

## Environmental Assessment of Basin Geosystems Based on the Landscape Approach

Yermolaev Oleg Petrovich and Ivanov Maxim Andreevich

Kazan Federal University, 420008, Kazan, Kremlevskaya str. 18, Russia.  
International Laboratory for Comparative Urban Research, Institute for the  
Comparative Studies of Modernity, Kazan Federal University

doi: <http://dx.doi.org/10.13005/bbra/1472>

(Received: 27 September 2014; accepted: 10 October 2014)

The article presents the methodology of environmental assessment of the state of a river basin based on the landscape approach using geoinformation systems. This study implements the landscape approach to evaluation, when types of terrain, i.e. the natural geographical systems, act as the spatial-operational units, which ensures the objectivity of the obtained results. The main land use categories are used as the factor of anthropogenic pressures. With this purpose, a spatial database of the functional use of the studied territory, based on the results of a satellite image analysis, was created.

**Key words:** Environmental assessment, watershed,  
Anthropogenic pressures, landscapes, geoinformation systems, RSD.

The basin of the Kazanka River is located at the junction of two landscape areas: Its major part (the whole right bank of the river, the midstream and upstream waters) belong to the boreal landscape area, and the right bank (the interstream area between the Kazanka and Mesha Rivers in the midstream and downstream waters) belongs to subboreal northern semihumid landscape area. The major part of the basin is located in the Kazan uphill area with the Transural pine and spruce forest (where pines and spruces prevail) and broad-leaved and spruce nemoral-herb and partially broad-leaved forests (with lindens and oaks) on the dark grey forest and sod-podzolic soil<sup>1</sup>.

The area is located in the boreal landscape zone, sub-taiga landscape zone. Geographically, it is located in the northwest of the Republic of Tatarstan (in the Regions of the Zapadnoye Predkamye). The territory of the area

lies between the border of Tatarstan with the Mari El Republic in the west, and the Malaya Mesha River in the east. The northern border goes along the watershed of the right slope of the Kazanka River valley. The southern border starts near the City of Kazan from the creek of the Kazanka River and goes along the watershed of the Kazanka and Mesha Rivers until the head of the Nyrsa River in the East. The main part of the area relates to the Vysokogorsk and Arsk administrative districts. In the west, it partially includes the territories of the Zelenodolsk and Atninsk districts, and in the east – of the Sabinsk, Pestrechinsk, and Tyulyachinsk districts. The total square of the landscape area is 2,473 km<sup>2</sup>.

Currently, a wide range of geoinformation methods is applied at studying landscapes and adverse processes influencing on them, including the anthropogenic processes<sup>3</sup>, as well as at carrying out environmental evaluation of landscapes [4].

**Research methodology and results.** Let us consider the landscape structure of the Kazanka River basin. Directly within the boundaries of the

---

\* To whom all correspondence should be addressed.