GIS and ICT in my class
„New Geography”

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How I introduced GIS and ICT to geography lessons

- First tool - ArcView in 2001

Our school got the application for 10 computers ArcView 3.1 from the ESRI director

  - Important textbook Mapping Our World – GIS Lessons for Educators with ArcView 3.2a

- GIS lessons with IT teacher 2002-2004 (education experiment in our school)

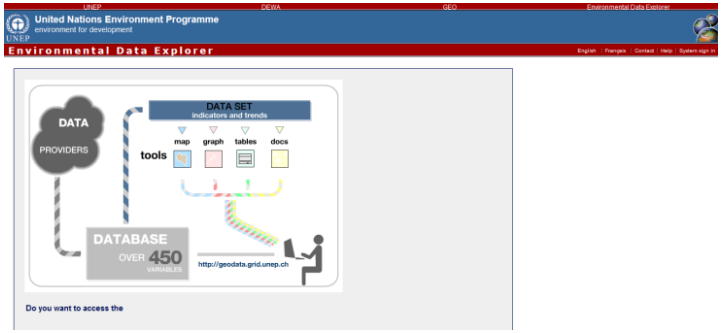
- Included GIS into regular lessons from 2005

  - Different GIS tools: Arc Explorer, Arc GIS, Quantum GIS

  - Many specialized geoportals, GoogleEarth, GoogleMaps, spread sheets

GIS lessons with ArcView and its advantages for students

- Learned how to use the ArcView program
- Make teaching geography attractive
- Generate multi-layer maps
- Map the real world aspects
- Work with real data and visualize it



- Create maps and electronic atlases by themselves.
- Interpret charts

First successes and problems

First successes:

I recognized that using GIS gives new dimension in geography teaching.

It was warmly accepted by the students, who started to work with passion.

First problems:

Rapidly changing software made the previously learned mechanics of the tool obsolete.

The scenarios were unstable and subject to change year by year.

What tools can we use on geography lessons?

- In the classroom:
  - Computers with Internet connection
  - Interactive blackboard
  - Tablets, smartphones
- Outdoors:
  - Smartphones
  - GPS

Geo-media on geography lessons

- Why to use geo-media on geography lessons?
- How to marry traditional methods with the modern ones?

Examples of geo-media in the classroom and outdoors teaching

- **Outdoors**
- With the topographic maps and GPS
- Registering and analysis of data measured by the pupils
- Smartphone

✓ Databases in the cloud

✓ Mobile maps

- **In the classroom:**
- Computers and electronic blackboard in the classroom

✓ Interactive databases

✓ Geoportals

✓ GIS

Field lessons

With the topographic maps and GPS:

- Sense of direction
- Excursion planning
- Topographical cut
- Sketching plans

Registering and analysis of data measured by the pupils.

Geological lesson during the excursion

- During the excursion we use traditional and electronical maps.

Sense of direction

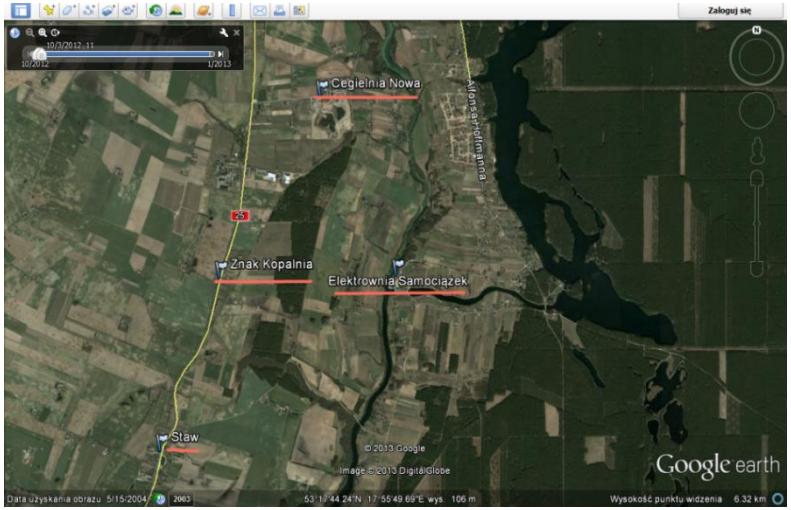
- Traditional maps, compass and GPS.
- Many smartphones are equipped with navigation, compass and maps.

Example problem:

Design a route and determine the asymuth to the bridge on Rawka in Budy Grabskie.

Locating and adding the terrain points on maps

- GPS facilitates recording observed terrain data.
- Visualizing the data by adding them to the maps.
- Collected data simplify verification of observed items and analysis of them on thematical layers of geoportals.



