Geo-ABC book

And inside:

HEAD OFFICE OF GEODESY AND CARTOGRAPHY

Note!

Fun facts

Tasks

Dear Sir/Madam,

It is with great pleasure that I present to you the new edition of the "Geo-ABC book", updated and supplemented by employees of the Head Office of Geodesy and Cartography.

In the "Geo-ABC book" you will find explanations of basic concepts in the field of geodesy and cartography, information about mechanisms occurring in these fields from history to the present day and descriptions of their directions of development. All of this has been prepared in a simple and accessible way for readers of all ages.

The book has been prepared in both print and electronic versions, the latter available on the website www.geoportal.gov.pl under the "Education" tab.

I hope that this publication will help you understand how important geodesy and cartography are in various areas of life.

Sincerely,

SURVEYOR GENERAL OF POLAND
Alicja Kulka

GEO

in Greek, gé means "earth", it is the first part of a compound word denoting a connection with the Earth.

ABC BOOK

in Latin, elementarius means "elementary, initial", in scientific terms – a textbook for the initial learning of reading, but also a textbook for beginners in a specific field.

Each of us wants to be an explorer. There is a real treasure hunter in each of us. We imagine a world with countless treasures and the secrets it holds.

Man has always been interested in what surrounds us. The curiosity to know, the thirst for knowledge, the constant desire to discover – this has always driven mankind, civilisation. Since ancient times, man has wanted to get to know the surroundings, region and country. With time, people ventured into more and more remote regions and corners of the Earth. It became a natural need to describe and graphically reproduce the discovered areas, rivers, mountains, forests and other elements. Maps and descriptions of lands have become a necessity for daring expeditions, wars, treasure hunts or discovering new lands. Today, it is difficult to state when the first map appeared. The oldest known map of land is the one found in a cave in Abauntz, in the Navarra region, in northern Spain – it is a stone tablet from almost 14,000 years ago. The oldest preserved maps include the Babylonian "map of the world", carved on a clay tablet from the mid-2nd millennium BC, and a slightly later one – an Egyptian papyrus from the mid-1st millennium BC.

Thanks to them, we can understand how our ancestors imagined the space around them, how they explained various natural phenomena and imagined life in distant lands.

Flat earth, earth in the shape of a ball, cone or box; three continents covered with water, a huge mountain in the centre of the world, strange inhabitants of distant lands, gods at the edge of the world – all this shows us how rich the imagination of our ancestors was, and how difficult it was for them to collect information and put it together.

The father of modern cartography is the Greek scientist Claudius Ptolemy, the author of the work "Geography". In his time, it was known (still!) that the Earth was round.

The real revolution in cartography came with the great geographical discoveries of the Renaissance. It was then that the sphericity of the Earth was proven beyond any doubt.

Shapes of the continents, more and more close to reality, began to appear on maps.

Since the mid-20th century, with the technological revolution and the use of satellites to create an image of the world, a new time has come for cartography. Thanks to technology, cartographers were able to produce an accurate map of the world and focus on making usable maps, such as car maps.

Nowadays, we don’t have to worry about whether the Earth on the map is really spherical and whether the road or city depicted on the map really exists.

The map directs us – explorers – wherever we want to. Discover the secrets of close spaces and distant areas. Find treasures, become a world explorer, a wanderer!

How to do it, what tools do you need? The "Geo-ABC book" will give you hints.

DID YOU KNOW THAT

the surface of the Earth is approximately 510 million km^2

Introduction to the world of maps

DO YOU WANT TO GO ON A SPECIAL TRIP? YOU NEED A MAP!

WHAT IS A MAP?

A map is a generalised picture of the surface of the Earth or a part of it, represented on a plane using specific signs and reduced to a given scale.

Maps contain a lot of useful information, which is why they are used by sailors, pilots, foresters, meteorologists, policemen, fire-fighters, paramedics, architects, scientists and hydrologists in their daily work.

If you are going on an excursion or are about to find a lost treasure, a map will be your basic orientation tool in the field. A map is an invaluable source of information about both your immediate area and the world.

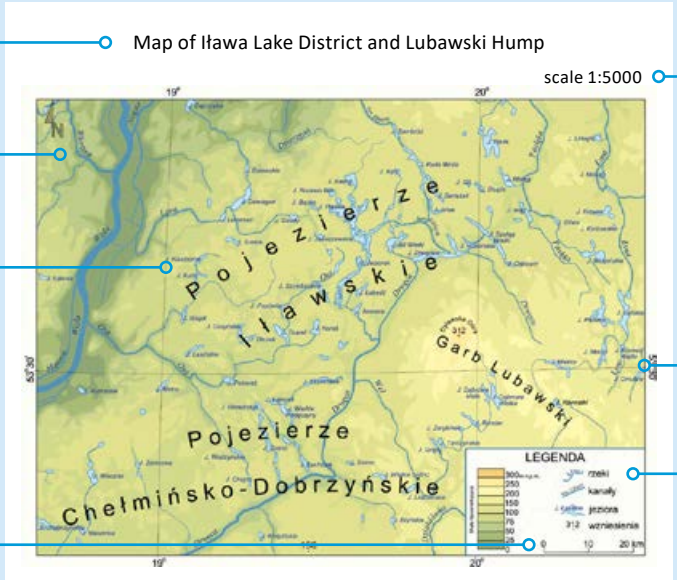
MAP ELEMENTS

MAP TITLE: name of the area or subject of the map, e.g. Warsaw, Białystok, Poland landscape map.

MAP CONTENT: represented by conventional graphic signs and symbols.

GRATICULE: image of a geographic grid (arrangement of meridians and parallels) modelled on a plane.

GRADUATION: used to define distances on a map in the traditional way. It is a graphical method of presenting a scale in which sections corresponding to specific distances in the field are measured on a straight line, e.g. 1 km, 2 km.



SCALE: image presented on the map is reduced compared to the real image, so the scale determines the ratio of the length on the map to the length in the field. A numerical scale looks like this, e.g.:

1:100,000 reads: "one to one hundred thousand". This means that 1 cm on the map is 100,000 cm in reality.

NEATLINE: surrounds the content of the map.

LEGEND: description of the symbols appearing on the map.

HOW TO USE A MAP WHILE ON A TRIP?

The signs on a map are a kind of words that give us information about an area, which is why we often say that maps are read. On maps, you can find many interesting places in your area and those that are very far away.

Did you know that you can read a map from all sides, even upside down! The important thing is to choose the right direction at the crossroads during the trip. It is also important to orient a map. An oriented map means that the north on the map matches the north on the ground. The north is usually at the top of a map. The south is at the bottom of the map, the west is on the left and the east on the right. On some maps and plans, the north is indicated by an arrow of the compass rose marked with the letter N (for the north). Other letters that you may find on a compass star are: S for the south, W for the west and E for the east.

Remember that the roads on the map run in the same direction as they do in the field: if to the right, then right; if to the left, then left.

To use the map to plan your route correctly, you must first orient it.

HOW TO ORIENT A MAP?

