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ГЕОГРАФИЯ
СЕРИЯСЫ

СЕРИЯ
ГЕОГРАФИЧЕСКАЯ

АЛМАТЫ

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CURRENT STATE AND PROSPECTS OF GIS EDUCATION
IN KAZNU BY AL - FARABY

Al-Faraby Kazakh National University, Almaty c.

This article discusses the main directions of development of GIS - Technology at the Faculty of Geography in education and scientific research purposes, as one of the most advanced tools of spatial organization of the data. It is shown that the use of GIS for geo-mapping and the weather forecast is promising for the faculty.

Geography Faculty recognized in Kazakhstan's leading scientific school of geographical science, which aims to develop a theory of geography and cartography as the science of cartographic modeling and knowledge of Geosystems.

The main directions of research at the Faculty of Geography is an educational and research work, taking leading positions in the Republic. Established at the Faculty of Science Laboratories Geoinformation mapping and GIS weather.

Modern geo-informatics as the science of space co-ordinate information and modeling of multi-faceted as digital maps, having versatile properties and a variety of functions, and is a model of reality, Geosystems, and a channel for the transfer of spatial information, and the special language of geography and other earth sciences. Like many other aspects of our lives, maps and spatially coordinated geographic information have changed considerably thanks to computers and communications. Extensively to develop research on geoinformation mapping, GIS, multimedia, computer presentations, development of new software applications.

In this regard, the focus of scientific research the Department of cartography and geoinformatics is to develop theories and methods of geographical cartography, geomatics and aerospace sensing for the study of natural and socio-economic Geosystems.

The scientific work of the department of geomorphology and cartography is in the priority area "Geographic Cartography", "Geoinformatics" and "Aerospace Sensing" on two fundamental themes:

1. "Cross-border prevention of natural disasters in Central Asia", implemented by InWent, GFZ and CAIAG on behalf of the Federal Ministry of Foreign Affairs of Germany.

2. Project: 510978-TEMPUS-1-2010-1-AT-TEMPUS-JPCR, project title, "Geoinformatics: Managing Energy, Resources, Environment – GEM. GEM". As part of those members of the department are currently engaged in work on several fronts:

- Thematic mapping of natural and socio-economic and geo-environmental Geosystems, including the development of computer techniques of thematic mapping in the preparation of complex, socio-economic, climatic maps of the territory of Kazakhstan and regions.
- The development of university geography education in the field of cartography, geomatics and space methods: Within formulated the concept of mapping and geoinformation-cartographic university education in earth sciences.
- Develop innovative training programs to prepare new textbooks and teaching materials with interactive and innovative ingredients and other materials submitted in electronic form.

The most important factor pointing to the relevance of scientific research should include the following:

- the orientation of virtually all research on the subject of GIS, GIS development and creation of various types and purposes: Electronic Atlas GIS "Kazakhstan", the development of

electronic mapping, and computer presentations, intensive introduction of computer technology in the processing of aerospace materials and sensing in space mapping;

- expanding the range of software research and educational process, including the use of modern commercial GIS to handle vector and raster images (MapInfo 9.0, ArcGIS 9.3, Envi 4.3, etc).

In research projects are actively involved students and undergraduates of the Department performing coursework, dissertations and theses, as well as work on field trips on the main topics of research faculty.

At the department created a training Geological Museum and Laboratory of GIS mapping, where the bachelors, masters and young scientists deepen knowledge in the field of geology, neotectonics, GIS mapping, environmental and socio-economic processes and phenomena.

Established with the Department of Landscape Ecology and Landscape Planning Department spatial Planning University of Dortmund (Germany). Through the preparation of doctoral Ph.D. was organized by the joint training between Dr. Ph.D Professor of Landscape Ecology and Landscape Planning Department spatial Planning Technical University of Dortmund (Germany), Burkhard Meyer and assistant professor Kerimbay N.N. The result of this activity is to prepare a doctor Ph.D Asylbekova A.A.

Department of Geomorphology and Cartography continues to work closely with the Geography Faculty of Moscow State University, St. Petersburg and Kiev University, Institute of Geography RAS.

This makes it possible to assert that the Kazakh National University formed its own geographical science school. The Department for many years is a scientific and methodical center of the Republic of Kazakhstan on geomorphology, topography, and cartography.

