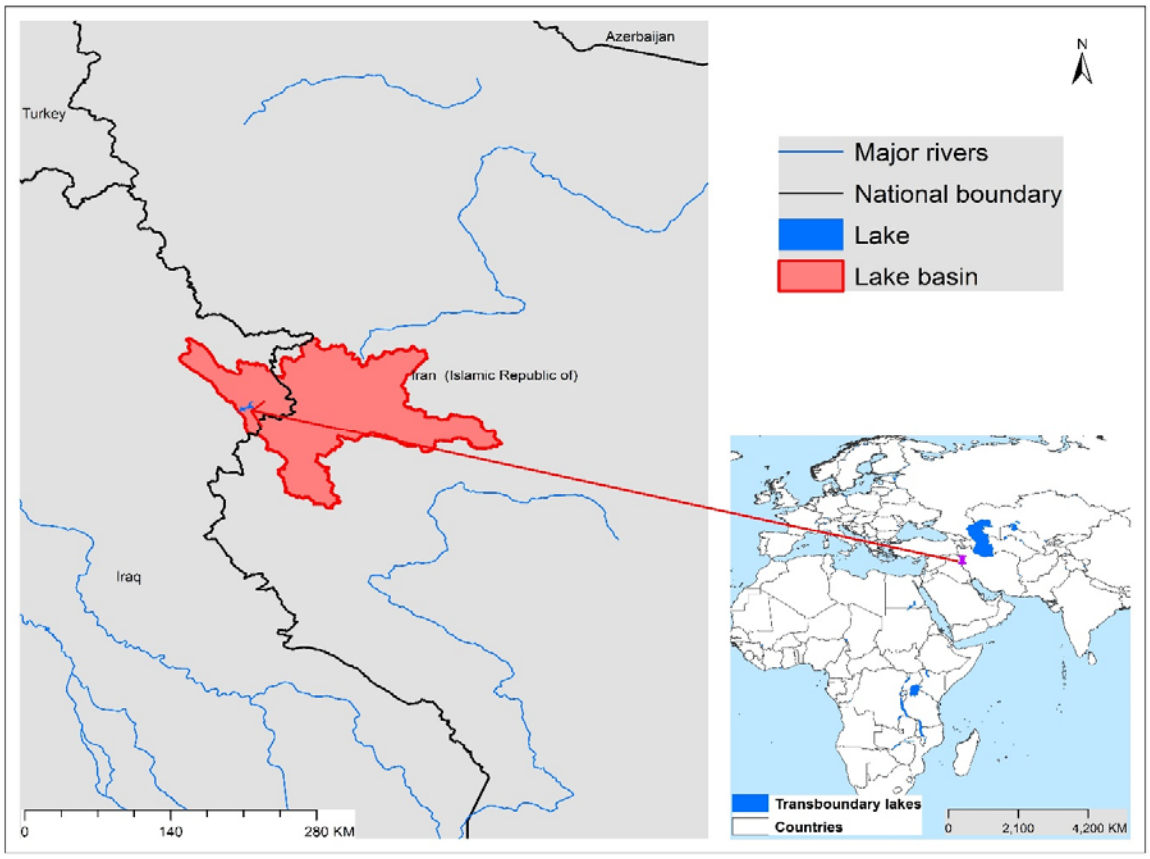
Lake Profile Brief

This is based on the results of Multiple Lake Threat Assessment and its Scenario Analysis. Refer to the Technical Report for details.

