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Применение почвенных стандартов Европы на территории Азербайджана

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В статье рассматривается вопрос возможности интеграции почвенных исследований Азербайджана в почвенно-географическое пространство Европейского Союза. Анализ существующих почвенных данных показал, что имеющиеся трудности, связанные с различиями в научных подходах и методах можно преодолеть и обеспечить процесс Евроинтеграции. Как результат исследований, в рамках проекта расширения базы почвенных данных ЕС (ESDB), в соответствии с требованиями стандартов ЕС была составлена цифровая почвенная карта Азербайджана в масштабе 1 : 1 000 000 на ГИС основе.

Ключевые слова: база почвенных данных, Европейская интеграция, геоинформационная технология.

Application of the European soil standards in the territory of Azerbaijan

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At present the integration to the European and international structures goes on in many directions, including scientific. Against a background of globalization it is fundamentally important to form an adequate soil-information space which would ensure progressive international cooperation in the field of soil science. As is known, the new digital soil database of Mediterranean and Caucasus Countries' territory in the format of the soil geographical information system of the European Union (EU) is being prepared within the program for the Extension of the European Soil Database (ESDB). These researches intend to create the Soil Geographical Database of Eurasia at scale 1 : 1, 000, 000 as a part of the European Soil Information System (EUSIS). The current stage of the Azerbaijan soil resources inventory on supranational level is closely linked with the processes of adaptation of the country to the conditions of new geopolitical realities. It is of fundamental importance to preserve and develop the national scientific and practical traditions and their harmonious integration with the EU soil inventory. Taking into consideration the urgency of the problem, we have made researches in order to create the digital data base of the soils of the Republic of Azerbaijan. The digital soil map of Azerbaijan has been prepared in a scale of 1:1000000 using modern geoinformation technologies and taking into account the

ESDB requirements. During the analysis of soil database of Azerbaijan, some difficulties that impede the integration process to the ESDB were revealed. Generally, the work that has been done brought to a conclusion that the knowledge available on soils of Azerbaijan makes the integration to the EU soil-geographic data base possible.

Keywords: Soil database, integration, geoinformation technology.

Introduction

At present the process of integration towards European and International structures are taking place in many dimensions, including scientific. Against the background of globalization, is crucial to form an adequate soil-information space, which would provide the solution to pressing problems, in order to derive mutual socio-economic benefit. Due to the fact that Azerbaijan has an important geographical position, the country has a great potential for implementing modern concepts in the field of efficient land resources' use. On the basis of above-mentioned, it can be stated that the integration into a single soil-geographical space of Europe is one of the urgent tasks. Due to the country's geographical location and climatic conditions makes use of soil resource of Azerbaijan the issue of variety of international interests, including joint production of agricultural products, transfrontier migration of pollutant, development of an overall strategy of basin land use, etc. In this regard, formation of adequate soil information space, that would provide a solution of these and other issues in order to derive the mutual socio-economic benefits in the condition of globalization, becomes very crucial. Having more than 8.6 million hectares of land the region has a vast potential for realization of the concept of efficient land resource use. Peculiarity of the region is the fact that its topsoil formed from a huge variety of soil-forming factors. Bioclimatic conditions are varying in a very wide range. The relief represented by lowlands located below sea level and the high mountains of southern Greater and Lesser Caucasus.

There are huge variations of granulometric, mineralogical composition and age of the soil-forming rocks. Mentioned specific conditions of soil formation determine the enormous diversity of soil forms stones. Diversity of topsoil traditionally was nominated among the most important task of the inventory of soil resources.

Due to the specifics mentioned above, as rightly noted by famous scientists there is need to develop a system of methods and approaches that would cover all the different physical-geographic conditions and soil forms, and would enable conduction of unified soil surveys in densely populated regions, as well as in remote, inaccessible areas [4]. The new methodology proposed by European scholars, includes a set of

methods based on comparative-geographical approach developed by several generations of brilliant and largely distinctive scientists of soil-genetic direction. The methodology includes new fundamental concepts of factor-geographic conditions of soils, ecological-genetic identification and classification of soils, typology of soil spatial units and methods of soil mapping. In general it can be noted that the soil science and practice fully comply with the tasks and ensure the needs of agricultural production in soil information to the extent necessary for the proper functioning of society. However, the requirements for soil-information support constantly changing under the influence of the dynamics of emerging scientific and practical problems. What it is true today — seemed insignificant in different historical periods of time [5]. A perfect example of it was the land reform carried out in Azerbaijan, which resulted by a fundamentally new land relationship. The purpose of land reform was the creation of qualitatively new relations on land ownership on the basis of economic freedom and social justice, development of market economy, food security, and increasing material prosperity of society.

