INDICATORS OF URBAN ENVIRONMENT ASSESSMENT AND CRITERIA FOR THEIR SELECTION

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Annotation. It is an important task to formulate and justify the universal rules for choosing fair sustainable development indicators for the social, economic, and ecological spheres of human activity. At present, we can achieve sustainable development by updating ecological development indicators within the research object selected on the basis of a problem-complex approach.

From the point of view of ensuring sustainable development, it is necessary to highlight priority directions and justify certain rules. Among them, in particular, the formulation of rules for the selection of eco-dynamic indicators should be particularly important.

Keywords: urban ecology, assessment, criteria of indicators, air pollution, noise index, unhealthy, waste, recycling, energy consumption.

Introduction. The first difficulty that arises in this way is the difficulty of justifying the priority results that will occur after the introduction of these indicators. If the results are clearly indicated and the main intended goal is achieved, then such key indicators can serve as a starting point for improvement by introducing new ones. Usually, experts from different countries express different opinions on this issue, but these differences begin to disappear as the dimensions of the indicator levels increase. It should be noted that until recently, the social factor was a priority, but now almost all countries are paying attention to economic and environmental problems, which is a reason to hope for unanimous agreements on these issues. But there can be significant differences between developed, developing, and underdeveloped countries because their environmental problems are relatively different.

For this purpose, blocks of priority tasks were developed by the UN, which shows the important directions of the use of indicators. These blocks are arranged in three levels:

- general priority tasks;

- priorities specific to developing countries;

- priorities for developed countries.

In each of these blocks, special attention is paid to the environmental problems of cities. In this direction, according to experts from almost 140 countries of the world, first of all, it is necessary to justify the indicators of sustainable ecological development of cities.

Main part. In this regard, the most common criteria for the selection of indicators for the solution of environmental problems of large cities and their widespread use in the future should be [3]:

1. Relevancy to national environmental priorities: compliance of indicators with the goals and objectives of national strategy documents on environmental protection and natural resource management (national strategies for environmental protection, sustainable development, biodiversity, national action plans, etc.);

2. Relevance to international environmental policy: indicators are related to the implementation of international agreements, international obligations, and international comparability;

3. Its role as a means of communication to inform the population: clarity of indicators for the general public and increase awareness of the state of the environment;

4. Availability of cost-effective methods and methodologies for indicators and necessary data (measurements or calculations);

5. Availability of data on the time scale (regular data flow): indicators were assessed by the availability of long-term data and primary data to identify trends;

6. Forecasting: the indicators are evaluated in terms of the possibilities of monitoring the effectiveness of the environmental policy being carried out;

7. Prioritization: the indicators were evaluated according to their importance relative to each specific environmental problem (or sub-problem) or other environmental policy indicators.

Another important factor affecting the selection criteria of indicators is the models and approaches used in the study of specific problems of urban eco-dynamics. This means that within a complex urban model at the macroscopic level, we should choose only macroscopic quantities as indicators and indices of eco-dynamics. Recently, the terms "micro indicators", "macro indicators" and even "meso indicators" have been increasingly used in scientific literature. This is related to the selected level of description of the object under study.

Taking into account the above points, it is appropriate to adopt the following general rules and criteria of urban eco-dynamic indicators as macroscopic indicators [6]:

1. Scientific basis;

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2. Accuracy of indicators;

3. Ability to combine indicators;

4. Easy interpretation.

Scientific validity is a clear criterion, which should be the primary factor not only in the development and selection of indicators but also in all fields of knowledge.

The criterion of the accuracy of indicators requires some discussion. If we talk about urban eco dynamic indicators only about observable (measurable) quantities (experts from developed countries call such indicators natural indicators), then the accuracy is determined by the exact indicators of the equipment measuring a certain component in the area. In addition, when moving from simple indicators to more complex indicators, accuracy decreases because measurement errors always tend to add up. If we do not talk about the quantities used as indicators, then the question of accuracy may lose its meaning [14].

The ability to combine indicators is understood as collecting data and bringing a number of specific results to a certain general result with larger indicators. This criterion is very difficult to meet because it has always been difficult to collect accurate data. The criterion requires serious study, the main purpose of which is to develop a certain universal scheme of the unification process, with the help of which we can get an answer to the desired question.

The criterion of easy interpretation is very important for decision-making systems. In this regard, the question of the dimensions of the indicators and the dimensions used to measure them remains relevant.

Thus, when analyzing to add a certain macroscopic quantity (indicator) to an eco-dynamic indicator, it is necessary to follow the step-by-step "selection rules" by checking the compliance of the included indicator with all the above recommendations and criteria.

