Geospatial data for SDGs

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Acting Secretary General and Executive Director

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Location is a powerful tool;
it tells us where things happen
but also provides the link between
information and action so we can
target and coordinate responses.

TARGET

ACTION

LOCATION

INFORMATION

COORDINATE

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Supporting UN Sustainable Development – Ireland's SDG Hub
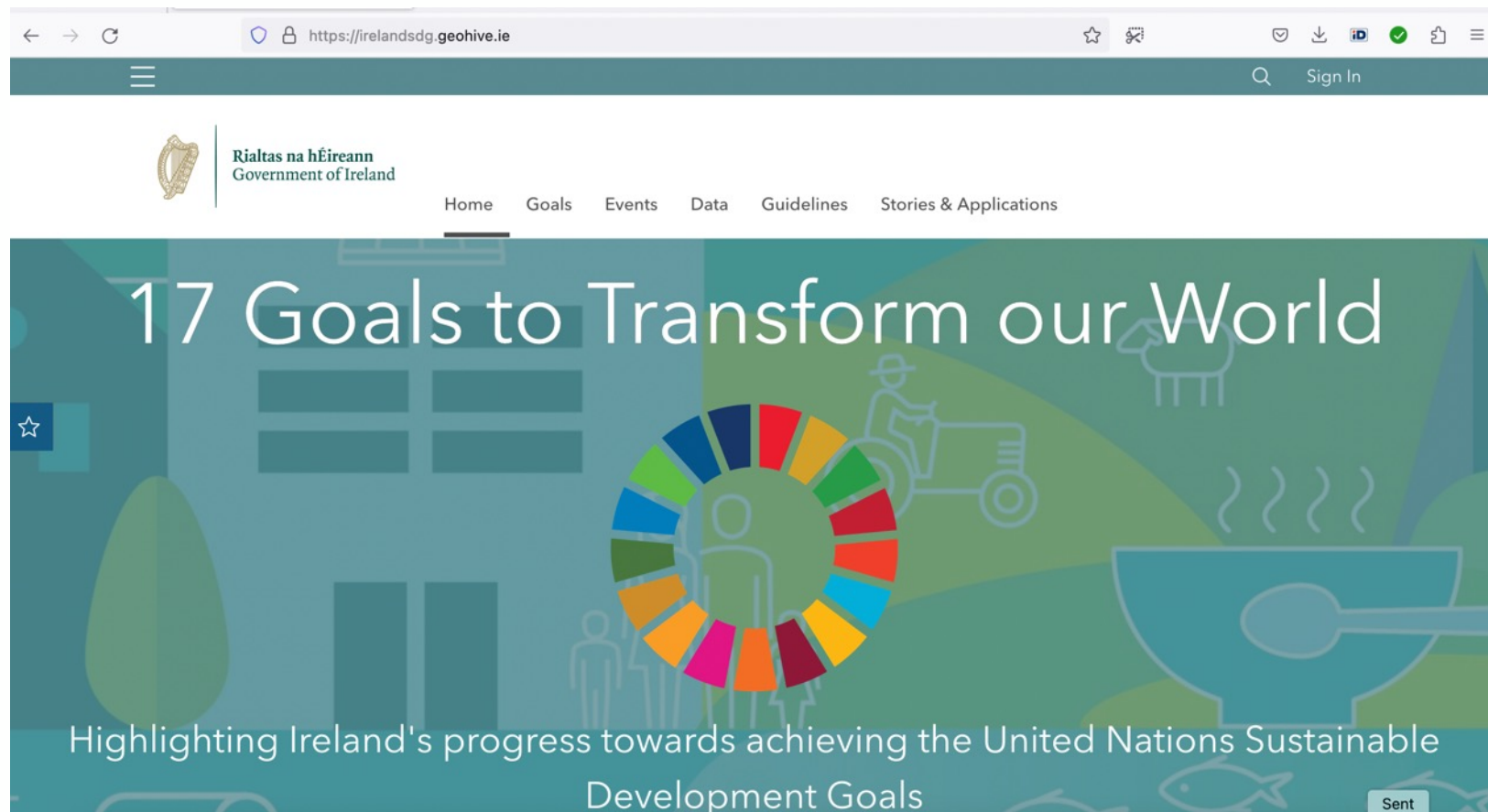
GOAL 3: Good Health and Well-being

Mapping greenspace in Northern Ireland to support government policies and decision-making

"OSNI data products and services are being leveraged to support the development of outdoor recreation in Northern Ireland and help deliver vital health, environmental, and economic benefits to the public."

