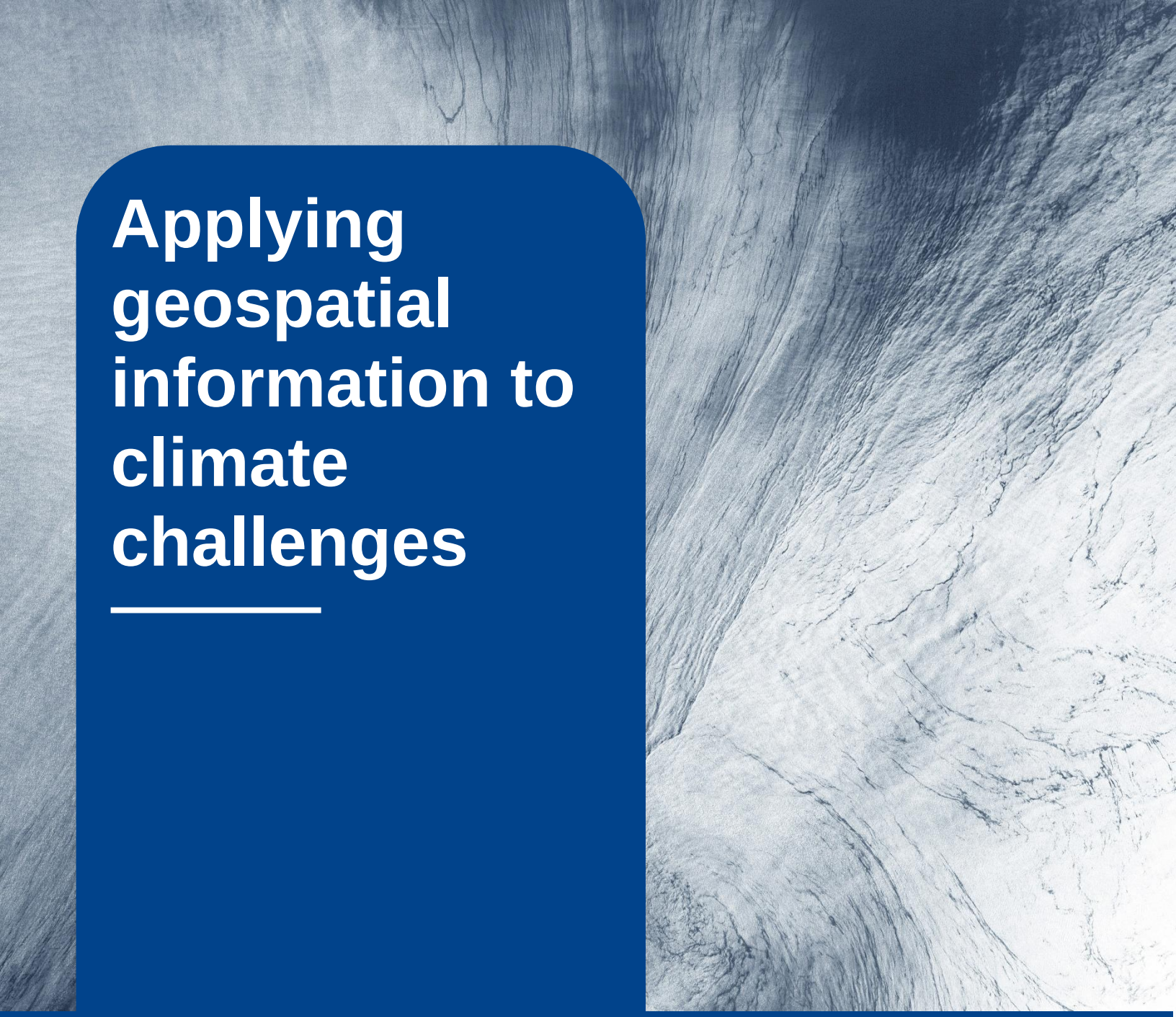

Applying geospatial information to climate challenges

ADVANCED UNEDITED DRAFT

UN-GGIM Task Team on Geospatial Information for Climate Resilience

OCTOBER 2024

UN-GGIM
UNITED NATIONS
COMMITTEE OF EXPERTS ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT

United Nations Committee of Experts on Global Geospatial Information Management

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is the apex intergovernmental body to discuss, enhance and coordinate global geospatial information management activities by involving Member States at the highest level, to work with Governments to make joint decisions and set directions on the use of geospatial information within national and global policy frameworks, and to develop effective strategies to build geospatial capacity in developing countries. See https://ggim.un.org

Notes

The designations used and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. The term "country" as used in this publication also refers, as appropriate, to territories or areas. The designations "developed regions" and "developing regions" are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process.