When talking about the rules for selecting urban ecological indicators, we must remember to study these indicators before the decision-making system. This means that the following two issues need to be taken into account and worked out in advance [8]:

1) selection and justification of the measurement scale of the introduced indicator;

2) assessment of the level of uncertainty in the description of the phenomenon measured using this indicator.

The issue of the classification of eco-dynamic indicators can be approached from different points of view. The most common approaches are:

The first approach is based on the classification of indicators according to the categories of phenomena they describe, that is, the quality of the city's

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atmosphere, water resources, soil cover, flora and fauna, industrial and household waste, radiation pollution, and public health. This first-level classification is widely used by international organizations such as the Center of Collective Development and the Inter-Agency Working Group on Reproductive Health in Crisis. Although there are significant differences between these two organizations in terms of prioritization and the construction of indicators, in general, their positions on the issue of categorization of indicators are almost identical.

The second approach is based on the inclusion of vertical and horizontal measurements. The vertical scale includes the levels discussed above, namely global, regional, national and local. The horizontal scale means the analysis of the indicators reflecting the environmental condition of the city on the basis of the vertical scale. This interpretation is made within the framework of the UN Sustainable Development Indicators and has a general character, that is, it focuses on general environmental protection [3].

Taking these data into account and studying the experience of developed countries of the world shows that the correct choice of indicators is a very important issue in classifying, evaluating, and finding solutions to urban-ecological problems. The study of the world experience in the selection of indicators, in particular the reports of Germany, Italy, Australia, and the European Community, showed that the DPSIR (Driving force-Pressure-State-Impact-Response) model is of great help in the assessment of urban ecological problems and in solving existing problems based on this assessment. This model is model that explains why polluted areas have become the way they are and how to respond to them, allowing for the re-planning of ecologically "unhealthy" areas [7].

Analyzing existing studies and their results, we collected and grouped potential indicators that can describe the environmental condition of cities.
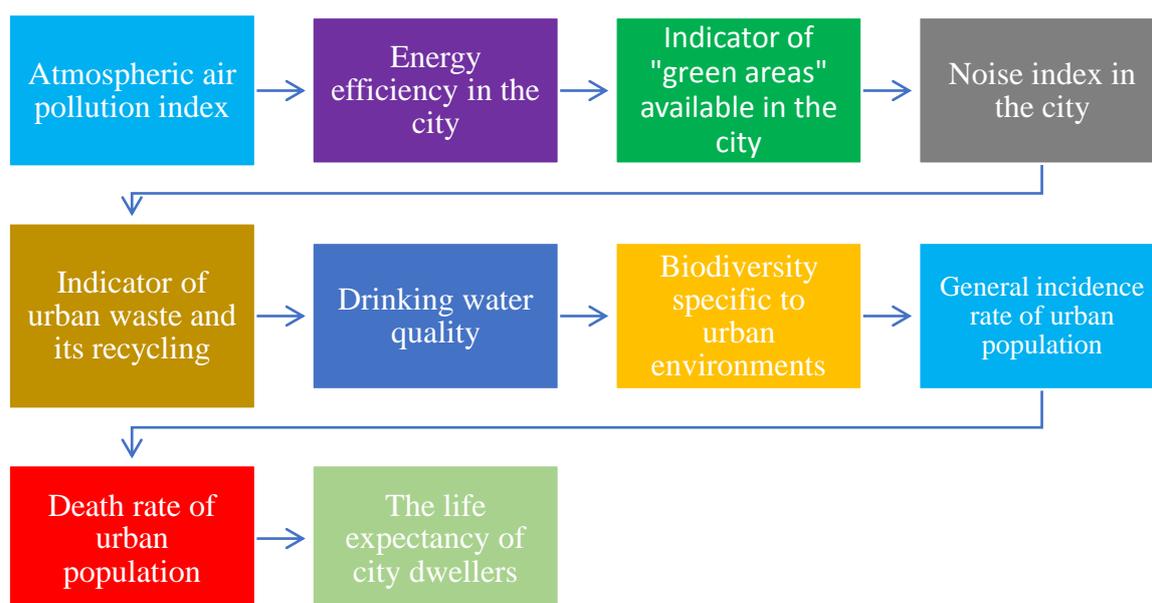

Figure 1. Indicators for assessing the environmental condition of cities

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Conclusion. These recommended indicators to a certain extent allow not only to assess the state of the city environment, but also to develop specific measures for its optimization and conduct an optimal socio-economic policy.

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