Jim Lennon
Chief Survey Officer, Ordnance Survey Northern Ireland

People in Northern Ireland (NI) will benefit from a comprehensive new map showing greenspaces for recreation, health, tourism, environmental protection and more.

The information will be made publicly accessible through Spatial NI, Ordnance Survey Northern Ireland's (OSNI) web-based spatial data portal.

OSNI worked in collaboration with and support of public sector leads, including the Department of Agriculture,

Environment and Rural Affairs (DAERA) and Department for Communities (DFC), to develop the comprehensive mapping account of existing greenspace provision.

Critical OSNI spatial datasets, including OSNI Fusion, OSNI Transport Network, and Pointer Address Database, form the foundation of the greenspace model.

The organisation also chaired a Greenspace Mapping Steering Group consisting of a diverse range of stakeholders across NI to guide its development.
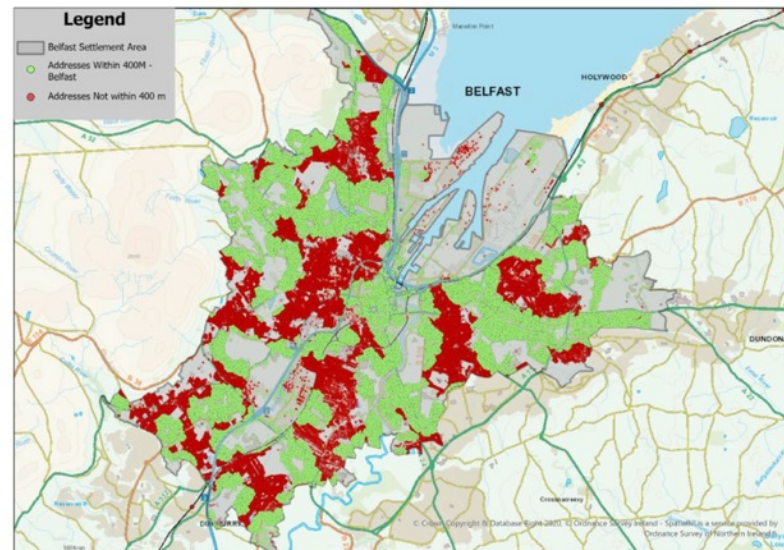
Benefits

- Supports government policies and decision-making including NI Programme for Government objectives.
- Promotes public health through inclusion in healthy living and active travel initiatives.
- Guides and targets resources aimed at growing and greening the economy.
- Informs the development of outdoor recreation activities and sustainable tourism opportunities.

GOAL 7: Affordable and Clean Energy

Providing an insight into potential of solar energy in The Netherlands

"Our data is at the basis of sustainable goals in society. Only by working together and combining available high-quality data, can we achieve a solid base of the full picture for solar energy potential."

Frank Tierolff
Chair Executive Board Cadastre, Land Registry and Mapping Agency, The Netherlands

The Netherlands Cadastre, Land Registry and Mapping Agency (Kadaster) has created a database of information related to solar potential and solar photovoltaic (PV) installations, which is very useful for policymakers to reach targets related to the Climate Agreement. The data is used gain an insight into the potential for solar energy.

Kadaster has developed a method to assess this potential using two approaches. The first combines a 3D model based on aerial photography with objects from the Key Register Addresses and Buildings. The second approach uses object detection, which is a deep learning technique used to manage the Key Register Topography. This technique automatically detects changes in the landscape, such as the appearance of solar panels on roofs.

A 3D model, based on high resolution elevation data, was used to calculate solar radiation multiple times per day and several days per year. Deep learning techniques were employed to detect existing solar panels from very high-resolution aerial images for the whole of the Netherlands. The results of both techniques provide data for all individual buildings which is combined with information about function and ownership.

This is a good example of GeoAI, where the best of both worlds are combined to use large geographic datasets and create useful policy- and monitoring information for the energy transition.

Benefits

- Generates insight into roof ownership, for example are they citizens, companies or housing associations, which is important for local governments to develop their communication and implementation strategies.

- Helps policymakers to speed up the energy transition by providing information on where and how much space is available to generate solar energy. At the same time, the data is easy to understand and visualise.

- Provides an insight on not only where the potential lies, but also categorises it by building and owner type, which is much more useful to the policymakers.

- Assists the statistics Netherlands organisation called CBS to improve the quality of their solar panel statistics, which are mostly based on register information.

- Presents a realistic insight on solar potential of building rooftops which is useful in urban planning applications.

