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MONITORING THE GEODYNAMICS OF NATURAL AND MAN-MADE RISKS OF ALMATY

Abstract

The purpose of the article is to solve the problems of drawing up a map, its presentation, processing, analysis in order to comprehensively assess the regional system of natural and artificial threats of the Almaty region. By solving these problems, you can consider ways to easily resolve the upcoming conflicts and problems. It can be prevented by making predictions about natural and man-made problems. The root of natural and man-made catastrophic conditions of Almaty region are natural disasters characteristic of mountainous regions. We will take into account the conditions of seasonal mudslides and earthquakes. Since Almaty region is a region located in a mountainous zone, there are a lot of earthquake foci. Tectonic movements often occur. In order to prevent major natural disasters, it is necessary to carry out special monitoring work. From this point of view, the compilation of Geodynamic maps, the study of the Earth's crust, the identification and differentiation of earthquake foci come to the rescue. With this, major disasters can be prevented. The article compiled a map of natural and man-made conditions of the Almaty region. In the process of creating a map, using GIS data, we created a map in the ArcGIS application. We received data from the GIS through a special platform, processing space surveys using a program. We received the data on the basis of SRTM space survey. By studying the dynamics of changes for each year, by comparing maps, you can make conclusive forecasts. Collecting data through free platforms helps to create rational solutions. It is possible to monitor, update,store,and edit the database of information using maps. In the article, a complete study of the region's region was carried out, the importance was given to the rational, effective use of GIS data.

Key words: cartography, GIS, statistical data, geodynamics, man-made risks, Arcgis, map, SRTM, survey

Introduction

Almaty is a region rich in natural resources, economically and, on the one hand, mountainous in nature. In addition, the Earth gives is considered a region with very complex, tectonic eruptions. Population density, rapid economic development lead to the spread of environmental problems. Almaty region is a natural and man-made disaster zone, as well as an ecologically aggravated zone.

The following work will be carried out to analyze the socio-economic and environmental situation in developed countries and states with high market economies:

- conclusion of legislation and contracts;
- involvement of citizens in this direction, dissemination of information;
- financing of Environmental Protection;
- new technological application, compilation of special monitoring cards;
- improving environmental education;
- conducting special research work with the help of satellites.

In this context, GIS specialists can also contribute. With the help of special space surveys, it is possible to create maps and conduct reconnaissance of the regions [1].

Literature review

In accordance with the experience of the Environmental Protection Organization of the Republic of Kazakhstan, as well as the experience of developed countries, the comprehensive regional plan for Environmental Protection is one of the most important components of the health and Environmental Protection of the population of the Republic [2]. The Environmental Protection Program includes environmental audits aimed at establishing a system for the implementation of comprehensive rehabilitation measures, including the full determination of the environmental impact of the above activities and the analysis of geographical features, climate, Natural Resources, socio-economic conditions. It defines environmental priorities for the next 3–5 years and the future, sets out specific activities, their goals and objectives, deadlines for implementation, a plan for financing the plan [3].

It can be said that the Almaty region has entered the stage of a major natural and technological disaster. The analysis of GIS information, a comprehensive assessment of the impact of many natural and artificial processes on the territorial system will allow us to build a unified model, as well as obtain new scientific results to overcome problem situations [4].

Main provisions

For this purpose, the structure of GIS-the collection, storage, modification and automatic transmission of geographic information through automated computers and GIS-can be combined according to the project as follows [5]. The multifunctional mortise is used for many tasks. This implementation will use the following features:

- prepare and put a certain substance in a container;
- reference for information and modeling;
- modeling;
- professional modeling;
- automatic card creation;
- visual calculation [6].

To solve these problems, it is necessary to prepare the processed data in cartographic form and provide it with the algorithms and software used. Can be seen as a data base as a tool for studying the natural elements, dynamics, and system modeling of a region. The-provides specific options for solving the following physical-geographical problems: studying the morphological structure of a country, conducting physical-geographical comparisons, etc. [7].

