

Local environmental monitoring as a tool for evidence-based decision-making: The experience of a family laboratory in Ukraine

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Abstract

Environmental monitoring is traditionally associated with large industrial enterprises and government institutions. In practice, however, a significant share of measurements is carried out at the level of individual apartments, offices, small workshops, and construction sites. In Ukraine, where urbanization, post-war recovery, and the adaptation of legislation to EU standards are taking place simultaneously, local measurements of noise, air quality, and water quality are becoming an important tool for resolving everyday conflicts and confirming compliance with regulatory requirements.

This article presents the experience of a family environmental laboratory that has been operating in Ukraine for more than eight years and serves at least 60 clients per month, including both private individuals and commercial organizations. Typical tasks (assessment of noise, air quality, water quality, and microclimate parameters), the format of interaction with clients, and the measurement instrumentation used are described. Based on practical experience, the article shows how local measurements help support evidence-based decision-making, facilitate dialogue with regulatory authorities, and improve environmental literacy among the population. The global context of the development of the environmental monitoring market and research into the health impacts of pollution, within which the activities of small laboratories are situated, is briefly reviewed.

Keywords: Environmental Monitoring; Ukraine; Noise; Air Pollution; Water Quality; Microclimate; Sanitary Standards; Local Measurements; Private Laboratory

1 Introduction

Over the past decades, environmental monitoring has ceased to be the exclusive domain of large enterprises and government agencies. According to international reviews, the global market for environmental monitoring solutions is valued at tens of billions of dollars and demonstrates steady growth, largely driven by air and water quality monitoring systems, stricter regulation, and increased public attention to environmental risks.

For Ukraine, the relevance of environmental monitoring is reinforced by several factors simultaneously:

- The Consequences Of Military Actions And The Need To Assess Environmental Damage;
- The Restoration Of Infrastructure And Housing Stock;
- The Gradual Alignment Of National Sanitary And Environmental Standards With Eu Requirements;
- A High Proportion of urban population and the concentration of people in dense urban development.

Against this background, issues arising “on the ground”—in a specific apartment, office, workshop, school, or small production facility—become no less important than the control of large emissions or regional indicators. Residents

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complain about noise from roads and entertainment venues, property owners about odors and air quality, and small businesses about inspection requirements and complaints from neighbors.

The purpose of this article is to demonstrate, using the example of a family enterprise engaged in environmental measurements in Ukraine for more than eight years and serving at least 60 clients per month, the role of local monitoring as a tool for evidence-based decision-making and the formation of a fact-based environmental culture.

2 Operating Model of a Family Environmental Laboratory

The family enterprise in which the author works specializes in on-site environmental measurements for private and corporate clients. Its geographical coverage includes several regions of Ukraine; the portfolio of projects includes residents of apartment buildings and private housing, owners of small and medium-sized businesses, property management companies, and educational institutions.

The main areas of activity include:

- Measurement of noise levels in residential and public buildings, on adjacent territories, and at workplaces;
- Assessment of air quality indoors and outdoors (concentrations of pollutants, presence of odors, microclimate parameters);
- Analysis of water quality (drinking water from wells and centralized supply systems, as well as technical water at small production facilities);
- Measurement of microclimate parameters (temperature, relative humidity, air velocity) in premises of various purposes.

The methodological basis consists of the current sanitary and construction standards of Ukraine, as well as, when necessary, recommendations of the World Health Organization and EU documents used for comparison and interpretation of results.

A typical work cycle includes four stages:

- **Request and task clarification.**

The client describes the problem: noise, odor, suspected air or water contamination, preparation for an inspection. At this stage, the applicable regulatory standards, required measurement parameters, and the format of reporting documentation are clarified.

- **Site visit and measurements.**

A set of measurements is carried out at the site using calibrated instruments (sound level meters, gas analyzers, water sampling devices, thermo-hygrometers, etc.) in accordance with approved methodologies and during representative time periods (day/night, equipment operating modes, etc.).

- **Data processing and report preparation.**

The results are compared with regulatory values and presented in the form of tables and graphs with clear documentation of measurement locations and conditions, as well as conclusions regarding compliance or non-compliance with established requirements.

- **Discussion of results and recommendations.**

The client is provided with explanations of the obtained values, possible consequences of exceedances, and options for action—from organizational measures and technical solutions (sound insulation, ventilation, filtration) to preparation for interaction with regulatory authorities or judicial bodies.

Over eight years, this cycle has been implemented many times in a wide variety of settings—from small urban apartments to workshops and logistics warehouses.

