OS SUSTAINABILITY

INNOVATION TRENDS

Ordnance Survey

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Foreword

We are in a climate emergency. Our growing population is increasing pressure on our environment. Our planet is heating up and the climate is changing. What role can geospatial play in helping us act now?

Ordnance Survey (OS), the national mapping service for Great Britain, has identified innovation trends that use geospatial data and know-how to tackle climate change at local, national, and global levels.

Digital technologies can help reduce global carbon emissions by up to 15% – one-third of the 50% reduction required by 2030 – through solutions in energy, manufacturing, agriculture and land use, buildings, services, transportation, and traffic management.[1]

These transformative technologies, combined with the use of geospatial data, provide vital insight and can help protect the future of our planet.

What is geospatial data?

Geospatial information describes the physical location of geographic features and their relationship to other features and associated statistical information. It is an essential resource, with proven societal, economic, and environmental value, that enables governments and organisations to address the key global and local issues that affect people.

The use of geospatial data is crucial in making the bold decisions needed in our response to climate change.

SUMMARY

OS's 7 sustainability trends in location data

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Intelligent mapping for wind and solar farms – to support renewable energy infrastructure

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Green spaces for heat – identifying sustainable heat sources

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Mapping EV charging points – to enable green mobility

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Keeping cool – mapping weather events

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Preserving our carbon sinks – to mitigate climate change

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Sustainable urbanisation – using geospatial data to build sustainable cities

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Monitoring climate change – tracking vegetation

1. Intelligent mapping for wind and solar farms – using geospatial data to support renewable energy infrastructure

Location data is vital for planning the development of wind and solar power if we are to come anywhere close to achieving net zero in electricity generation.

It is essential to consider location when positioning green energy infrastructure to mitigate future risks, for example taking account of coastal erosion.

CASE STUDY

Scotland

The Scottish Government is committed to making Scotland a net zero society by 2045 – reducing emissions by 70% by 2030 (compared to 1990 figures).

However, by 2050 an estimated £1.2 billion of Scotland's buildings, transport infrastructure, cultural and natural heritage may be at risk of coastal erosion, a process that is already under way due to sea level rise.

The Dynamic Coast project used OS data alongside additional surveys to develop new maps that serve as a coastal change planning tool to build resilience and adapt to the pressures of climate change and sea level rise.

Additional detailed analysis, using spatial data from OS, is being published during COP26 to allow planners, infrastructure managers and the public to see how their coast may change under a high emissions future compared to a low emissions future. Such innovations are vital to help society better achieve net zero, quickly adapt to future challenges and become more "sea level wise".

To the future:

Geospatial data will be used to plan wind and solar farms with thought to the future – ensuring any rise in the heat profile of the area, or changes to the landscape, will not affect their efficiency.

Using geospatial data combined with energy usage data can pinpoint the best locations for renewable energy to be plugged into the grid.

Mapping will also be used for household renewable assets: location data can help local authorities identify houses which are ideal for solar panels.

2. Green spaces for heat – using geospatial data to identify sustainable heat sources

Green spaces not only improve quality of life for people who live in cities, by offering calm spaces away from traffic and noise and improving biodiversity, but they can also provide vital sources of clean energy.

Geospatial data can identify underground heat sources in green spaces, mapping ideal locations for ground source heat pumps.

CASE STUDY

Scotland

OS MasterMap Greenspace dataset helped reveal that 60% of Edinburgh and Aberdeen are made up of green space. Greenspace Scotland has identified these greenspaces as vital sources for clean energy production – places where low carbon heat can be harvested using ground source heat pumps and used to heat homes and businesses.

To the future:

All cities can be mapped for green spaces which are suitable for installing ground source heat pumps to further reduce reliance on fossil fuels (directly or indirectly) for heat generation.

3. Mapping EV charging points – using geospatial data to enable green mobility

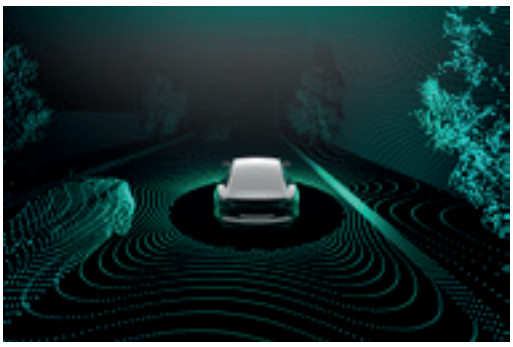
In a future where vehicles are fully or partially electric, all vehicle users will require adequate access to charge points. Electric vehicles (EVs) help increase air quality and reduce emissions but there is a shortage of charging points. Geospatial data can be used to identify accessible locations where electric charging points for EVs can be installed.

Demand for charging points will grow in residential areas, on motorways, in car parks, for city hotspots and remote communities. Electric fleets also require large scale charging facilities. Provision for this requires considered mapping, integrating location with access to the grid.