Lake Danbandikhan

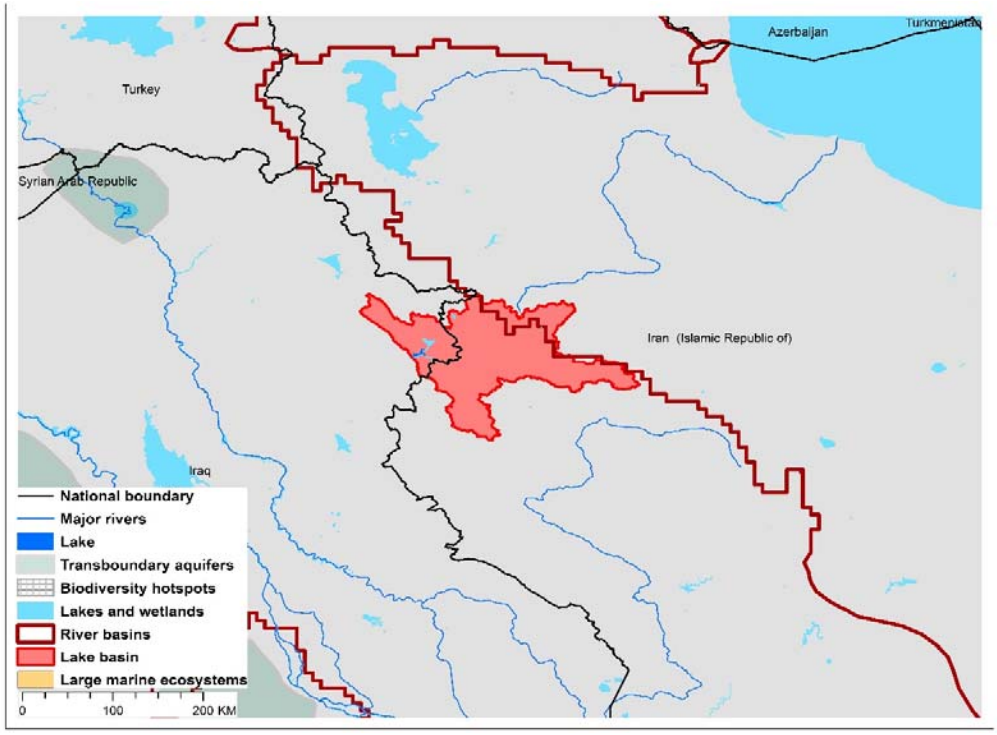
Geographic Information

Lake Darbandikhan is a reservoir constructed for irrigation, flood control, hydropower production and recreation. Its dam has undergone several repairs since its construction between 1956 - 1961, attributed to poor construction and neglect. Several slope failures have occurred since its construction. The dam spillway and power station suffered damage during the Iran-Iraq war, with the power station recently rehabilitated. The area as a whole supports significant bird life, as well as recreational use and a fishery. Nevertheless, the lake is reported to be facing water quality degradation resulting in occasional fish kills. It is not clear that the riparian countries have any direct interest in addressing these issues through an international intervention facilitated by the GEF. Any consideration of a GEF-catalyzed management intervention should be preceded by an assessment of the current scientific and political situation.