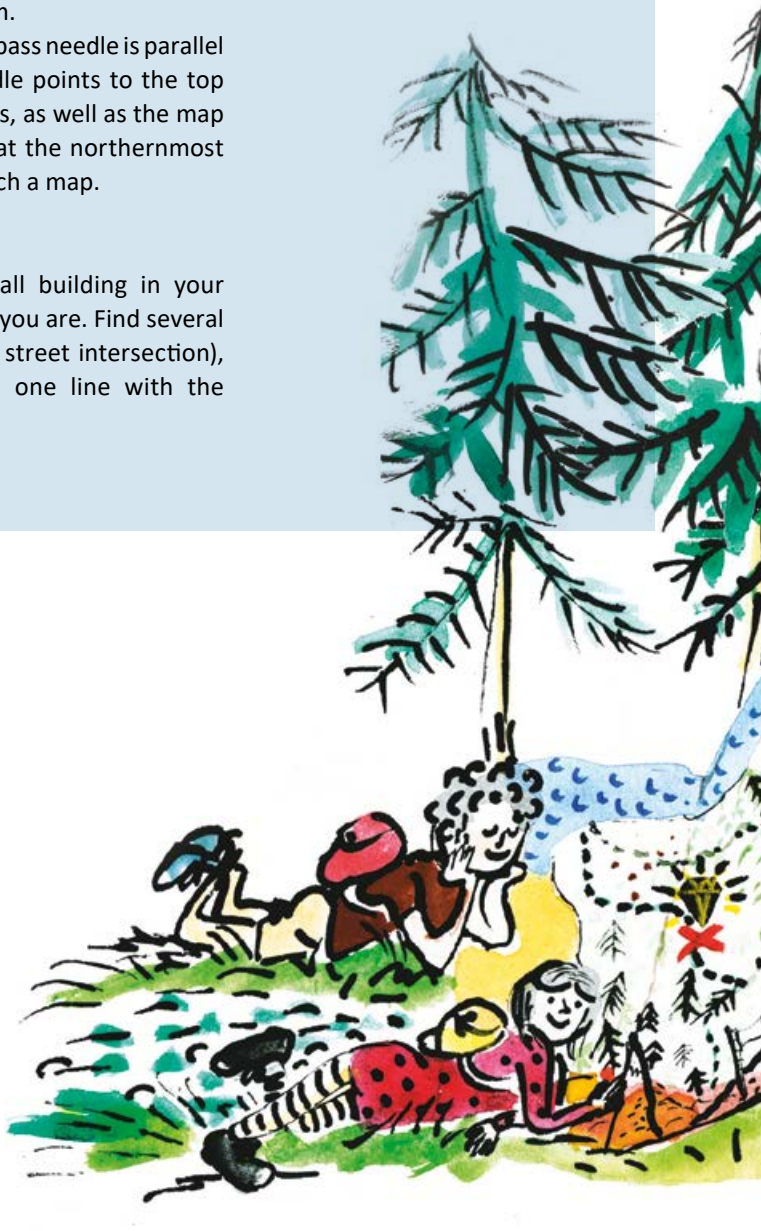
USING A COMPASS

Place the compass on the map so that the needle rotates freely and the north-south line is visible on the map through the clear bottom.

Rotate the map (with the compass on it) until the compass needle is parallel to the line on the map and the north end of the needle points to the top edge of the map. Many maps, especially of smaller areas, as well as the map of Poland, have a northern orientation. This means that the northernmost objects in the field are placed along the top frame of such a map.

USING FIELD OBJECTS

Choose a characteristic object in the area, e.g. a tall building in your surroundings, and point to the place on the map where you are. Find several other landmarks nearby (e.g. another building, tree or street intersection), rotate the map so that each selected object is on one line with the corresponding mark on the map.



USEFUL INFORMATION FOR THOSE GOING ON AN EXPEDITION

If you are going on an excursion, a map will help you find the planned route and get to specific places. It must be positioned well to properly orient yourself in the area. The most important step is to determine where the north is on the map.

Arrange the map so that the north on the map corresponds to the north in reality.

DID YOU KNOW THAT

- the word map comes from the Latin word "mappa" which means "tablecloth";
- the properties of the magnetic needle found in the compass were first known in China. There, it was used in the form of a magnetised spoon as early as the 1st century AD, and it might have been a secret of court magicians as early as the 2nd century BC.

TASK

Hide a "treasure" and create your own map of the area. Then, hand it over to a colleague and ask him/her to find the treasure in reality.

TYPES OF MAPS – A BIT OF THEORY

Let us move on to the division of maps. Due to the scope of the presented content, there are two types of maps:

GENERAL GEOGRAPHIC MAPS

Their content is the general characteristics of the presented area, its relief, waters, communication lines, settlements, etc. If a map is created using a large scale of 1:200,000 or larger, it is called a topographic map. A general geographic map, created using a scale smaller than 1:200,000, is called an "overview" map.

THEMATIC MAPS

Thematic maps are used to present one or more selected elements. Due to the thematic distinctiveness and different ways of presenting the content, thematic maps are divided into:

- natural-geographical maps – these include climatic, geological, hydrographic maps, the distribution of mineral resources, plants, animal world and many others;
- socio-economic maps – population maps, ethnographic, political, historical, communication maps, etc.

MAPS OF POLAND

Administrative division map

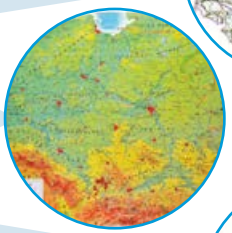
It shows the division of the country into administrative units – most often voivodeships and districts. Additionally, the geographical coordinates of each city, the network of rivers, roads and highways are displayed.

General geographic map

This map shows the terrain, enriched with shadings, distribution of hydrographic objects, voivodeship borders, the current road network and settlement network, taking the size of towns and cities into account.

Landscape map

A map on which all geographic regions are shown (a geographic region is an area with similar landscapes).



Hydrographic map

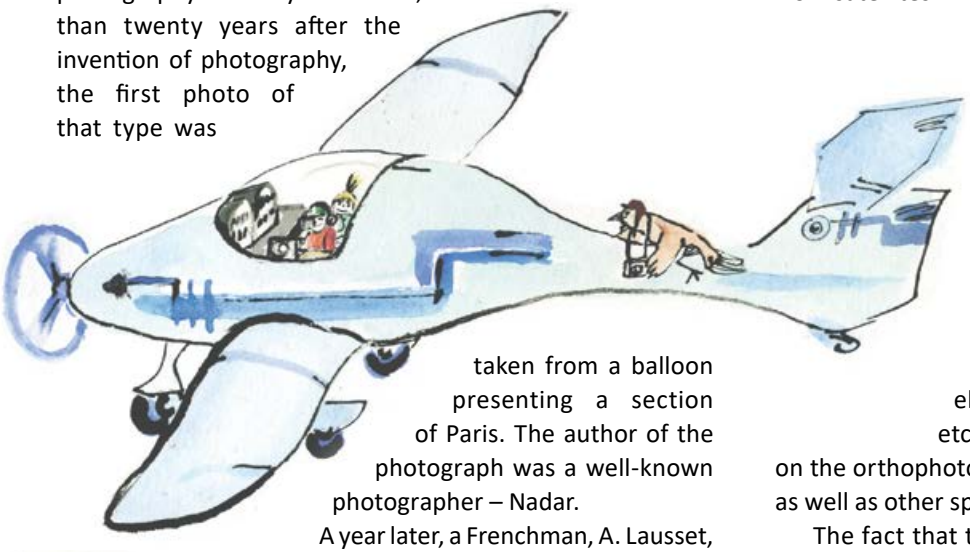
It presents the current state and condition of water circulation in relation to the geographical environment. A hydrographic map is used in work related to water supply, flood control, other water-management issues.

Aerial photographs and orthophotomaps

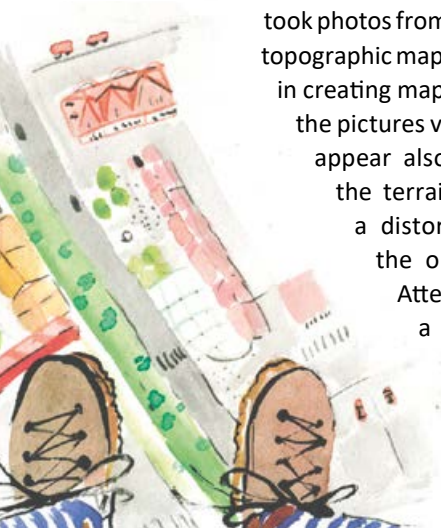
AS A WAY OF DEPICTING THE EARTH FROM A BIRD'S EYE VIEW

Everyone wants to see what the world looks like from a bird's eye perspective. Mountains, rivers, lakes, buildings and roads seen through an aeroplane window are fascinating. It's great that we can capture those images in photographs, as well as in maps based on the amazing photos.

Aerial photography is almost as old as classical photography. As early as in 1858, less than twenty years after the invention of photography, the first photo of that type was taken from a balloon presenting a section of Paris. The author of the photograph was a well-known photographer – Nadar.



A year later, a Frenchman, A. Lausset, took photos from a "bird's eye view" to prepare topographic maps based on them. The problem in creating maps based on photos was taking the pictures vertically – discrepancies often appear also due to the unevenness of the terrain. The goal was to produce a distortion-free map. This is how the orthophotomap was created. Attempts were made to construct a device for converting aerial photographs into maps. This is how a stereoautograph was constructed.



Already before World War II, cartographers were able to prepare distortion-free orthophotographs that could fit perfectly into the grid of a topographic map. An image cropped to a map sheet with described coordinates is called an orthophotomap.

