

Using GIS Across Key Stage 3

1. Why do we need to use GIS in our KS3 schemes of work?

There are several references to **GIS** in the New Secondary Curriculum documents:

Geographical enquiry

Pupils should be able to:

b collect, record and display information

[Explanatory notes - *Collect: Information should be gathered from a variety of sources, including fieldwork libraries, the internet & digital media, official agencies, GIS & newspapers.]*

Fieldwork and out-of-class learning

Pupils should be able to:

a select and use fieldwork tools and techniques appropriately, safely and efficiently.

[Explanatory notes - *Fieldwork tools: These include using ICT, such as digital and video cameras, GIS, and environmental sensors.]*

Graphicacy and visual literacy

Pupils should be able to:

a use atlases, globes, maps at a range of scales, photographs, satellite images and other geographical data

[Explanatory notes: *Geographical data: This includes published statistics, data gathered from fieldwork, literature, biographies, travel writing and information generated by GIS.]*

Curriculum opportunities

The curriculum should provide opportunities for pupils to:

d. use varied resources, including maps, visual media and **geographical information systems**

In the first three examples, the references to GIS are in the non-statutory guidance (*shown in italics*) but in the **Curriculum Opportunities** section of the new national curriculum document for Geography, there is a clearly stated statutory obligation that “**the curriculum** (at KS3) **should provide opportunities for pupils to use geographical information systems.**” Taken together, there is a clear message that pupils should understand what a GIS is, how it is used in real life and that they should be able to use GIS to acquire, manipulate and display geo-referenced data. In addition, there should be opportunities for pupils to use GPS equipment to collect data during fieldwork for use in GIS.

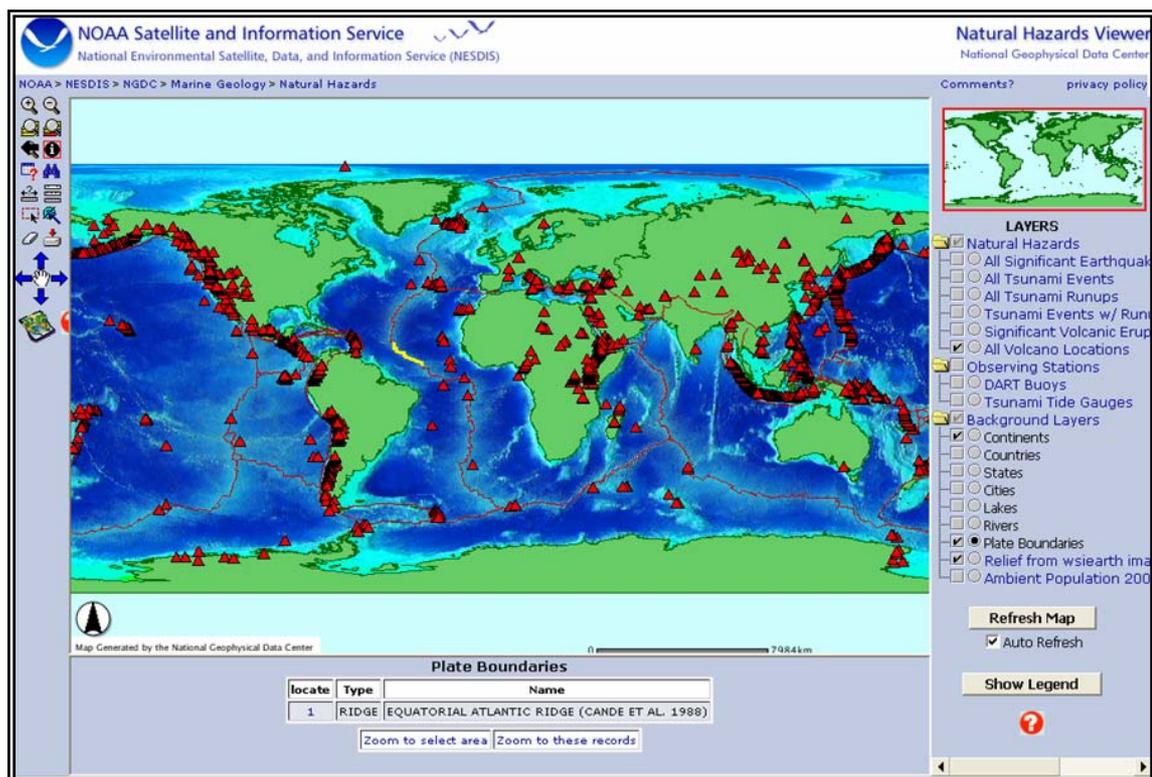
In addition to this statutory requirement, there is general agreement that GIS now plays a key role in society: “*Geographic Information Systems (GIS) is a technology that has come of age in the information society. The character of GIS that sets it apart from other information technologies is the need to identify 'where.'* GIS has evolved from specialized mapping software and joined the ranks of the mission-critical business infrastructure. Today, **GIS is all around us** -from web-based mapping to in-car navigation systems, from sophisticated scientific and business analysis to emergency planning. “