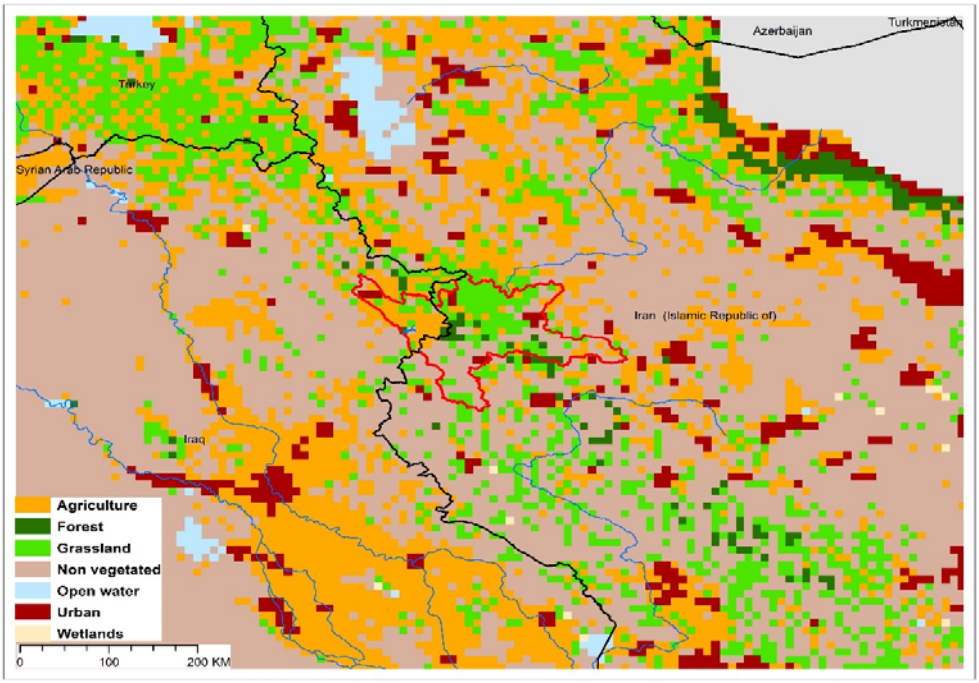


TWAP Regional Designation	Northern Africa & Western Asia; Southern Asia	**Lake Basin Population (2010)**	1,822,575
River Basin	Tigris/Euphrates	**Lake Basin Population Density (2010; # km^{-2})**	76.6
Riparian Countries	Iran, Iraq	**Average Basin Precipitation (mm yr^{-1})**	610.0
Basin Area (km^2)	15,725	**Shoreline Length (km)**	94.0
Lake Area (km^2)	114.3	**Human Development Index (HDI)**	0.68
Lake Area:Lake Basin Ratio	0.002	**International Treaties/Agreements Identifying Lake**	No

Lake Danbandikhan Basin Characteristics



(a) Lake Danbandikhan basin and associated transboundary water systems



(b) Lake Danbandikhan basin land use

Lake Danbandikhan Threat Ranking

A serious lack of global-scale uniform data on the TWAP transboundary in-lake conditions required their potential threat risks be estimated on the basis of the characteristics of their drainage basins, rather than in-lake conditions. Using basin characteristics to rank transboundary lake threats precludes consideration of the unique features that can buffer their in-lake responses to basin-derived disturbances, including an integrating nature for all inputs, long water retention times, and complex, non-linear response dynamics.

The lake threat ranks were calculated with a spreadsheet-based interactive scenario analysis program, incorporating data and information about the nature and magnitude of their basin-derived stresses, and their possible impacts on the sustainability of their ecosystem services. These descriptive data for Lake Danbandikhan and the other transboundary lakes included lake and basin areas, population numbers and densities, areal extent of basin stressors on the lake, data grid size, and other components considered important from the perspective of the user of the data results. The scenario analysis program also provides a means to define the appropriate context and preconditions for interpreting the ranking results.

The Lake Danbandikhan threat ranks are expressed in terms of the Adjusted Human Water Security (Adj-HWS) threats, Reverse Biodiversity (RvBD) threats, and the Human Development Index (HDI) score, as well as combinations of these indices. However, it is emphasized that, being based on specific characteristics and assumptions regarding Lake Danbandikhan and its basin characteristics, the calculated threat scores represent only one possible set of lake threat rankings. Defining the appropriate context and preconditions for interpreting the lake rankings remains an important responsibility of those using the threat ranking results, including lake managers and decision-makers.

Table 1. Lake Danbandikhan Relative Threat Ranks, Based on Adjusted Human Water Security (Adj-HWS) and Reverse Biodiversity Threats, and Human Development Index (HDI) Score

(Estimated risks: red – highest; orange – moderately high; yellow – medium; green – moderately low; blue – low)

Adjusted Human Water Security (Adj-HWS) Threat Score	Relative Adj-HWS Threat Rank	Reverse Biodiversity (RvBD) Threat Score	Relative RvBD Threat Rank	Human Development Index (HDI) Score	Relative HDI Rank
0.87	18	0.46	46	0.68	30

It is emphasized that the Lake Danbandikhan rankings above are discussed here within the context of the management and decision-making process, rather than as strict numerical ranks. Based on its geographic, population and socioeconomic assumptions used in the scenario analysis program, the calculated Adj-HWS score for Lake Danbandikhan indicates a moderately high threat rank compared to other priority transboundary lakes.

