LOCATION INTELLIGENCE

How location is supporting environmental programmes

INTRODUCTION

Why location data

The case for location data

Understanding patterns and trends is easier when placed in a geographic context. Vast amounts of information can be distilled when viewed on a map.

But a map is just the start of what can be done with location data, and many organisations and start-ups are realising that fusing location into their data systems has many benefits.

Benefits

• Location data is authoritative, which means it can be trusted as being correct, accurate, and reliable.

• Location data can be used to bring multiple sources of information together. It is the chain that links together datasets.

• Location data is high quality data, captured and processed using common data principles and standards.

What is authoritative data?

'Authoritative' means something you can trust and respect as true and correct; synonymous with accurate, reliable, and trustworthy. Authority needs to have a trustworthy source. Where does the data come from? Who owns, collects, and manages that data, and how do they

manage quality? Will it be reliable, i.e. still the same in five years' time?

As the National Mapping Service to Great Britain, Ordnance Survey creates, maintains, and disseminates consistent, definitive, and authoritative geospatial and cartographic data of Great Britain. The capabilities we deliver support the public and private sectors and the delivery of the UK Geospatial Strategy.

OS benefits from being trusted by those who use our data, and we ensure we apply the highest standards to our data and products. In fact, we do more than follow global data standards; we lead in their development, maintaining high quality data which is 'authoritative.'

Building trust in sustainability

Every sustainability programme is under pressure to deliver. But with the urgent need to act quickly and find workable solutions to the complex challenges of climate change and environmental degradation, organisations face problems with transparency and trust. To avoid claims of green washing, brands must demonstrate to consumers the sustainable credentials of a product, service or supply chain.

One of the most effective ways to build transparency and trust, while being able to deliver at pace and scale, is to use geospatial data. Geospatial intelligence gives an objective and transparent view of progress for sustainability initiatives to investors, landowners and government stakeholders.

Another challenge faced by sustainability managers, is being able to unlock valuable intelligence locked up in data silos. Geospatial data links information together, standardising data into a single version of the truth, allowing sustainability managers to get on with important science and policy decisions.

CUSTOMER EXAMPLE

Mitigating climate events

The UK is leading the way in climate adaptation by using space data to monitor and understand the effects of climate change. More than half of key climate data comes from space. The government has recently announced up to £200 million of funding to invest in the Earth observation sector to meet space and net zero ambitions.

In a project backed by the UK Space Agency, Ordnance Survey collaborated with the National Centre for Earth Observation (NCEO) using satellite data to monitor and map heat in locations at greatest risk. The aim is to provide meaningful insights for policymakers to manage the impacts of climate change in hot spots across the UK and further afield.
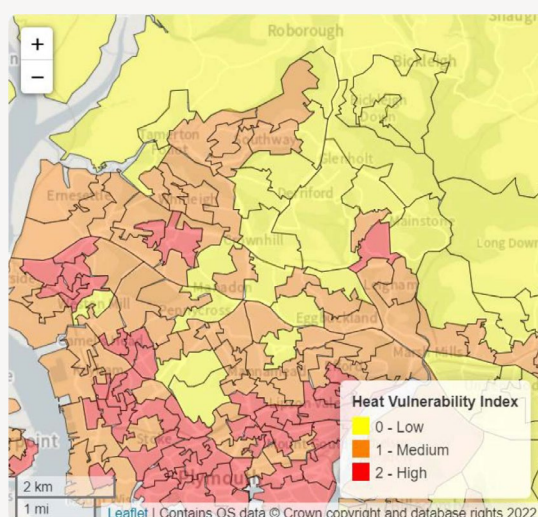

Identifying populations at risk

Our case study in Plymouth highlights regions of the city that have a higher deprivation score, combined with a higher heat discomfort index.

This could be used to:

- Identify where cool spaces or areas of refuge are needed in order to protect vulnerable communities during heatwaves.
- Target education campaigns about heat risk.