Example problem:

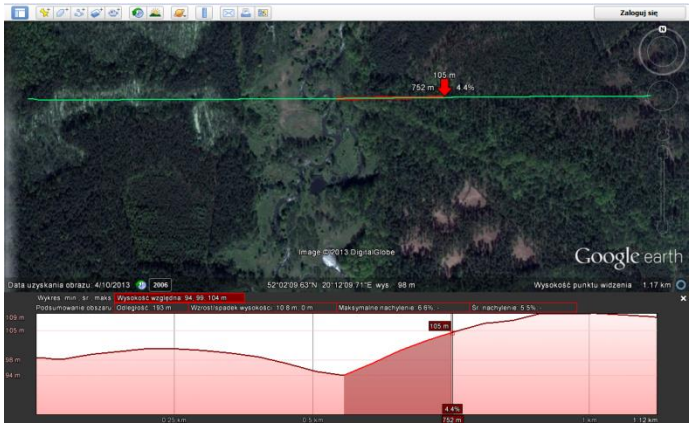
Find clay excavations in the terrain. How can clay be comercially used?

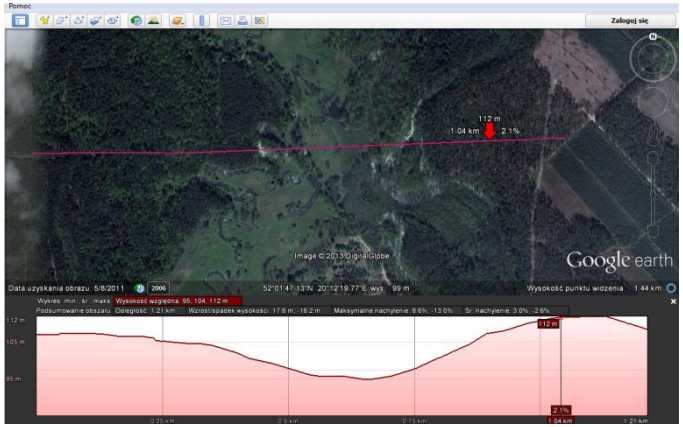
Topographic profile

- Drawing profiles with geoportals became easy.
- Possibility to compute the terrain denivelation(drop).
- Programs and applications to draw the terrain profiles facilitate the landforms interpretation.

Example problem:

Draw the cross profile of Rawka river valley in several places. Determine the landforms and compute the angle of slope of the river banks.



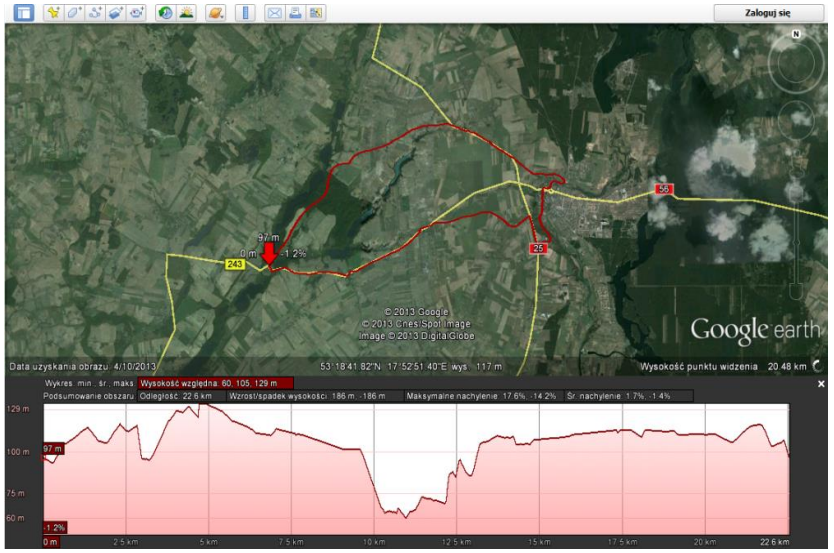


Geocontext Profiler

Google Earth

Designing the trip

- Geoportals simplify planning of the excursion.
- Length of the trip, cumulated denivelation, biggest ascents and descents can be calculated immediately.
- Tracking the tour, visualisation of the profile of the tour.



Example problem:

Determine and elaborate the tour of one-day school trip in the Brda valley near Koronowo.

Sketching plans

- Verifying the terrain sketches with satelite images and actual topografic maps available at geoportals.

Example problem:

Make a sketch from the basis of the new reservoir on Rawka near Bolimów. Verify the correctness of the sketch with the available maps and images.

http://mapy.geoportal.gov.pl/imap/

Sample field work. Geo-media in description and verification of the results.

- Soil excavations and soil profiles - documentation: GPS, localized pictures, geoportal.
- Mapping, drawing and reading geological profiles - camera, GPS, geoportals.
- Rocks and minerals search, detection and classification in the terrain - databases, electronic atlases, GPS
- Testing the quality of river water by chemical and biological methods - databases with norms of chemical and organism indicators, GPS.

