ORGANIZATIONAL AND METHODOLOGICAL PROBLEMS OF ENVIRONMENTAL AUDIT OF LAND USE IN AGRICULTURAL ENTERPRISES AND THEIR SOLUTIONS

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Abstract: The organizational and methodological approaches to environmental management systems organization at agricultural enterprises have been analyzed in the paper. The role of environmental audit in land use regulation and protection has been determined. The tasks and principles of environmental audit application and evaluation of land resources in agricultural enterprises have been disclosed. Methodological fundamentals of environmental audit of land use and protection at agricultural enterprises have been improved.

Keyword: Environmental audit, land resources, agricultural land protection, environmental management system, right of ownership of lands, verification, standard, ISO, environmental aspects, application of fertilizers and pesticides.

Introduction

The decisive factor of agricultural enterprises activity is land resources. They are the means of production in crop outputting, spatial fundamentals for placing livestock farms, servicing facilities. The agricultural lands are subjected to intensive anthropogenic influence due to unbalanced production processes. This causes soil degradation, increased erosion and reduced fertility. To improve the efficiency of land use and protection of land resources it is necessary to implement innovative environmental management tools, including environmental auditing.

Theoretical and methodological principles of environmental audit have been investigated by leading scientists, namely: V. A. Borisova, T. P. Galushkina, B. M. Danylyshyn, M. A. Hvesyk, O. S. Kozhukhova, G. I. Kupalova, C. I. Lebedevych, V. S. Ali, L. Grayson, H. Humphrey, M. Hadley, K. Muller et al.

Despite the significant results of researches, conducted by mentioned scientists, theoretical and methodological fundamentals of environmental audit of land resources at enterprises are still out of researchers interests. Given the above, the purpose of the paper is to improve organizational and methodological fundamentals of environmental auditing of use and protection of land resources at agricultural enterprises.

To achieve this goal the following tasks have been solved:
1. To analyze the organizational and methodological provisions of environmental management system for agricultural enterprises and to determine the role of environmental audit in land use and protection at these enterprises;
2. To disclose the tasks and principles of environmental audit conduction and evaluations of land resources at agricultural enterprises;
3. To improve methodological fundamentals of environmental audit land resources use and protection at agricultural enterprises.

Results

For years, state policy in the agricultural sector of the most countries was aimed at increasing productivity through the intensive use of fertilizers, pesticides and heavy machinery. The combined effects of the above factors have led to land degradation, decreased fertility, erosion propagation, reducing fauna and flora species diversity, unification of agricultural landscapes. The deterioration of the land resources quality reduces the economic efficiency of businesses in agricultural sector.
For example, in Uzbekistan average economic losses due to soil salinity are estimated at 1 billion $. In Moldova, the economic losses from soil erosion are estimated at 40 million $. In Ukraine the amount of humus in soil is reducing by 1 ton per year. It is equivalent to the cost of CO$_2$ emissions of 40 $ per 1 ha. The decrease soil fertility leads to the loss of 2.8 billion $ a year in agriculture.

Experts state that average costs associated with the use of pesticides are varying from 8 to 47 $ per 1 hectare of arable land at average cost of $ 4.28 per 1 kg in United States, Germany, UK, USA and China. In fact, the losses due to externalities in China exceed the market value of pesticides. The damage inflicted to the health and environment is estimated on average at the level of 1.86 $ for every dollar used on pesticides [1].

Despite the urgency of the problem, critical analysis of organizational approaches to the environmental management system of agricultural enterprises has showed that the management of land use and protection is not priority for them. Thus, the study of environmental goals and objectives of 15 agricultural enterprises in Poland, Ukraine and Kazakhstan (specialization – growing crops) has showed that only 3 companies have assigned the highest rank hazard of impact on environment and people to the use of fertilizers and pesticides. While the formation of waste has been pointed as the most important by 6 companies, and CO$_2$ formation – by 4 (in Table 1).