Identifying infrastructure at risk

To identify buildings in Plymouth impacted by the Urban Heat Island (UHI) effect, we combined OS AddressBase Premium with NCEO's discomfort index. This could be useful for targeting buildings that require adaption, such as retrofit green or cool roofs. By supplementing this data with OS Topographic Area, we could also determine available roof space and estimate instalment costs.
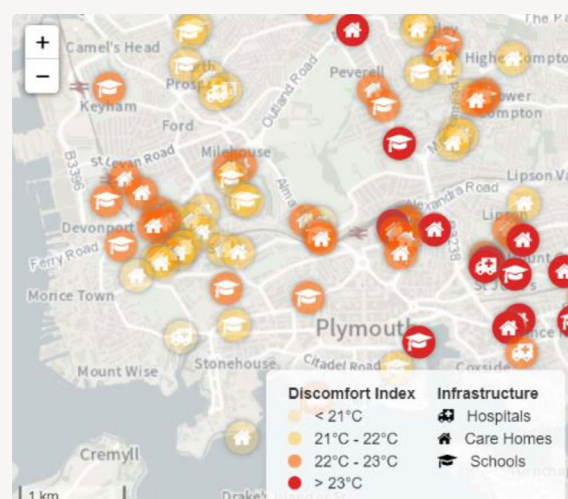
Monitoring and verifying environmental impact

The trust and transparency required for sustainability programmes, is built when we monitor, report and verify them.

To do this, we get a powerful picture, when location and earth observation data are combined. As location data is used to create maps and models of the Earth's surface, earth observation uses satellite images to collect data about the environment.

Both are crucial for environmental protection programs, and for monitoring and reporting the impacts of climate change and improving our understanding of what change is happening and measure if our policies are working.

From tracking heat waves to coastal erosion, and reporting pollution to habitat restoration, we're able to analyse the earth surface in a way that helps us improve the effectiveness of environmental programs.

The accelerating use of location and earth observation data

In the past, only governments could afford to launch and use satellite-based earth observations, mostly to support security and defence operations. Now with the massive growth in satellite systems, and the cheaper cost of space-based imagery, we've seen democratisation and wider use by more organisations and governments.

To accelerate the uptake of this important monitoring tool, the UK government recently announced up to £200 million of funding to invest in earth observation and climate programmes. The focus of the fund is to reduce our carbon footprint through better management of our land, oceans, and forests so that they absorb more CO_2 than they emit into our atmosphere. This investment will help us meet our net-zero ambitions as more than half of key climate data comes from space – making this a vital part of achieving them

How location supports environment monitoring

The use of geospatial data to support climate change monitoring and reporting varies according to the nature and scale of projects. For example, in the case of an individual project, such as a wind farm, geospatial data may be used for planning purposes only.

However, it is also common for large-scale projects to involve multiple agencies at various levels within government and industry. In these cases, geospatial information becomes essential for coordinating activities across departments that may otherwise not communicate with each other directly – such as municipal planning departments working with provincial environmental agencies or private companies involved in renewable energy development.

Climate change monitoring projects can also benefit from using both traditional remote sensing methods as well as newer techniques enabled by advances in digital technologies such as drones (unmanned aerial vehicles) equipped with sensors capable of collecting large amounts of high-resolution imagery. Ordnance Survey is testing how we can use these methods and new technologies to support nature-based restoration at landscape scale and understand what is required to provide the baseline of a site and verification of its restoration to support urgently needed high integrity projects for potential private investment.

CUSTOMER EXAMPLE

Building trust in supply chains

Analysing complex supply-chain data is critical for organisations wishing to embed sustainability and climate-led decision-making across their operations – from stopping deforestation to ensuring ethical engagement and support for farmers and communities.

Pushing the use of this data beyond reporting requirements to implementation of climate action at scale is an urgent imperative, which is why the Supply Chain Data Partnership was formed with Ordnance Survey as a founding partner. The Supply Chain Data Partnership aims to inject transparency and trust back into the supply chain, enabling companies to understand their climate and environmental risks and impact through knowing the true, verified location of their supply chain assets.