Soil profiles

- Scripts of soil testing methods and soil profiles can be downloaded and stored on the mobile devices.
- Smartphone or a tablet is all you need in the terrain. No heavy books to carry.

Example problem:

Make a soil excavation. Determine the type of soil and describe the recorded soil profiles.

Script for the methods of the soil testing

Registering and reading the geological profiles

<u>Example problem</u>:

Make a sketch or a picture or a visible geological profile. Determine and name the rock layers. Describe the processes, which caused such shapes. Read the age and type of rocks buiding the described form the geological maps. Which orogenesis made the observed layers?

Search of rocks and minerals. Classification of found samples.

Mobile Geology

AGH – rock classification

River water purity testing

Water purity description

State of the environment GIOŚ

Example problems:

- *Determine the water purity by physico-chemical methods and by bioindicators.*
- *Verify the norms for each of the tested parameters. Check, if your results comply with the state of water purity from the GIOŚ databases.*

Geological excursion

- Lessons designed by specialists available in the Internet are easily accessible.
- Internet databases: maps, scripts available on smartphones simplify problem solving during the excursion.

Example problem:

What kind of a mountain is Ostrzyca Proboszczowicka? Make a study in the field. Determine the kinds of rocks building the mountain top. Which processes shaped the mountain?

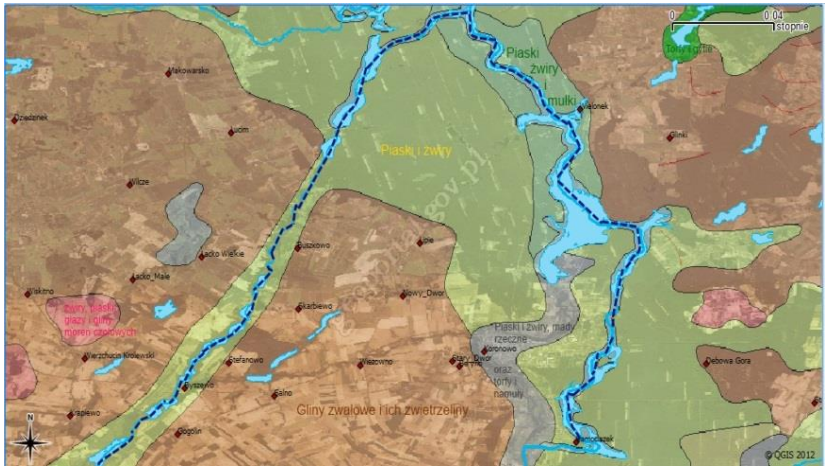
Trip to polish volcanoes with PIG

Sudety.Geotourist guide

Reading and using the geological maps: traditional and electronic ones.

<u>Example problem:</u>

Make the analysis of land use. Determine the floral ecosystems during the trip. Read the surface rocks under the observed floral forms from the map. Can you see a correlation?



In the classroom

- Pupil with a smartphone on a geography lesson has an access to :
  - Databases
  - Mobile maps
  - encyclopedia
- A computer and interactive blackboard makes available :
  - Geoportals
  - Virtual excursions
  - Interactive databases
  - GIS

Geoportals diversity

- Thematical (geological) – IKAR

  http://ikar2.pgi.gov.pl/index.php/pl/mapy.html

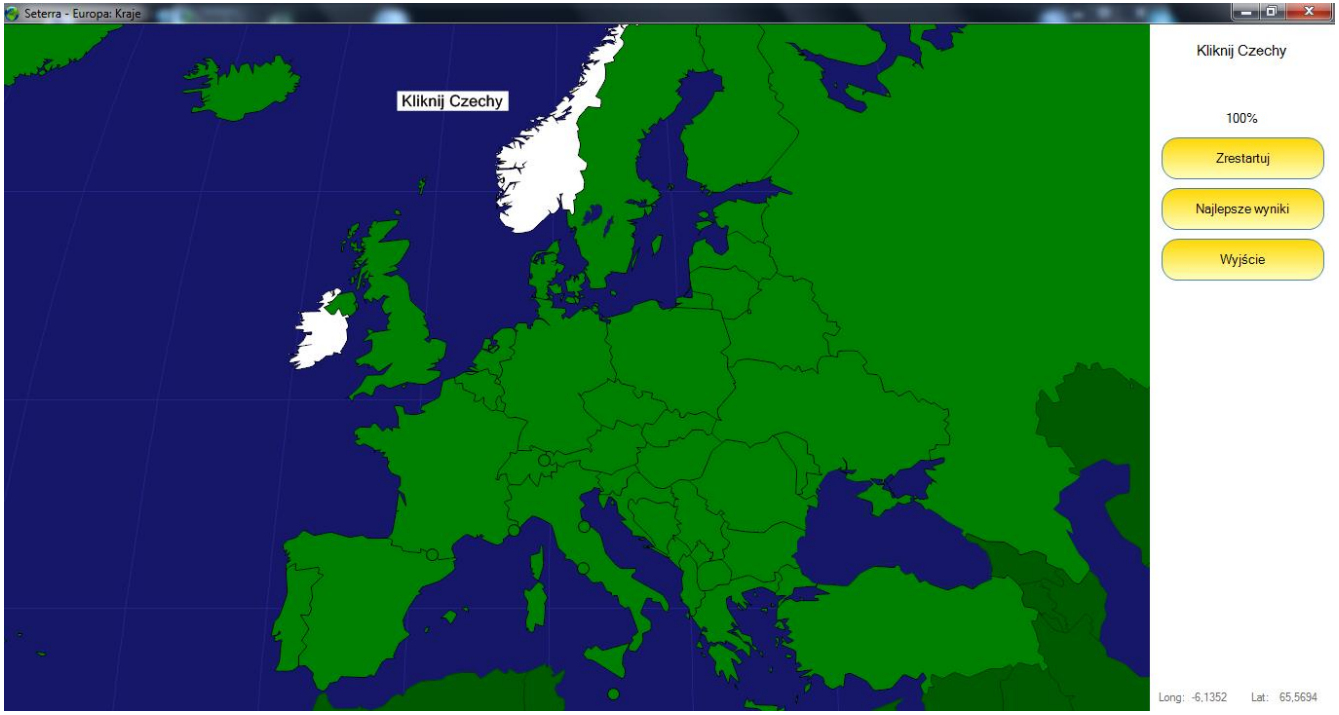
- Multi-function and multi-task - geoportal