As a result of land reform land from collective and state farms was redistributed and there was a sharp increase in the number of land user- as the subjects of land-cadastral works.

Material and methodology

Naturally, above-mentioned land reform process was characterized by a peculiar kind of problem-statement and, of course, required specific soil investigations starting from the total soil-geographic descriptions through more detailed studies up to large-scale soil surveys. Current stage of development of Azerbaijan is not an exception and has its own specific needs-driven changes in soil information due to the collapse of the Soviet Union, disintegration of the soil resource space, the destruction of the state monopoly on land and trends in formation of the land market, which in turn stimulates the process of transformation and modification of land use systems in line with economic fundamentals and requirements of internal and external markets. Under these conditions, soil information first must be unified and focused on solving problems that arise in a dynamic market (internal and external) environment. Fundamentally important aspect of the problem is the requirement for compatibility of formats of national and international soil information spaces that allows the use of a common system of models for assessing and monitoring land-resource potential.

The challenge is to achieve comparability of criteria and the results of assessments of quality of soil- resource potential at the international level. All this will provide the basis for the formation of a single economic space within which it will be possible to implement a coherent policy on the use of soils with the best socio-economic and environmental results [5]. To this end in Europe a number of unique soil- information

systems were created at various levels, and developed systems allow assessing the suitability and land productivity of individual countries using standardized and internationally recognized standards with application of the latest information technologies based on geoinformatics, integrated modeling, coupled with the means of remote sensing of the new generation.

The purpose of these actions was presentation of a new digital soil database compiled in the territory of different countries, in the format of soil geographic information system of the EU. Development of a soil geographic information system of the European Union (EUSIS) was launched in 1986 and served the aims of the Pan-European program. A soil map of Europe in a scale of 1:1 million served as the basis of the project. Soil base has undergone several modifications to meet the requirements of the program MARS (Agriculture Monitoring through Remote Sensing). Conceptually EVSIS represent various opportunities for showing both the homogeneous and heterogeneous polygons in relation to soil.

This approach is fundamentally similar to the traditional method used in the post-Soviet Republics, according to which demonstration of soil areas based on soil heterogeneities. This method was particularly vividly developed in fundamental works related to the structure of the soil cover. In general, the concept of creating of database of soil characteristics - envisages relational type that gives the opportunity to match the individual layers of information based on a scheme such as «one-to-one», «one-to-many» and «many-to-one». According to the above-mentioned procedure, the soil layer is a digitized representation of the soil map. It consists of a mosaic of polygons, which corresponds to the traditional reading to the closed contours of the soil map. [5]. In consideration of the urgency of the problem, we conducted research to create a digital database of soils for the Republic of Azerbaijan. Soil database of Azerbaijan provides a fairly complete analytical characterization for representative soil profiles. However, the differences in approaches to analytical methods, measurements that have existed and exist to this day, limit the possibilities of integration. Because of these reasons, attributive information about the different soils of Azerbaijan is differs from European standards. Hence, we can conclude that, under current conditions, one of the urgent tasks for the pedologists of the post-Soviet countries, including Azerbaijan, is to develop soil database in the format of soil geographic information system of the EU, its structure and working correlation legend soil map of the region specific scale (for example Azerbaijan, 1 : 1000000) with a list of soils used in the EU system. Currently, international organizations are interested in a comprehensive unified classification required to produce a large-scale soil maps of the world, which can be used for evaluation and treatment of land in each country, and for focused and proper soil fertility management. Understanding the importance of integration for the solution of soil-resource problems at the international level, the Azerbaijani soil scientists should actively support the project of Extension of Europe-

an Soil Database to Mediterranean and Caucasian Countries. To do this, first of all necessary to develop a new digital soil database prepared for the territory of Azerbaijan in the format of soil geographic information system of the EU. Prepare the soil map legend correlation of Azerbaijan in the scale of 1 : 1000 000, with a list of soils used in the EU system. Connecting to The European Soil Database allow assessing the suitability and land productivity of individual countries on the basis of standardized internationally recognized standards using the latest information technologies based on geoinformatics, integrated modeling, coupled with the means of remote sensing of the new generation.