CASE STUDY

England

The Department for Transport, in conjunction with the University of Exeter, undertook a study to estimate the proportion of properties in a test area that can accommodate private EV charge points powered via the household electricity supply. This study used geospatial data from OS combined with other datasets and developed an algorithm which could be used to classify residential dwellings as potential locations for private charge points.



To the future:

The transport landscape will change dramatically in a fully digitised net zero world. Alternative fuels and digital solutions will determine a new era of transport; we will see autonomous vehicles on our roads and new road infrastructure. We may see a world where autonomous and individually-owned aircraft are a lot more common in our airspaces – decreasing our need for land transport infrastructure and preserving natural land habitats. Such transport will rely on geospatial data combined with other big data to navigate roads and airways and to reduce collisions by real time positioning intelligence.

4. Keeping cool – using geospatial data to map weather events

As our planet continues to heat up, climate events will increase. Recent floods in Europe and America; heatwaves and wildfires in Canada and Siberia are clear examples that climate change is happening faster than predicted.

Geospatial data is being used to monitor weather events and can map the heat profile of a city.

CASE STUDY

UK

The 'Heat Hazard Postcode' provides a map of 'at risk' areas to help manage the effects of extreme weather.

Developed by 4 Earth Intelligence (4EI), using the OS Covid licence that made the OS data accessible to companies during the pandemic, satellite imagery and algorithms were used to create a free map that identifies literal 'hot spots' within urban areas where temperatures get higher.

To the future:

Future sustainable cities can be mapped to ensure a low heat profile. This has the potential to mitigate the risk of a heat event and a health event happening simultaneously, e.g., a future pandemic and wildfire, saving lives.

5. Preserving our carbon sinks – using geospatial data to mitigate climate change

Space-enabled technological advances, using geospatial data, are being used for peatlands monitoring and climate action.

Peatlands are a type of wetlands that occur in almost every country on Earth, currently covering 3% of the global land surface. They preserve global biodiversity, provide safe drinking water, minimise flood risk and help address climate change.

Critically, Peatlands are the largest natural carbon store on land. These 'Carbon Sinks' store more carbon than all other vegetation types in the world combined. Their preservation is essential.

CASE STUDY

UK

Peatlands occupy a sizeable 12% of the UK's land area. However, 86% of the UKs peatlands have been degraded due to human activity, vastly decreasing their capacity for carbon storage, affecting biodiversity, and adding to greenhouse gas emissions when peat is burned for heat.

OS is working with Assimila, Space 4 Climate and Durham University, and the University of Leicester to use geospatial data collaboratively to help monitor, protect, and preserve peatlands. This will ensure that these vital carbon stores continue to take in carbon dioxide and reduce the overall levels of greenhouse gases in our atmosphere helping to eventually halt climate change.

To the future:

Peatlands will continue to be monitored, preserved, and used for carbon offsetting. Protecting peatlands will allow them to build up naturally over time, increasing capacity for carbon sequestration.

As peatland restoration can bring significant emissions reductions, the UN is encouraging countries to include peatland restoration in their climate change commitments.

6. Sustainable urbanisation – using geospatial data to build sustainable cities

Addressing rapid urbanisation in a sustainable way is being helped by new and faster mapping techniques. The affordability of these maps is increasing, giving better access to valuable insight for those nations facing the pressing need to plan sustainable housing, water and sanitation.

Implementing a sustainable infrastructure of roads, waste, water, and power, is not possible without reliable geospatial data. It provides a single source of accurate, environmental information to allow fast decision-making by governments and policy makers.

CASE STUDY

Zambia

The World Bank estimate that 54% of Sub Saharan African urban dwellers are living in informal settlements. These informal sites lack the infrastructure required to support sustainable, liveable, and productive urban environments.

In response to the challenges associated with rapid urban growth, OS, in partnership with the International Growth Centre (IGC) and the Commonwealth Association of Architects (CAA), have piloted the creation of an automated digital base map of Lusaka, Zambia.

Using aerial imagery provided by the Zambia Survey Department in the Ministry of Lands and Natural Resources, OS utilised its advanced automated process to generate a new base map, using artificial intelligence, across 420km^2 of Lusaka.

These accurate digital base maps create a vitally important resource for policy makers and planners in the development of evidence-based environmental solutions.

To the future:

The UN is urging countries to commit to enhancing inclusive and sustainable urbanisation by 2030 as part of its Sustainable Development Goals (SDGs).

OS mapping data will help identify informal settlements, population and density, the number of built structures, the location of transport infrastructure surrounding formal and informal neighbourhoods, as well as access to electricity, sanitation facilities and clean water.

7. Monitoring climate change – using geospatial data to track vegetation health

You can only manage what you can measure.

68% of the environmental indicators in the SDG framework lack sufficient data for monitoring global progress.[2]

Geospatial data can help address this major shortfall. It can become a key tool in helping to measure how the environment is changing and to monitor the effectiveness of intervention strategies.

