MONITORING THE POPULATION GROWTH PROCESS USING GEOINFORMATION TECHNOLOGIES (ANDIJAN)

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Abstract. Today, it is no secret that the process of demographic growth is accelerating. This requires the control and monitoring of settlements on the ground. This article describes in detail the monitoring of the growth of settlements with the help of geoinformation technologies.

Key words: demographic process, settlements, society, monitoring, concept of geoinformation, modern technologies, etc.

A geographic information system (GIS) is a computer system designed to collect, manage and describe geospatial data, in which these data can be displayed in images, tables, along with the details of events, events, activities, or where they exist. Geoinformatics, which is a different form of geoinformation system, means a complex of scientific, technical and applied sciences related to the development of geoinformation system. This complex arises from the connection between geography, informatics and information technology theory, cartography and new approaches to computing. Currently, as a result of the rapid growth of this section of the information system, it is used not only in technical fields, but also in various social areas of our life. GAT has a wide range of applications, including in health care, in the process of geographically and conveniently locating new clinics and hospitals, in the creation and determination of road routes and schedules for trucking companies, and in the design of new routes and roads for highway construction companies. it is very useful when choosing the most optimal option, as well as in correctly and rationally calculating the land in the state fund, developing new land for farmers, determining the condition of the land and obtaining sufficient information about it. Today, geoinformation systems provide convenience to drivers and pedestrians in navigating various routes and finding the closest, most convenient ways by processing geospatial data location information in communication with satellites. At first glance, it seems easy for us to easily get such information on a card through our simple mobile phone, but behind this convenience lies the scope of work, such as the correct application of the rules of the geoinformation system.

Imagine that you are living in the 1960s, a time when computer technology was not yet developed. Let the ministry where you work be entrusted with the task of collecting general information about the natural resources available by the state and,

on this basis, determine the current and future reserves of natural resources. Of course, to carry out such a large-scale work, first of all, reliable data, experienced specialists, various technologies and a huge amount of paper products for their description are required. Also, it takes a lot of time to do this. An automated system is needed to organize and analyze these works. The first country that felt the need for such a system was Canada, and the concept of a geoinformation system was introduced by the Canadian Ministry of Environmental Development at that time, and later, the development of the geoinformation system is being continued in close connection with the improvement of computer technologies. In order to simplify the work mentioned above, to reduce the involvement of specialists, to save time and of course to save money, we need an automated system with the help of modern computer programs and technologies - Geographical Information System. The main tasks of the geoinformation system are to create an automated digital database by collecting and processing spatial data, storing it for future analysis and printing. It is not correct to understand the task of the geoinformation system only as the production of a digital map by a computer, because the information obtained through this system is analyzed and used in making important decisions. This system allows us to perform operations such as querying data, combining different layers, unlike tabular data created in the traditional way.

Scientists have defined the geographic information system or geoinformation system in different ways. For example, J. Berry gives the following definition: "Geographic information system is an internally positioned spatial information system created for data management, cartographic representation and analysis." This definition is not very complete, because it does not show the human as an important element of the information system, although the human plays an important role in all information systems as an expert, observer and analyst. Therefore, direct human participation plays an important role in GAT, and we have reason to say that the definition given by K. Chang below is complete and easier to understand, that is: "Geographic information system is the collection, storage, search, analysis of geospatial data. and is a computer system for imaging. If we give a simpler view to the above definition, it can be concluded that the geoinformation system is a complex system of software hardware and human activity designed to store, manage and describe geographical information. Summarizing the mentioned points, we can give the most accurate definition below: "Geoinformation system is a system under the management of specialists and analysts whose main tasks are to collect, store, manage, analyze, model and describe geospatial data of natural and social phenomena using special tools. is a generalized software system". It is possible to give different definitions to the geoinformation system, to continue discussions about it, but at the heart of all definitions lies the main meaning given above. Therefore, the given definition can be accepted as the main definition. The set of spatial-geographic data in the definition given above includes all data about

land, including coordinates, boundaries of land plots, information about their location, legal and economic data of a place, and many other important spatial information must be understood.