Further development of faculty to train specialists in the field of Cartography and Geoinformatics, I see in two directions. The first area is the opening of the "Applied Science (in geography), with assignment of graduates of training "Geoinformatics". Profile of graduates of this program – Geoinformatics, a specialist in geographic information systems (GIS).

Competition for this profession is very high, the graduates are in demand. Specialists in this specialty in the Republic of Kazakhstan is not specifically prepared, although the demand for them is evident. Bachelor's and master's degree in Geoinformatics would increase the competitiveness of Kazakhstani specialists in domestic and international markets for labor, requiring the ability to solve practical problems, to ensure the entry of Kazakhstan in 50 capable of competitively countries.

Therefore, in future we plan to open a specialty "Geoinformatics". The second direction of the department – it's opening "of the Situation Center GIS and remote sensing" at the Department of geomorphology and cartography for the following research:

- geographical Information System (GIS). Basic concepts, the creation and use;
- remote sensing: the use of aerial photo and satellite images, the definition of forest cover, aboveground biomass, humus content, watersupplies, diagnosis of soil salinity and other landscape indices;
- use of GIS in geomorphology and cartography;
- conduct certified training courses offered GIS users in Kazakhstan;
- development and support educational site for learning and advising users of GIS technology and remote sensing;
- to make the reception and processing of remote sensing the Earth's surface to ensure the current level of implementation of scientific research in the field of GIS-technologies;
- forming a thematic framework satellite imagery;
- introduction of technology through-landscape-ecological and economic analysis of nature-based interpretation of aerial and satellite imagery in a GIS environment;
- to target investment projects and programs aimed at sustainable use of natural-resource potential of the territory.

During the 18 years since, both at the Faculty of Geography of the KNU. Al - Faraby started reading the special courses in Geoinformatics and GIS. Already dozens of graduates of the Faculty of Geography GIS professionals working in leading foreign and Kazakh companies such as AGIP KKO, Institute of Geography, RK, TSDZ and GIS "Terra", LLP "Kazakh Agency of Applied Ecology, LLP Kazekoproekt", GIS Centre, Ministry of Defense, all the provincial Department of Land Resources and many other organizations.

GIS EDUCATION FOR SPECIALISTS IN ECONOMIC, SOCIAL AND POLITICAL GEOGRAPHY

The Department of economic, social and political geography of Faculty of Geography of Kazakh National University after Al-Faraby are directed to formation and development of GIS education and its concepts, and formation of education with geographical information technology for bachelor, masters and PhD. The concept is based on model of GIS education widely interacting with the Earth sciences and similar social-and-economic spheres. It means theoretic and practical study of geoinformation technologies, methods of GIS formation and use, geoinformation methods of geographic research and mapping and basics of remote sounding. Training of specialists, namely economists-geographers is based on combination of traditional and computer technologies for construction and use of electronic and paper maps.

Following disciplines are worked out according to requirements for GIS use and introduction to educational process as specified of Higher Education for various specialties for bachelor: GIS in geographical research, Social and economic mapping, GIS in economic and social geography, Information systems and technologies in economic and social geography, for masters: Modern GIS technologies in geographical scientific researches, Geoinformatics and computerization scientific researches, Spatial statistical analyze, for PhD: Geospatial Data and GI technology in geographical scientific research, Modern GIS technology in economical and social geography, Geoinformation technology using in modern mapping.

Following GIS methods and functions are studied during the course: Basic principles and tasks of geoinformation mapping; Methods of geoinformation mapping; GIS mapping tools; Transformation of coordinate system, vector and bitmap images; Generalization; Formalization of mapping process, reproduction of mapping images; Selection of scale; Map montage; Construction and imaging of maps, "geometry" (for positional data) and "substantive" (for attributive data); Obtaining of paper and electronic maps; Computer processing of images for construction of thematic maps.

The course program of *GIS in Social-Economic Geography* covers following clauses:

1. Introduction, including:
 - GIS determination and terminology;
 - GIS applications (ArcMap, ArcCatalog, and ArcToolbox).
2. Data management in GIS:
 - spatial data;
 - attributive information in GIS. Databases;
 - relation of spatial and attributive data;
 - data editing in GIS;
 - import-export of graphic and attributive data.
3. Function capabilities of modern GIS:
 - selection of objects on spatial and attributive data. SQL-requests;
 - tasks to be solved on selected objects;
 - statistical analysis of information;
 - 3D-image, GRID, TIN-models;
 - application of Spatial Analysis;
 - organization of work in local network by Arc Publisher.

