

Customer

ALT – Sociedade de História Natural (ALT-SHN) is a non profit institution headquartered in Torres Vedras, Portugal, specialized in palaeontology. The institution manages a large fossil collection, mainly from the Upper Jurassic era.

Challenge

The fossil collection trusted to the institution consists of thousand of fossils, but they lacked a vital information: the exact location from where they were originally extracted. Assessing the geographic coordinates was the first problem to be solved.

Solution

Given the harshness of the landscape – mainly cliffs and high slope terrains, a mobile GIS survey was the best way to retrieve the spatial data needed in due time and without the need (and financial effort) that a topographic approach would imply.

Results

The possibility of assessing coordinates through several differential GPS modes allowed to achieve high precision rates and thus ensure that those sites can be revisited again even by those who had never been there.

ALT – Sociedade de História Natural (Portugal)

GIS field survey applied for paleontological research

The Portuguese West Coast is a beautiful yet harsh landscape to explore due to high slope cliffs and very accelerated erosion process. This landscape conceals a very rich paleontological heritage: fossils of large vertebrate animals (mainly dinosaurs, turtles and crocodiles) from the Jurassic period. Mobile GIS technology enabled paleontological researchers to better explore this area by determining exact location of fossils.



The challenge

Over the last decades, several remains of these ancient animals were retrieved from the original sites by private enthusiasts without proper record – other than memory and personal sketch books, or the spatial context where the fossils were found. This meant that only the original retriever knew the precise location.

This lack of spatial information affected thousands of fossils that were entrusted to ALT – Sociedade de História Natural, a non profit institution from Torres Vedras dedicated to the study of natural sciences. The fossils who lacked this information were representative of more than 300 paleontological sites scattered through an area of 80km of coast line.

Adding to this, there's also the problem of the harsh terrain that makes the collection of the data needed particularly hard for traditional methods such as a topographic team equipped with a total station. GPS technology was the way to go, but even this solution presented several issues that had to be solved. The consequence of the high cliffs is that they tend to impose high DOP levels and low satellite visibility with serious consequence to positional accuracy – a regular GPS wouldn't be enough to go over these problems – it had to grant access to a good differential network, a need satisfied by the Army Geographic Institute (IGEOE) through their Virtual Reference Stations Network – SERVIR.

Mr. André Mano, who is in charge of field survey jobs for ALT – Sociedade de História Natural, explains his experience with DigiTerra Explorer as follows:

'Although I had some ideas about the capabilities of DigiTerra Explorer 6, I initially feared that I had to invest a big amount of time studying the software in order to get the most out of it – something that is hardly compatible with tight schedules. The fact is that the software is incredibly simple and intuitive. I plugged the SD card in the GPS Receiver and within 5 minutes, without any prior study, I was collecting data.'

Software used

DigiTerra Explorer 6 mobile GIS and data collection software

Hardware used

Magellan MobileMapper CX with VRS DGPS mode

Consultant involved

Instituto Geográfico do Exército (www.igeoe.pt)

For more Information

DigiTerra Information Services Ltd.
H-1025 Budapest
Csévi u. 6.
Phone: +36 1 225 8173
E-mail: info@digiterra.hu

and

ALT – Sociedade de História Natural
R. Cavaleiros da Espora
Dourada, n.º27A
2560 -909 Torres Vedras,
PORTUGAL
www.alt-shn.org

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The solution

Once the problems of team mobility, efficiency and granted accuracy for field measurements were solved, it was time to choose the best way to record the data while on field survey.

The solution had to deliver three main functionalities:

- 1 – Record data directly to standard formats (.shp, .dgn, .log, etc)
- 2 – Allow visualization of other geographic elements (airborne imagery, administrative borders, geological units, etc)
- 3 – Record data to different layers.

DigiTerra Explorer met all this requirements and added several advantages. It doesn't need any special extra configuration or modules to record data gathered in DGPS mode; it has a wide range of file types to be stored on the SD card for later visualization while on field work; it's interchangeable with other GPS receivers and allows, if you wish, to automatically fill data attributes, such as altitude, DOP level, number of satellites, etc.

'We proceeded with the survey with one portable equipment powered with DigiTerra Explorer and through it we had access to a set of information in a wide range of formats – airborne imagery (ECW), topographical maps(TIF), administrative borders(SHP) and geological maps (JPG). This granted us the possibility of knowing all the relevant aspects of a given site while observing it – a big advantage that allows you to save hours of post processing time in the office'

Results

Following the field survey, there are precise spatial information about all the fossils in the collection. This grants ALT-SHN the possibility to assemble survey teams to monitor the sites in order to check if erosion uncovered more elements of a given animal or even a missing link of the evolutionary puzzle.

Furthermore, it allows to derive important statistics that support risk models that will improve the efficiency of future prospection and field campaigns.



'Any investigator of any part of the world can now visit these paleontological sites even if he had never been there. On a long term perspective, this is a great legacy for future investigators – we no longer depend of the memory and sketch books of the original fossil retrievers. '