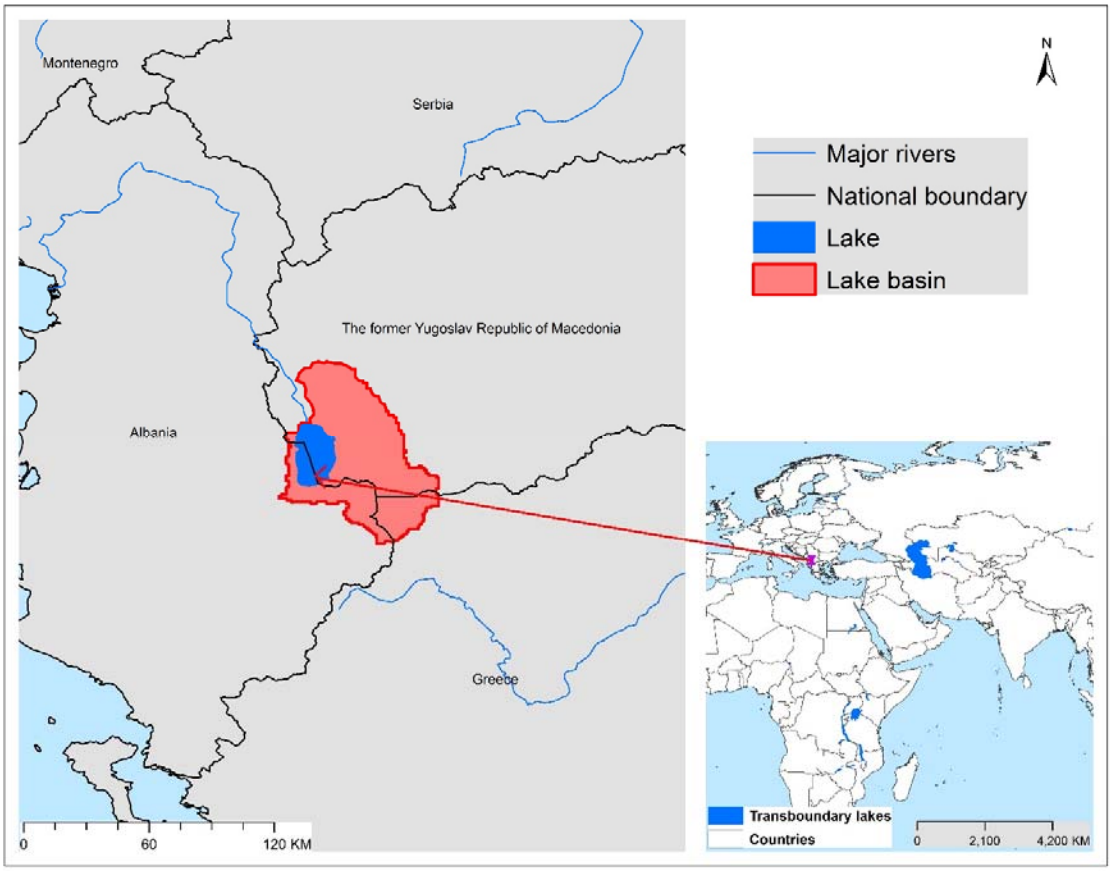
Lake Profile Brief

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

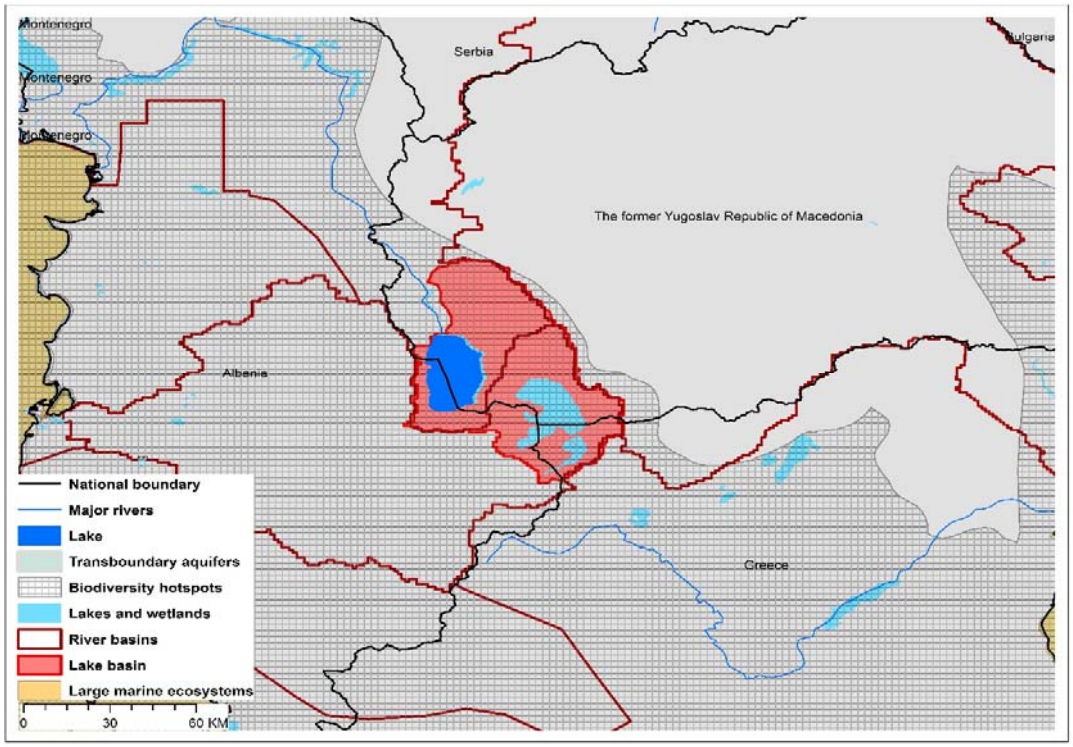
Lake Ohrid — Geographic Information

Lake Ohrid, one of Europe's deepest and oldest lakes, straddles the mountainous region between southwestern Macedonie and eastern Albania. It is the deepest lake of the Balkans, containing a unique aquatic ecosystem of worldwide importance, with more than 200 endemic species, and being previously declared a World Heritage Site. Its endemism is such that it covers the whole lake food chain, from phytoplankton to predatory fish. It receives about half of its inflowing water from karstic aquifers draining upstream lake Prespa. Exhibiting an oligotrophic status, it has exceptionally clear water transparency. Historic monuments, as well as its pristine environment, make the area around Lake Ohrid a prime tourism site.

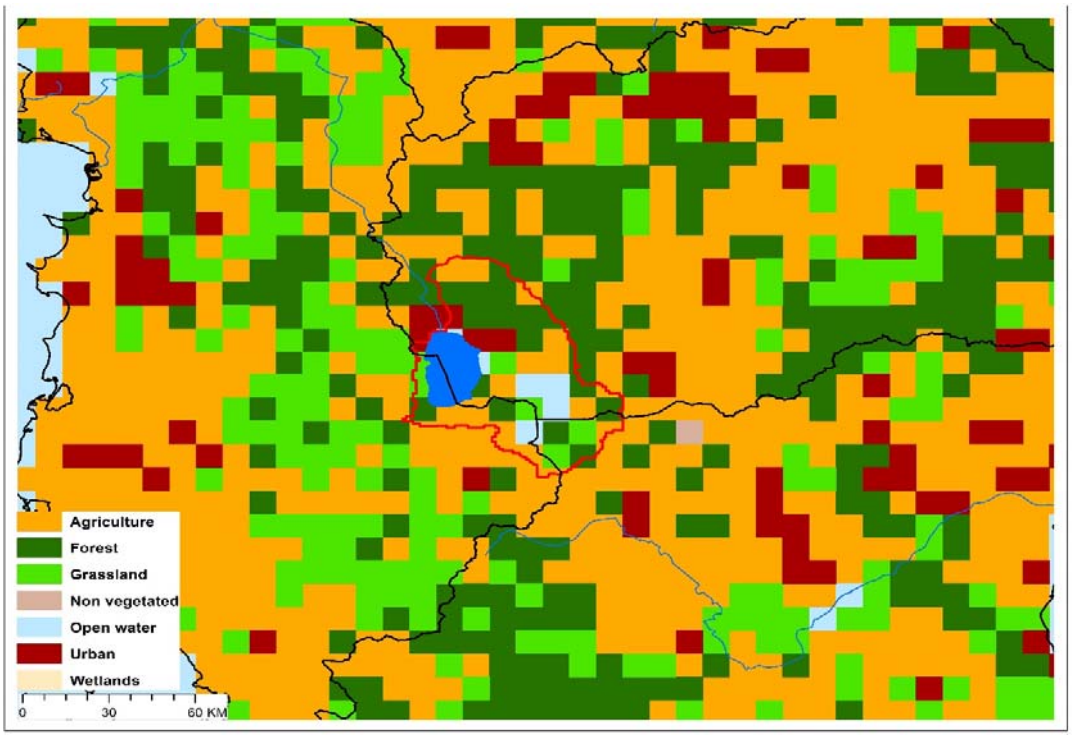


TWAP Regional Designation	Northern, Western & Southern Europe		**Lake Basin Population (2010)**	165,355
River Basin	Black Drin		**Lake Basin Population Density (2010; # km^{-2})**	45.8
Riparian Countries	Albania, Macedonia		**Average Basin Precipitation (mm yr^{-1})**	851.4
Basin Area (km^2)	2,828		**Shoreline Length (km)**	80.9
Lake Area (km^2)	354.3		**Human Development Index (HDI)**	0.74
Lake Area:Lake Basin Ratio	0.123		**International Treaties/Agreements Identifying Lake**	Yes

Lake Ohrid Basin Characteristics



(a) Lake Ohrid basin and associated transboundary water systems



(b) Lake Ohrid basin land use

Lake Ohrid 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 Ohrid 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 Ohrid 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 Ohrid 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 Ohrid 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