Additional insight and reporting can be crucial for policymakers

In addition to supporting climate change monitoring and reporting, geospatial data can also be used to monitor and track changes in land cover, land use and biodiversity.

As a result of this monitoring, policymakers will be better informed about how their policies are affecting these important factors for sustainable development.

CUSTOMER EXAMPLE

Using AI to track urbanisation

The world is rapidly urbanising with over 55% of the global population now living in urban areas and by 2050, it is projected to expand by an additional 2.5 billion urban dwellers. Africa in particular, is urbanising twice as fast as Europe with urban populations expected to triple by 2050.

Using aerial imagery provided by the Zambia Survey Department in the Ministry of Lands and Natural Resources, OS used advanced automated process to generate a new base map using artificial intelligence across 420km2 of Lusaka.

This innovative technique is a rapid, accurate and cost-effective way to generate a detailed digital map that has multiple use cases, including the design and management of critical infrastructure services, land use planning, transport planning, land tenure, ownership and administration together with the integration of future census data. Computers are taught what to look for in images using training data; the technology then automatically creates mapping quickly and accurately.
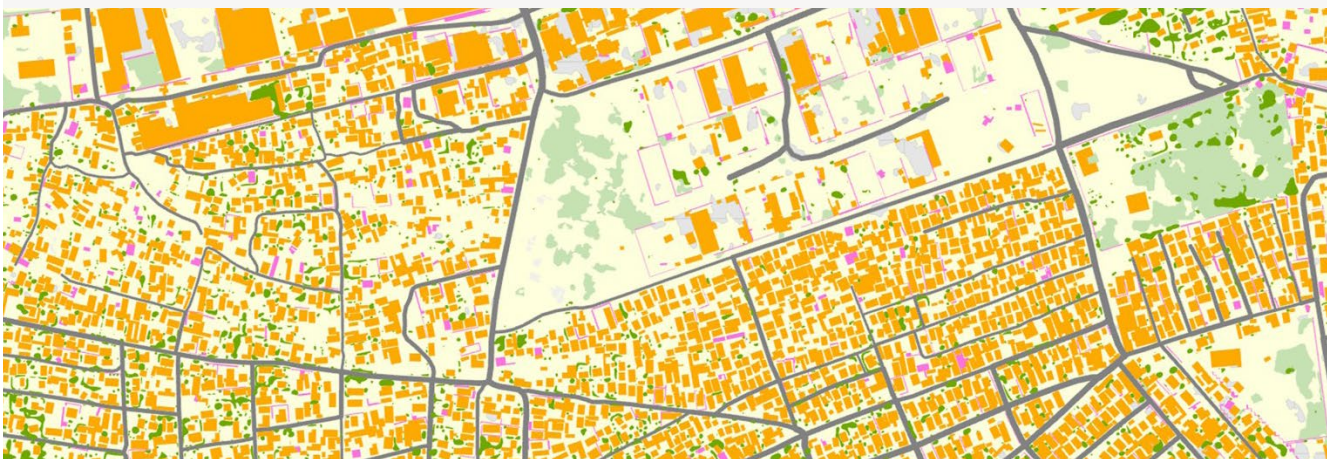
Geospatial data provides trusted analytics

Geospatial data can play a key role in detection and monitoring, and providing trusted analytics to help shape adaptation, modelling, and the implementation of viable solutions.

Geospatial technologies contribute to improved environmental decision-making by providing timely access to critical information about climate change risks. Investors and fund managers want due diligence in place so they're not acquiring climate change risks.

With geospatial analysis is possible to better understand where vulnerable populations live so that they can be protected. We can better plan where urban environments can be protected from heat events by making decisions on where to plant trees or analysis roof materials on buildings to mitigate temperature change.