  http://mapy.geoportal.gov.pl/imap/

- Regional, e.g. geoportalTatry

  http://www.geoportaltatry.pl/portal/

Fast political map learning



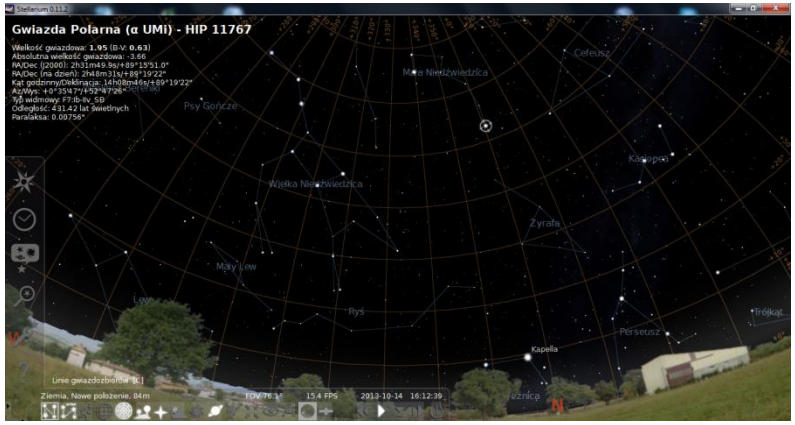
Seterra

Example problem:

Learn the location of all the European countries and their capitals

Virtual astronomy

- Simplified planetarium in the classroom through : astronomical portals and interactive board
- Visualization on the celestial sphere of phenomena stimulates the imagination and makes it easier to understand difficult issues.



Example problem:

Read the polar star altitude on the celestial sphere for Warsaw, the North Pole and Cairo. What determines its height ?

stellarium - virtual astronomy/

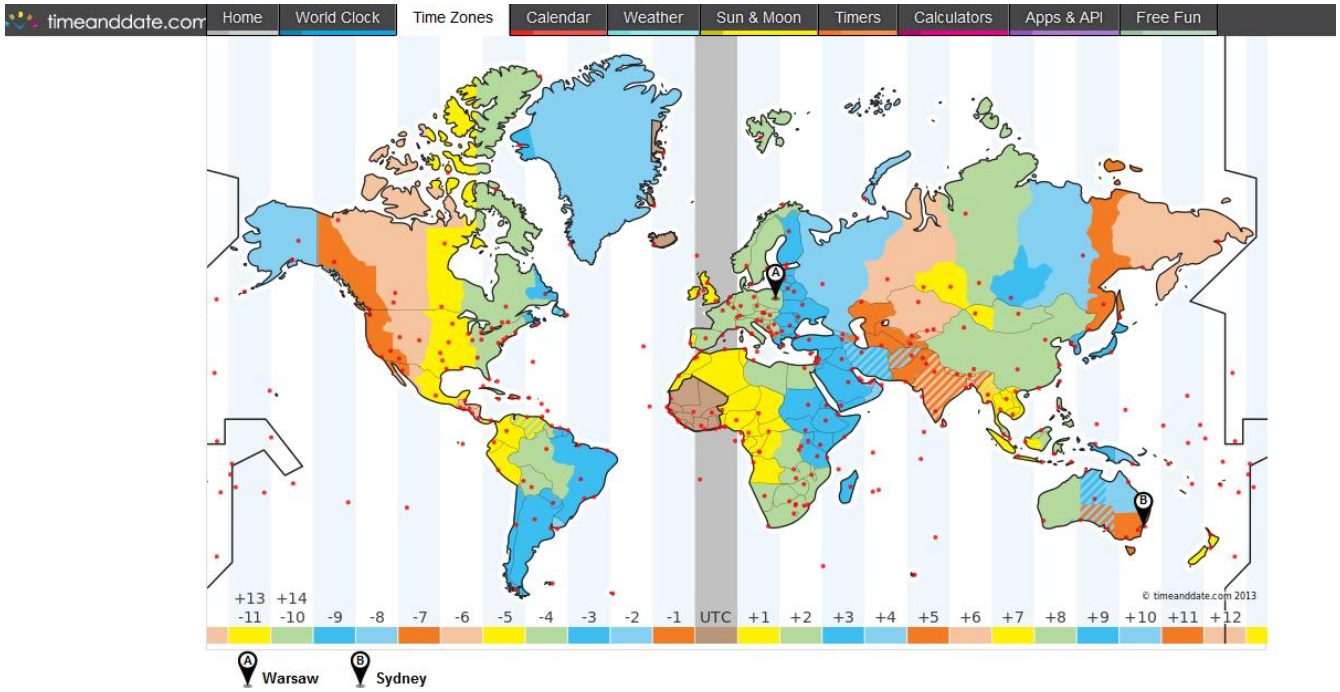
Changes in illumination of the Earth within a year