This document is an advanced unedited draft and has been developed by the UN-GGIM Task Team on Geospatial Information for Climate Resilience, at the request of the Committee's mandates. The Task Team is led by Barbados, Tonga and the United Kingdom of Great Britain and Northern Ireland. The content is based on existing literature on the topic and the contributions and views expressed by the Task Team members at virtual meetings held in 2023 and 2024. This version was developed, considering feedback received at these discussions. A further draft of this paper will be submitted to the Committee of Expert's fifteenth session in 2025.

The Task Team is composed of relevant experts from UN Member States including Argentina, Australia, Austria, The Bahamas, Barbados, Brazil, Canada, Chile, Ethiopia, Germany, Mexico, Mozambique, Nepal, Singapore, South Africa, Tonga, Türkiye, The United Kingdom of Great Britain and Northern Ireland, United States of America.

Note that this paper is meant as a starting point for discussion. Given the breadth and depth of related content, this paper is not meant as a comprehensive analysis of geospatial information for climate resilience but is intended to support the sharing of national good practices as it relates to the use of geospatial information for climate resilience and foster increased awareness and support of the Committee's work programme in this area. To the best of the knowledge of the Task Team, this paper is accurate at the time of publication.

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The Task Team would like to acknowledge the expert contributions of Isabelle Crozier-Morris and Amy Wright from Ordnance Survey for support and input in preparing the report.

António Guterres

Secretary-General of the United Nations

Opening remarks during the Summit of the Future

22 September 2024

"The climate crisis is destroying lives, devastating communities and ravaging economies"

François Ayodele Jackman

Permanent Representative of Barbados to the United Nations

"Geospatial information is crucial towards identifying how our communities are, and could be, impacted by climate change. Armed with this knowledge we can take action."

The following National Experiences support this paper:

1. AI frameworks for the prediction of bark beetle infestation risk in a continuous monitoring scenario [Submitted by **Austria**].
2. The impacts of climate change on human health and the health care system [Submitted by **Austria**].
3. Subsidence and landslide monitoring [Submitted by **Austria**].
4. Flood hazard mapping for Canada [Submitted by **Canada**].
5. Spatial data infrastructure enabling seamless sharing of geospatial data across borders and time for the Arctic region [Submitted by **Canada**].
6. Mapping the effects of heavy rainfall [Submitted by **Germany**]
7. Digital Twin for Germany [Submitted by **Germany**]
8. Integrating Geospatial Insights for Community Empowerment and Ecosystem Services: Isimangaliso Wetland Park [Submitted by **South Africa**]
9. The Street Addressing Initiative of the US Virgin Islands [Submitted by **United States of America**]
10. Analysis of coastal erosion and rising sea levels inform coastal erosion risk assessment and adaptation planning [Submitted by **the United Kingdom of Great Britain and Northern Ireland**]
11. Environmental monitoring and applied research to monitor hydrometeorological disasters [Submitted by **Brazil**].
12. Generation knowledge of Brazil and its population [Submitted by **Brazil**]
13. Chile's response to wildfire event – January 2024 [Submitted by **Chile**]
14. Increasing climate resilience using geographic information system technologies [Submitted by **Mozambique**].
15. Improved resilience to natural hazards including those affected by climate change [Submitted by **Barbados**]
16. The Military Geographic Institute of Uruguay and its efforts to promote climate resilience [Submitted by **Uruguay**]

Contents

Chapter 1 – Introduction

Climate change, the long-term shift of temperature and weather patterns is changing our world, and not for the better. The accumulation of greenhouse gases in the Earth's atmosphere, primarily from burning fossil fuels, is leading to rising global temperatures, changing weather patterns, rising sea levels, and more frequent and severe disasters. These changes are already significantly impacting ecosystems, economies, and communities worldwide, and if left unchecked, will have even more devastating consequences for the future.

The *Paris Agreement*, adopted in 2015, represents a landmark international agreement to limit global warming to below 2°C above pre-industrial levels; human activities have caused around 1.1°C of warming to date, and those impacts are being felt in every region. Recent United Nations Climate Change Conferences have underscored the need to fight the climate emergency, agreed the need for adaptation and mitigation (COP26 – Glasgow Climate Pact) and established a loss and damage fund for countries most vulnerable to the climate crisis (COP27 – Sharm el-Sheikh Implementation Plan). Further, COP-28 – Dubai, marked the conclusion of the first 'global stocktake' of the world's efforts to address all areas of climate change under the Paris Agreement. Noting that progress was slow across all areas of climate action – including resilience to a changing climate – countries responded by agreeing on methods to accelerate action by 2030.