Over the years, analogue materials have been replaced by digital materials and stereoautographs have been replaced by computers. More and more often, we have images taken from satellites.

Today, orthophotomaps are standard in many areas of life, and on the Internet, they are the basis of most map portals. When you browse through them, it is worth to realise how complicated the processing of the photos was before they became maps.

An orthophotomap, unlike an aerial photo, has a uniform scale for the entire terrain.

An orthophotomap usually contains elements such as a coordinate grid, scale, etc. Additional map elements may be placed on the orthophotomap, e.g. the road network, descriptions, as well as other spatial elements.

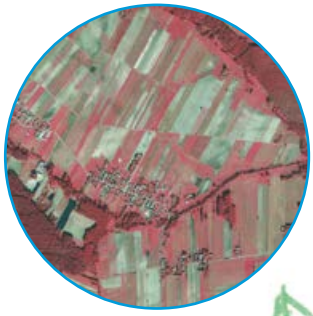
The fact that the image depends on the specific moment of registration means that the orthophotomap is different in spring, summer and autumn, which makes it possible to monitor changes in the environment. An orthophotomap can be made based on aerial photographs, satellite images, in greyish colours, in real or false colours (other than real or grey colours).

EXAMPLES OF ORTHOPHOTOMAPS

IN REAL COLOURS

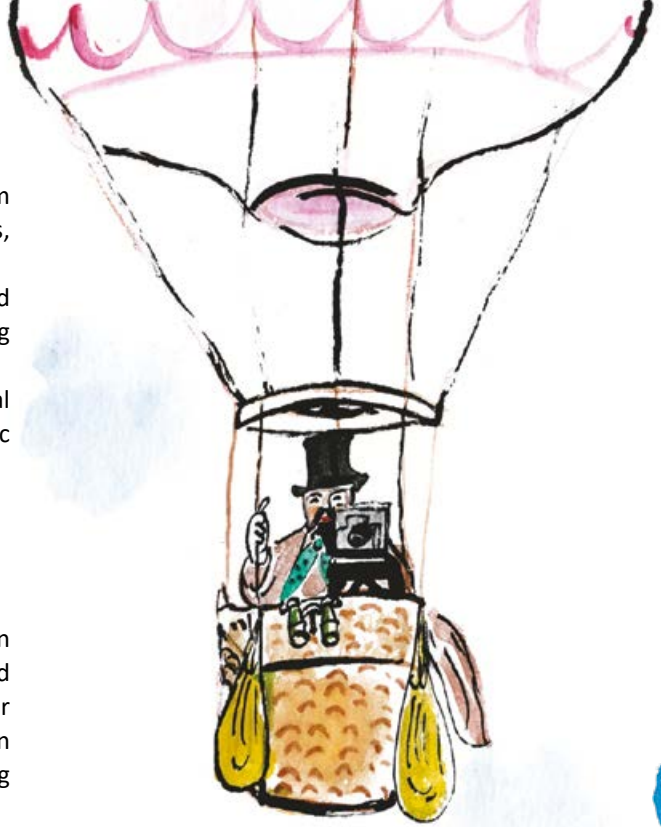
IN GREY SCALE

IN FALSE COLOURS WITH NEAR-INFRARED CHANNEL



INTERESTING FACT

Already in 1907, the prototype of an analogue stereoautograph was constructed, which was constantly improved until the 1970s, when the first computers were used to process photos. The stereoautograph was an extremely precise and huge machine by modern standards, weighing several hundred kilograms, which still arouses the admiration of engineers today. With its help, it was possible to take very precise measurements using a photograph, almost like using a topographic map.



BACK TO AERIAL PHOTOGRAPHY

Aerial photography, as mentioned earlier, is photography taken from a "bird's eye view": from balloons, aircraft, helicopters, satellites, parachutes, kites and remote-controlled devices.

The camera can be hand-held or mounted on a suitable stand and operated either manually or remotely by the photographer using a drone. A drone is a small unmanned flying device.

Aerial photographs are used to observe changes in the geographical environment and for the development of topographic and thematic maps, inter alia.

TYPES OF AERIAL PHOTOGRAPHS

OBLIQUE AERIAL PHOTOGRAPHS

As the name suggests, those photographs are taken from an appropriate angle at low altitudes. They are very useful for road construction, brochure presentation of companies, monuments or to make the content of websites more attractive. They are taken in such a way that it is possible to show, e.g., the area surrounding the building.

VERTICAL AERIAL PHOTOGRAPHS

Photographs taken straight down. They are obtained when the angle of the lens axis to the ground surface is 90 degrees. Such aerial photographs are used to create photomaps, in forestry, agriculture, archaeology, geodesy and cartography or in GPS applications.

COMBINED IMAGES

A combination of different types of aerial photographs depending on the possibilities and the final purpose.

A BIT OF HISTORY

Aerial photography was pioneered by a French photographer and balloonist – Gaspard-Félix Tournachon – known as "Nadar", in 1858 in Paris. Sadly, none of the photographs taken by him has survived until today.

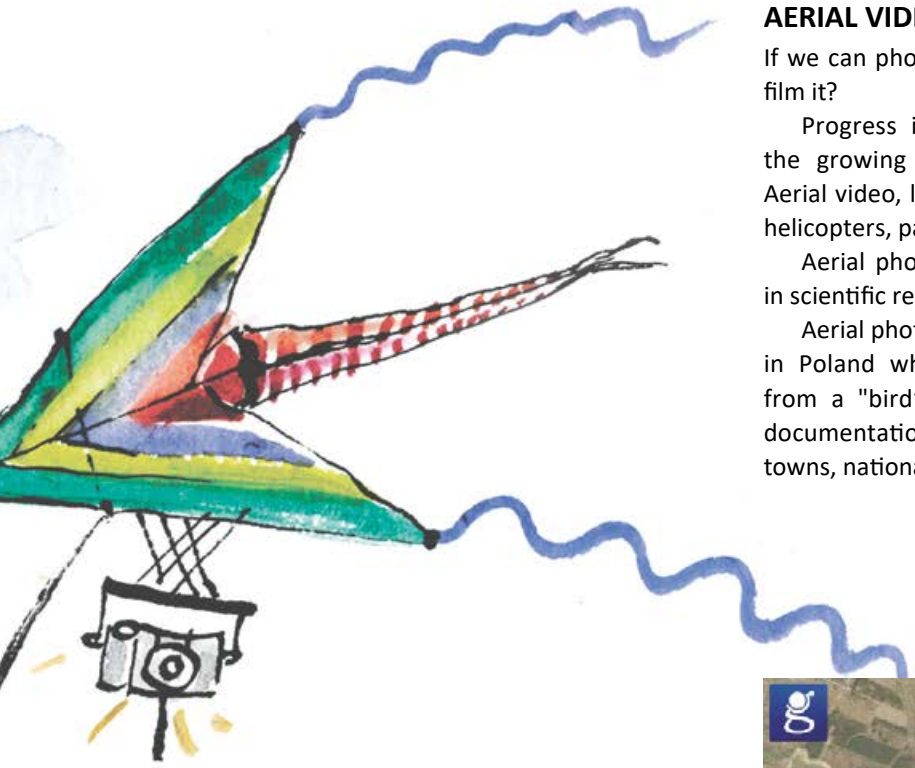
TYPES OF AERIAL PHOTOGRAPHS

VERTICAL
IN REAL COLOURS

VERTICAL
IN FALSE COLOURS

OBLIQUE
IN NATURAL COLOURS

ARCHIVE
PHOTOS



AERIAL VIDEO

If we can photograph an area from a "bird's eye view", why not film it?