The geographic information system helps to describe objects on the earth, including buildings, cities, roads, rivers, and countries through a computer. Currently, this system is used to describe and analyze human activities and changes in the world, to identify and understand problematic situations. Analytical problems described by cards help a person to understand more visually than various numbers and diagrams. This is because there are currently many ways to describe a problem visually through GAT. These methods include different colors, three-dimensional views, and vector rendering, which in turn reveal aspects that are difficult to understand through text or numbers. Therefore, although this system belongs to the group of technological systems, it is also widely used in the social, economic and health sectors. Currently, the scientific basis of the geographic information system is widely studied, and now mapping through maps has become one of the proven methods in the field of geographic knowledge. When we start to understand and solve problems in any field, we can now immediately develop a digital map of that problem, look for solutions by assessing the scope of the problem, and make decisions accordingly. In this tutorial, some of the terms used in GAT are mentioned and for the user's understanding, we provide some information about their meanings and abbreviations below. A map (English: map, chart; Greek: chartes means sheet) is a miniature image of the earth's surface and its projection on a spherical surface. The map is drawn up in rectangular coordinates in a known cartographic projection or zonal system. Nomenclature refers to the system of dividing topographic maps into sheets and marking these sheets, that is, naming them. A digital map (numerical, digital map) is a digital model of the surface created on the basis of cartographic generalization laws adopted in map projection, coordinate and height system determination, in other words, digital cartographic information. A digital card is created based on all the norms and rules of cartography, card accuracy, generalization, conditional symbols system. The digital map serves as the basis for creating a simple paper, computer and electronic map and is part of the cartographic database. At the same time, it can be considered as an important element of GAT information supply, and at the same time it can be a result of GAT processes. A computer card is a type of card issued on a graphic device using the means of automated cartography (graphic device, plotter, printer, digitizer image on paper, plastic, photo film). GAT technologies are the technological basis that helps to realize the functional capabilities of GAT and creates it. Geoinformation analysis is a department that analyzes the location, structure, and interrelationship of objects and events using geomodeling and spatial analysis methods. Geoinformatics cartography is the result of the interdependence of geoinformatics and cartography.

Geoinformational cartography is formed in the interdependence of automated cartography, aerospace methods including remote sensing, decoding, digital photogrammetry and geoinformatics.

The following factors motivated the formation of this trend:

- Development of geoinformatics as a scientific-technological and production science.
- Practical cartography required to provide solutions to problems.
- Application of computerized map creation and automated cartography as the core of GAT in cartography.
- Integration of theoretical, cartographic and geoinformatics approaches.
- Scientific-practical processing of new-look card types on a large scale.

A coordinate base consisting of geodetic latitude, longitude and orthometric height is necessary for solving practical issues of a number of sectors of the economy of the Republic of Uzbekistan (Uzairgeodezkadastr, Ministry of Emergency Situations, construction and transport organizations, etc.). But at present, our republic does not have a global time-coordinate calculation system, such as the GNSS space system, from the location on the earth's surface. On the other hand, the relationship between the earth base coordinate system and the physical surface of the geoid has not been found with sufficient accuracy. It is necessary to develop a method of providing a geodetic basis in order to increase labor productivity and reduce the costs associated with the collection of initial geodetic data. Initially, the first part of this problem - the creation of the Kitab-Tashkent database - was solved by the research team of the project. A state patent was obtained for the software created for the purpose of evaluating the accuracy of points. Currently, the base geodetic network based on the Krasovsky ellipsoid is used by topogodetic and geophysical services in their calculations. The GNSS system relies on the WGS-84 International Elevation System, so the problem of the difference between the two coordinate systems has become an issue as a result of the proliferation of satellite-based receivers that determine coordinates and altitude. On the other hand, the Central Asian region has active deformation for both horizontal and vertical movements. Vertical shifts are not only the result of interlayer deformation, but also the effect of atmospheric pressure and soil moisture.

In addition to ellipsoidal coordinates, polyharmonic mathematical models of the gravimetric field with high accuracy are needed to determine orthometric heights. To further develop this method, the project envisages the use of time series of coordinate changes obtained from Kitab and Tashkent stations using classic and satellites (GNSS, DORIS). Taking into account that changes in the ionosphere are an

indicator of processes in the lithosphere, the project envisages monitoring the state of the ionosphere using VLF and Super SID devices - very low frequency electromagnetic wave receivers. This will not only improve the accuracy of finding the height of the points, but also make it possible to study the correlation between the processes occurring in the ionosphere and the seismic activity of our region. Since ancient times, people have represented geographic information in various ways, and over time, the methods of displaying geographic information have improved. One of the first ways to describe geographic information was to describe information about this place on a map. Later, they started to enter conventional signs and coordinates on the cards. If the first cards were drawn and entered by hand, and conventional symbols were intended to be used on the scale of the society in which they lived, then later, not by hand, but on printing equipment, and conventional symbols also began to be used on a global scale by mutual agreement. At this point, we need to touch on the concepts of information and information, because these two concepts are close to each other and are often used together, which can lead to confusion. Information is an unprocessed, unstructured collection of raw facts. Information can be qualitative and quantitative and is generated based on measurement results. Information can be presented in a table in the programs of the geoinformation system. After the information is processed and analyzed, it becomes information. When we read information, we see only numbers, information is presented in an orderly form, and when we do not see this information, we can see the result processed based on them. In order to make it understandable, we can cite students' exam results as a simpler example. If the exam result of each student is considered information, then the average grade of students in the auditorium or the institution as a whole, the mastery rate is called information.