### Table 1

<table>
<thead>
<tr>
<th>Environmental aspect</th>
<th>Rank based on the intensity of the environmental impact, from 1 to 10</th>
<th>Number of enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Application of fertilizers and pesticides</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>CO$_2$ emissions</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Water supply</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>5-6</td>
<td>9</td>
</tr>
</tbody>
</table>

*Author’s own development

Accounting the priority principle applied in environmental management systems according to ISO 14001 "Environmental Management System", agricultural enterprises primarily use arrangements and financial resources, allocated for environmental protection, for waste management organization and reduction of CO$_2$ emissions.

Insufficient attention to land resources protection is caused, primarily, by the lack of complete and objective information about current condition of land resources and intensity of economic activity impact on them. The study of voluntary environmental management tools application for land resources protection by 15 agricultural enterprises in Poland, Ukraine and Kazakhstan has shown that now the most widespread is environmental management (Table 2).

### Table 2

The application of voluntary environmental management tools in the field of land resources protection by agricultural enterprises in Poland, Ukraine and Kazakhstan*

<table>
<thead>
<tr>
<th>Voluntary environmental management tools</th>
<th>Total</th>
<th>Kazakhstan</th>
<th>Poland</th>
<th>Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental management</td>
<td>13</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Environmental audit</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Environmental control</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

*Author’s own development

Thus, despite the urgent need, environmental audit has not become common for agricultural enterprises. The reasons of limited application of land resources environmental audit are:

1. The lack of science-based and legally approved methodology of land resources environmental audit for agricultural enterprises;
2. The lack of information about economic, environmental and managerial advantages of internal and external environmental audit of land resources;
3. Conduction of synthetic environmental audit within environmental management system aimed at verifying environmental goals and objectives achievement do not fully take into account the audit of certain natural resources, including land.

Critical analysis of theoretical principles of organization and conduction of environmental audits in agriculture has showed that common interpretation of the term "environmental audit of land resources" are still lacking. Scientists and auditors use generally accepted definition, namely "environmental audit is a documented systematic independent process of assessing object of environmental audit, including collection and evaluation of objective evidence of compliance of certain activities, events, conditions, management systems surrounding environment and information on these issues to the legislative requirements of environment protection and other environmental audit criteria". However, this definition does not fully take into account the relevant prerequisites of environmental audit of land resources and their specificity as an object of management, legal interactions and accounting.

Under the conditions of investment risk and growing total economic losses due to deterioration of land resources quality the most important prerequisites of their environmental audit are:
- progressive reduction of soil fertility;
- gradual withdrawal of lands from exploitation due to their inefficiency;
- increasing environmental costs (of land reclamation, penalties due to violations of environment protection legislation, tax burden, etc.);
- development and/or substantiation of optional environmental strategies and policies for a company;
- need in independent objective assessment of current environmental management system efficiency in the field of land resources protection, work analysis, evaluation and prognosis of monitoring system for environmental impact sources, environmental production control system of;
- investment (substantiation of potential land cost based on environmental indicators of economic activity);
- insurance (assessment of environmental risks, economic losses from environmental pollution, cost of liquidation of consequences of human impacts on the environment);
- protection of company environmental interests (environmental assessment of leased land, information support of dispute resolution with landowners and other enterprises interacted geographically or technologically etc.).

The objects of the environmental audit of lands resources at agricultural enterprises are separate land plots with established boundaries, certain location and on certain rights.

Given the above, we propose the following definition of the category “environmental audit of lands resources of agricultural enterprises” – a set of organizational, methodological and documentation measures for the assessment of ecological condition and resource potential of land resources of an entity, detection and identification of anthropogenic impact sources, negative natural and technogenic processes, determination of the complex of actions and measures for environmental rehabilitation of polluted areas».

Environmental audit of lands resources of agricultural enterprises must be based on the following principles:
1. Systematic – periodic conduction of environmental audits to control the productivity of current activities on land resources protect, timely identification of potential environmental risks and environmental plans adjustment accounting the results obtained and impact of external (legal requirements, environmental certification etc.) and internal factors (financial software, changes in environmental policies and so on).
2. Implementation of legal requirements – the main criteria of environmental audit of land resources is national legislation in the field of lands protection. Depending on strategic needs of an enterprise, international environmental standards or management systems standards can also be applied as audit criteria.
3. Objectivity – the conclusion of environmental audit should include objective, documented and complete data about land resources, intensity of anthropogenic influence on them, effects of economic activity.
4. Taking into account natural land features, their intended use and economic evaluation.