2. What do I need in order to be able to use GIS with KS3 pupils?

Integrating GIS into KS3 involves having the right hardware, appropriate software and data plus some ideas for integrating these resource into your schemes of work. School hardware varies enormously in terms of what is available in each school and it is important to talk to school IT managers about what you would like to do – well in advance of trying to do it!. Software packages range from very expensive, high-end software such as the **ESRI Schools Bundle** which is comparable to software used in the workplace through to more affordable but more restricted software such as **AEgis 3** which is fine for KS3 but has less scope for progression through to GCSE and A2 courses.

Many schools are now looking at **free** and **online** software with GIS capabilities to start GIS work in KS3. An outline of the current possibilities are given below but you should remember that the speed of developments is such that information dates very quickly and you will need to check carefully on GIS website and software changes.

Online GIS Viewers – these are websites that contain online GIS software which will display geo-referenced data of various kinds but there is little if any scope to add your own data. They are an excellent way of introducing GIS to pupils and developing their understanding of how a geographical information system works.



Website: <http://map.ngdc.noaa.gov/website/seg/hazards/viewer.htm>

This excellent example from **NOAA** is a great GIS Viewer to use with pupils when looking at hazards and in particular, earthquakes and volcanoes. As you can see, there is a world base map with a variety of 'layers' listed on the right that can be turned on or off to look at spatial patterns and to look at the relationship between the various data sets. There are also some simple tools to measure distances and area and to indicate latitude/longitude. You can zoom in or out to see areas in more detail.

‘Google Earth’ Style Software – there are a large number of ‘virtual earth’ software packages that can be accessed online or downloaded on to a computer. In most cases, downloaded software still requires live internet access in order to download datasets or to download live data e.g. current weather.

Although **Google Earth** gets a large amount of regular publicity, it is not the only software of its kind and it is worth spending a little time looking at the alternatives. Some of the alternatives are less demanding of the hardware systems in school and may prove more suitable.

Google Earth (GE)

Advantages:

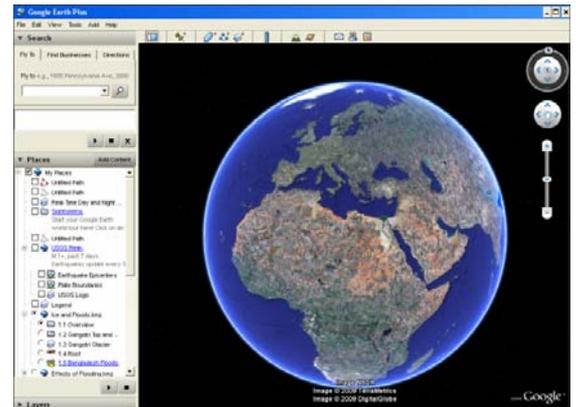
Well known to both teachers and pupils – most people have had a play with this software. Has increasingly high resolution satellite imagery of all the continents. It has the capability to show 3D landscapes and to ‘fly’ across the land between pre-determined locations. The latest version (v5) now has historical satellite images and underwater data. You can attach placemarks at a specific location and add text, photos, sound and video files. There are a large amount of additional data layers available in the form of kml (kmz) files. You can import your own fieldwork data from GPS units.

Disadvantages:

Some schools have had problems getting the Google Earth software to run successfully on school networks and you may find that one of the alternatives is preferred by IT managers.

Download: (9MB)

<http://earth.google.com/download-earth.html>



NASA World Wind

Advantages:

NASA World Wind has been around for several years and contains what some people believe is the more visually appealing ‘Blue Marble’ satellite imagery. It contains a variety of ‘atlas style’ maps (data layers) which look great on the IWB. You can add extra data layers by importing ESRI shapefiles or GE kml files. It is very straightforward to learn.

Disadvantages:

Less well known and therefore less well supported.

Download: (16MB)

<http://worldwind.arc.nasa.gov/download.html>



Earth Browser

Advantages:

Quick and easy to install – runs relatively fast. With a good internet connection, it is excellent at demonstrating ‘live data’ e.g. current weather or earthquake events. You can add your own data to Earth Browser or you can easily import GE kml files to add extra data layers. Worth looking at the trial version to assess its’ value in the classroom.

Disadvantages:

Used to be free but now costs \$99 (about £68) for a licence for a 32 seat computer suite.

Download: (16MB)

<http://www.earthbrowser.com/install/>



Microsoft Virtual Earth

Advantages:

Slightly unusually, this software integrates Live Search mapping and Virtual Earth satellite images. You can get GE style 3D views and in some areas there are detailed aerial photos. It is quick and easy to use.