Geospatial technologies provide tools for understanding how our planet is changing at every scale so that we can anticipate what impact these changes will have on natural resources such as water supply quality; agriculture production; biodiversity conservation efforts; transportation routes and infrastructure planning.

Why does ESG matter?

Environmental, social and governance (ESG) considerations are increasingly important decision-making criteria for organisations to measure their activities and report progress.

When an organisation chooses a strong ESG profile, it demonstrates strong commitment, both to codes of practice and corporate values, and to current and potential investors and lenders.

Accountability is a powerful element in purchasing decisions, particularly in complicated and lengthy supply chains. Consumers want to know the background of service providers. Both employees and customers expect companies to stand for something with a positive social impact. For example, more than six in ten younger consumers closely consider a company's ethical values and authenticity before buying their products.

To governments, encouraging reporting against ESG measures builds frameworks for corporate accountability and communication. In the UK, the government has made disclosures of climate related financial information mandatory as part of its commitment to achieve Net Zero by 2050, and further sustainability discloser requirements are expected to come in to effect by 2025.

In a complex and ever-vigilant world, the role of ESG to monitor, manage, and maintain responsibility for tackling climate change is more relevant than ever.

The role of location data in ESG

Ordnance Survey believes that trusted and authoritative location data is fundamental to the development of impactful ESG. Such data will help accelerate the journey towards both nationally and internationally consistent ESG.

Location data can be used to monitor changes to a landscape affected by urbanisation or climate change, analyse habitat loss or restoration, track pollution, or model the extent of mobile network coverage. It also has a critical role to play in modelling national physical infrastructure and supporting responses during times of emergency or crisis.

Climate risk - why fund managers are missing a trick

Sonny Masero – Chief Strategy Officer for ESG experts EVORA Global – explains why ESG has changed for fund managers and real estate portfolio holders and how geospatial data is being underutilised in helping them.

Climate risk

Climate risk is going to change the value of assets and how easy they are to buy and sell. If you are not thinking about that now, particularly when you are buying or selling properties, you leave yourself at risk of exposure, because nobody knows quite how fast this is going to move. If you are not aware of it, you can't make informed decisions.

Companies must be forward looking. They can't just worry about what has happened in the past, they have to think about how the climate is changing, what physical damage might be done by extreme weather events, how regulations might change to reduce emissions and what the costs might place on companies for buildings.

Location intelligence reduces risk exposure

Fund managers, heads of real-estate funds, or investment portfolio managers looking at their next acquisitions, want due diligence in place so that they are not acquiring climate change risks. When they buy an asset, they are trying to get information about how energy efficient it is today, but also whether there are physical climate risks there in the next time period.

What that means in terms of geospatial data is models for how the world is going to change.

With geospatial data you can see where there has been recent flood damage, what the scale was, where wildfires are happening in real time. You can start to get a richer picture of how those changes are already starting to happen.

It gives you a platform then to predict what might we expect if the world warms by 2 or 3 degrees. You can start to make informed decisions about property investment. Should you be investing in Miami Beach, where sunny-day flooding is happening on a regular basis? City authorities are putting in water pumps around Miami Beach and are raising street levels to be able to cope with that.

Location data makes those scenarios and their impacts much more visible. Particularly for physical assets like real estate or infrastructure like transport or power.


OS data's future impact

Environmental Impact Assessments today look historically at whether there has been flooding. But what hasn't been done is using live data in a model for the future. You have to make sure models being used for investment assessments are as up-to-date as the latest data. That is where OS can help. OS can source geospatial data such as what has happened in a climate event, or how frequently those changes are occurring.

Predicting and modelling climate events

Geospatial can enable predictive capabilities for sustainability programme managers.