1 it is related to high-resolution satellite imagery, shaded topographic maps, and two-map digital program maps. It contains data on more than 270 earthquakes in more than 50,000 countries and regions, more than 50,000 cities and islands, and more than 15,000 locations around the world [8]. Interpreting information about political boundaries, rivers, lakes, world coasts, etc.in in addition, it has many interesting features and we can imagine it as scientific software for geography education [9].

Methods and materials

When these robots entered, they received about 12 mah of radar data, and after processing, they obtained mah, which covered the Earth from 60 to 54 degrees [10].

There are several versions of the information available in IA: a preliminary version. The second option will be considered further – separating the edge and the tank, filtering the wrong values. Information from no. they are popular in several versions: the size of the grate is 1 sec. 1 no. E 3 No 3 No [11].

The cell size data is 1 angle 91 seconds (i.e. the cell size is 1 angle 91 seconds). in some cases (for example, a spatial resolution of 30 meters), they are more accurate, but, unfortunately, only in the United States [12].

In the rest of the country, the data comes from IA and is available to the public, the cell size is 3.3 arc seconds (that is, the spatial resolution of 90 m), and the resolution is at least 16 [13].

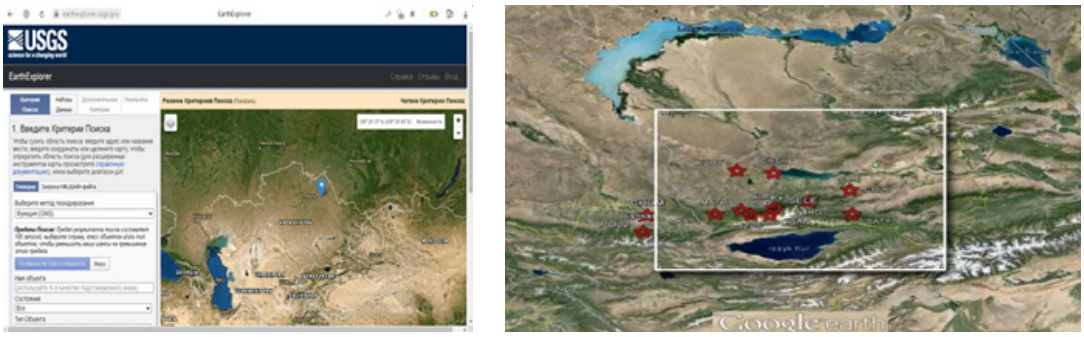

Figure 1 − Access to the earthexplorer page through special registration

Figure 2 − Designation of the required area

Figure 3 − Selection of the desired space shot

Figure 4 − SRTM space surveys

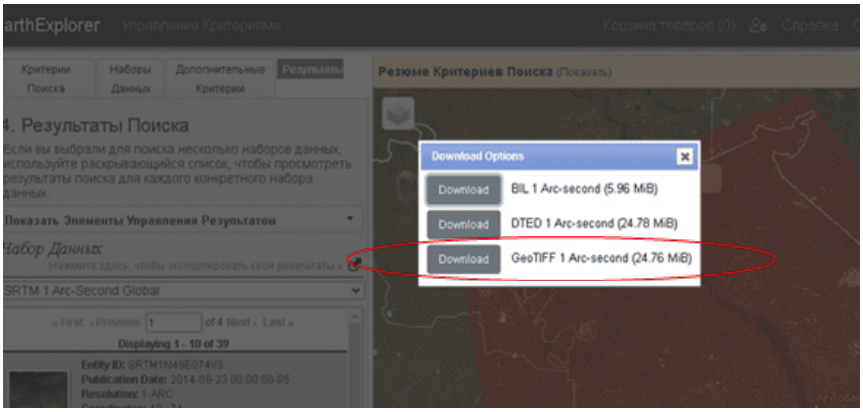

