LITERATURE

1. Aisatulin, T. A. Ocean. Active surfaces and life / T. A. Aisatulin, V. L. Lebedev, K. M. Khailov // Hydrometpublishers. – Moscow, 1979. – 191 p.

2. Living with coastal erosion in Europe. Sediment and space for sustainability. Results from the erosion study / P. Doody [et al.] // Office for Official Publications of the European Communities. – Luxembourg, 2004. – 38 p.

3. Krasnov, E. V. Mapping modeling of crisis impacts on to environment of coastal regions. Complex managing of coastal zones and its integration with other marine sciences / E. V. Krasnov, G. M. Barinova. – Saint-Petersburg, 2000. – 96 p.

4. Bikmametova, M. Ecological problems of the world ocean / M. Bikmametova, V. Bakalov // MEO MGUK. – Chelyabinsk, 1997. – P. 13–14.

5. Bakanev, V. S. Live resources of pelagial and bental of the Barents Sea in zone of development and exploitation of Stockman gas condensate deposits / V. S. Bakanev // PINRO. – Murmansk, 1997. – 83 p.

6. Краткосрочный (на 100 лет) прогноз развития прибрежно-шельфовых областей в Мировом океане [Электронный ресурс] / Н. А. Айбулатов [и др.] // Русский архипелаг. – Режим доступа: http://www.archipelag.ru/agenda/geoklimat/history/prognosis.

7. Aibulatov, N. A. Cs-137 in bottom sediments of western part of Kara Sea / N. A. Aibulatov, A. N. Plishkin, J. A. Sapojnikov // Hydrometeoisdat. – 1993. – 304 p.

8. Matishov, G. G. Radionuclids at Kola peninsula, Novaya Zemlya, Franz Josef Land and Barents Sea / G. G. Matishov, D. G. Matishov, V. V. Podobedov // Apatity. – 1992. – 67 p.

9. Radionuclides in ecosystem of Barents and Kara Seas regions / G. G. Matishov [et al.] // Apatity. – 1997. – 207 p.

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P. LEMENKOVA
Charles University in Prague, Faculty of Science, Czech Republic, Prague
E-mail: pauline.lemenkova@gmail.com

UPHOLDING OPEN SOURCE PRINCIPLES FOR EDUCATION: USE OF QUANTUM GIS FOR TEACHING GEOINFORMATICS

The variety of data and information increases interest to the subject at students. The development of the skills and abilities to use GIS is not only important in the professional education (cartography), but also for broader formal education in any branch of geosciences. Using geoinformation technologies allows to visualize data and perform lectures at high standard as well as to integrate multi-disciplinary approach in lectures. Hence, students feel like active participants while learning process rather than passive listeners. They are able to gain new skills, to analyze and compare, to look for

data. Applying active, collaborative mode "teacher-student" in educational process enables student to discover and develop his creative potential [1].

However, the most sensitive question while using and choosing GIS is its price. Though it might not be a big problem for the corporations or big companies, it often becomes a serious challenge for students with restricted financial budget. The most popular GIS are represented by following software products: ArcGIS, MapInfo, Panorama, Neva, Erdas Imagine, GeoMedia and others. However, they are commercial software, not free of charge. In this work I am going to inform audience about the use of the GIS environment in the public domain: a Quantum GIS. The Quantum GIS is a GIS released under the license GNU (General Public License).

Use of Quantum GIS is free of charge, i.e. every student may install it on his laptop and enjoy its multi-functionality for the educational purposes. Quantum GIS allows student to create and analyze maps of countries, territories, regions, cities, to use both raster and vector data. Thematic layers can be displayed in various ways, including in the form of high-quality map layouts. Quantum GIS allows students to solve complex problems of geographical analysis based on the implementation of que-

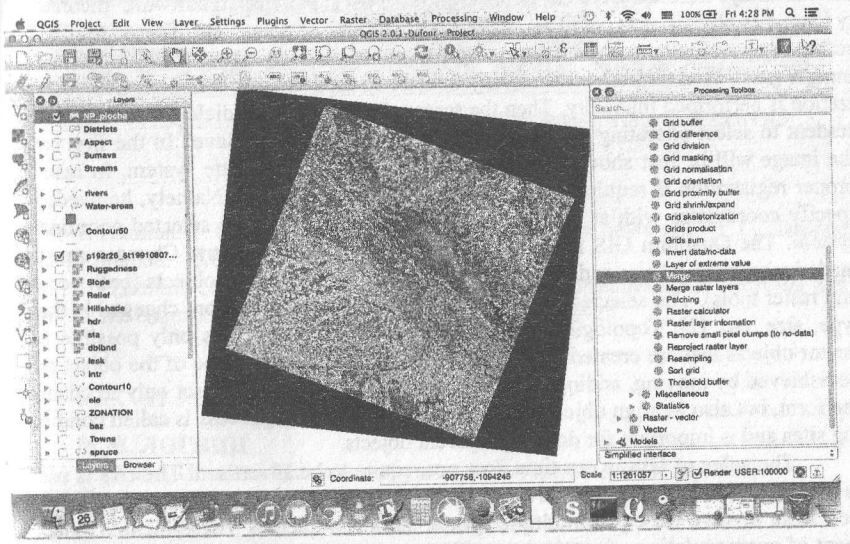

Fig. 1 – Organizing project in Quantum GIS: example of Czech National Park

ries and creation of various thematic maps, to communicate with remote databases, to export geographical objects in other GIS, etc. Thematic maps created in Quantum GIS provide broad opportunities for data analysis and design possibilities: visualizing graphical objects using colors, hatchings, line types and symbols, etc.