Example problems:

- *How does the lighting of the Earth change in a year?*
- *What determines the presence of polar days and nights ?*

Sun and Moon

Time on Earth

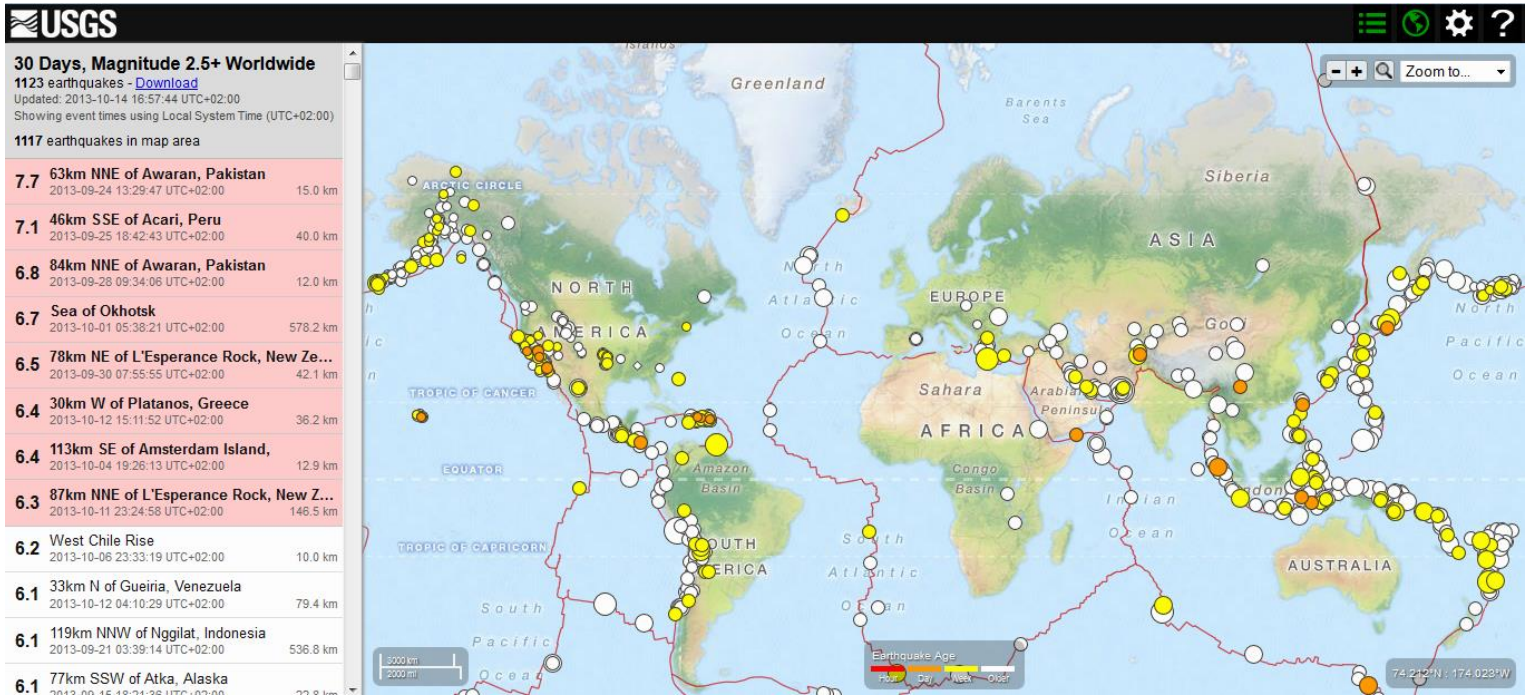


The calculation of the time zone and official time is easier

<u>Example problem:</u>

Calculate what time is the official time in Sydney, while in Warsaw is 10:00.