By combining historical location and climate data we can perform modelling and scenario analysis to inform policy. Understanding the dynamics of systems that include economic, social and environmental components can be a complex task made easier by using location data.
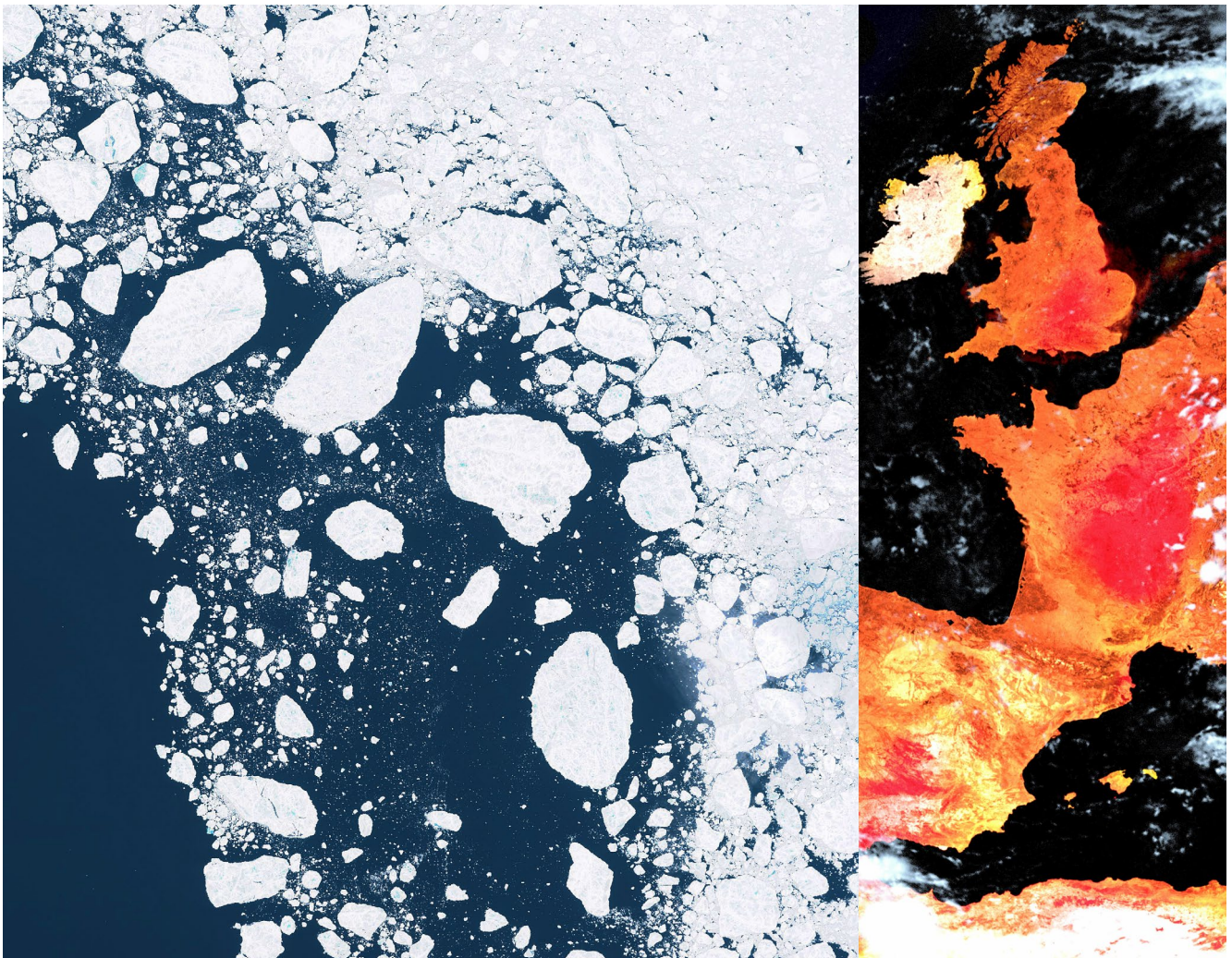
CUSTOMER EXAMPLE

Building a predictive model   **CGI**

Ordnance Survey is working with CGI to investigate the role that Earth observation and accurate location data can play in detecting and predicting sewage events.