Figure 5 − Download a shot of the desired format

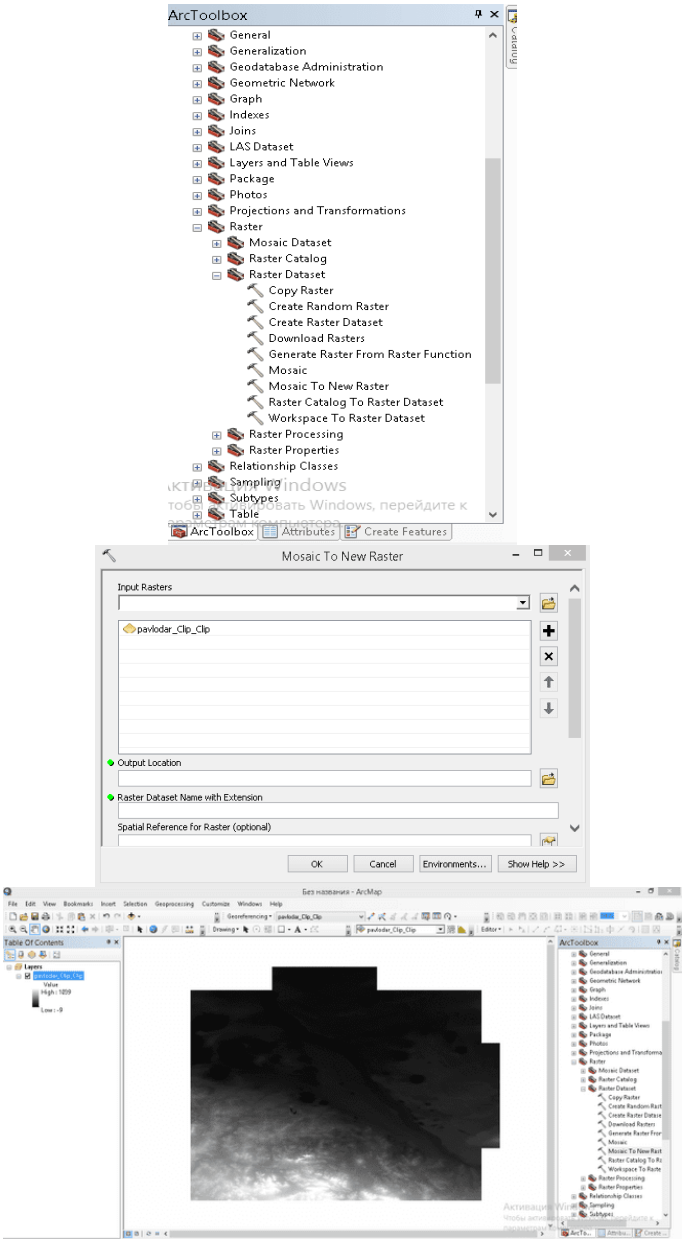

Figure 6 − The process of obtaining a DEM Image by creating a special mosaic

The process of obtaining hydrography using SRTM space survey:

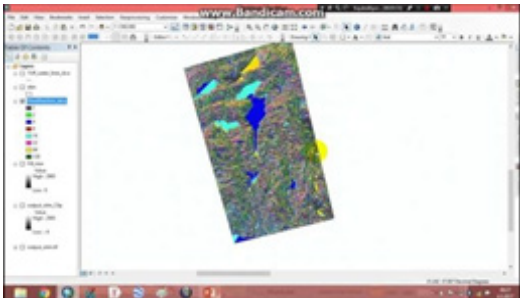

Figure 7 − Obtaining hydrography data from Space survey

Results and Discussion

1. Filling tool (mAh) focus current (mAh), pulse direction. It uses several different parameters such as (direction), urban development reduction (catchment area), catchment area (catchment area) and soil filling (zoning) [14]. Tool use is a procedure that is repeated until all shortcut websites are exhausted, taking into account the specified number of limits (above). When you fill a local gateway, you can create a new local gateway at the edge of the selected area, and these sections will then be removed from the loop [15].
2. Duck section to obtain the hydrological properties of the surface

The direction of cell flow can be selected. This is done using a flow direction tool.

3. This tool uses it as an input page and provides a grid that shows the direction of supply of each cell. If you select the «output distortion» option, Create an output table that represents the measure of the maximum change in the flow direction relative to the distance between the drive centers in cents. If you select «load from end cell» (force all boundary cells), all cells loaded from the edge of the website will be outside the network boundary [16].
4. There are 8 correct directions relative to 8 adjacent blocks through which the drain passes. This method is often described as the eight-step flow model (98) and follows the basic method of Jenson and Domingo [17].