- Enables consultancy to develop new products and services based on the solar potential and existing solar panel information.

- Enables electricity network operators to make more accurate investment plans for the electricity network using this information.

GOAL 9: Industry, Innovation and Infrastructure

Building the national geodata infrastructure for efficient and linked mobility in Switzerland

"Mobility has a spatial reference. That is why official geodata is needed. The Transportation network CH project is intended to optimise and expand the transport data infrastructure of the public sector. This ultimately benefits society, as new and innovative solutions based on verified and linked data make Switzerland's mobility system more efficient."

Dr. Fridolin Wicki
Director, Federal Department of Defence, Civil Protection and Sport, Federal Office of Topography swisstopo

Switzerland's Federal Office of Topography swisstopo is delivering the Transportation Network CH project to build the national geodata infrastructure for an efficient and linked mobility.
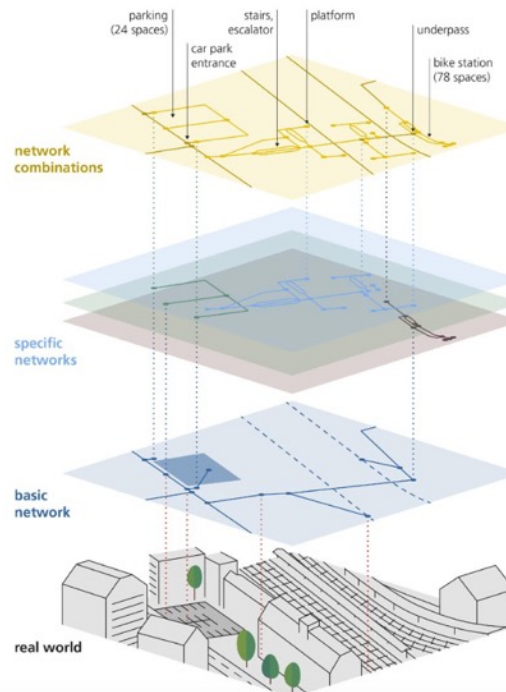
The transport system is mapped digitally across all modes of transport in a coherent and simple manner. Specific data networks can be built on this basic network.

Mapping several specific networks together via the basic network in a highly automated way enables the exchange and combination of data for applications.

The project has demonstrated feasibility and is now being realised.

Benefits

- Optimises and expands the transport data infrastructure of the public sector.

- Provides reliable basic data and will make the data on transport infrastructure and mobility combinable and broadly usable.

- Reduces redundancies among agencies at different federal levels.

- Encourages innovation in the private sector through free availability of these data and services.

- Benefits society as new and innovative solutions based on verified and linked data make Switzerland's mobility system more efficient.

GOAL 11: Sustainable Cities and Communities

Supporting sustainable land development in Albania

"About 80% of Central and Local Government decision-making directly affects the territory and having digital topographic maps helps tremendously in the planning, development and monitoring activities of many institutions in Albania."

Lorenc Çala
General Director, State Authority for Geospatial Information, Albania

Albania's State Authority for Geospatial Information (ASIG) has delivered a new topographic map to support sustainable land development in the Tirana-Durrës Area. Covering around about 300 km², the 1:2 000 scale digital map was part of a major project conducted with the Japan International Cooperation Agency (JICA).

The training and technology transfer has increased ASIG's capabilities for photogrammetry, accuracy and quality management, as well encouraging the use of geospatial information in the infrastructural and social development of the country.

All central and local public authorities that base their activity on geospatial information, such as ASIG, the public authorities responsible for geoinformation topics, municipalities and any other central and local institution that needs to use topographic maps, are benefitting from the data.

Following the completion of the project, Geospatial Information for Sustainable Land Development in the Tirana-Durres area in Republic of Albania, ASIG has started the preparation of the 1:2 000 scale base map into the western part of Albania.

Benefits

- Supports the development of the country's infrastructure based on the general development plan of Albania.

- Contributes to the implementation of development plans, feasibility studies, detailed projects, as well as environmental protection.

- Improves sustainable development in the context of economic growth, social infrastructure and living standards.

- Helps to understand the current situation and analyse trends for: Geographical features of the terrain, condition of infrastructure, condition of properties, general conditions along the coastal area and developments in urban areas.

- Helps in the rapid urbanisation of areas with irregular development due to demographic movement and rapid population growth in recent years in the Tirana-Durrës area.

- Promotes product use by government agencies, business companies and citizens.

- Provides analysis for gradual changes over time.