Sewage in water is not just a growing public health concern but has the potential to cause harm to the natural environment.

The UK's rivers, waterways, and coasts are connected to a series of sewage overflows, which are owned by water companies and used for emergencies when the UK experiences heavy rainfall. There were more than 770,000 raw sewage discharges into the ocean and rivers around the UK over the course of 2020 and 2021.

Location data and earth observation has the potential to devise a more robust monitoring system for sewage outspills and downstream impact.

The Earth imaging satellite company Planet, provided detailed satellite that was able to identify organic matter in waterways and could be used to detect organic matter from sewage overspills and their downstream impact. This type of data could be a valuable input into an early warning system for water bodies across the UK.
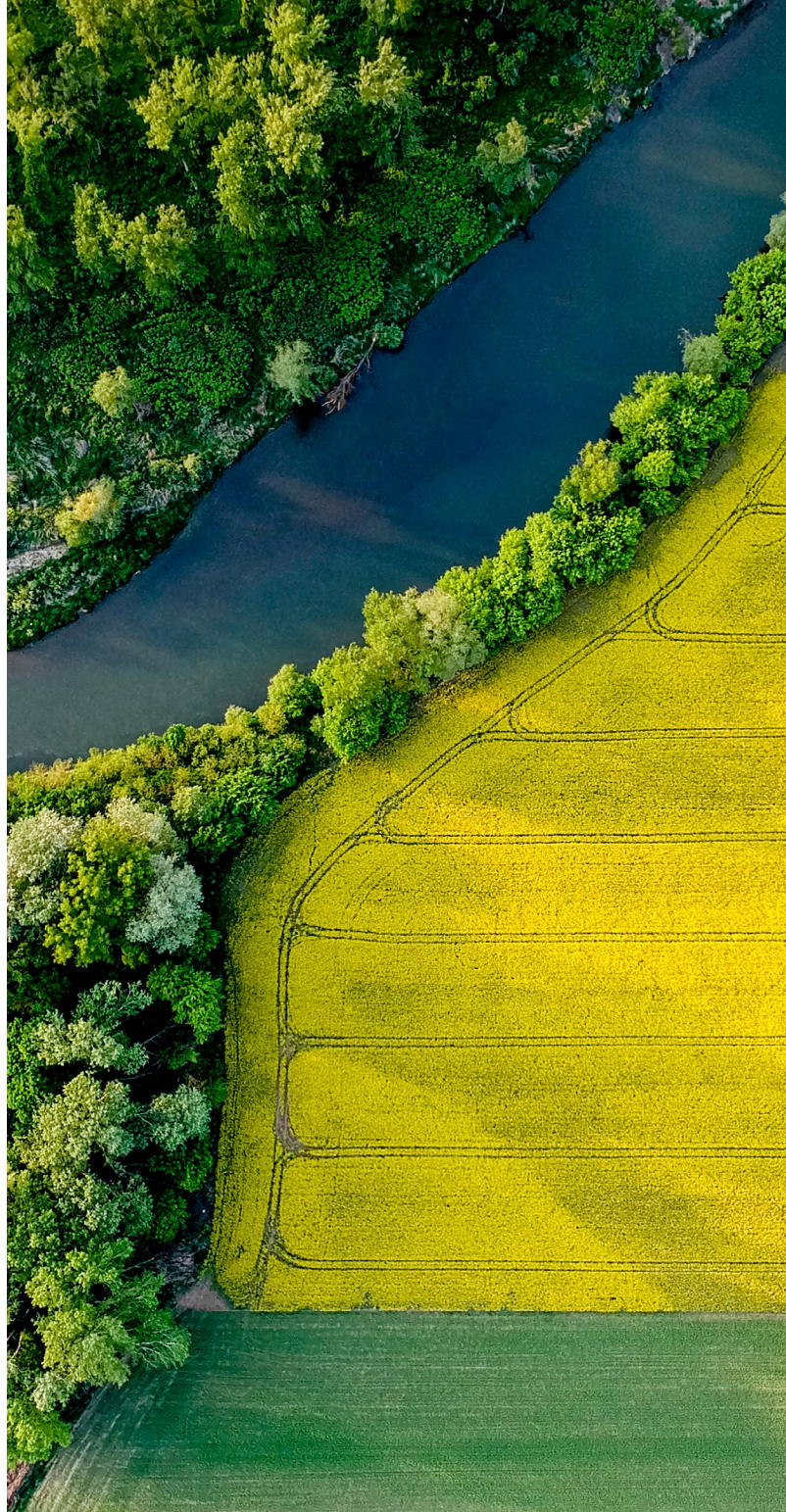
Predictive analysis is vital to monitor and mitigate risk, because if we are able to better determine the likelihood that sewage will be dumped at a specific location or where there will be an overspill, water companies will be able to make preparations in advance to mitigate the impact of the release.