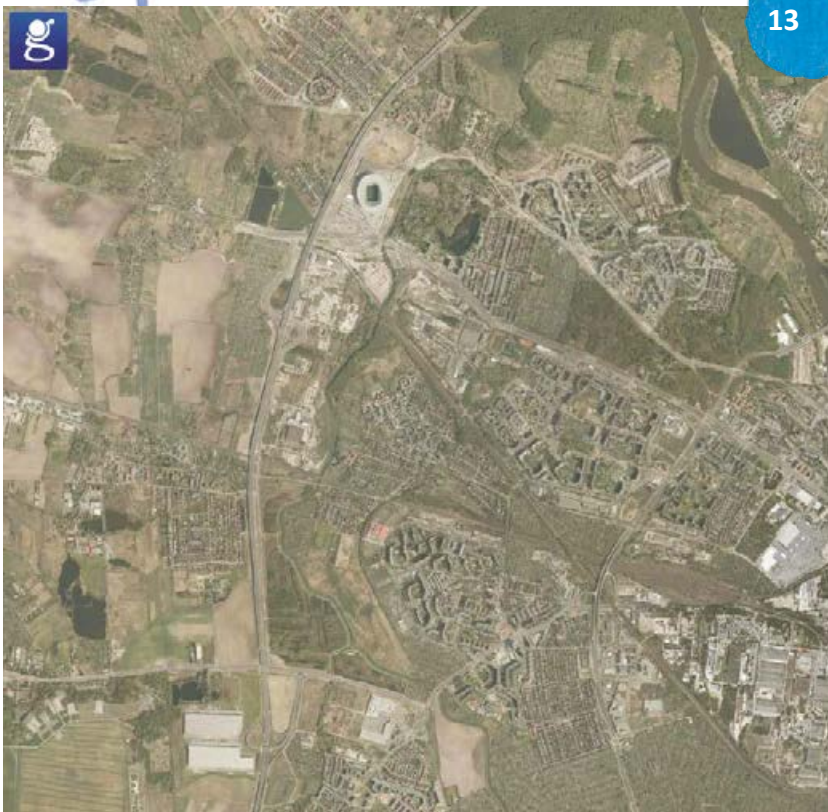
Progress in the field of video filming has contributed to the growing popularity of aerial video filming applications. Aerial video, like aerial photography, can be made using aircraft, helicopters, paragliders, balloons, kites or drones.

Aerial photography and aerial video have been widely used in scientific research and advertising.

Aerial photography is attracting a growing group of supporters in Poland who, using various solutions, take unique photos from a "bird's eye view". The produced material constitutes documentation of many points on the map of Poland – cities, towns, national parks, monuments or cultural events.

TASK

Find a stadium on the sample orthophotomap.



HOW TO DISCOVER TREASURE WITH GPS AND GIS

We're going on a trip! We are going to discover new, unknown places! Hooray!

Mum has packed all the necessary things. There's a backpack with warm sweatshirts, a torch, comfortable shoes, a water bottle and everything else a real hiker and treasure hunter needs.

My brother and sister, the fearless hikers, are in the car ready to go as quickly as possible into the unknown.

– Wait a second, we didn't take the most important thing with us! We don't have a map! Mum, let's go back!

– I didn't forget the map, I have all the necessary information about our route right here, on my phone.

– On the phone?

– The phone has a GPS system. Throughout our journey, the receivers check our location. They keep track of our location on the ground throughout our journey.

– What is GPS?

– GPS (Global Positioning System) is used to determine geographical position. The system is freely available to the public, anyone can use it, including us – all it takes is a suitable GPS receiver, such as our mobile phone. Such receivers can also be found in computers, tablets, telephone sets and car navigation systems. GPS is extremely precise in determining geographical coordinates. Thanks to a device with a GPS system, we can find out where we are during our trip. Let's agree that our treasure is in the next town, not far from the town hall and... it's a delicious, large portion of ice cream in a nearby cake shop.

Now, we can determine the route, distance and time when we will reach the designated treasure. Remember that each point on the map and in the field has its own coordinates. Imagine that there is a whole system of information about space and terrain. Such a system is called GIS (Geographic Information System) and it is used to acquire, process, enter and share spatial information. Information about the location and relations of objects in a specific area, e.g. the location of a building and the road leading to it. The objects about which we can obtain information may also include natural phenomena, such as storms or heavy rainfall; social phenomena, such as the number of people of a certain age in a given area; and economic phenomena, such as increases in fuel prices.

– Mum, it's complicated. Tell us, how can we access this information system?

– Most often, such systems take the form of a website, which allows constant access to data.

Online map websites are hugely popular. One of such websites is geoportal.gov.pl. Map websites are more than just simple road maps with a route search option. Currently, they are complex systems consisting of several or even several dozen layers of maps! – This is extremely interesting, but how is it possible to have so much information in one place, on one website?

Geographic Information System (GIS) is the best way to provide an interactive, multi-dimensional and, at the same time, very detailed presentation of the ground surface. Advanced technologies are used to create such systems. GIS databases are created using specialised software.

Geographic Information System is a set of computer hardware, software, spatial data and people (contractors and users, i.e. us) created for the purpose of efficient

- collection,
- storage,
- sharing,
- processing,
- analysis,
- visualisation of all geographic data.

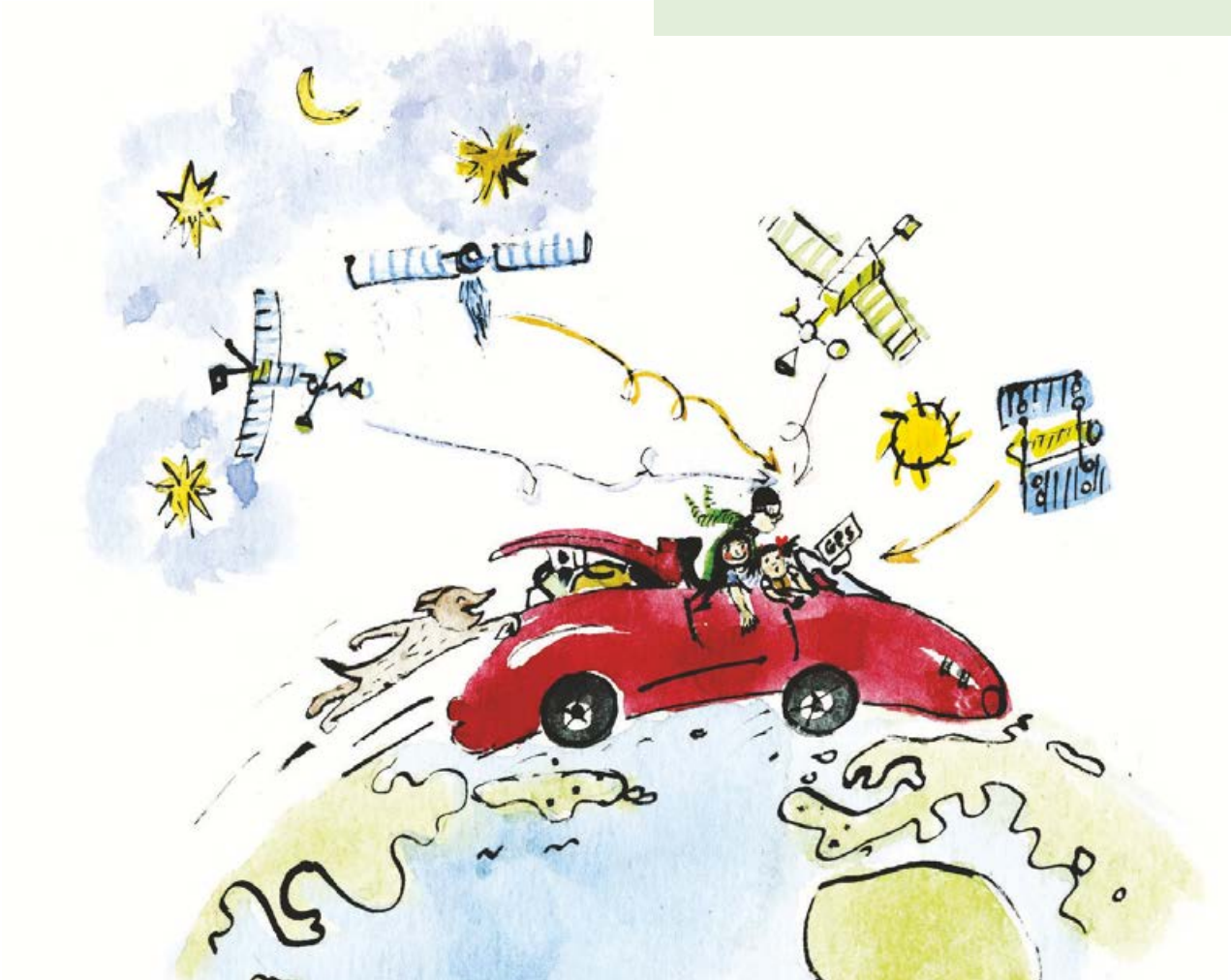
NOTE!

The abbreviation GIS is taken from the English language and it means "Geographic Information System" (GIS).

