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Integrated assessment of the environmental quality in Odessa agglomeration

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ABSTRACT

A study into the topical issue of environmental quality assessment by a range of indicators is given a review in the paper. An integrated approach is made use of in the research which is based on the case study of the Odessa industrial-and-urban agglomeration (IUA).

Quality assessment of the natural components of the Odessa IUA environment by means of integrated indices of the natural environmental status and the natural component quality revealed that the studied urban ecosystem is impersistent on the whole, however, the environmental quality is quite favorable and the technogenic load is low. The environmental reliability of the studied area was classified as low.

Prospects for development of Odessa Agglomeration, despite the complicated environmental situation, are quite favorable, due to the advantageous economic and geographical location, and the well-developed research, technical and recreational potential. Application of the structural analysis approach to definition of the adaptation strategy for the area makes it possible to suggest the ways for optimization of the natural environment component in the Odessa IUA.

The assessment criteria for the area under study and the suggested adaptive governance tools constitute the research outcomes.

1. Introduction

The research area stretches along the Black Sea coast for 120 km (Fig. 1) and consists of the cities of: Odessa (oblast center), Bilhorod-Dnistrovskyi, Chornomorsk, Teplodar, Yuzhne, as well as smaller settlements (Alfiorov, 2012). In terms of population, Odessa is the third largest city in Ukraine after Kyiv and Kharkiv (1,010,845 inhabitants as of 1 June 2017, according to the Main Department of Statistics in the Odessa Oblas). The area is 162.42 km^2. The population density is 6224 pers. per km^2. The geographical coordinates are: 46°28′N 30°44′E. The city is located on the north-western coast of the Black Sea at the intersection of the most important international ways from Northern and Central Europe to the Middle East and Asia.

Peculiarities of socio-economic development of Odessa agglomeration as a transport, agroindustrial and health-resort complex of national value conditioned unfavorable environmental situation with high sickness rate and mortality of the population, in particular. Therefore, the principal problem in this area is how to maintain sustainable tourist activity under deterioration of the environmental quality resulting from the increased anthropogenic load.

The research is aimed at comprehensive enhancement of the urban environment and executing control of the anthropogenic load on its components in order that rehabilitation of the damaged components of the natural environment, attraction of therapeutic tourists and enrichment of economic development be made feasible.

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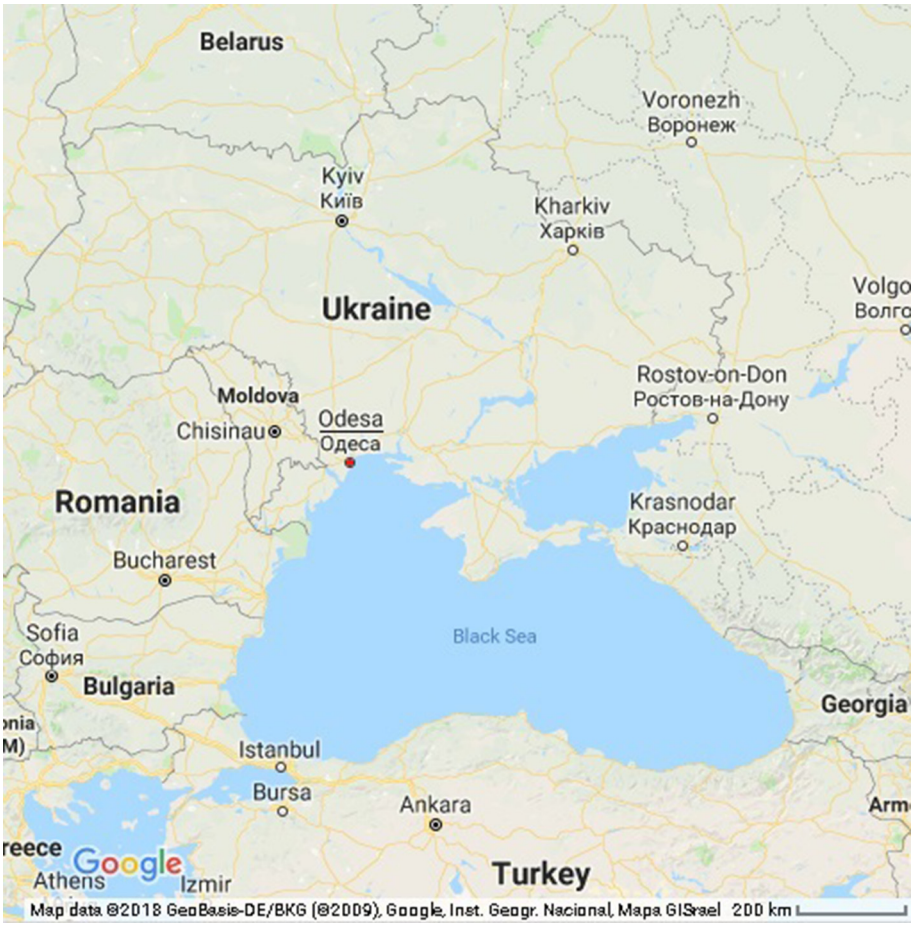

Fig. 1. Location of Odessa IUA, Ukraine.

For the time present implementation of an efficient environmental strategy for the studied area is delayed owing to its focus on accumulation of extensive data arrays on the environmental parameters. These are difficult to colligate, in view of a lack of appropriate methodological basis, and are almost inapplicable to decision making on nature conservation. Therefore, an integrated approach, which the world practice sees ever more frequent, is essential for making description of the natural environment quality.

Universal concepts and socio-economic approaches with wider use of GIS technologies, analysis of big databases and development of alternatives to the negative urbanization processes prevail in the research papers of European scientists (Meiner, 2011; Lavalle et al., 2004; Kavanagh et al., 2005; Reports of UNCHS (Habitat), 2009, 2013; Lavalle et al., 2002; and ESPON — European Spatial Planning Observational Network, 2005a, 2005b). A characteristic feature of the papers authored by researchers from Ukraine and the CIS (Adamenko et al., 2011; Fesenko et al., 2008; Grodzynskyi, 2005; Kartava, 2001; Khorenzhaia, 2014; Korinevskaia, 2009; Kucheriavyi, 2008; Kuleshova and Sergeev, 2011; Loieva, 1991; Petruk et al., 2012; Smirnova, 2012; Stolberg, 2000; Topchiev et al., 2000; Verlan, 1999; Vladimirova, 1991; et al.), alongside with theoretical developments, are the applied methodological approaches of rather in-depth specification: a thorough analysis of cartographic and statistical material and significant focus on anthropogenic pollution factors, in particular.

2. Materials and methods

This paper is based on the Thesis for a PhD degree (Geography) dedicated to environmental status and quality in the urban areas by the case study of Odessa.

Research methods are intended to provide implementation of an integrated approach for finding a solution to the stated problem. Contemporary propositions of Structural Geography, Environmental Science and Nature Conservation are to shape the theoretical and methodological basis. General scientific methods, geographical methods (mapping and zoning) and standard statistical methods are deployed. The methods of systems and structural analysis are applied to solve the problem of environmental quality assessment in the urban areas. Calculations and empiric data processing are made by means of MS Excel, and mapping – by the instrumentality of Quantum GIS, one of the geographical information systems packages.

Further research will be focused on finding a solution to those aspects of the commonly encountered problem related to