All course units cover issues on modern GIS hardware and software and give comparison to widespread packages. Completely equipped computer class and licensed software including ArcGIS ArcINFO 9.3.1, are to be used for practice work. Course contents are constantly updated and reflect progress in these scientific spheres.

Lectures are given by professors, associated professors, and practical exercises by certified GIS-specialists. Increasing demand for qualified specialists with good understanding of tasks and methods of spatial analysis due to increasing popularity of GIS is one of the important issues for increasing training, practical and specialized courses for students. As the result students of appropriate specialties are in demand and have good prospects of getting interesting and prestige work requiring sound knowledge in GIS industry. Study of GIS and related technologies are popular in all Central Asian countries.

APPLICATION OF GIS TECHNOLOGY IN THE PREPARATION OF METEOROLOGICAL

Modern trends of the National Weather Service in the GIS provide for increased automation of the process of observation and processing technologies, data analysis and weather forecasting, respectively. Until recently, the GIS, there are several technologies for production and analysis of weather maps:

- manual nanoska and rascherchivanie Receive faxes programs;
- receive faxes to a computer program (TV-Inform "Met");
- getting ready images of maps from Bracknell using equipment;
- building the necessary maps using GIS Meteo (Geographic Information System "Met").

For example, in the following table compares the two technologies: facsimile and GIS Meteo.

<i>The main criteria</i>	<i>Fax technology</i>	<i>GIS Meteo</i>
Assortment maps	Assortment of cards range maps, their scale, format and schedule are fixed and determined in accordance with fax soft.	Range maps user-defined GIS Meteo. Possible to construct maps for any area at any time and any content.
Timing of receipt	Timing of receipt of cards are fixed and defined in the fax program. Transfer card begins only after the receipt of all necessary information, drawing maps on plotter and conduct manual analysis. The result is a map in 2-3 hours after the observation period.	In GIS Meteo terms of manufacturing card determines the user. The card is made almost immediately – immediately upon receipt of all necessary information it can work. It is also possible to prepare a map earlier on incomplete data – on the 20 th minute from the time and supplement it with newly received data later.
Quality	Average depends on the quality of fax communication channels. When you receive a card on the radio quality is very low.	Excellent! It all depends on the quality – monitor and printer.
The possibility of combining information on the map.	There is no possibility of combining the information on the map.	GIS Meteo provides unlimited possibilities for combining different types of information on the card.
Harmful	Map is displayed on the unhealthy paper.	Friendly technologies. Maps are displayed on the display screen and/or printer. Laser Printer – silent.
Scalability	None.	In GIS Meteo provides an opportunity of consolidation of individual fragments of maps with display of details in areas of high data density.
Possibility of modification	Possible to apply additional information manually.	In GIS Meteo possible to produce the most convenient format for the card with its own analysis, processing and design.
Ability to archive	Not archived.	Capabilities and backup data on different media (diskettes, tapes, CD). Printed maps are archived.

Analysis of the table shows the obvious advantages of geographic information technologies. Briefly discuss the general characteristics of GIS Meteo developed by NGO "MAP-Meykers" Moscow.

GIS Meteo – an interactive and real-time tool designed for use in operational work of meteorologists. It can be used with success in areas such as agro-meteorology, hydrology, oceanography, etc. With the help of GIS Meteo you can receive weather maps using operational information from various databases:

- meteorological data base that can be completed in real time;
- the database with images from various weather satellites;
- the database with information from weather radar.

GIS Meteo consists of a main module and module components. Component modules are responsible for the creation, modification and display of the components of the slides. For example, one module allows mapping of data in the code of GRID, the other module is designed for the construction of vertical sections, one responsible for nanosku surface data, etc. The presence of geographical module is required. Other modules are added to the system by the user. Thus, the user can create a system that is configured exactly according to his needs.

Specifically for GIS Meteo uses meteorological data base of real time (MDB). It is optimized for size and access time and provides a means of storing and retrieving data from various WMO code forms, including SYNOP, SHIP, TEMP, PILOT, AIREP, METAR, GRID, GRIB, BATHY, TESAC, DRIBU and many others. To accelerate access data stored in binary form. Together with the decoded data by the user can store the original text of the telegram.

To accompany the meteorological database provided by a special set of tools that allows you to partition the new database, upload the data from them and download them back.