Satellite Earth Observation (EO) data has long been an important source of information for measuring and monitoring how the environment is changing. However, producing geospatial information for large areas from EO data is time-consuming and costly. Integration of machine learning is growing, and artificial intelligence is more responsive: EO data is now easier and quicker to use, helping governments monitor climate change more effectively.

CASE STUDY

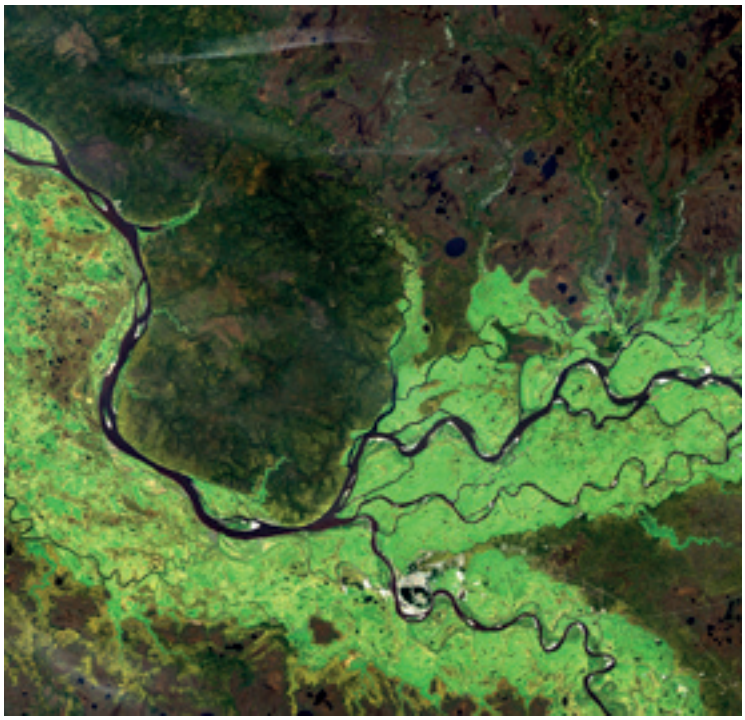
United Arab Emirates (UAE)

The Environment Agency, Abu Dhabi (EAD), is a government agency committed to protecting and enhancing the environment as well as maintaining and promoting the biodiversity of the desert and marine ecosystem. OS worked with EAD to develop a GIS Roadmap which provides a detailed structured plan to help EAD capture, maintain and analyse environmental information to support their 2030 Vision.

OS and Deimos Space UK worked with the Mohammed Bin Rashid Space Centre (MBRSC) in Dubai to automate the production of geospatial information from satellite EO data using machine learning algorithms, making EO data more accessible and usable, saving time and costs. This state-of-the-art machine to machine model combines EO data and artificial intelligence to monitor and track the growth and health of important vegetation such as mangroves and palm trees.

To the future:

Geospatial data aligned with New Space datasets will be used to measure the effectiveness of interventions put in place to mitigate the effects of climate change. Accessing Earth Observation data is key to this widespread use; automating geospatial information attribution and creation using machine learning and AI will make these new measuring data services more far more accessible. Geospatial information can then inform development of mitigation strategies and eventually support the prediction of change in health to ensure the desirable outcome is reached.



Conclusion

Sharing of information is imperative in our fight against climate change.

The integration of data from different sources and organisations is key to understanding the challenge, and then building solutions for a sustainable world. Just as global scientific collaboration is the way out of the pandemic, data sharing across global organisations is fundamental in our fight against climate change. The effects of climate change are happening already and a lot faster than scientists predicted – we must act fast and act together.

OS can help any nation or organisation use geospatial data and know-how to put in place innovative sustainability solutions so that we can all see a better place. To find out more information, visit Ordnance Survey | See A Better Place.

Mapping the future

In less than 100 years we will be exploiting resources from space – the mapping has already begun.

The key is sustainability. If we find the resources needed for cleaner energy production from elsewhere in the solar system, then we'd go a long way to solving our energy consumption needs while keeping the earth pollution free. Wherever humans go, whatever we do, it needs to be done in a sustainable way.

Geospatial data can help plan for the future of our planet, mitigate the risks climate change brings, support prosperity on earth and look beyond into space.

About Ordnance Survey

Established 230 years ago, Ordnance Survey is a world-leading geospatial organisation and experienced geospatial partner. We deliver huge value for the UK through our contract with UK Government, the Public Sector Geospatial Agreement (PGSA), and we share our location insights with governments around the world to help them make better-informed decisions. Our pioneering geospatial services are continually evolving to add value for our partners. These include 3D data modelling, creating strategies for overseas national mapping agencies and using location data to accelerate economic growth. We also help businesses stay one step ahead through data insights from our products including OS MasterMaps, OS Maps API and AddressBase.

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