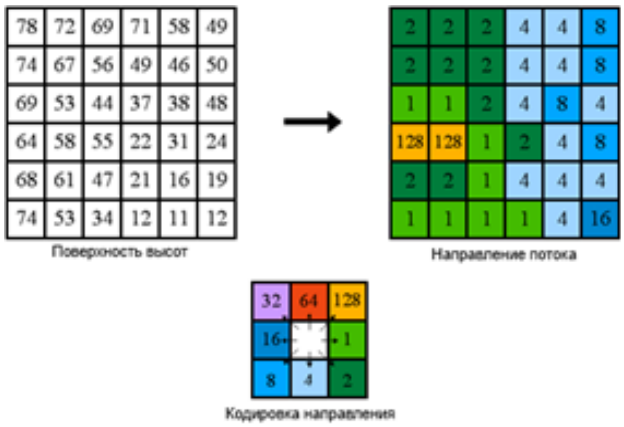

Figure 8 − Mathematical foundations of the program.

The flow accumulation tool calculates the total flow, which is the total mass of all stations falling under the starting laser slope of each station. In the absence of a raster scale, each cell acquires a mass of 1, the value of the original raster cell is equal to the number of cells contained in each cell [18].

The lower icon in the upper left corner shows the direction of movement of each cell, and in the upper right the number of cells entering each cell [19].

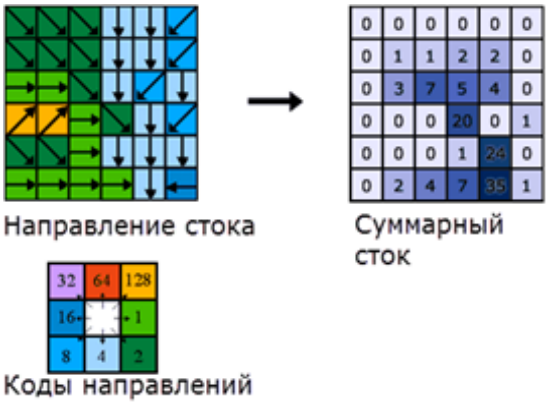

Figure 9 − Mathematical foundations of the program

An example of using this tool is to determine the amount of precipitation that will arrive in a basin. In this case, the input range of the scale can be a continuous range representing the average precipitation for a given period of time. The measurement result determines the amount of precipitation flowing from each cell, so that all precipitation flows to the surface, no precipitation, no evaporation, and precipitation does not reach groundwater. This procedure can be considered precipitation above the surface of each cell [20].

Required layers in the process of creating a physical map:

1. introduction of settlements
2. Hydrography
3. roads
4. Forest
5. Border

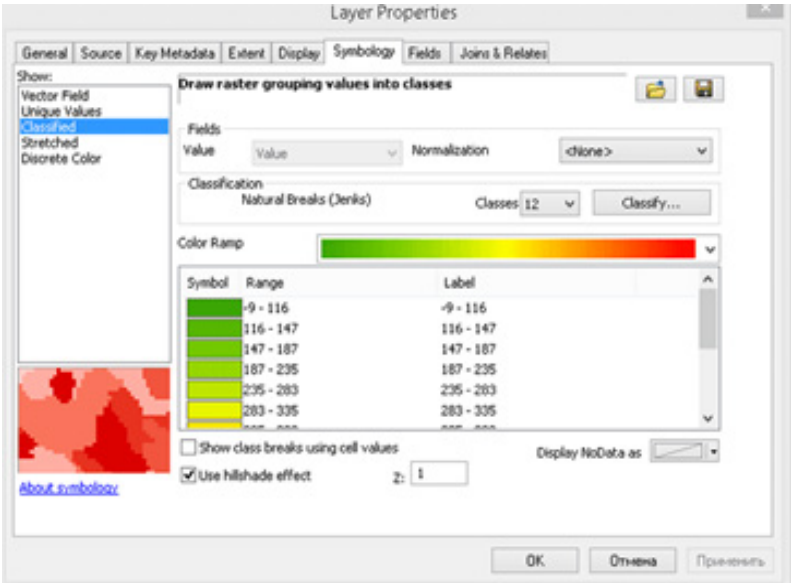

Figure 10 − Physical data extraction works (classification)