Earthquakes and volcanic eruptions in geoportals



Example problem:

Check the distribution of earthquakes of the last 30 days of magnitude > 2.5 . Analyze the areas in which they most often occur .

Virtual Tours

exploration of the world with Google Earth

virtual panoramic tours

Virtual tour Karkonosze

virtual tour Zachełmie

- Give you the opportunity to see the terrain in 3D.
- Help to explore the world in various aspects .
- Facilitate learning map reading .

Example problem:

Show the activities of mountain glaciers . Describe the morphology of these forms.

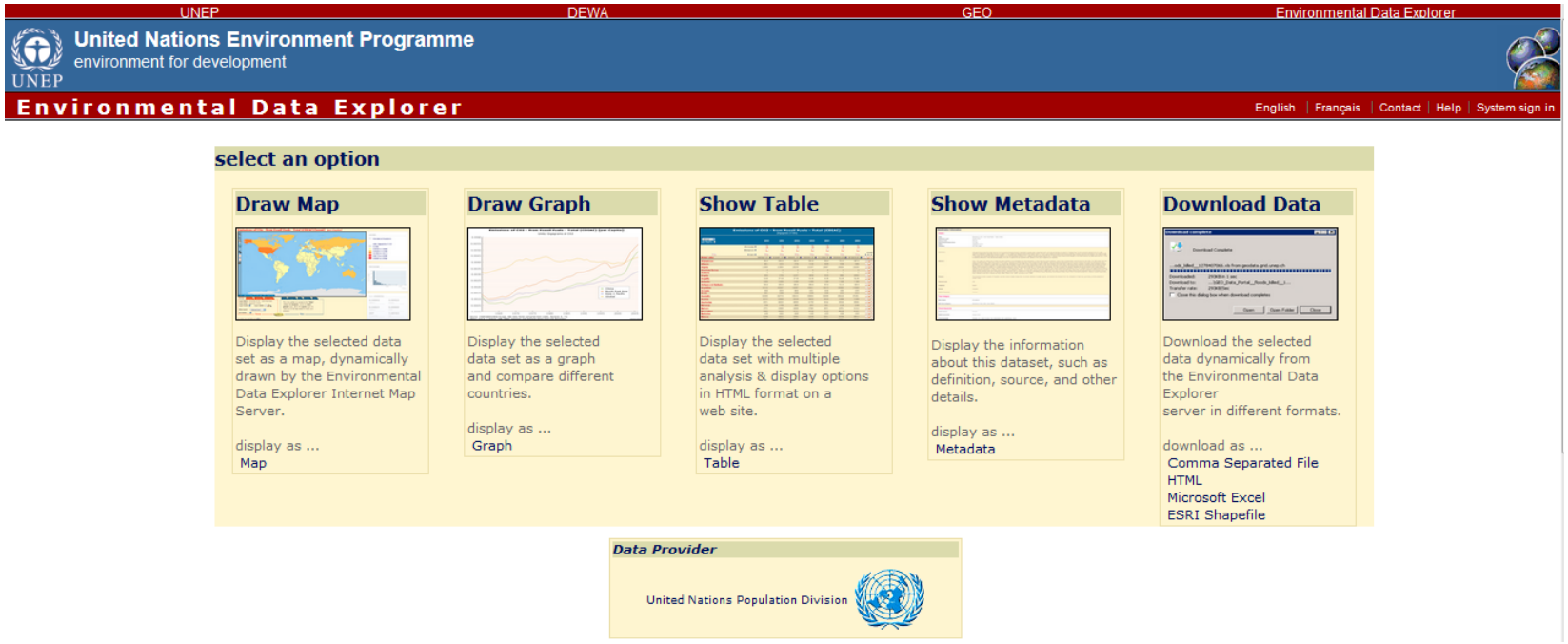
Interactive database socio-economic data help a lot during geography lessons

- Easily accessible data
- Current data
- Ability to view earlier data
- The data available in different formats (charts , maps, graphs)
- Unlimited data management (create your own statements , changes in presentation of data, creating analyzes)

The World Bank Data Explorer

Environmental Data Explorer UNEP

A student selects the most suitable solution to the problem analysis



Example problem:

Investigate the changes in the life expectancy in the countries of the world in the last 10 years.