Other abbreviations with similar meanings are also used, such as:

SIS – Spatial Information System (SIP);

LIS – Land Information System (SIT).



– And where does all that spatial information come from?

– There are many sources and ways to obtain spatial data. The ones that are most often used are:

- satellite images,
- aerial photographs,
- GPS,
- ground geodetic surveys,
- existing topographic maps, etc.,
- statistical yearbooks and other similar publications,
- databases of various institutions,
- local information banks,
- Internet databases.

GIS is not only used by geographers and surveyors. All of us benefit from the spatial data collected in GIS databases. We can find places or buildings that interest us at a given moment or that we need – e.g., information about the location of our house and the size of the plot on which it is situated or information about the size of the area where our treasure is hidden!

These systems are also used by, for example, statistical offices, state administration, the army, commercial, transport or insurance companies, etc. They serve a variety of purposes: for population, building and land registry, spatial planning, market research, logistics and management.

DATA VISUALISATION

Spatial data contained in a GIS database can be visualised, i.e. presented in graphical form.

– Can we use this system to see the location of the cake shop with our treasure?

– Of course, we can check it on an interactive map, i.e. one that we can adapt to our questions about the location of the treasure.

– We can select the type of content displayed on the map (by activating/inactivating individual layers), we can view the map at any magnification, we can even change the appearance of map elements (colour, line thickness, font) or search for objects of our interest (towns, buildings, streets). How about viewing the place where grandma and grandpa live and checking what their house looks like from a "bird's eye view"?

Main applications of GIS:

- surveying and cartography (e.g. map design),
- administration and management (e.g. land-use planning),
- environmental protection (e.g. air pollution analysis),
- agriculture and forestry (e.g. yield estimation),
- specialised services such as the police and emergency services (e.g. for rapid location of an accident or fire),
- health care (e.g. determining the location of emergency stations),
- transport (e.g. finding the shortest route between two given points).

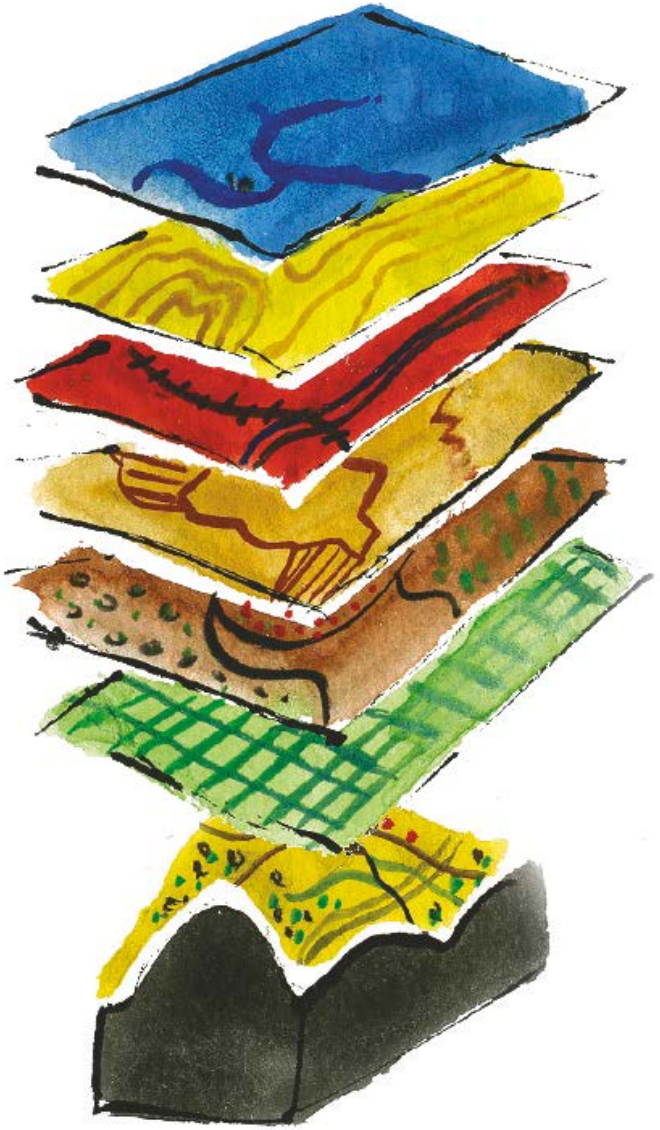
A BIT OF HISTORY

History of the development of geographic information systems:

- 1963–1971 – the first geographic information system, Canadian GIS, created by Roger Tomlinson,
- 1966 – SYMAP – the first computer system for the presentation of spatial data (Harvard Laboratory for Computer Graphics and Spatial Analysis),
- 1968 – Apollo 8 – the first images of the Earth from space,
- 1978 – the first GPS satellites placed in orbit,
- presently – rapid development of Internet applications.

THEMATIC LAYERS

Let's take a look at how thematic layers work in GIS. Thematic layers, i.e. individual layers with information about space. Any selected thematic layers can be placed on top of each other to create a new map.



WATER RESOURCES

TOPOGRAPHY

INFRASTRUCTURE

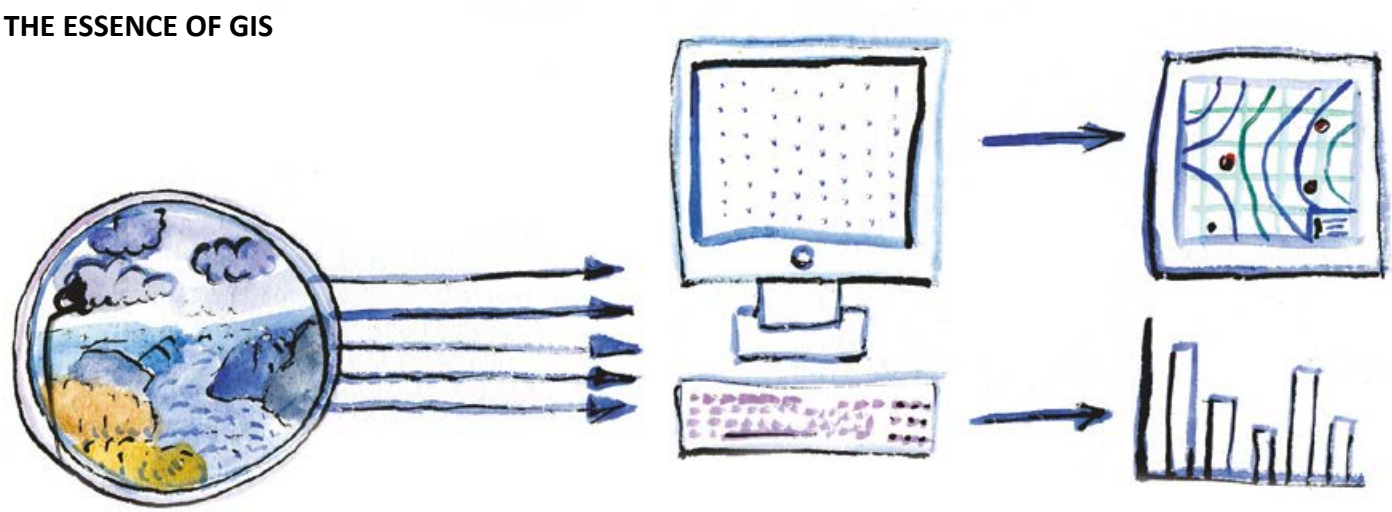
SOIL

LAND USE

GEOGRAPHIC GRID

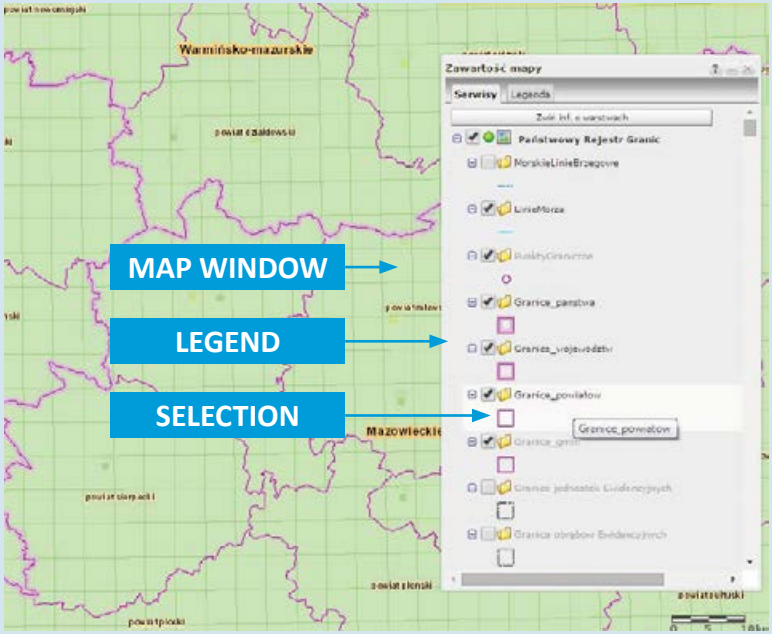
REAL WORLD

THE ESSENCE OF GIS



SPATIAL DATA COLLECTION | DATABASE CREATION | DATA PROCESSING | DATA VISUALISATION

EXAMPLE VISUALISATION OF GIS DATA



TASK 1

Explain why a GPS device is able to determine your location in space.