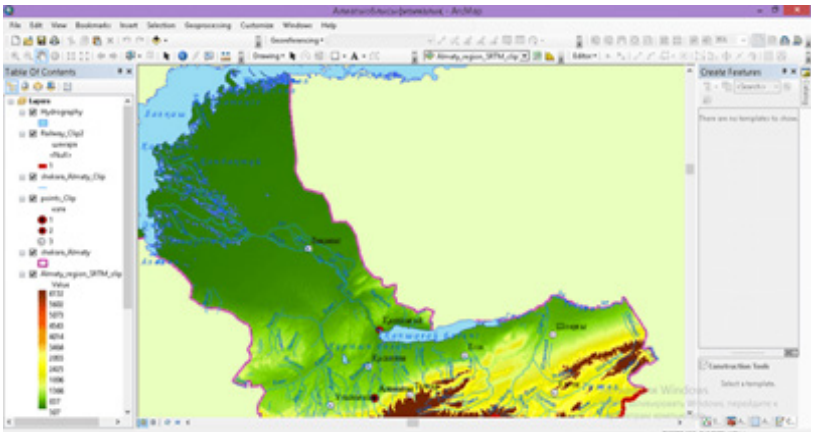

Figure 11 − Natural and man-made map of Almaty region

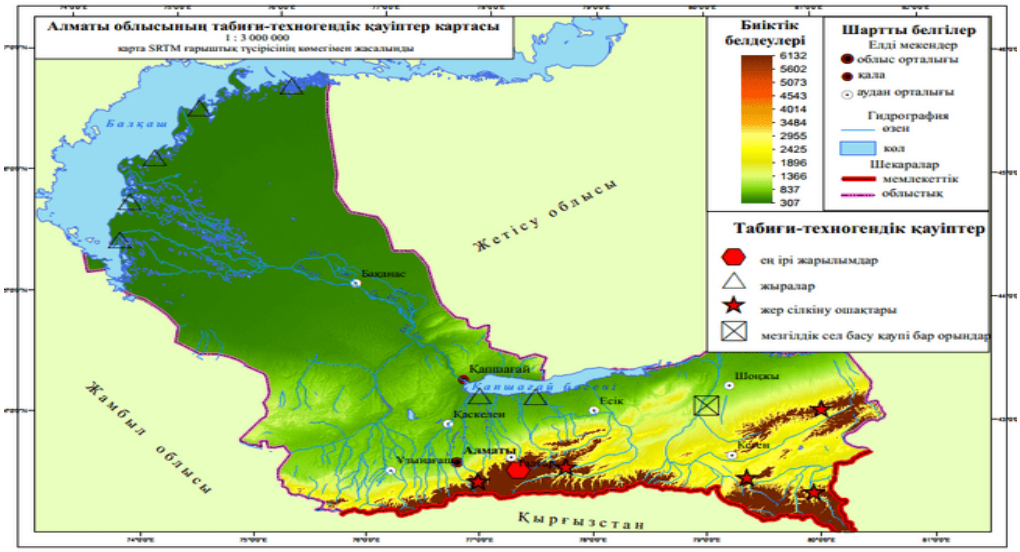

Figure 12 − Natural and man-made map of Almaty region

Conclusions

In the article, we compiled a map of natural and man – made threats to the Almaty region using GIS data. To create a map, we used SRTM space capture. Card details can be processed, updated, compared, and monitored. By making a preliminary forecast of natural hazards, it is possible to prevent the upcoming major disasters. Drawing natural and artificial maps of Almaty region. Effective use of location images during installation, use computer technology, data mapping. On the map, you can explain, predict and track threats in the Almaty region.