The variety of data in the Internet

„popular " and" less popular " representation of data

time
data changing

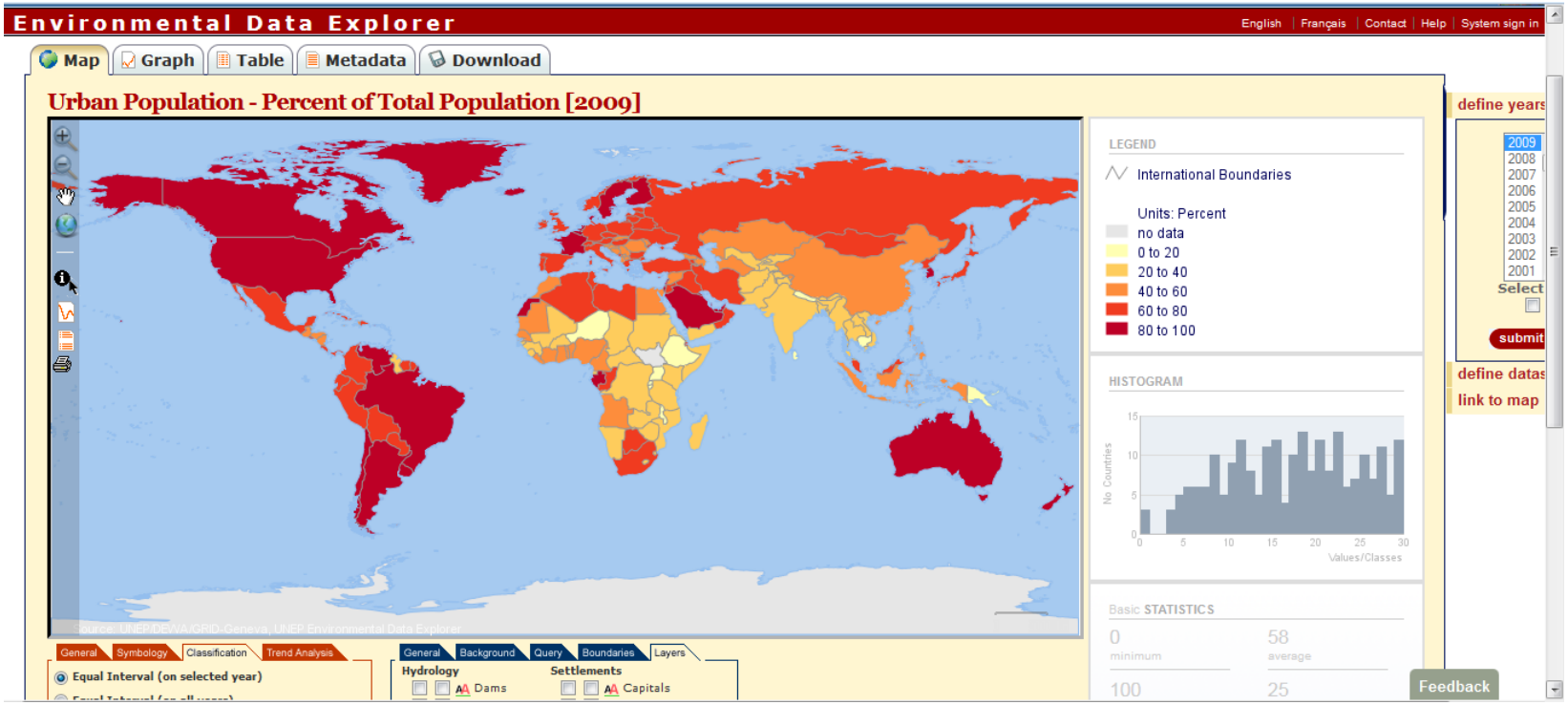
Data Table for Poland in xls format downloaded from the GUS

- The selection of tools for the analysis of the problem depends on the student's age and the complexity of the task.

Example question :

In which Polish provinces is the biggest unemployment ? What are the reasons of differences in unemployment in Poland?