Methodologically, staring project from scratch often (though not always) begins at georeferencing scanned paper maps and their vectorization in order to put them into

e-form and to get new spatial information thereafter. To work with bitmap image in a Quantum GIS environment student has to open it as a raster file, find appropriate coordinates and refer to them. Then they should move on objects vectorization ('View', 'Toolbars', 'Digitizing'). By manual vectorization operator student encircles each object by the mouse and save it using 'New Vector Layer' dialog in Quantum GIS that allows to define a new layer. Then student navigate and click on the menu entry Layer-New-New Shapefile Layer. The new vector layer now exists. To begin digitizing, student need to enter edit mode which is commonly required to prevent accidental deleting of important data. Edit mode is switched on or off individually for each layer by the student himself. Using such commands as 'Add Feature' for starting vectorizing, 'Move Feature' to move entire feature, 'Node Tool' to just only one part of a feature, enables student to play around with new objects.

While vectorizing contour lines it is usually enough to set up the starting point and the direction of the tracking lines. Later on, it will track the line for as long as it meets an uncertain situation (e.g. line break). Interactive vectorization is strongly related to the quality of the data source. Automatic vectorization involves direct transfer from raster-to-vector format using special software (Autotrace). However, editing is almost always necessary thereafter, as even the most sophisticated software incorrectly identifies objects, e.g. confuses symbols with groups of points, etc. There are special software specifically designed for certain types of automatic vectorization of raster images (such as maps, text information) that can be used as well. Quantum GIS vectorization is performed manually. Then the screen displays another dialog box that allows student to select operating mode with the image of: 'View' or 'Save'. In the first case the image will be just shown on the map in the default coordinate system. In case if proper registration is required, student has to register the image. Namely, he needs to specify coordinates with at least three points of the image in the selected coordinate system. The Quantum GIS has a variety of tools for editing layers. Changes can be made by activating layer and choosing any of tools for processing objects (both vector and raster tools). The selected object can be moved to a new location, changed in their type, size, etc. [2]. Topologically, performing changes in shape is only possible for vector objects that are created by the polygon tool. Change the shape of the object can be achieved by moving, adding or removing nodes which are used not only to change the form, but also to align objects relative to each other. This process is called combining sites and is important for docking adjacent objects.

The value of GIS in our time does not require to be advertised. The GIS is used in almost all kinds of human activities: be it commercial analysis or education activities. Both involve variety of multiple special tasks and queries. These include assessment of overpopulation, air and water pollution, land cover changes, natural disasters, finding best route between points, planning sightseeing, tourism, selection of the optimal location of the new office, municipal tasks, etc. The use of GIS in educational environment, i.e. at workshops, seminar, colloquia, lectures, etc. enables applying multidisciplinary approach. Thus, teacher can use information from many sources and related disciplines (e.g., a priori knowledge, in situ data, soil or geomorphic schemes, climatic data, math calculations, statistics, etc.). The paper reported technical usage and some functionality of Quantum GIS for education.

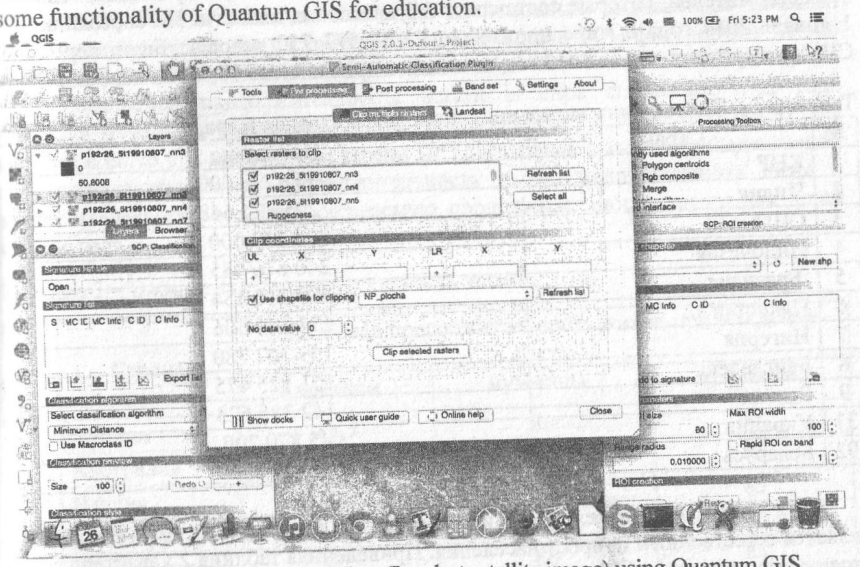

Fig. 2 – Pre-processing raster data (Landsat satellite image) using Quantum GIS

LITERATURE

1. Панина, Т. С. Современные способы активизации обучения / Т. С. Панина, Л. Н. Вавилова. – М., 2006. – С. 1–16.

2. Цыпина, Э. М. Тематические карты и геоинформационные системы для всех / Э. М. Цыпина // География. – 1991. – № 9. – С. 20–24.

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М.М. ЛОГВИН
Украина, Полтава, Полтавский университет экономики и торговли
E-mail: lmm2004@yandex.ru

ГЕОДЕМОГРАФИЧЕСКИЕ ОСОБЕННОСТИ СОВРЕМЕННОГО МИРА

Важной составляющей современного развития общества является исследование демографических ресурсов мира, макрорегионов и отдельных стран. Одним из главных показателей демографического развития служит общая численность населения мира, отдельных стран и его динамика (таблица 1). В первых двух странах списка – Китае и Индии – проживает свыше 1/3 всего населения