The OS team of data scientists have the expertise to predict areas at greater risk. Using OS location data, they can identify different land cover types, terrain, height, and densely populated areas, building cover and predict where there is likely to be a sewage outflow after increased rainfall.

This is because urban areas are more likely to have overspills due to paved or concrete areas absorbing less water than undeveloped nature and this creates run off water that impacts on the sewage system.

Equally it's important to combine data sources, such as using historical records from the UK's Met Office, to create a dataset showing how much rain was released over each outflow site. Combined with location data you can more accurately predict how much rainfall would be absorbed by the land and where viable solutions can be put into effect.
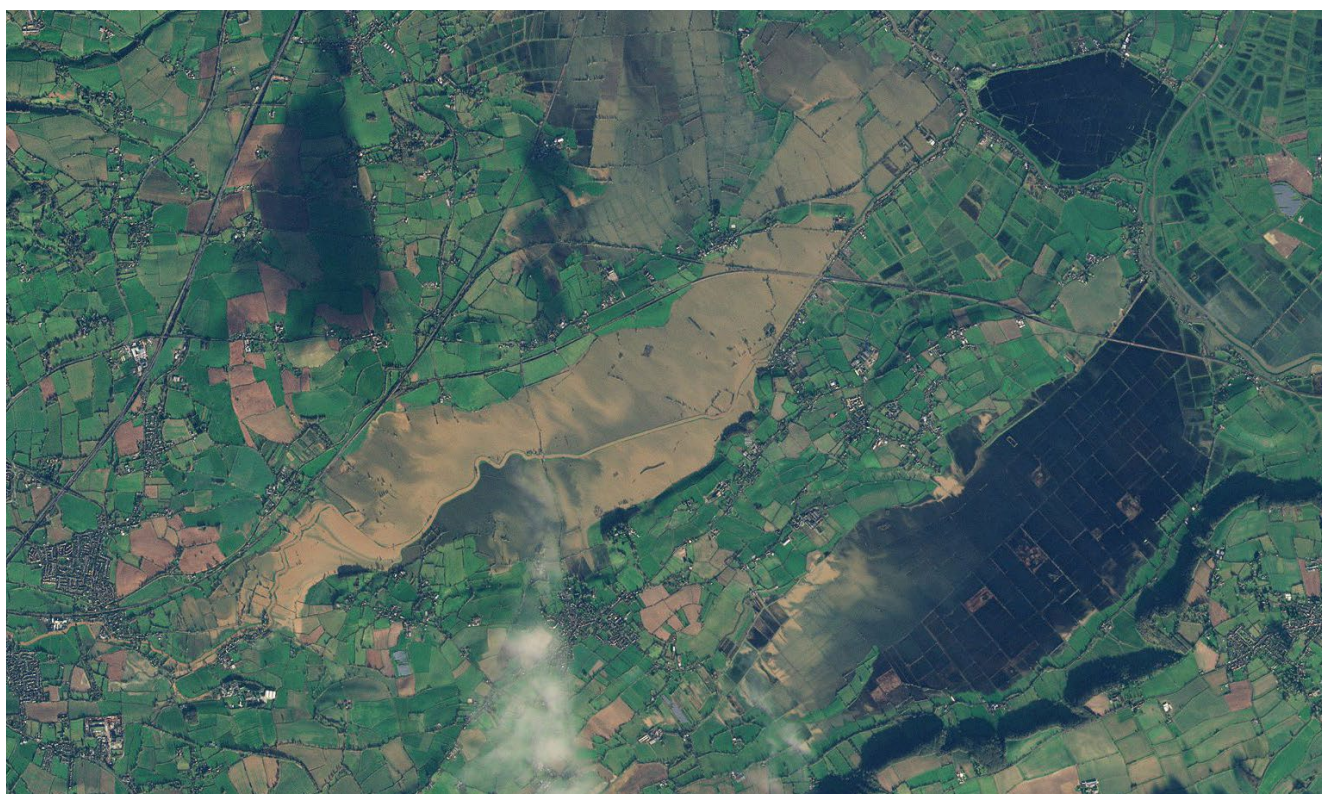
Imagery courtesy of Planet Labs PBC. Satellite imagery and location data can be used to detect organic matter from sewage overspills and their downstream impact.