Environmental audit of agricultural enterprises land resources may be conducted by external and internal environmental auditors. Advantages and disadvantages of these auditors involvement are given in table 3.
Advantages and disadvantages of external and internal environmental audit of land resources use and protection in agricultural enterprises

<table>
<thead>
<tr>
<th>Type of audit</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>1. Higher objectivity of the audit results due to impartiality and independence of auditors; 2. Ability to obtain suggestions and recommendations based on best practices, research and technical innovation.</td>
</tr>
<tr>
<td></td>
<td>1. High cost; 2. Impossibility of current audit control over the results of environmental policies implementation in the field of land resources.</td>
</tr>
<tr>
<td>External</td>
<td>1. Possibility of permanent operational control over the efficiency of protection activity for land resources; 2. Low costs; 3. Efficient information interaction with other departments of the company.</td>
</tr>
<tr>
<td></td>
<td>1. Risk of the objectivity principle violation; 2. Incomplete knowledge about innovative methods of reclamation, restoration of damaged soils and others.</td>
</tr>
</tbody>
</table>

To mitigate the above mentioned shortcomings and organize efficient environmental management system of land resources use and protection it is recommended to conduct external environmental audit of land resources for evaluating their actual condition, determining the effects of human activities and suggesting improvements. The internal environmental audit of land resources is conducted to monitor the results of environmental programs and operational measures implementation for soil quality restoration or preservation.

Methodological principles of external environmental audit of land resources of agricultural enterprises include the following steps:

1. Definition of the total land area owned (used) by agricultural;
2. Determination of enterprise general land resources structure based on the following criteria:
   a) right of land ownership or use, right of servitude;
   b) land use purposes;
   a) type of land use within a purpose category.
3. Verification of documents proving ownership and / or use of land, right of servitude.
4. Identification of the encumbrances types on land.
5. Familiarization with general plan of the company to establish the borders of industrial, warehouse, utility and administrative areas and areas covered with vegetation and built-up area, areas under temporary and permanent storages of waste and hazardous substances (including the previous situation), areas of pesticides application, reclaimed land, sanitary protection, water protection zones, etc.
6. Visual inspection of the territory in order to verify land use purpose compliance, building scheme compliance with the development (master) plan, detection of soil pollution due to damage of infrastructure (sewage, pipeline systems, storm waters collecting system, heating, etc.) or non-compliance with the rules for handling hazardous waste and substances, etc.
7. Sampling of soil / groundwater, laboratory testing to establish their chemical composition, detection pollution and identify location of sources.
8. Analysis of compliance with soil quality standards, permissible anthropogenic pressure, agricultural development, etc.
9. Verification of audit subject compliance with legislation on protection of land resources, restoration of disturbed lands, order and limitations over the use of land and water fund. Here it is necessary to check: the actual implementation of activities for land protection by the enterprises; condition of anti-erosive and hydraulic structures, protective plantations; presence of waterlogged lands; availability and implementation of sanitary protection zone improvement project at audited enterprise.
10. Audit of ground and underground tanks and vessels exploitation, which involves checking:
   – the availability of legal and technical documents regulating the design and construction of reservoirs (tanks);
– fulfilment of specifications and requirements to exploitation, operating conditions of intended use and safety requirements;
– list of chemicals and compounds stored in ground / underground reservoirs / tanks;
– order of conducting control examinations and availability of records about the use of reservoirs / tanks.

Conclusions

Under the conditions of growing investment risks and increased economic losses due to deterioration of land resources, one of the most promising tools of environmental management in agriculture is environmental audit. Despite the urgency, the environmental audit of land has not become spread among agricultural enterprises. One of the main reasons is the lack of science-based environmental audit methodologies for land resources of agricultural enterprises. The application of the proposed methodological approaches to land resources environmental audit will help form uniform theoretical and methodological fundamentals of the audit, improve information-analytical media of environmental management, promotion of innovative environmental management approaches.

References