Results and discussion

Implemented work was carried out using modern geoinformation system and in the format of soil geographic information system of the EU. Sources of considered soil database on Azerbaijan served existing soil maps of Azerbaijan at different scales and numerous soil profiles. Due to the efforts of many pedologists of Azerbaijan Republic topsoil was completely covered by soil surveys. As a result of many years of work done by well-known Azerbaijan scientists-pedologists in 1957 the soil map of the country in scale of M1 500 000 [1] was developed. In 1991 the soil map of Azerbaijan in scale of M 1 : 600 000 [2] has been published. In order to harmonize nomenclature units of soils with names of international soil classification, correlations were conducted with the soil classification system of Azerbaijan WRB. [3, 4]. It should be noted that since 1990 the work on systematization of unification of soil data has been carried out in Azerbaijan. As attributes of soil typological units were used such factors as climate ($\Sigma > 10^0$ C), botanical area, macro-relief, the predominant type of soil use, concomitant type of soil use, type of humidification, character of humidification, type of water regime, type of anthropogenic ally regulated regime, potential depth of root habitation, prevailing types of parent rocks, mineral composition of the clay, groundwater depth, grain size, the upper limit of effervescence of HCl, average precipitation Σ (mm), pH, gross N %, gross P %, gross K %, the presence of impermeable layers of roots in the soil profile, biomass t/ha. Information on soil factors entered into the database only upon necessity, in the presence of varying the relevant information about the attributes for particular soil typological units [4].

Thus, we can assume that the attributable part of the soil database of Azerbaijan to a certain extent similar to the European soil standards. At the same time it should be noted that the obvious fact that that difference in approach, analytical methods, measurements that have existed and exist to this day, limit the possibilities of integration. Due to these reasons, attribute information about the soils of Azerbaijan differ from European standards due to the diversity of national traditions, differences of practical problems, etc. [5]. Therefore, it is obvious that it is not possible to achieve integration into the international community with the old traditional methods. Exactly

due to this reason, despite the fact that Azerbaijan holds a huge number of soil studies and there are available numerous scientific reports the possibility of their use in modern conditions is not high. Because of aforementioned reasons, the integration of Azerbaijan into the soil and geographical space of EU conditioned with some difficulties. These difficulties can be divided into the following groups:

General difficulties. Difference in scientific-methodical approaches; Difference in terminology and the language barrier; Difference in perception of new technologies;

Technical difficulties. Accessibility problems with the primary data; - Paper format of the soil data sources; — Great variety of cartographic and attribute data; - Absence of the digital spatial and attribute database;

Technological difficulties. Low level of the information technology use (software and hardware) in soil-agrochemical researches; — Mastering problems of modern approaches in soil science researches including the use of IT by some specialists.

There is a positive fact that nowadays more and more people understand the need of use of information technologies in soil investigations.

Understanding the importance of integration of the solution of the problem of soil-resource problems at the international level, we support the Project «Extension of The European Soil Database to Mediterranean and Caucasian Countries». To this end, the first version of digital soil database developed for Azerbaijan in the format of soil geographic information system of the EU. Soil map legend correlation of Azerbaijan in the scale of 1 : 1000 000 has been prepared, with a list of soils used in the EU system. Connecting to the European Soil Database will help us to assess the suitability and land productivity on the basis of standardized and internationally recognized standards using the latest information technologies based on geo-informatics, integrated modeling, coupled with the means of remote sensing of the new generation. All of the above-mentioned issues are serving the purpose of application of the European geographical and analytical soil database on the territory of Azerbaijan.

Conclusion

The article discusses the issues related to the use of European soil standards of on the territory of Azerbaijan. It is shown that the difference in approaches, analytical methods, measurements that have existed and exist to this day, limit the possibilities of integration. Exactly because of this reason and despite the fact that Azerbaijan holds a huge number of soil studies and there numerous scientific reports are available, the possibility of their use in modern conditions is not very high. Due to these reasons the integration of Azerbaijan into the soil and geographical space of EU con-

ditioned with some difficulties. It is noted that, it is not possible to achieve integration into the international community with the old traditional methods. Participating in the project «Extension of The European Soil Database to Mediterranean and Caucasian Countries», the first version of digital soil database was compiled for the territory of Azerbaijan in the format of soil geographic information system of the EU. Soil map legend correlation of Azerbaijan in the scale of 1 : 1000 000 has been prepared, with a list of soils used in the EU system.

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