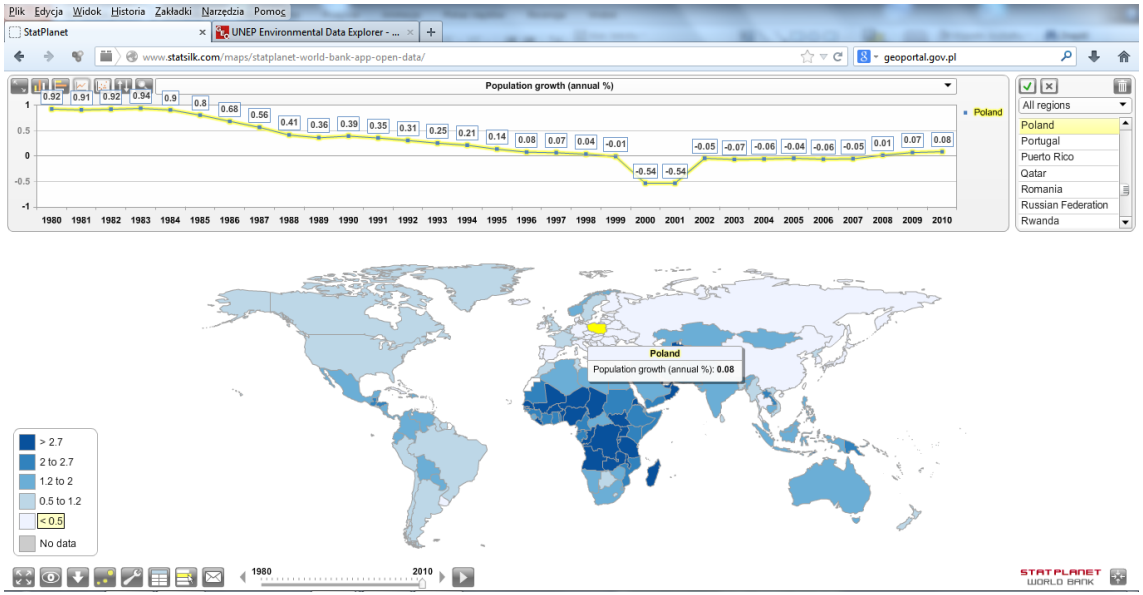
Geoportal accelerates data analysis



Example problem:

In which countries can we see the phenomenon of overurbanization?

Spatial analysis through the time



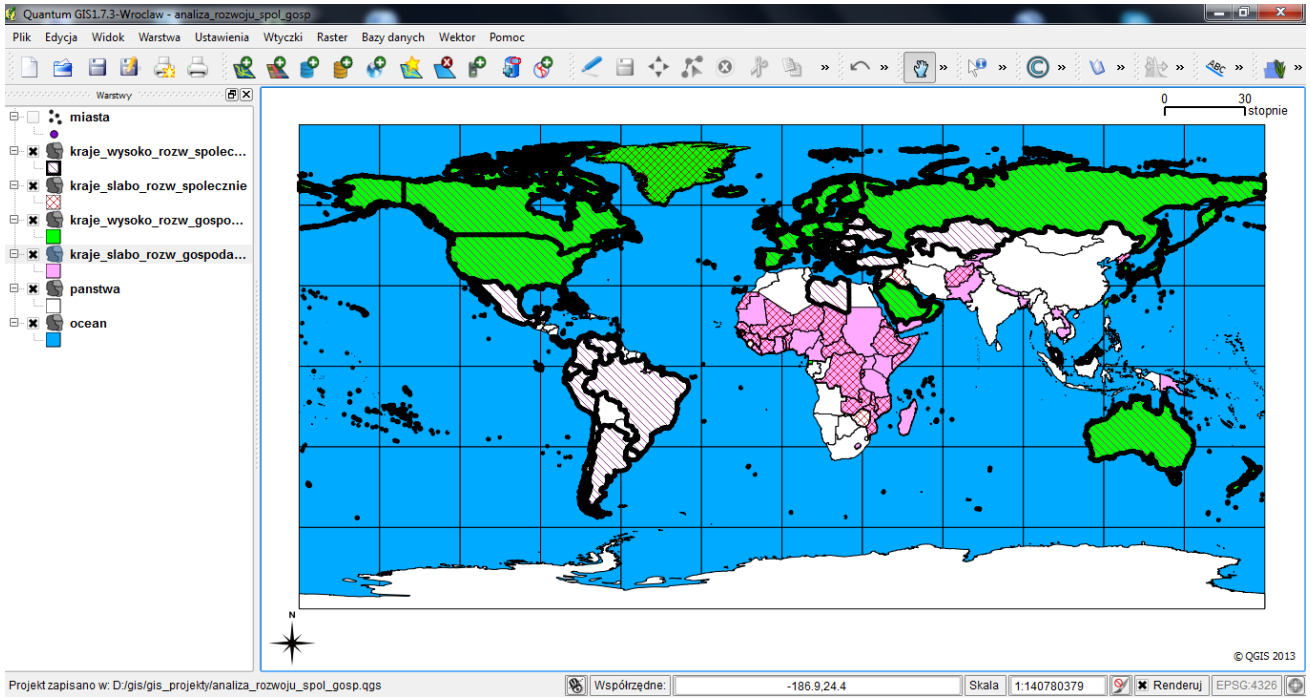
Example problem:

Check the changes of the birth rate in Poland.
Introduce socio - economic consequences of these changes for our country in the next 50 years.

Stat Planet

Use of GIS in data analysis

Quantum GIS – free tool for students



QuantumGIS

<u>Example problem:</u>

Check whether there is a correlation between the social and economic development of countries in the world .

Summary

GIS and ICT:

- enrich the geography lessons
- provide access to a huge knowledge
- stimulate the imagination
- facilitate the organization of work
- accelerate the learning process
- encourage the student to act
- facilitate carrying out complex analyzes
- help establish positive social relationships