

## CARTOGRAPHICAL GAMES - THE NEW FORM OF KNOWLEDGE ACQUIREMENT

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«The decade of education for sustainably development» declared by the United Nations (2005-2014) demands not only improvements of well-established methods in supplementary education, but also a search of the new solutions which meet modern requirements. «Strategy of education for sustainable development» of the UN European Economic Commission recommends activization in the use of the interactive methods which are based on a close contact with lecturers, employees of protected natural territories or out-of-school educational institutions.

The analysis of the latest researches and publications shows that educational interactive games are being used widely in the last years not only for additional education, but also for self-education.

Educational games are intended for different age groups. For example, not all employees of national parks reach the end of the game «Rescue a tiger», and preschool children can play a game displayed on a website [deti@mail.ru](mailto:deti@mail.ru) where they may point their cursor at any place on the globe and they will be given an image of an animal that is specific for that territory.

After the analysis a conclusion may be made - all ecologically orientated educational games give biological or sometimes biogeographical (where-what) knowledge. Maps even if applied, are being only gamefields in a very schematical variant. Maps are static they dont change in the game proress.

The interactive project «Ekonet - ABC» which gives an opportunity to design ecological networks for biodiversity preservation and model eco-social processes in a region for the period of 30 years. The ranges of game application are geography, biology, ecology, natural resources management and etc. Educational groups may be various: schoolchildren, students.

Decisions are being made by a team of players which represent administration of the modeling area that is presented by a set of ranges. The type of natural community for each range is defined, and the process of imitation modeles its succession. In range types such as «agricultural grounds», «the industry, power, transport and communication», «city and rural settlements» succession is being started only when these territories have been withdrawn from economic use. If there has been a disafforestation or a fire (which were generated by the program) in the ranges with natural communities succession comes back to its initial stage.

The game gives opportunity for various administrative strategies and ecological policy scenarios:

- 1) all goes untouched
- 2) the nature protection policy and aspiration for a sustainable development dominate
- 3) economic interests dominate

This game favourably differs from all other interactive educational projects by having a serious scientific foundation, giving different development scenarios, availability of a complete map set used in decision-making. Complete set of maps includes: topographical, landuse, protected natural territories, recreational areas, most important economic territories, initial natural communities, modern natural communities, rare species, landscapes and a map of ranges.

As a result of cooperation between the authors and the national park «The Russian North» employees an other educational interactive project has been created where the information is presented basically in maps - educational game «Learn «The Russian North»». The educational component of the game is presented by a series of questions that are being accompanied by hints and illustrations, so that the playr could independently gain new information on the nature and culture of the region. The games interface is focused on a student of middle school. The project is realized by the means of Macromedia Flash software. The basis of educational and informational units are various thematic maps and animations which can be used as elements of an multimedia project and also as independent cartographical products. ArcGIS 9.1 package was used for their creation. All of them have common cartographical basis and design principle. The given set of maps allows to receive a great amount of the information on territory of national park «The Russian North».

The first page of the game is a park map with an «the ecological path» where each step is a question. By answering it, the player moves forward or back (if the answer is incorrect). The project is based on a board

game that has been used by park employees for several years for ecological education of schoolchildren of the Vologda area.

Transgression and retrogression processes of glaciers have generated the basic natural sights «The Russian North» natural park. Educational animation in a form of a dynamic map of the European territory of Russia was made for their detailed illustration. The main stages of a freezing are sequentially displayed on this map. The map also shows the border changes of descending glaciers and gives a reconstruction of landscapes that were present in interglacial era.

Animation for national parks territory has been created, reflecting the formation history of parks highest sites so-called mountains Tsipinoj, Sandyrevoj and Maury which nuclei are parts of Permian formation that have been brought here by the Moscow glacier.

Hydrological objects are among of the basic elements of a landscape. They carry out important binding functions so that their studying is extremely significant. The region is characterized by an ancient history of landuse, some unique hydraulic engineering constructions of national importance the Volga-Baltic and North Dvin channels are located here. Two animation plots are created for hydrological objects. The first one is the regulation of the Sheksna river flow where special attention is given to the environmental problems caused by reservoir construction: the disappearance of settlements, destruction of animal habitats, swamping of the territory.

The second plot features seasonal change in a hydrographic mode of the rivers. Besides the obvious purpose of dynamics studying, animation acquaints with earth's surface on space images that vary seasonally. This task can't be achieved by means of a map.