TASK 2

Find a mobile device at home that contains maps, e.g. a mobile phone, and try to determine your route from home to school using it.

Geoportal

A brother and sister watch their mum, who is looking at an amazing map on the Internet. It's not just any map, it's a "bird's eye view" of houses and trees! Suddenly, mum clicks the mouse button and everything changes, the houses, trees and streets turn into a network of lines.

– Mum, what did you click and what do the lines mean?

– I'm looking for the treasure. And the lines are a graphic view, a representation of the area where the treasure is located.

– What do you mean? Are you looking for the treasure without us? We want to join you! How can we do that? We can do it, after all, it can't be difficult... Oh dear, it all looks very complicated.

– Look, this is Geoportal, an online map application. Do you remember how earlier, before our trip, we looked at the place where we ate delicious ice cream? Now, I'm looking for something much more important. I know there is a treasure hidden somewhere here, and your help will be much appreciated. You must know that on Geoportal, we can find any object we want. A town hall building, friend's house, stadium, church, school or a shopping centre.

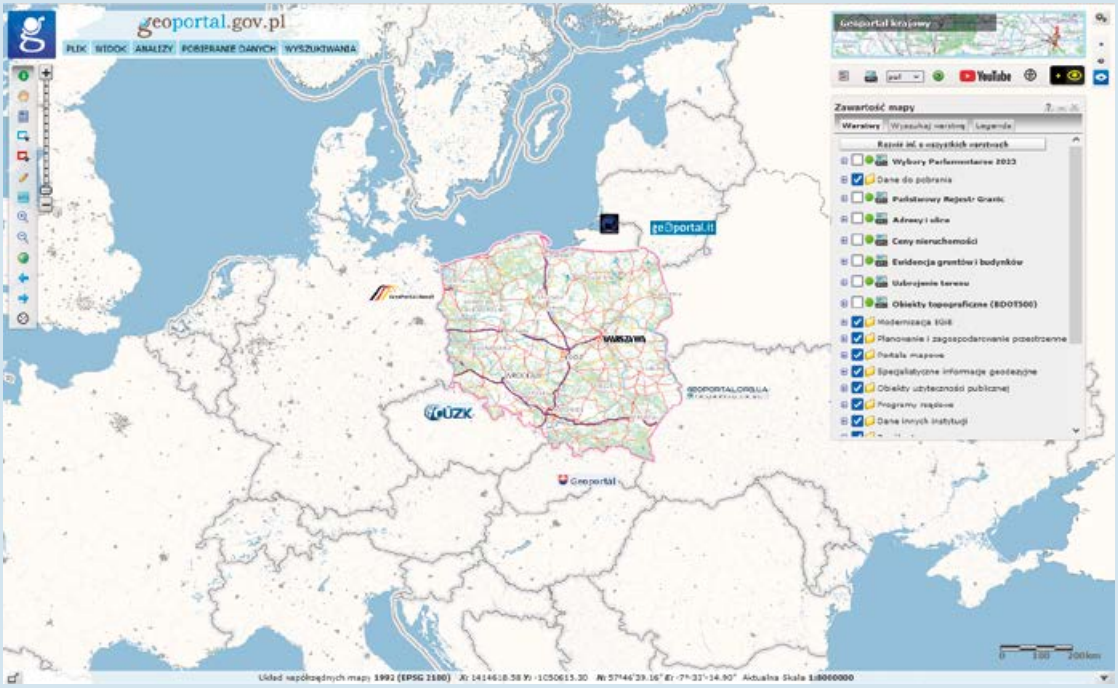
– And a cake shop!

– Yes, a cake shop too, let's take a closer look at that.

– We can also see other maps. We can find various maps to guide us during our next expeditions, as well as those with real treasures hidden in them.

– How so?

– The Geoportal web application has many possibilities. Let's take a look at the individual elements to find out how to use them effectively. When we select map search on the main page of geoportal.gov.pl, Geoportal opens in an expanded view mode, where we have access to the search window for geographical objects and addresses.



TOOLS WE CAN USE:

BUTTONS
CHANGE THE VISIBILITY
OF MAP COMPOSITIONS

OVERVIEW MAP START
BUTTON

LINK TO THE GEOPORTAL
HOME PAGE

MODE SELECTION
BUTTONS

NAVIGATION
TOOLBAR

To use all the benefits of Geoportal click the icon:

Now, you have access to all the functions Geoportal offers. To access different options, you can use the menu bar:

INSTRUCTION FOR TURNING ON AND OFF THE VISIBILITY OF INDIVIDUAL LAYERS/SERVICES IN GEOPORTAL

It is possible to add and remove map layers by deselecting the appropriate layer.

MAP CONTENT TOOL WINDOW

We can zoom in and out our treasure view. We just need to keep in mind that the scale may change the view on our map. For example, if the map covers a very large area, individual layers may be disabled. For instance, when we keep increasing the size of the map and move away from our house, the topographic map scan layer will be disabled and the data will not be displayed.

– Wonderful! When we zoom in on the map, we can see our entire town or even the names of individual districts. If we zoom in or type our address into the search window, we can see a real treasure – our house from a "bird's eye view".

– We can check the distance from our house to the school or a friend's house. We can also determine the size of the plot of land on which our house is located or the size of the park next to the school building.

The web application makes it possible to search for and view spatial data. The Geoportal map viewer provides users with many functions: from the possibility to control the map view (zooming in and out, moving), through customising the visibility of individual layers (turning layers on and off), to taking measurements on the map (length, distance). It is also possible to search for, e.g. geographical objects, addresses or plots of land.

Geoportal is also available as an application for mobile devices, such as mobile phones and tablets. Now, wherever we are, with access to the Internet, we can measure or view any area. Moreover, the application allows you to send an e-mail containing a link to the current map area and the current location of the device you are using.

– Great, so we can always send our colleagues links to maps of our trips and show them the places we have visited!

– We can also save the entire route of our next trip based on the GPS signals.

NOTE!

The Geoportal website also includes the "Applications" tab and its extension – "Mobile applications".

You can download a mobile application to your device to be able to:

- access the spatial data collection services,
- search and locate land plots, for example, the area where your school is located,
- select map compositions,
- search for geographic objects, including addresses.

See how interesting browsing geoportal.gov.pl can be. How many possibilities it gives you to obtain information related to the space around us.

Geoportals are available in every European country. With access to them, via the Internet, we can go on not only national but also worldwide expeditions, even without leaving home. Thanks to geoportals, we can go on many exciting trips and search for areas or treasures that have not been discovered by us yet!

It is also worth knowing that the spatial information provided by Geoportal is very important and helpful in many situations. Geoportal contributes to the protection of the environment (in accordance with the EU INSPIRE directive, which is discussed in the next chapter), supports the activities of rescue services and helps prevent crisis situations by facilitating access to spatial information.

TASK 1

On your computer, while on www.geoportal.gov.pl, click "National Geoportal". A toolbar will appear in the top left corner, click "WYSZUKIWANIA" (search) and select "Wyszukiwanie działek" (search for plots). When the window appears, enter the plot ID 086101_1.0004.1294/5 or the plot number 1294/5 (in this case, fill in additional fields: Lubuskie Voivodeship, Gorzów Wielkopolski district, Gorzów Wielkopolski municipality and Staszica precinct) and press the "Szukaj" (search) button. A specific plot of land will be displayed. Is it a forest, river or a road? Using the "pomiary" (measurements) function on the toolbar in the upper left corner, select the "mierz odległość" (measure distance) option and try to measure the longest side of the plot by clicking the beginning and end of that section. Then, determine the area of the plot using the "mierz powierzchnię" (measure the area) function. Use the mouse to outline the plot, click the corners of the plot accordingly, and after closing the geometric figure, the measured area will appear in the middle.