# Location intelligence provides trusted analytics

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Location technologies provide tools for understanding how our planet is changing at every scale so that we can anticipate what impact these changes will have on natural resources such as water supply quality; agriculture production; biodiversity conservation efforts; transportation routes and infrastructure planning.

Given the urgency and importance of having integrity in sustainability programmes, the most important benefit of location data is the need for trust and transparency. Only with these elements together can we realistically adapt and mitigate to climate change.
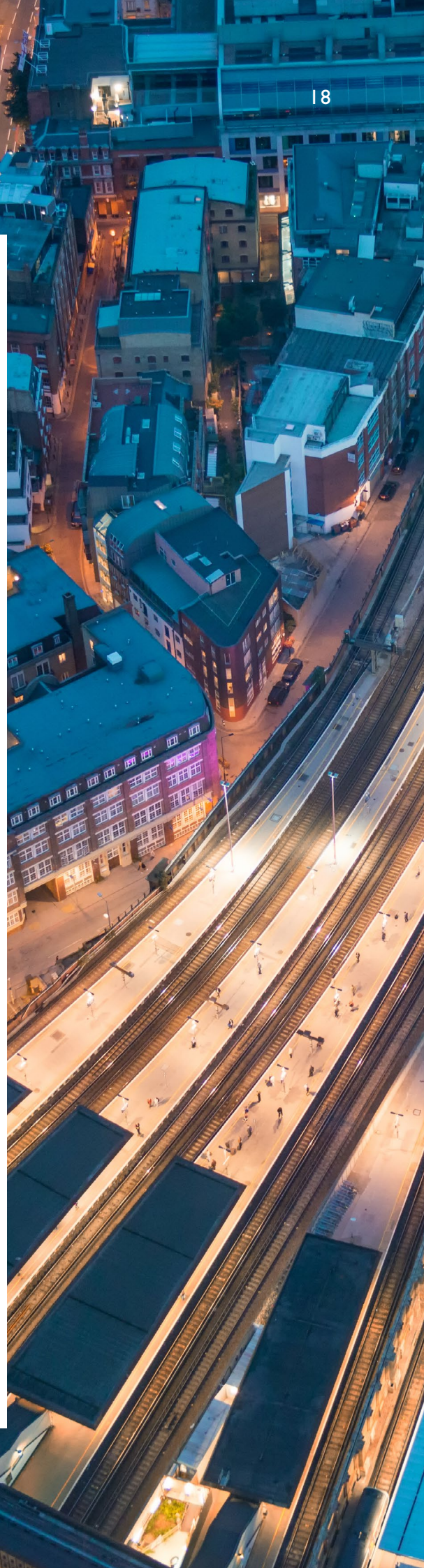
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