Section "Vegetation" is represented by a single map, which shows the distribution of woody vegetation of the park.

The study of the past, present and future of the Kirillov district of the Vologda region can not be separated from its Orthodox heritage. Representatives from various countries visit this area to see the Orthodox shrines of the three monasteries (Ferapontov, Kirillo-Belozersky and Goritsky), and a number of churches. A map of this territory was made according to the results of the study, which shows all the churches of the Kirillov district, classified by a number of features. The map shows all active, inactive, lost churches and monasteries that are located within the national park "The Russian North". Objects are classified by the time of establishment; their state; dedication.

The system of links is made in addition, using which one can move from objects illustrated on the map to information about them.

A great interest is created by the study the regions toponymical component. Toponyms of Kirillov district vary in time of occurrence and belong to different languages. For the given territory it is possible to speak of predominance of Slavic or Finno-Ugric origin toponyms, which often adds Slavic suffixes, the rest of toponyms (for example, Turkic) are not numerous. The linguistic and time origin of wordbasis or its first mention is given on the map. Areas on the map vary by qualitative background which characterizes the type of settlement: the territory of the earliest Finno-Ugric settlements (with a predominance of the Finno-Ugric place names), the territory of the earliest Slavic settlements (dominated by Slavic names and modified by the Finno-Ugric), sparsely populated territories.

Two types of maps were made for this project - traditional and winter map. The latter was created in order to increase the interest of tourists to winter recreation in the park, as one of the environmental problems which the park faces is a great imbalance of attendance (90% in summer). The tourist map of the national park reflects the current state of recreational infrastructure, active sightseeing tours and ecological trails, zoning, objects of historical and cultural heritage. Winter tourist map indicates the locations where winter fishing is permitted, frozen waters, suitable for kiting, projected ski slopes, skiing paths.

Modern technologies have allowed to successfully combine in games traditional cartographic and graphics materials with elucidatory, often learning texts. Numerous pictures with comprehensive texts, provide an opportunity to visualize and comment on the events represented on the maps. Of course, all information is hierarchic and multilevel: access to desired information can be individualized and tailored to the interests and abilities of users. All information is presented step by step, for example, first there is a page on which is the most general information about the area and several kinds of pictures of different subjects (landscape, architecture), then you can go to a specific thematic page on the selection and have more detail to find out about a particular object. The possibility of hyperlinks usage allows to specify and detail the information.

The usage of satellite images in the games is a fundamentally new approach. Images give a real view of the territory at a particular time, that sometimes for a layman is more visible and understandable than the

figurative-symbolic model - the map. Data sharing of satellite images and other methods of learning allow students to explore the environment on their own experience teaches us to make decisions and see their results, which undoubtedly increases the efficiency of environmental education through the cartographic games.

Learning games are divided into types as follows: introductory, educational, research. Introductory games are designed for the self-study of a territory in a small volume, they might as precede visit to protected areas and considered and studied thereafter. The content of these sections consists mainly of photos and video, text and geographic maps. Since these materials are focused on attracting visitors, they represent the most interesting, famous, unique objects of territory and show the possibility of the entrance or approach to them. Necessarily in these sections include rules of conduct in protected areas, and desirable for the execution of the rules of human behavior in dealing with nature in general.

The task of environmental education is not only to raise awareness of every person and of society as a whole, form the contemporary understanding of the outside world, but also to pass on knowledge of specific facts to understand the causes and consequences of processes that arouse his interest for everything that happens in nature and in its relations with the man. And since eco-tourism and environmental education focused on the voluntary acquisition of knowledge in your spare time, and the games offered for these purposes should be interesting, easy to understand, involve further communication.

Software products are used in this work can be attributed to three categories: image editors, GIS, and multimedia applications. The graphical editors used: Adobe Photoshop, Fireworks MX. Out of GIS software such packages as MapInfo and ArcGIS were used. Multimedia applications used in the final stages of work: Flash 9.

Prospects for further research towards the creation of educational games, based on the cartographic work, are being seen in expanding the list of known scales and in the coverage of different natural and socio-economic conditions of the territory.

Such projects may explain different geographical phenomena (day and night, seasons) using as example a specific territory, familiar to the user, and therefore they make learning process fun, more accessible to the understanding, embodied in practice.