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АЛМАТЫ ҚАЛАСЫНЫҢ ТАБИҒИ ЖӘНЕ ТЕХНОГЕНДІК ТӘУЕКЕЛДЕРІНІҢ ГЕОДИНАМИКАСЫН БАҚЫЛАУ

Аңдатпа

Мақаланың мақсаты – Алматы облысының табиғи және жасанды қауіптерінің аймақтық жүйесін жан-жақты бағалау мақсатында картаны құру, оны ұсыну, өңдеу және талдау мәселелерін шешу. Осы мәселелерді шешу арқылы болашақта туындауы мүмкін қақтығыстар мен мәселелерді оңай реттеуге болады. Бұл, әсіресе, табиғи және техногендік апаттар туралы болжам жасау арқылы олардың алдын алу мүмкіндігін қамтамасыз етеді. Алматы облысындағы табиғи және техногендік апатты жағдайлардың негізгі себептері таулы аймақтарға тән табиғи апаттармен байланысты. Біз маусымдық көшкіндер мен жер сілкіністері жағдайларын ескереміз. Алматы облысы таулы аймақта орналасқандықтан, жер сілкінісінің ошақтары өте көп және тектоникалық қозғалыстар жиі кездеседі. Ірі табиғи апаттардың алдын алу үшін арнайы бақылау жұмыстарын жүргізу қажет. Осы тұрғыдан алғанда геодинамикалық карталарды құрастыру, жер қыртысын зерттеу, жер сілкінісі ошақтарын анықтау және саралау маңызды рөл атқарады. Бұл шаралар ірі апаттардың алдын алуға мүмкіндік береді. Мақалада Алматы облысының табиғи және техногендік жағдайларының картасы жасалды. Картаны құру барысында ГАЖ деректерін пайдалана отырып, ArcGIS қосымшасы негізінде карта жасадық. ГАЖ деректерін арнайы ғарыштық зерттеулерді өңдейтін платформа арқылы алдық. Бұл деректер SRTM ғарыштық зерттеулер негізінде жиналды. Жыл сайынғы өзгерістер динамикасын зерттеу арқылы карталарды салыстырып, нақты болжамдар жасауға болады. Тегін платформалар арқылы деректерді жинау ұтымды шешімдер қабылдауға көмектеседі. Карталардың көмегімен мәліметтер базасын бақылауға, жаңартуға, сақтауға және өңдеуге болады. Мақалада облыс аймағына толық зерттеу жүргізіліп, ГАЖ деректерін тиімді және ұтымды пайдалану мәселелері қарастырылды.

Тірек сөздер: картография, ГАЖ, статистикалық мәліметтер, геодинамика, техногендік қауіптер, Arcgis, карта, SRTM, зерттеу

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МОНИТОРИНГ ГЕОДИНАМИКИ ПРИРОДНЫХ И ТЕХНОГЕННЫХ РИСКОВ АЛМАТЫ

Аннотация

Целью статьи является решение задач составления карты, ее представления, обработки, анализа с целью всесторонней оценки региональной системы природных и искусственных угроз Алматинской области. Решая эти задачи, вы можете рассмотреть способы легкого разрешения предстоящих конфликтов и проблем. Это можно предотвратить, делая прогнозы относительно природных и антропогенных проблем. Причиной природных и техногенных катастроф в Алматинской области являются стихийные бедствия, характерные для горных регионов. Мы будем учитывать условия сезонных селей и землетрясений. Поскольку Алматинская область является регионом, расположенным в горной зоне, здесь много очагов землетрясений. Часто происходят тектонические движения. Для предотвращения крупных стихийных бедствий необходимо проводить специальные мониторинговые работы. С этой точки зрения на помощь приходят составление геодинамических карт, изучение земной коры, выявление и дифференциация очагов землетрясений. С помощью этого можно предотвратить крупные катастрофы. В статье составлена карта природных и техногенных условий Алматинской области. В процессе создания карты, используя данные ГИС, мы создали карту в приложении ArcGIS. Мы получали данные из ГИС через специальную платформу, обрабатывая космические съемки с помощью программы. Мы получили данные на основе космической съемки SRTM. Изучая динамику изменений за каждый год, сравнивая карты, можно делать убедительные прогнозы. Сбор данных с помощью бесплатных платформ помогает создавать рациональные решения. С помощью карт можно отслеживать, обновлять, хранить и редактировать базу данных информации. В статье было проведено полное исследование территории региона, важность была придана рациональному, эффективному использованию данных ГИС.

Ключевые слова: картография, ГИС, статистические данные, геодинамика, техногенные риски, Arcgis, карта, SRTM, съемка.

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