The Fourth International Conference on Small Island Developing States adopted the *Antigua and Barbuda Agenda for SIDS (ABAS): A Renewed Declaration for Resilient Prosperity* which pledged to help SIDS achieve their priorities in the next ten years. The Declaration reiterated that SIDS remain a special case for sustainable development and that progress requires enhanced global partnerships. Section G(iii) of the ABAS Declaration focused on enhancing science-based and innovative approaches, including: sustainable development-oriented, inclusive, and responsible use of artificial intelligence, in the non-military domain in full respect; promotion and protection of human rights and international law, for the collection, storage, analysis disaggregation, dissemination; and use of demographic data for Small Island Developing States, including the use of geospatial technologies.

The *Pact for the Future*, adopted by Member States of the United Nations during the Summit of the Future in September 2024, reiterated that climate change is one of the greatest challenges of our time, with adverse impacts that are disproportionately felt by developing countries, especially those who are particularly vulnerable to the adverse effects climate change. It committed Member States to strengthen their actions to address climate change by confirming the need to keep global temperature rise to 1.5°C above pre-industrial levels, to transition away from fossil fuels in energy systems, to achieve net-zero emissions in 2050, and promote disaster risk-informed approaches to sustainable development.

Geospatial information plays a vital role in informing resilience, adaption, and mitigation efforts. This report, prepared by the Task Team on Geospatial Information for Climate Resilience established by the United Nations Committee of Experts on Global Geospatial Information (UN-GGIM), considers the application of geospatial information to climate challenges through the lens of integrated geospatial information management, and demonstrates how the global geospatial community is already stepping forward to meet these challenges and remains committed to applying geospatial information to climate challenges.

UN-GGIM Mission

To make accurate, reliable and authoritative geospatial information readily available to support national regional and global development.

The work of UN-GGIM Committee of Experts brings the world one step closer to achieving Agenda 2030 and the SDGs.

It provides Frameworks, guides, tools and Country-level Action Plans for nations to develop their geospatial capabilities, contributing to national security, digital connectivity, environmental protection, economic growth.

It paves the way for a safer, more sustainable world now, and in the future. A world in which no one is left behind.

What is Geospatial Information

Geospatial information is the record of what we do, and where we do it. It tells us where people and objects are and how they relate to each other and a particular location.

The Earth, and objects on it have been mapped for millennia. These maps have been used for finding food, showing landmarks for navigation, for exploration, defence and development.

Now geospatial information provides the digital version of our world, and is a foundational information resource for decision making.

It is a critical component of national infrastructure and knowledge economies. It provides a blueprint of what happens where – and when – and may be used to answer questions and respond to global challenges.

Global Challenges (created the need for global goals)

- Sustainable Development
- Natural disasters
- Climate change
- Health pandemics

Global Agendas/ Goals (created the need for new data)

- Agenda 2030
- Sendai Framework
- Paris Agreement
- SAMOA Pathway for SIDS

UN-GGIM has created frameworks in response to these global challenges:

- The UN Integrated Geospatial Information Framework.
- The Global Statistical Geospatial Framework
- The SDG Geospatial Roadmap
- Global Fundamental Geospatial Data Themes
- Geospatial Information for land administration and management
- Geospatial Information and management for disasters
- Marine Geospatial Information

Chapter 2 – The need for geospatial information in climate resilience

Geospatial information and management for adaptation and resilience

To build long-term resilience, countries and communities need to build systems that can prevent disasters or better manage risk. This can include taking actions such as investing in resilient infrastructure that can withstand climate impacts and improving economic and social opportunities to reduce underlying social vulnerability to hazards by increasing community resilience. This ability to withstand risk, and recover from disasters, in a manner that is transformative and bounces forward, is at the root of resilience.

Geospatial information is a critical component of any nation's infrastructure and knowledge economy; a blueprint of what happens where, and the means to integrate a wide variety of government services with proven societal and economic value. The role of geospatial information as foundational data acting as a lens to understand and mitigate the impact of our changing climate cannot be underestimated.