Disadvantages:

You cannot import data of your own but various website developers have used the software code and added their own data layers e.g. <http://www.3dgeomaps.com/>

Download: (21MB)

<http://www.microsoft.com/downloads/details.aspx?familyid=E9298080-50C4-4F2E-9FC4-4009074996BA&displaylang=en>



Collecting your own GIS data

Increasingly, the technology that we own has built in **GPS capabilities** – alongside the more obvious SatNav in our cars, we have cameras and mobile phones that record our precise location whenever we use them. Until large numbers of pupils own such phones or cameras, it could be useful to purchase a small number of GPS units for your Learning Outside the Classroom activities. Alongside precise latitude/longitude (or OS grid references), these units will record altitude. This data, alongside the fieldwork data collected by pupils provides a rich resource for data presentation and analysis in the classroom. The GPS data can be easily downloaded using free software such as **EasyGPS** (<http://www.easygps.com/download.asp>) and then displayed in programs such as Google Earth or NASA World Wind.



The KS3 Units in the **Geography Teaching Today** website provide a wide range of opportunities to incorporate GIS work into these topics. Some examples of the possibilities are given below. Try these out if you teach these units, adapt them to other units that you are teaching and keep an eye open for new opportunities as you develop your own KS3 units.

A. London 2012

At the heart of this unit is the story of **urban regeneration** and there are numerous opportunities to introduce GIS into this unit of work.

Pupils can collect photos, textual information and videos to display on one of the virtual earth programs in order to look at changes in the area over time. Maps and plans can be easily added as overlays on top of the satellite images.



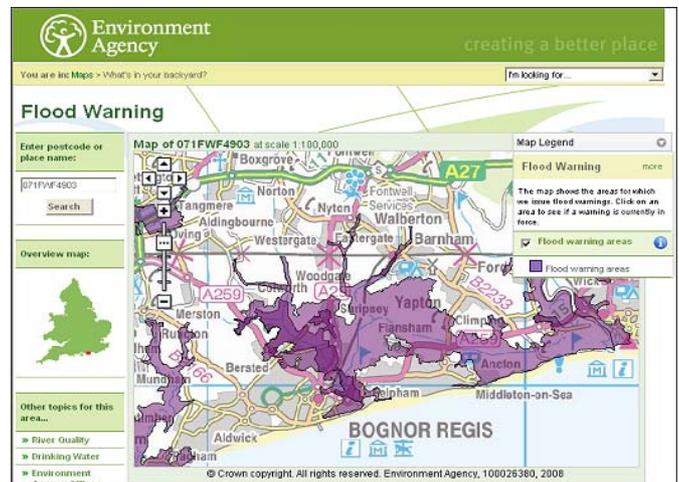
This GTT Unit gives a variety of useful websites for collecting together such resources and the rich variety that is available gives a lot of scope for pupils to produce individualised work. It is perfectly feasible with this task to ask pupils to complete the research and perhaps the presentation of the data as a home-based task. Over the next 3-4 years, the amount of resources available will increase and there will be greater scope for looking via GIS at the impact of changes in the area.

B. Risky World

Any topic linked to hazards and hazard management has a huge potential for building in some GIS work. Although there is less scope in this country for incorporating local hazards, it is possible to use the **Environment Agency** website to see how GIS systems can be used to predict floods and save property and lives. The website is regularly updated in times of danger.

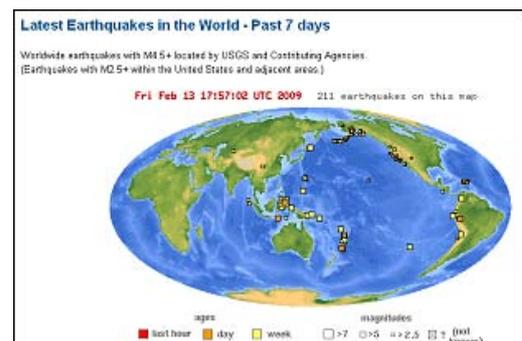
The website can be found at:

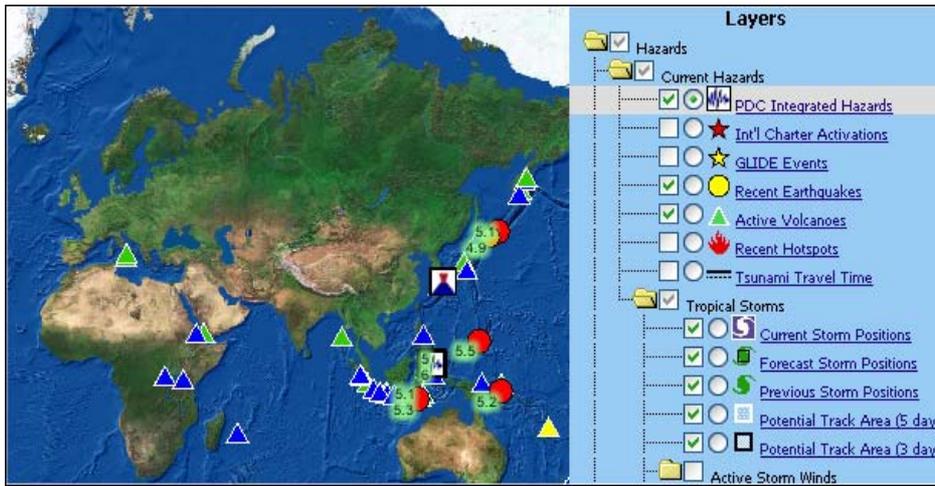
<http://www.environment-agency.gov.uk/homeandleisure/floods/31618.aspx>



The NOAA GIS Viewer has already been mentioned in relation to looking at patterns of earthquakes and volcanoes. The United States Geological Survey (USGS) has an excellent online site which shows earthquake magnitude and location and is updated every hour. You can click on locations to bring up further details of earthquake events. It is found at:

<http://earthquake.usgs.gov/eqcenter/recenteqsww/>



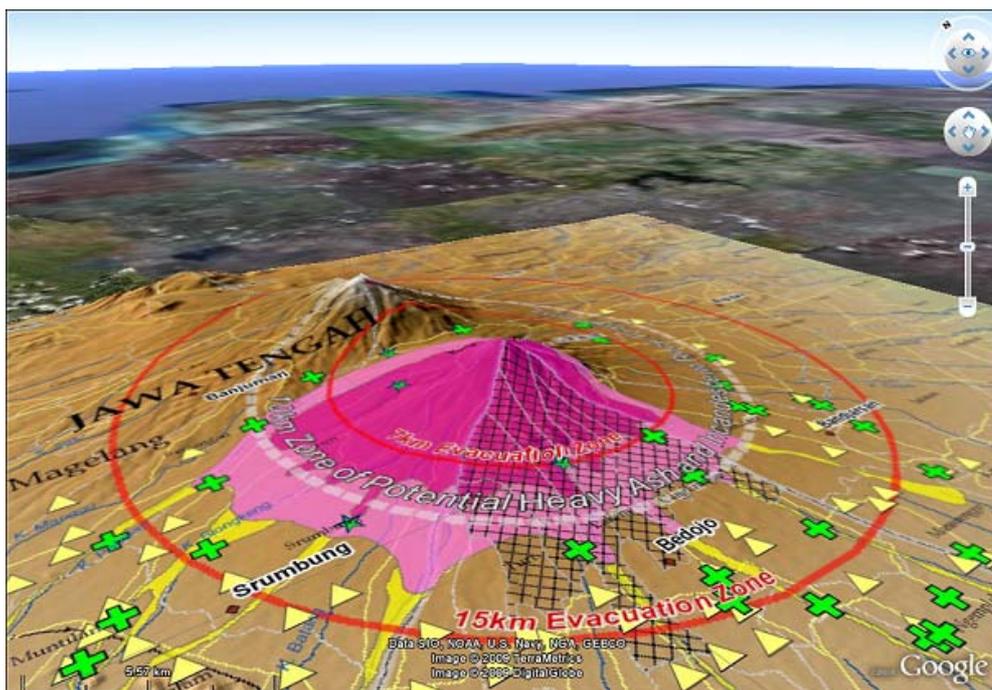


There are a few GIS Viewer websites that deal with the whole range of natural hazards and the **Pacific Disaster Centre** is one of these. It deals with earthquakes, volcanoes, tsunami, and all kinds of storms including tornados and hurricanes. It is a rich source of data but can be very slow to refresh the GIS maps.

Website: <http://www.pdc.org/iweb/pdchome.html>

Websites such as **MapAction** provide emergency mapping during hazard events and these can be combined with Google Earth satellite imagery to create a fascinating 3D view of things like evacuation zones. Such maps provide an excellent focus for discussion of management issues and pupils could be encouraged to create their own emergency planning maps based on a set of imaginary data for a volcano or storm hazard.

Map source: http://www.mapaction.org/component/option.com_frontpage/Itemid,1/



[Evacuation planning map for the Merapi volcano in Java, Indonesia]

Practical hints and tips for using GIS in the classroom and in fieldwork

The GTT website has a large number of excellent hints and tips that give practical advice on how to geo-tag photos, etc as well as how to use a variety of the GIS software that is currently available. If you haven't yet seen it, go to:

<http://www.geographyteachingtoday.org.uk/fieldwork/info/teaching-technology/>