The Reverse Biodiversity (RvBD) for Lake Danbandikhan, which is meant to describe its biodiversity sensitivity to basin-derived degradation, places the lake in a low threat rank, compared to the other

transboundary lakes. Management interventions directed to improving the biodiversity status must be viewed with caution, however, since we lack sufficient knowledge and experience to accurately predict the ultimate impacts of biodiversity manipulations and preservation efforts. Further, the RvBD scores indicate the relative sensitivity of a lake basin to human activities, and high threat scores *per se* do not necessarily justify management interventions. Such interventions may actually increase biodiversity degradation, noting that many developed countries have already fundamentally degraded their biodiversity because of economic development activities. Thus, activities undertaken to address the Adj-HWS threats may actually degrade the biodiversity status and resources, even if the health and socioeconomic conditions of the lake basin stakeholders are improved as a result of better conditions, thereby increasing stakeholder resource consumption.

The relative Human Development Index (HDI) places the Lake Danbandikhan basin in a medium threat rank in regard to its health, educational and economic conditions.

Table 2. Lake Danbandikhan Threat Ranks, Based on Multiple Ranking Criteria

(Scores for Adj-HWS, RvBD and HDI ranks are presented in Table 1; the ranks may differ in some cases because of rounding of tied threat scores; Estimated risks: red – highest; orange – moderately high; yellow – medium; green – moderately low; blue – low)

Adj-HWS Rank	HDI Rank	RvBD Rank		Sum Adj-HWS + RvBD	Relative Threat Rank		Sum Adj-HWS + HDI	Relative Threat Rank		Sum Adj-HWS + RvBD + HDI	Overall Threat Rank
17	30	46		63	35		47	23		93	33

When multiple ranking criteria are considered together in the threat rank calculations, the Adj-HWS and HDI scores considered together place Lake Danbandikhan in the upper half of the threat ranks. The relative threat is somewhat reduced when the Adj-HWS and RvBD threats are considered together. Considering all three ranking criteria together, Lake Danbandikhan exhibits a medium threat ranking.

Further, a series of parametric sensitivity analyses of the ranking results also was performed to determine the effects of changing the importance of specific criteria on the relative transboundary lake rankings. This analysis involved increasing or decreasing the weights applied to the threat ranks derived from multiple ranking criteria to reassess the relative impacts of the weight combinations on the threat ranks. For example, in determining the sensitivity of the Adjusted Human Water Security (Adj-HWS) and Biodiversity (BD) ranking criteria, the threat rank associated with the first was assumed to be of complete (100%) importance (i.e., rank weight of 1.0), while the other was assumed to be of no (0%) importance (i.e., rank weight of 0.0). The relative importance of the two ranking criteria was then successively changed, with weight combinations of 0.9 and 0.1, 0.8 and 0.2, etc., until the first ranking criteria (Adj-HWS) was assumed to be of no importance (rank weight of 0.0) and the second (BD) was of complete importance (rank weight of 1.0). In the case of Lake Danbandikhan, the 0.5 and 0.5 weight combinations for three cases of parametric analysis for Lake Danbandikhan resulted in respective threat rankings of 2nd, 4th and 2nd, respectively, among the total of 8 Asian transboundary lakes in the TWAP study (see Technical Report, Section 4.3.3, pp44-50).

In essence, therefore, identifying potential management intervention needs for Lake Danbandikhan must be considered on the basis of both educated judgement and accurate representations of its situation. A fundamental question to be addressed, therefore, is how can one decide that a given

management intervention will produce the greatest benefit(s) for the greatest number of people in the Lake Danbandikhan basin? Accurate answers to such questions for Lake Danbandikhan, and other transboundary lakes, will require a case-by-case assessment approach that considers the specific lake situation and context, the anticipated improvements from specific management interventions, and its interactions with water systems to which the lake is linked.