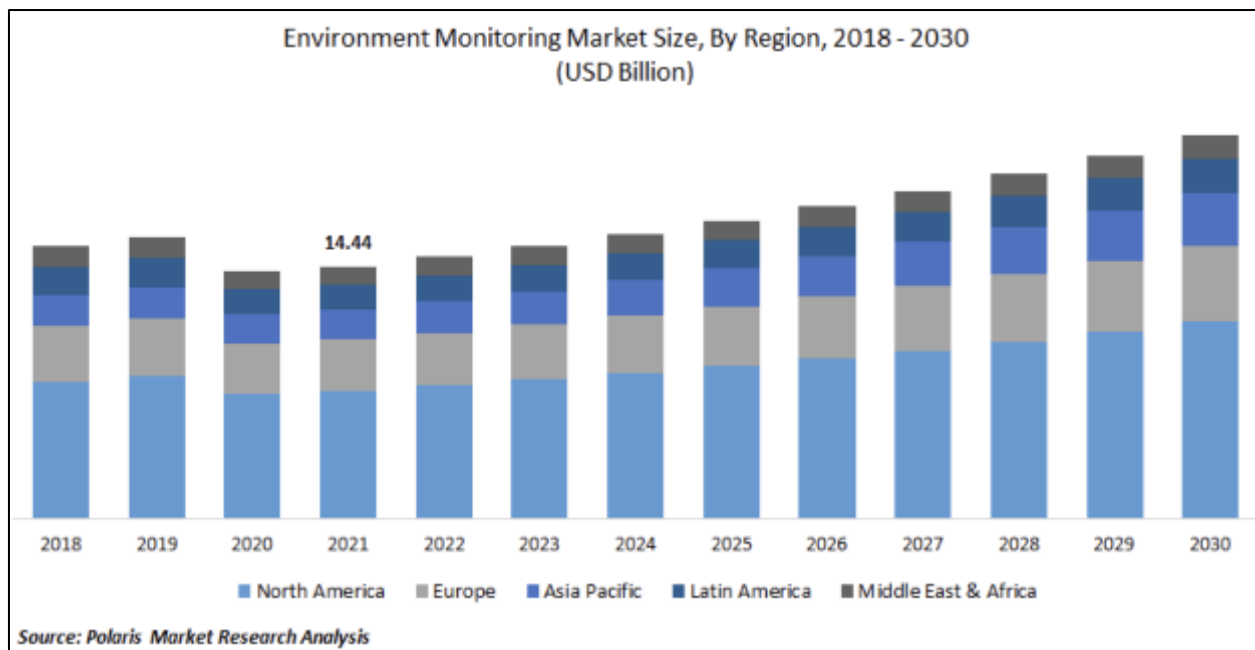


Figure 1 Global Environmental Monitoring Market Size by Region (2018–2030, USD Billion)

3 Typical Client Requests and Their Practical Significance

Analyzing client requests allows us to identify several characteristic groups.

3.1 Private Clients

Among private individuals, the following situations are most common:

3.1.1 Noise pollution

Complaints about constant noise from highways, railways, entertainment venues, or engineering equipment. Measurement of noise levels and an official report become an argument in appeals to local authorities, landlords, property management companies, or in court.

3.1.2 Air quality and odors

Suspected air pollution after renovation, fire, installation of new ventilation systems, or the opening of a café or workshop on the ground floor. Clients are interested both in exceedances of specific pollutants and overall microclimate indicators.

3.1.3 Drinking water quality

Testing water from wells, boreholes, or local water supply systems before domestic use, especially in suburban and rural areas.

In all these cases, the final report serves not only an informational purpose but also a legal one, allowing the conversation to move from subjective complaints to objective discussion.

3.2 Commercial Clients and Organizations

For businesses and organizations, environmental measurements are more often associated with regulatory and reputational risks:

- **Pre-assessment before inspections.** Companies order measurements to identify potential violations in advance and reduce the risk of fines or orders.
- **Documentation for design and reconstruction.** Baseline data on noise, air quality, and microclimate are used for project design decisions, selection of engineering equipment, and space planning.
- **Conflict resolution.** Objective data help resolve disputes with neighbors or employees—for example, regarding office temperature regimes or noise levels from production areas.

In this segment, the laboratory acts as a “link” between the technical reality of the facility, regulatory requirements, and the expectations of different stakeholders.

3.3 Global Context: Air Quality, Noise, and Health

Although the family laboratory operates locally, its work fits into a broader international context.

According to WHO estimates and specialized research centers, in many Eastern European countries, including Ukraine, the annual average concentrations of fine particulate matter (PM_{2.5}) exceed WHO recommended levels by 1.5–2.5 times. Long-term exposure to polluted air is associated with an increased risk of cardiovascular and respiratory diseases, as well as reduced life expectancy.

Noise is also recognized as a significant health risk factor. European assessments show that tens of millions of residents in large cities are exposed to noise levels above recommended thresholds, correlating with higher risks of hypertension, sleep disturbances, and impaired cognitive development in children.