Data access MDB provided in the form of libraries to work in Windows. These tools allow programmers to develop their own software using operational meteorological data.

The database of satellite images may contain IR and TV images, taken from various orbiting and geostationary satellites, METEOSAT, JMS, NOAA, METEOR.

Geographic database contains data coastlines, borders, outlines of rivers and lakes, etc. and used in GIS Meteo for building foundations cards. Geographic database can be customized to a specific geographic area. Can simultaneously use multiple geographic databases. Various slides may relate to different areas.

Given current trends, a number of higher educational institutions of the CIS, in particular the Department of Meteorology Geography Faculty of Moscow State University, Odessa GMI, Department of Meteorology of the Kazakh National University. Al-Farabi and others have shifted to training, meteorologists, given the current level.

Currently, the use of GIS "Meteo" is an important part of the educational process in the Kazakh National University. Al-Faraby on the preparation of Meteorology and Climatology, which allows stakeholders to ensure that Kazakhstan highly qualified specialists capable of solving all the modern challenges of monitoring the state of the atmosphere.

В. Сальников, Н. Керимбай, Г. Нюсупова

**Әл-Фараби атындағы ҚазҰУ-гі ГАЖ-ді оқытудың қазіргі жағдайы және даму
болашағы**

Бұл мақалада география факультетінің оқу жүйесінде пайдаланылатын Геоақпараттық жүйелердің оқу және ғылыми зерттеу негізінде қолданылуы жағында жазылған. Факультетте ГАЖ – ды қолдануды картографияларда және ауа райын болжаудағы бағыттары көрсетілген.

В. Сальников, Н. Керимбай, Г. Нюсупова

Текущее состояние и перспективы развития ГИС образования в КазНУ им аль-Фараби

В статье рассматриваются основные направления развития ГИС – технологий на географическом факультете в учебных и научно-исследовательских целях, как одного из самых передовых инструментов пространственной организации данных. Показано, что использование ГИС для геоинформационного картографирования и прогноза погоды является перспективным направлением факультета.

UDC 556.53.08:002.6

A.R. Medeu, V.P. Blagoveshchenskiy, S.U. Ranova

GIS TO COMBAT LANDSLIDE PROCESSES (BY THE WAY OF EXAMPLE OF THE ILE ALATAU)

Institute of Geography LTD, «Parasat» NSTN GSC, Almaty c.

In a series of dangerous processes in mountain areas of Kazakhstan the landslide processes occupy a special place because of their wide spread, great destructive power and quick response to changing of external conditions. Therefore, the problem of investigating landslide hazard in the Ile Alatau has the character of a critical importance and relevance in connection with the intensive development and ecological imbalance.

The creation of maps and geographic analysis are not something entirely new. However, GIS technology provides a new, more appropriate to modern times, more efficient, convenient and fast approach to analyzing problems and solving tasks that mankind, in general, and the specific organization or group of people, in particular, are facing. It automatizes the analysis and prediction procedures. It is always important to know not only the nature and extent of the threat, but also its location, particularly with regard to how it may affect people around. GIS allows creating maps with the latest information about landslides as soon as possible. And modern means of remote sensing are able to supply with this information around the clock and in any weather.

The foundation of any GIS is formed by an automated mapping system – a complex of devices and software tools ensuring their development and use of maps, which consists of a number of subsystems, the most important of which are subsystems of input, processing and output of information.

We have compiled a series of maps for landslide hazard assessment on a scale of 1:200 000 by using the ArcInfo 9.3. software product and a widespread use of remote sensing data (RSD). The process of creating maps was carried out in several stages, which differ in type of data input, methods of processing, analysis and creation of thematic layers on their base, which are then put together to create the specific electronic maps.

We have put the following information into GIS: 1) RSD, 2) thematic and topographic maps, 3) data from field researches; 4) published data on individual landslide processes.

1. The stage of work associated with remote sensing was represented by processing of the following materials: – multi-zone digital Aster images of 2007–2008 with a resolution of 15 m; multi-zone digital Landsat images with a resolution of 28.5 m; – black and white and spectrozonal images of 1: 200 000 scale; photomaps of 1:200 000 and 1:500 000 scales.

The interpretation of satellite imagery was carried out by us in different ways: on the basis of a fully-automated deciphering; visual deciphering; variants of their combinations. The use of ASTER satellite imagery has allowed to draw borders between different types of relief; to reveal