TASK 2

On your mobile device (mobile phone or tablet), start the Geoportal app or use the mobile version of Geoportal. Using the "magnifying glass" icon search for the place where you live, and then, using the "ikony" (layers) icon change the layer from a topographic map to an orthophotomap and add layers: "Państwowy Rejestr Nazw Geograficznych" (State Register of Geographical Names) and "Państwowy Rejestr Granic" (State Register of Borders). See how the map has changed.

From your mobile device, you can send a link with the map of your choice and show your friends where you live.

www.geoportal.gov.pl

INSPIRE

SPATIAL DATA IN THE EUROPEAN UNION

Now, we will discuss a very important issue related to natural environmental protection in our country and the European Union.

Since 1 May 2004, Poland has been a member of the European Union. All EU Member States are bound by a set of legal acts called directives. One of the directives is INSPIRE – Infrastructure for Spatial Information in Europe, in force since 15 May 2007. The European Union introduced it to support environmental protection activities.

Natural threats, e.g. fires, floods or industrial disasters do not respect state borders. To better control such environmental incidents at the European level, there is a need to share spatial information between countries.

INSPIRE is both a directive regulating the issue of presenting spatial data and a kind of agreement on the sharing of space. Individual member countries collect data on their territory and provide universal access to such data. Thanks to the INSPIRE initiative, spatial data is collected and described according to the same rules in all EU Member States. Until the implementation of the INSPIRE directive, each EU country collected spatial data for its own needs and according to its own rules. The data was collected and processed by institutions at different levels, which resulted in data dispersion. It was difficult or impossible to compare data between countries. The Directive has changed this.

Imagine that you and your peers in another EU country can use the same set of data concerning a common space – the European Union.

Therefore, together you can influence what environmental protection will look like in our common space.

Pro-environmental activities are undertaken at various levels of administration, from local through national to European.

It is extremely important that INSPIRE combines spatial information systems created in various European Union Member States into one coherent system, available to every citizen from every EU country. This makes it very easy for us to access information about the European space. Member States are obliged to ensure public access to spatial information through a geoportal. The geoportal forms the basis of the Polish Infrastructure for Spatial Information, which cooperates with the European Community geoportal.

NOTE!

INSPIRE is not just a legal act or a scientific project. INSPIRE should be seen as a way of thinking placing the emphasis on:

- the needs of users who use spatial data in their everyday work,
- the use and analysis of spatial data, rather than constant search for it.

A BIT OF HISTORY

The INSPIRE directive came into force on 15 May 2007.

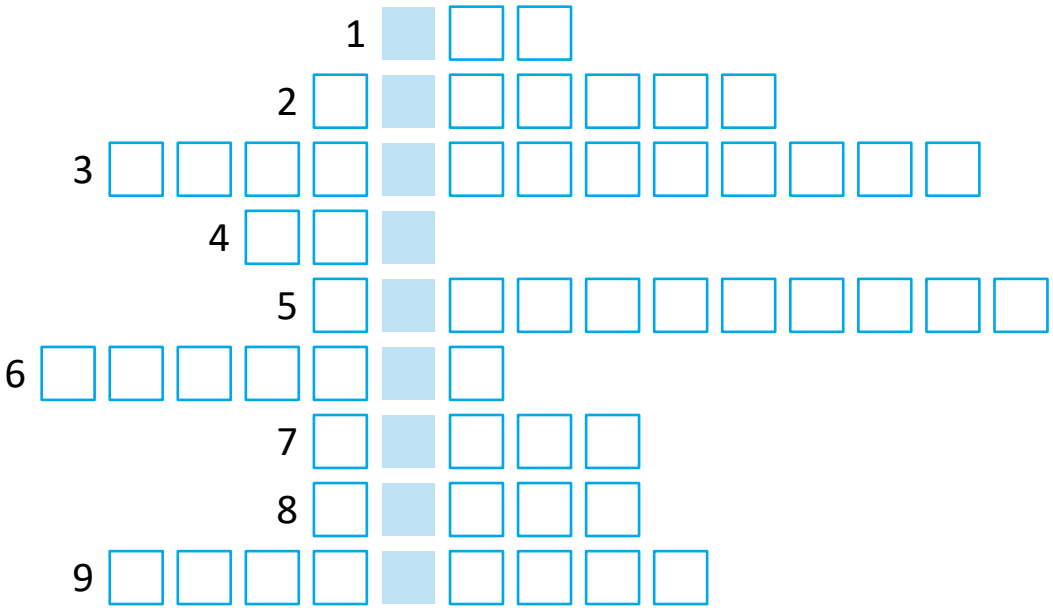
Each European Union member state was obliged to transpose the INSPIRE directive into its legal order. In Poland, this obligation was fulfilled by the entry into force of the Act on Spatial Information Infrastructure on 7 June 2010.

Geoinformation services use many interconnected databases. Datasets include, e.g., geographic reference systems, geographic grids, administrative units, transport networks, hydrography, protected areas, relief, soil characteristics, meteorological data or maps showing the land surface from a "bird's eye view". They also include data on the distribution of animal and plant species and data on oceanography.

The management of the data is facilitated by GIS, which we have mentioned in the previous chapter.

CROSSWORD PUZZLE

1. Geographic Information System is...
2. The science that deals with determining the size and shape of the Earth and determining the location of points on its surface
3. A map created using aerial photographs
4. It used to exist only in paper form
5. They typically consist of latitude and longitude values, which help specify locations globally
6. European Union Directive governing the presentation of spatial data
7. A collection of maps and plans
8. It contains a specific set of information and you can add it to a map on a geoportal
9. Artificial in the Earth's orbit



TASK

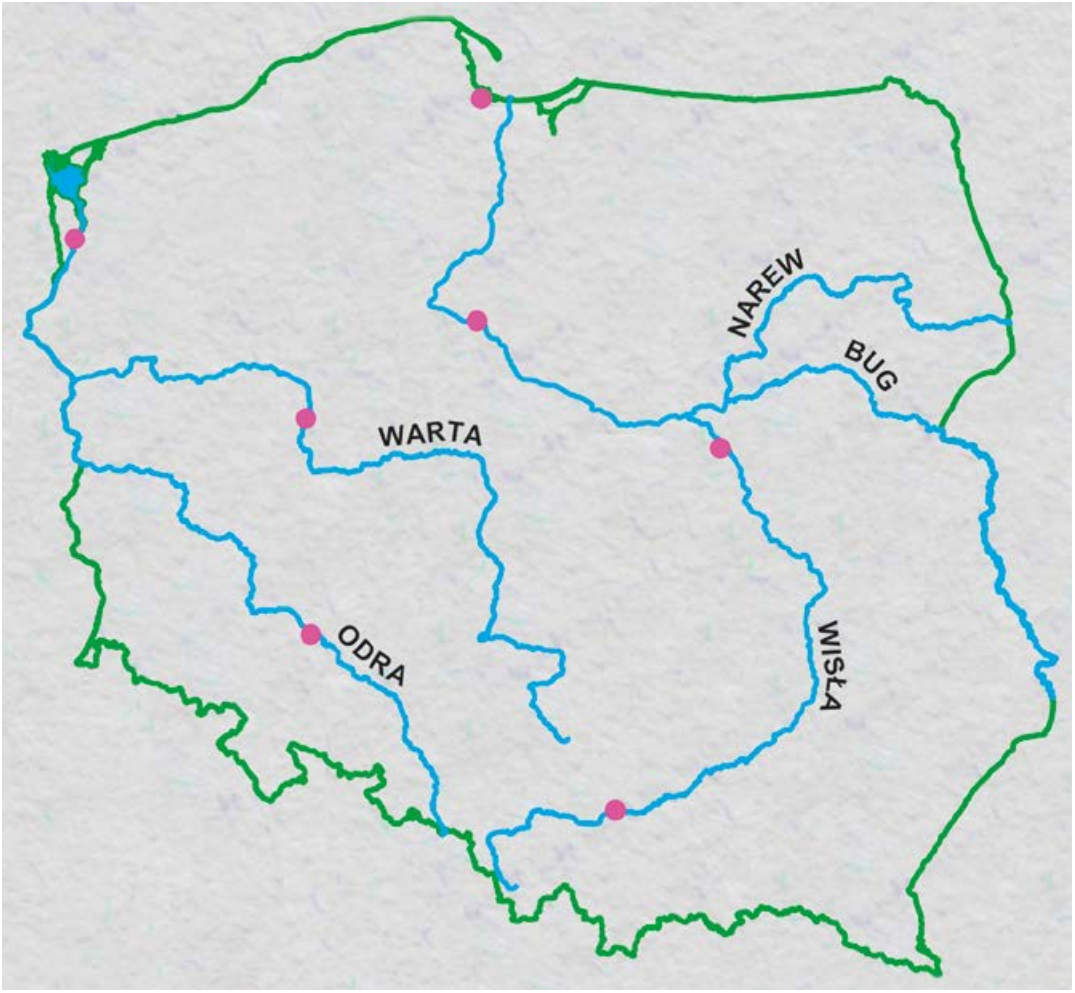
On the map of Poland, find five cities located by rivers: Warszawa, Kraków, Gdańsk, Wrocław, Poznań, Szczecin and Toruń.