- Enables cartographic generalisation of maps, for example 1:5 000 and 1:10 000 scale, using the 1:2 000 scale topographic urban map.

GOAL 11: Sustainable Cities and Communities

Monitoring unauthorised construction in Greece

"National cadastral and mapping agencies can use their capacities to offer services that extend far beyond their core businesses. In that respect, the Hellenic Cadastre's Remote Sensing Cartography System helps governmental authorities curtail unauthorized construction in environmentally sensitive areas of the country."

Prof. Dimitrios Stathakis
President of the Board of Directors, Hellenic Cadastre

The Hellenic Cadastre has developed a cartographic monitoring system that is used to detect construction activities in environmentally sensitive areas in the outskirts of Athens, Greece. Those areas are approximately 300 sq.km in size and are at high risk for unauthorised construction.

The system uses a remote sensing approach to detect land changes in the areas of interest and report them to the Corps of Auditors for Unauthorised Construction for further examination.

Every two months, high resolution (GSD<=50 cm) colour aerial photographs or satellite images are taken for the area of interest, an orthophotomap is compiled, and its contents are contrasted with the corresponding orthophotomap of the previous period. Once a human-induced change is detected on those maps, the competent Hellenic Cadastre staff records the location and the coordinates of that change and reports it to the Corps of Auditors for further investigation.

The system has been in operation for 12 years. During that period, more than 1,000 locations of potential unauthorised construction have been reported to the Auditors.

Area of the North-Eastern Attica, Greece, being monitored by the Hellenic Cadastre's Remote Sensing Cartography System
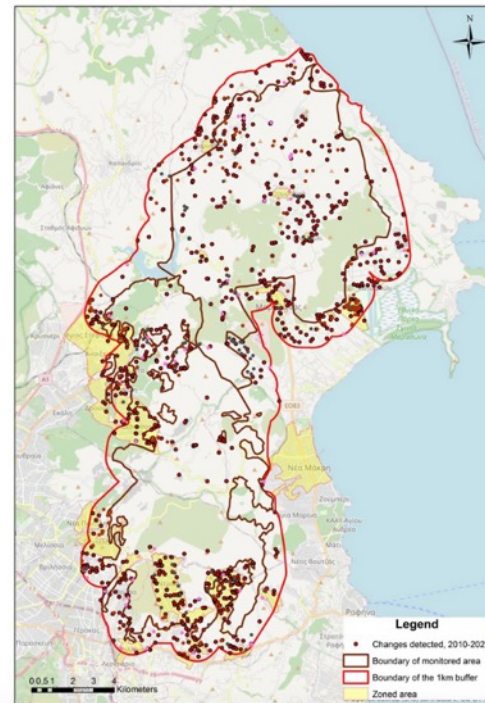
Benefits

• The system provides a reliable and robust way for monitoring unauthorized construction in the areas being monitored.

• Its surveillance procedure is exhaustive and covers all locations in the monitored areas.

• Findings are objective and verifiable at any time.

• Monitoring procedure is transparent.

• Operation is cost effective because unnecessary field trips are avoided and attention is focused only on locations that have changes.

Legend
• Changes detected, 2010-2022
□ Boundary of monitored area
□ Boundary of the 1km buffer
□ Zoned area

0 0.5 1 2 3 4 Kilometers

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GOAL 13: Climate Action

Understanding the impact of extreme weather
to plan preventive measures

Introduction

Authoritative digital elevation and land cover data provided by the Federal Agency for Cartography and Geodesy (BKG), Germany is being used to better understand, predict and prevent future flooding caused by extreme weather.

Challenge

In July 2021, heavy rainfall caused catastrophic flooding that devastated communities and claimed at least 187 lives along the Moselle, Rhine and Ruhr rivers in North Rhine-Westphalia, Germany. To better prepare and recover from such events in the future, it was crucial to understand how the disaster evolved within such a short timescale.
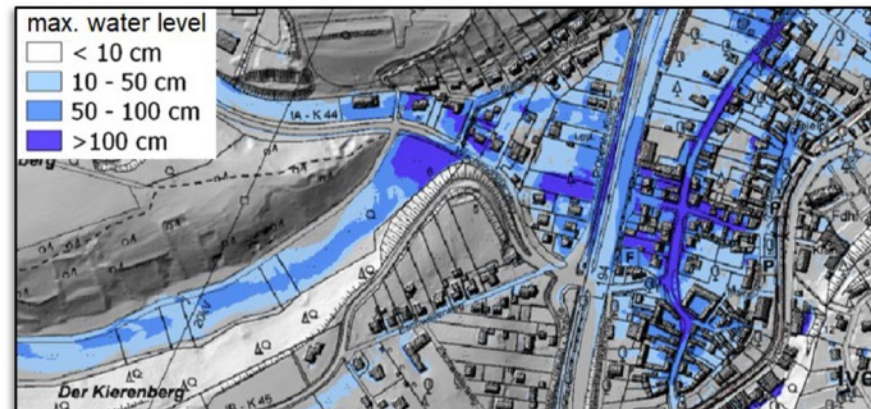
Benefits