0.47	49	0.51	39	0.74	39

It is emphasized that the Lake Ohrid 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 Ohrid indicates a low threat rank compared to other priority transboundary lakes.

The Reverse Biodiversity (RvBD) for Lake Ohrid, which is meant to describe its biodiversity sensitivity to basin-derived degradation, increases the lake to a moderately 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 Ohrid basin in a moderately low threat rank in regard to its health, educational and economic conditions.

Table 2. Lake Ohrid 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
49	39	39		88	46		88	44		127	44

When multiple ranking criteria are considered together in the threat rank calculations, the Adj-HWS and HDI scores considered together place Lake Ohrid in the lower quarter of the threat ranks. The relative threat is similar when the Adj-HWS and RvBD threats are considered together. Considering all three ranking criteria together, Lake Ohrid exhibits a low 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 Ohrid, the 0.5 and 0.5 weight combinations for three cases of parametric analysis for Lake Ohrid resulted in respective threat rankings of 9th, 8th and 9th, respectively, among the total of 9 European transboundary lakes in the TWAP study (see Technical Report, Section 4.3.3, pp44-48 and Appendix 6(1)).

In essence, therefore, identifying potential management intervention needs for Lake Ohrid 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 Ohrid basin? Accurate answers to such questions for Lake Ohrid, 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.