These data give additional importance to local measurements. When a family with young children complains about nighttime noise or poor air quality, the concern is not only about discomfort but also about risks confirmed by large epidemiological studies.

For illustration, the article could include charts showing:

- projected growth of the global environmental monitoring market;
- trends in the development of air quality monitoring systems;
- comparison of WHO recommended pollution levels with actual concentrations in different regions, including Eastern Europe.

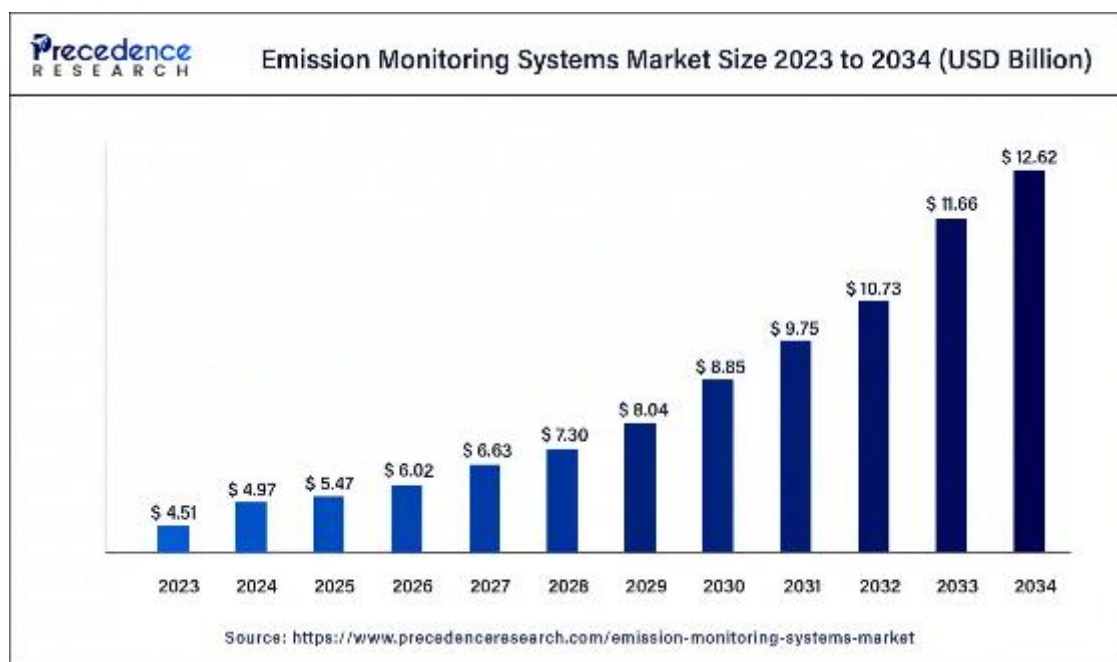


Figure 2 Global Emission Monitoring Systems Market Size Forecast (2023–2034, USD Billion)

4 The Role of Small Laboratories in Developing an Evidence-Based Environmental Culture

The experience of a family laboratory, serving a stable flow of at least 60 clients per month, demonstrates that small players can significantly influence the local environmental agenda.

Firstly, such enterprises lower the entry barrier to environmental monitoring. Services become accessible not only to large industrial facilities but also to ordinary citizens, small companies, and institutions.

Secondly, small laboratories translate technical language into a level understandable to clients. Clearly structured reports and explanations allow clients to understand exactly what the measured values mean in terms of health, comfort, and legal implications.

Thirdly, with a sufficient volume of requests, these structures effectively provide feedback to regulators. Repeated complaints and typical exceedances of certain parameters can signal areas where regulations need adjustment or enforcement needs to be strengthened.

Finally, small laboratories play an important role in staff development. Young specialists entering such companies gain not only technical skills for working with measurement equipment but also experience in communicating with real people and addressing real problems, which is especially important in applied environmental work.

5 Conclusion

Local environmental monitoring in Ukraine—at the level of apartments, offices, small production facilities, and social institutions—is gradually becoming an important tool for making evidence-based decisions.

The practice of a family laboratory, operating in the sector for eight years and serving at least 60 clients per month, shows that:

- Stable demand for accurate information on noise, air quality, water, and microclimate persists and tends to grow;
- Private laboratories can effectively connect the interests of citizens, businesses, and regulators, providing an objective evidence base;
- Global trends in health protection and environmental monitoring are directly reflected in everyday client requests.

As Ukraine continues to align its environmental and sanitary legislation with EU standards and implements recovery programs, the role of local measurements and small laboratories is likely to increase. Their work contributes not only to resolving specific conflicts but also to developing a more mature, data-driven environmental culture.

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