- Informs the population, public decision-makers and emergency services about potential flooded areas in case of a heavy rain event.

- Provides important information for future construction projects and supports a building policy adapted to climate change.

- Enables precise planning of preventive measures by showing where infrastructure is most vulnerable using a spatial grid resolution of 1 metre.

- Establishes the first nationwide basis for heavy rain hazard maps.

- Supplies municipalities with a basis for heavy rainfall risk management and can serve as a reference dataset for municipal mapping.

- Provides a freely accessible and easy-to-use heavy rainfall hazard information map on a central platform.

- Promotes cross-sectoral cooperation and exchange of expertise across public agencies.

max. water level
- < 10 cm
- 10 - 50 cm
- 50 - 100 cm
- >100 cm

GOAL 13: Climate Action

Data and digitalisation as a driver for Green Transition in Denmark

"Our main objective is to support the creation of digital solutions in Denmark. With the present energy crisis and Green Transition in mind, we find it essential to support initiatives which promote energy efficiency. Green Transition is also about data and digitalisation, and our pioneering website 'bygningshub.dk' is a good example of that. Together with the project's parties, we deliver a solution based on basic data, which provides analytic information for decision makers to support energy efficiency of buildings."

Kristian Møller
Director General, Agency for Data Supply and Infrastructure (SDFI), Denmark

The Danish Climate Act has set a binding objective to reduce greenhouse gas emissions by 70 per cent by 2030 compared to the 1990 level. This goal requires new high-tech solutions and tools.
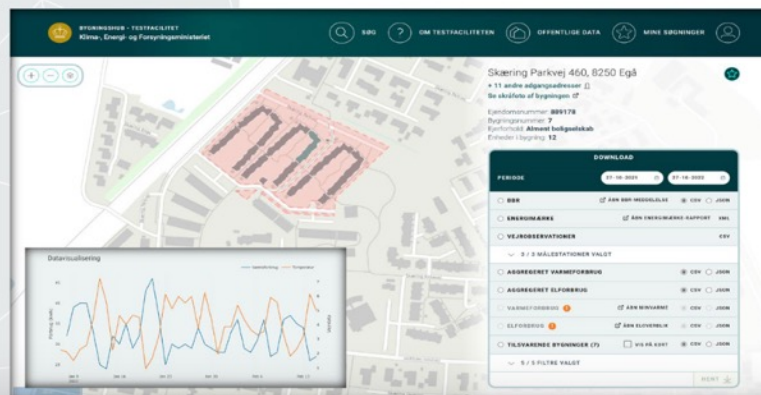
The website Bygningshub.dk. supports the Climate Act goals by providing building owners, building administrators and service providers with a dynamic data infrastructure to help improve the energy efficiency of buildings, whilst at the same time, assisting in a more efficient and cost-effective operation.

SDFI has led development of the website, which has been established as a test facility around Aarhus, Denmark's second biggest city, and involves a number of public authorities and companies working together to provide data. The test facility will allow stakeholders to review data delivery mechanisms, as well as the practical application of data analysis — with the aim of making buildings more energy efficient in a better and smarter way.

The test facility provides hourly data on electricity and heat consumption for selected buildings, which are updated weekly. Data on electricity and district heating consumption are provided by the participating energy companies and anonymized by aggregating data from all consumers in each building so that GDPR requirements are met.

Bygningshub.dk allows users to retrieve selected data on electricity and district heating consumption and combine it with data from the Danish Buildings and Dwellings register, geospatial data, weather data, and on energy labels for buildings. The website provides the necessary data to building owners and market players, giving them better opportunity to realize the potential to reduce energy consumption in buildings and underpinning the huge potential in providing access to data supporting the Green Transition. With the data provided building owners can gain insight into energy consumption right down to hourly level, and based hereon identify areas of potential optimisation.

Bygningshub.dk has been established in a cooperation between the Danish Energy Agency, the Agency for Data Supply and Infrastructure, Aarhus Municipality, the heating supply company 'Kredsløb' and Energinet.