Write their names.

DID YOU KNOW THAT

The five longest rivers in Poland are:

- the Vistula (1,047 km),
- the Oder (854 km),
- the Warta River (808 km),
- the Bug River (772 km),
- the Narew River (484 km).



Glossary of basic terms and abbreviations

GENERAL GEOGRAPHIC DATABASE (GGD)

information and data concerning geographical objects located on the territory of the Republic of Poland. The content of the General Geographical Database covers eight thematic areas:

- administrative division,
- transport,
- settlement and anthropogenic objects,
- ground surface,
- hydrography,
- protected areas,
- relief,
- geographical names.

TOPOGRAPHIC OBJECT DATABASE (BDOT)

corresponds to the topographic map on a scale of 1:10,000, which collects information and data about topographic objects (e.g. buildings, roads).

The BDOT covers ten thematic areas, each of which is recorded in several layers:

- administrative division units,
- road and railway networks,
- buildings and facilities,
- land cover complexes,
- land use complexes,
- watercourse networks,
- protected areas,
- geodetic control network, other objects,
- utility networks,
- address points.

EUROBOUNDARYMAP (EBM)

constitutes a database with an accuracy level of 1:100,000 and covers 41 European countries. It contains geometry (shapes), names and codes of administrative and statistical units (e.g. the division of Germany into zones). The data is updated on a regular basis by members of the EuroGeographics Association.

GEODESY

science that deals with determining the size and shape of the Earth and determining the position of points on its surface.

Geodetic works include: designing and performing measurements, aerial and satellite photos, calculating and processing measurement results and creating related databases.

The results of geodetic measurements are graphic studies, e.g. maps or profiles, but also text documents of a legal nature (e.g. when determining real estate borders).

GEOLOGY

study of the structure and history of the Earth and the phenomena and processes that occur in it.

GEOGRAPHY

study of the Earth's crust, its spatial diversity in natural and socio-economic terms, as well as the relationships between individual natural phenomena and socio-economic phenomena. Geography covers two subjects of study: the natural environment and man and his activities.

GEOPORTAL

a national geoportal is the main access point to the basic resources of the National Spatial Information Infrastructure in Poland. It contains: address details, data concerning registered plots, topographic maps, orthophotomaps (aerial photographs) and many other specialised data. The geoportal.gov.pl website is an access point to many spatial data and data services, including searching, browsing and downloading services.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

an information system used to input, collect, process, analyse and visualise geographic data, one of whose functions is to support the decision-making process. Each GIS consists of a geographic database, computer hardware, software, GIS developers and users.

SURVEYOR GENERAL OF POLAND

performs the tasks specified in the Geodetic and Cartographic Law. The Surveyor General of Poland creates and maintains the Spatial Information Infrastructure Geoportal and is the leading authority for fifteen spatial data themes listed in the Spatial Information Infrastructure Act.

HEAD OFFICE OF GEODESY AND CARTOGRAPHY (GUGIK)

a professional institution providing universal access to high-quality geodetic and cartographic information based on fundamental elements of modern administration. The mission of the Head Office of Geodesy and Cartography is to provide efficient and effective service to the citizens and the development of the country by ensuring access to up-to-date geodetic and cartographic information and by co-creating a modern infrastructure of spatial information. GUGiK is the office supporting the Surveyor General of the Country, operating under his direct management.

HYPSOMETRY

a branch of geodesy that deals with measuring the height of terrain above a certain set level (usually the sea) and presenting the results in the form of maps, charts, profiles or models.

SPATIAL INFORMATION INFRASTRUCTURE

created in Poland based on the Spatial Information Infrastructure Act and is part of the Infrastructure for Spatial Information in Europe (INSPIRE) defined by a directive of the European Parliament and of the Council – the INSPIRE directive. It is a set of legal and technical regulations, as well as economic and organisational solutions, which ensure the availability of data from the territory of our country. Thanks to them, e.g., the competitiveness of the economy increases, taking into account the principles of sustainable development of the country.

INSPIRE (INFRASTRUCTURE FOR SPATIAL INFORMATION IN EUROPE)

a directive developed by the European Commission and Member States that came into force on 15 May 2007. The directive is consistent with initiatives in individual Member States and global trends. Each Member State was obliged to transpose the INSPIRE directive into its legal order. In Poland, this obligation was fulfilled by the entry into force on 7 June 2010 of the Act of 4 March 2010 on spatial information infrastructure (Dz.U. [Journal of Laws] of 2010 no. 76 item 489). INSPIRE is an initiative with the purpose of providing access to knowledge about the common European space to all who need such information: administrative bodies, public and private organisations, entrepreneurs and citizens operating throughout the European Union, at the level of individual Member States and the regional and local levels.

CARTOGRAPHY

science, technology and art dealing with the creation of maps and the rules for using their content. Today, maps come in a variety of forms and shapes: from paper maps, through online maps, to maps used in digital robot control. Maps can be presented graphically on a plane, but they can also have a three-dimensional form and many other forms, not only graphic ones. Maps are most often stored in an electronic form, in the form of a database. In Poland, together with geodesy, they belong to the field of technical sciences, and together with geography – to the field of Earth sciences.

CADASTRE (LAND AND BUILDING REGISTER)

the official inventory and description of real estate, i.e. land, buildings and facilities. The land and building register is maintained by starosts or mayors of cities with poviat rights. The basic unit of a cadastre is the cadastral parcel, i.e. a continuous piece of land with a number, separated by boundaries, legally homogeneous. The cadastral parcel has an identifier, i.e. an ordered sequence of numbers and letters that allows the determination of the location of the cadastral parcel in space within the territory of Poland.

MAP

a generalised image of the surface of the Earth or a part thereof (also the sky or a planet or other celestial body) created on a plane with the use of a scale according to the principles of cartographic mapping, using conventional graphic symbols. A map is an essential tool for the search and presentation of results in history, geography and geodesy.

DIGITAL ELEVATION MODEL (DEM)

a set of points with known locations showing the physical surface of the terrain in 3D in a given area. The DEM is created with the use of a computer, and it is possible thanks to numerical maps and computer data processing.

ORTHOPHOTOMAP

a set of processed aerial and satellite photos, adjusted to a uniform scale and fitted into geodetic control network points.

GEODETIC CONTROL NETWORK

a set of points with known coordinates that constitute the basis for geodetic works. The geodetic control network points have unique numbers and topographic descriptions, they are marked in the field with geodetic signs, their details are recorded in the State Geodetic and Cartographic Resource.

STATE REGISTER OF BORDERS (PRG)

the official database that serves as a basis for other spatial information systems and contains data on territorial divisions. The PRG collects data concerning the entire area of the country in terms of the course of the borders and the area of the units of the basic three-level territorial division of the country (i.e. municipalities, districts and voivodeships).

STATE REGISTER OF GEOGRAPHICAL NAMES (PRNG)

a database of official, standardised and non-standardised names of geographical objects and their attributes (containing detailed information on the described feature).

TERYT

the National Official Register of Territorial Division of the Country, i.e. the official register of the division of our country's territory, maintained by Statistics Poland (GUS).

www.geoportal.gov.pl

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