

Scientific Environmental Monitoring Expedition of Lake Baikal

Section 1: General Information	
Summary	First launched in 2019, the purpose of the annual expedition is to detect and study threats to Lake Baikal, accumulate data, and assess the dynamics of the ecological state. Experts from nine scientific institutes from Russia and Mongolia have taken part in the expedition, sampling water and groundwater to assess and study the pollution and biodiversity levels of coastal ecosystems. The results then shape concrete public and private sector actions to combat ecosystem deterioration of Lake Baikal
Proponent Name(s)	En+ Group (Moscow), A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences (Moscow), Lomonosov Moscow State University (Moscow), Moscow Institute of Physics and Technology (Moscow), Institute of Problems of Microelectronics Technology and High-Purity Materials of the Russian Academy of Sciences (Moscow), Institute of Lake Science of the Russian Academy of Sciences (St. Petersburg), Siberian Federal University (Krasnoyarsk), Institute of Biophysics of the Siberian Branch of the Russian Academy of Sciences (Krasnoyarsk), Research Institute of Biology of Irkutsk State University (Irkutsk), Institute of Geo-Ecology of the Mongolian Academy of Sciences (Ulanbaator)
Proponent Type	Private Sector Companies
Primary Contact Name	Alexandra Gundobina, Head of Strategic Partnerships, Sustainable Development
Primary Contact Details	gundobinaai@enplus.ru
Additional Contact Details	sasha.gund@gmail.com
Region	Asia Pacific

Section 2: Commitment	
Linkages to SDG 6	Improve Water Quality, Wastewater Treatment and Safe Reuse, Protect and Restore Water-Related Ecosystems
Target	<p>Lake Baikal, a UNESCO World Heritage site, is home to 20% of the world's freshwater reserve and over 1,000 endemic species. The landscapes of the Lake are not only a tourist destination, but also bear a sacred significance for many local groups and nationalities.</p> <p>Over the last decade, as a result of increased anthropogenic factors, scientists have noted the deterioration of the Lake, a decrease in endemic populations and unique biodiversity. At the same time, the systemic threats to the Baikal natural territory have not been sufficiently studied. Recognising, that without a structured</p>

	<p>understanding of the threat complex, it is not possible to develop measures aimed at improving the situation, the Environmental Monitoring Expedition of Lake Baikal was launched in 2019.</p> <p>By providing data on the state of the Lake, the expedition seeks to help improve water quality, and protect and restore the water-based ecosystems.</p> <p>The expedition seeks to accumulate data, assess dynamics of the ecological state of the Lake in order to identify possible negative impacts on the ecosystem, as well as their sources.</p> <p>Data is annually collected across the same 35 sampling sites, using the same methodology across the eastern and southern coasts of Lake Baikal, as well as on the Selenga River, the source of 50% of Baikal's waters. The following aspects are assessed annually:</p> <ul style="list-style-type: none"> • Water quality (hydrochemistry, phosphate and nitrate concentrations, biogenic substances, heavy metals) • Quantity and distribution of microplastic particles • State of biodiversity (problems with the Baikal sponge, Gammarus amphipod crustacean, development of filamentous algae "Spirogyra") • Ingress (quantity and quality) of pollutants from settlements through groundwater • Qualitative data surrounding natural and anthropogenic factors bearing effect on the ecological state of Lake Baikal <p>Results of the expedition are then circulated, and help stakeholders advocate for and justify concrete actions and formation of legislation that seeks to minimize anthropogenic impact on the Lake.</p> <p>Currently, the annual monitoring is confirmed for a period up to 2026.</p>
Linkages to other SDG	Sustainable Cities And Communities, Life Below Water, Life On Land, Partnerships For The Goals

Section 3: Actions and Outcomes to Achieve Targets	
Relevant Sub-Theme	Disaster Risk Reduction and Management, Governance, Cooperation and Hydro-diplomacy
Actions and Outcomes	<p>The results of annual scientific expeditions conducted within the framework of environmental monitoring have become the scientific basis for projects providing comprehensive measures to protect the environment in the Baikal natural territory.</p> <p>The results of the expedition demonstrated the following:</p>

- The results of the 2020 expedition allowed us to draw scientific conclusions about the previously unstudied influx of phosphorus and nitrate-containing substances into Lake Baikal from ground-waters of coastal residential areas.
- Increased concentrations of microplastics in the waters of Lake Baikal from 2020 to 2022. In 2022, results showed 28,000 square mm of microplastic particles per square km of the lake's surface (up from 27,000 sq.mm/sq.km in 2021). Microplastic fibres, measured in mm length, in 2022 amounted to 99,000 mm of fibre per square km of the lake's surface.
- In the following year, no rise in concentration of microplastic particles was found, but a migration of the microplastic-polluted waters around the lake has been observed.
- Elevated concentrations of phosphate-containing compounds in ground-waters from coastline settlements. In Baikal waters, concentrations are steadily rising, from 0.04mg/l in 2021 to 0.11mg/l in 2022 and 0.17mg/l in 2023. Similar trend is visible in the Selenga River, albeit with higher concentrations (from 0.06mg/l in 2021 to 0.37mg/l in 2023).
This data has significantly contributed to the following outcomes:
- Formation of scientific articles, which provide authorities, businesses and other stakeholders with verified scientific data to make informed management decisions.
- Based on scientific articles on the influx of phosphorus and nitrogen-containing substances into the Lake from ground-waters published after the 2020 expedition, the Republic of Buryatia brought more attention to the problematic and justified the need to build sewage treatment plants in a number of settlements located on the shores of Lake Baikal. Increased focus of the local government on the problematics could be among the reasons for the following decrease in nitrate concentrations in ground-waters dropped from 16,7mg/l in 2021 to 15.8mg/l in 2022. Completion of the construction of wastewater treatment infrastructure is expected by the end of 2024. The infrastructure is to be operational in 2025.
- Elevated concentrations of phosphate-containing compounds in ground-waters from coastline settlements pushed for the establishment and helped justify the bill banning the sale of phosphate-containing household chemicals within the boundaries of the Baikal natural territory. The legislation has been approved in the first reading.
- A patent for a lake-specific microplastic sampling net.
- Conclusions about the increased concentrations of microplastics have led to the initiation of a bill banning the sale of single use plastic bags and tableware on the territories surrounding Lake Baikal. The legislation has currently been approved in the first reading. It is expected to pass by the end of 2024.
- Data on microplastics has also pushed for the formation of the Baikal Plastic Free Alliance, an alliance of businesses, NGOs, scientists, universities and natural parks to advocate for the reduction of single use plastic pollution in areas surrounding Lake Baikal.

	<ul style="list-style-type: none"> Increased awareness of local population and stakeholders on the threats to the Baikal ecosystem, their causes. This has been brought to the public's attention through conferences, round tables, publications, direct letters to interested and influential parties. <p>The expedition can be replicated on any freshwater resource. This will ensure detailed scientific, up to date data on factors affecting the quality of water and water-based ecosystems.</p>	
Implementation Period	Start Period	1/7/2019
	End Period	1/3/2026
Financial Commitment	From 2019 to 2026, funding for the expedition will amount to 43.5 million RUB (just under 500,000 USD). This shows that the project is financially affordable, scalable and replicable for other water resources.	