Visit the website
Bygningshub.dk

Benefits

- Supports creation of digital solutions for energy efficiency initiatives, including Green Transition and the Climate Act.

- Enables detailed insight into energy consumption to improve and optimize use.

- Demonstrates how SDFI expertise in web services, basic data and aggregation can provide dynamic data infrastructures for decision makers.

GOAL 17: Partnerships to achieve the Goals

Ordnance Survey enables effective urbanisation with geospatial information

"This programme will promote the value associated with accurate and relevant spatial data. The rapid delivery of a scalable and replicable national digital base map is not only relevant to cities such as Lusaka, but also has far reaching benefits at national and regional scale. The data OS has created will provide the evidence and information to support critical decisions when upgrading existing informal settlements and planning future infrastructure to promote economic prosperity."

Andy Wilson
Africa Region Director, Ordnance Survey, Great Britain

Ordnance Survey (OS) worked with the International Growth Centre (IGC) and the Commonwealth Association of Architects (CAA) to create an automated basemap of informal settlements in Lusaka, Zambia, in response to the challenges associated with urban growth, the availability of accurate and up-to-date data for creating well-planned and managed cities, and improving infrastructure at low cost.

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

Using Machine Learning techniques, computers were taught what to look for, to label data and trace features such as buildings, roads and water in images using training data; this algorithm classified the various features and the technology then automatically created mapping quickly and accurately.

This innovative technique, using AI, is a rapid, accurate and cost-effective way to generate a detailed digital map that has a multitude of use cases, including the design and management of critical infrastructure services, land use and transport planning, land tenure, ownership and administration, and integration of future census data.

The project won the
AI Innovation of the Year award at the Digital Leaders 100 Awards

Benefits

- Saves time and resources: The automated process took 10% of the time it would have taken to produce the detailed basemap manually.

- Improves quality of life for citizens by providing a robust foundation for the integration of future census data, as well as identifying informal settlements, population and density, the location of transport infrastructure surrounding the informal neighbourhoods, and access to electricity, sanitation facilities and clean water.

- Enables the Ministry to better target investment in critical infrastructure and services, such as roads and public spaces, in informal settlements.

- Assists government decision-making and planning for urban expansion, enabling predictions of informal settlement growth and their potential capacity to reduce the cost of infrastructure investment, and enable resilient and sustainable urban futures.

- Enables integration of further datasets to give government agencies more information and clarity to improve decision-making, for example as a foundation for street addressing for land management and taxation, and planning and managing disaster response.

- Provides a fast, efficient and economic way to create detailed current base mapping, enabling countries to start building an Integrated Geospatial Information Framework to support their strategic objectives and underpin geospatial business.

GOAL 17: Partnerships to achieve the Goals

Mapping out an interest in environmental sustainability for school pupils in Italy

"A successful path to basic school education also includes maps. Nowadays, when attention to the environment and sustainability in the use of resources is so widespread, knowledge of the territory is fundamental for a correct use of resources and, above all, for a healthy relationship between man and environment."

Major General Pietro Tornabene
Italian Military Geographic Institute

School pupils in Italy are benefitting from new maps that facilitate their understanding of the environment and local region.

The cartographic project led by the Italian Military Geographic Institute has created a 1:350 000 scale map for each of the twenty Italian regions. The aim is to represent the regional territory in an intuitive way. In doing so, the maps provide a valuable tool for facilitating an understanding of the environment for even the youngest school pupils.

The map shows the main, relevant natural and anthropic aspects that are useful for highlighting some general characteristics of the represented territory. These aspects can be grouped into the following topics: Altimetry, Hydrography, Borders, Transport, Inhabited areas, Settlements, Protected areas, Toponymy. Elevation is represented by hypsometric colours, contour lines and elevation points. Addition of a shading enhances the effect of the relief.

The main source of geographic data is EuroGeographics 1:250 000 scale EuroRegionalMap geographic database. Other data sources are used for the subsequent integration and control steps.

Benefits

- Demonstrates the practical uses and value of geospatial data in an easy-to-understand format.

- Encourages an interest and understanding in the environment, and the place that people have within in.

- Enables in-depth knowledge of the territory that is fundamental to sustainability and the correct use of resources.

- Ultimately promotes a healthy relationship between man and environment founded on respect for the natural world.

CARTA REGIONALE DELL'EMILIA - ROMAGNA

Regional map of Emilia Romagna

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Thank you