Research and observations show that the high rate of natural population growth in Uzbekistan, including the region, will continue for some time to come. The high rate of natural growth and birth in Uzbekistan, including Andijan region, is due to the influence of the following factors, which include:

1. The level of urbanization of the region was not so high until recently. Scientific research shows that natural growth in rural areas is higher than in urban areas. For example: in Andijan region, natural population growth has always been much higher in rural areas per 1,000 inhabitants. For example: the natural increase of the urban population per 1000 people was 21.6 people in 1990, 12.1 people in 2002, and 16.4 people in rural areas in 2002.
2. Compared to developed countries, our young people get married early, as a result, the earlier people get married, the higher the birth rate and natural growth.
3. Uzbeks and representatives of other local nationalities (Tajik, Kyrgyz, Russian, Uyghur, etc.) have a higher birth rate and natural growth than representatives of other European nationalities. Uzbeks in Andijan region are much higher than in

most regions of the republic, i.e. 91.9%, or representatives of Uzbek, Kyrgyz, Tajik, Uyghur nationalities make up 92.2% of the total population of Andijan region. (01.01.2010). This has a favorable effect on the high increase in the number of the population, and among them, the stability of the traditional processes of multiple births is observed.

4. In Uzbekistan, including in the Andijan region, it is characteristic to determine the number of children in the family in advance and to use means of birth control. Especially among the women of the local ethnic groups, due to the large number of children, the weight of women's participation in social production is low, because the higher the participation of women in social production, it has a negative effect on the birth rate and natural reproduction of the population.
5. The high birth rate in the region is due to the high proportion of married people and the low number of divorces in families, and the high family strength has a favorable effect on the high birth rate to a certain extent. In 1970, for every 1000 people, 9.7 people were married during the former Union, in 1989, 9.7 marriages, and in 1990, 9.2 marriages were recorded. The number of married people and families in Andijan region The lack of separation is characteristic.

Today, along with the development of the geoinformation system, there is a need to reform geoinformatics education. Currently, the geoinformation system is considered not only as a complex of technical sciences, but also as a science oriented to management, decision-making and social goals. At the level of individual organizations, training of specific programs on the geoinformation system has been launched, the main goal of which is to learn how to work in the program. However, with the development of this field, bachelor's, master's and doctoral programs should include not only technical, but also the above-mentioned fields. That is why it is very important for a modern specialist to work on himself and acquire knowledge in the field of geoinformatics. Geoinformation system software is the main and important part of any GAT process. As techniques and technology advance, programs continue to evolve, allowing for cost reductions in GAT projects. All GAT programs are divided into four systems. These include software installed on desktop computers, server computers, and developer and handheld devices. We can include ESRI Arc Reader, Intergraph Geomedia Viewer, Mapinfo ProViewer, AutoDesktop 3D, ESRI Arc View-ArcInfo, Ge Spatial Intelligence, Intergraph Geomedia Professional and other programs in the category of programs for desktop computers. The functions of these programs include simple map viewing as well as professional tasks such as data collection and analysis, database management, and geographic data processing and analysis.

An online geospatial system, also known as a web geospatial system, is a service that delivers your data to users outside of your organization. It is very important for national geodetic and cartographic organizations, geoinformatics centers, land resources committee or organizations dealing with spatial data to implement this type of service. In this case, any geospatial software you are working with will be available online. Most importantly, online services should be easy to use for the average user, and the search for information and making inquiries should be simplified. But some geoscientists can make it look a little more complicated. Through these methods, online services can expand the scope of paid services and achieve stability. Another important aspect is that nowadays the Internet is accessed not only from personal computers, but also through mobile phones and tablets. This requires the development of special programs suitable for those devices. Nowadays, the cost of connecting to the Internet is getting cheaper, and the speed is increasing. This development makes it possible to work online in geoinformation system programs.

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