As the nexus of human and physical geography, geospatial information provides the basis to understand the impacts of climate change on our society. It acts as a fundamental data layer which helps to reveal the uneven distribution of impacts on a nation and society. In identifying the most vulnerable locations and communities, it allows decision makers to more effectively allocate resources where they are most needed. Simply, geospatial information is the foundation of the knowledge needed to mobilise investments to build climate resilience and for supporting the critical decisions and actions required to achieve a net-zero increase of greenhouse gas emissions in our atmosphere. The remainder of this chapter highlights examples of how geospatial information and tools can support climate resilience.

Measuring and monitoring Greenhouse gas emissions

Greenhouse gases play a vital role in keeping our planet at a liveable temperature. Without the natural greenhouse effect, heat emitted by the earth would pass through the atmosphere and into space. Human activity has significantly increased the amount of greenhouse gas in the atmosphere, leading to increased global warming and putting our planet at risk. To preserve a liveable planet global warming

needs to be limited as much as possible. The Intergovernmental Panel on Climate Change (IPCC) describes how every fraction of a degree of global warming matters and can be demonstrated in the intensity and the frequency of temperature and precipitation events.

The Paris Agreement strengthened the global response to the threat of climate change by pursuing efforts to limit global average temperature increases to 1.5°C above pre-industrial levels; countries have been working towards this since the Paris Agreement was adopted in 2015. To keep temperature rises below 1.5°C we need to mitigate global greenhouse gas emissions. Without accurate measurements and trusted monitoring it is not possible to support countries to adapt to the adverse impacts of climate change.

Greenhouse gases (GHGs) contribute to the greenhouse effect, keeping emissions in, and warming our atmosphere. It is important to monitor and measure these gases, to track where they are emitted from and to take action to reduce their impact on climate change where possible. The diverse sources of greenhouse gas emissions range widely in the magnitude of their contribution to the problem, with each source falling into diffuse or point source emissions, an inherently geospatial measure; the identification of the location and extent of each source allows a more accurate assessment of the spatial extent of the impacts, facilitating mitigation strategies for each site.

Carbon dioxide, and its sources and impacts, are well known. Methane's sources and impacts are less well known and not yet fully understood – even though it is the second largest contributor to climate change after carbon dioxide. Methane has a much shorter lifespan in the atmosphere than carbon dioxide, roughly a decade compared to hundreds of years. However, methane is 28 times as potent as carbon dioxide. It is estimated that 60% of today's methane emissions are from human sources. Methane has the potential to have a significant short-term impact on climate change. As a result, measuring and monitoring of specific greenhouse gases and their source of emissions is vital to understanding and targeting resources to combat climate change.

Data capture – the role of space

Monitoring and measuring GHG emissions historically occurred through ground-based sensors. These have helped build a model of global emissions, but there were substantial data gaps, particularly in remote, hard to reach areas. The accuracy of the model depended on

regular reporting from a wide range of independent sources, particularly commercial companies. A substantial increase in the number of satellites deployed with the capability to accurately provide a steady stream of GHG emission measurements has helped narrow that data gap. Those remote areas which caused challenges with ground-based monitoring previously can now be monitored via satellites. Rather than a variety of heterogeneous sources of varying temporal resolution, we now have the addition of multiple sources with consistent streams of uniform data provided at steady, predictable intervals.

Space-based sensors have enabled GHG emissions measurements on different temporal and spatial scales. Satellites, which offer data free for end users tend to provide data on a regional scale as they have a spatial resolution at a kilometre level. Spatial resolution determines the size of the area on the ground that is represented by each portion of the image (i.e. a pixel). Commercial satellites, with a spatial resolution in the tens of meters or less, can provide emission measurements on a local scale. Ground-based sensors can capture local scale measurements, some capable of providing live streams of real-time data. In addition to the in-situ measurements, ground-based sensors can act in tandem with satellites acting as a ground reference validating their measurements. This validation enables fine tuning of satellite algorithms, leading to improvements in data accuracy.

Measuring GHG emissions from space enables quick feedback mechanisms. Some satellites orbit on the same path around Earth, returning to the same point within two weeks. This data (which tends to be openly available to end users) can be accessed within 24 hours of capture. Having consistent data of the same area unlocks long term monitoring capabilities. Commercial satellites can be 'tasked', which means they can rapidly respond to a monitoring request for a specific site. If a GHG emission source is detected remotely, commercial satellites could be tasked to collect data for the site, allowing customers to receive measurements within days.

Geospatial data unlocking value from Earth observations

There are challenges with using raw satellite-derived GHG emission data, as users often lack the additional context and technical capabilities needed to extract valuable insights and situational context from the data. A solution to this is to layer data from different datasets.

Improved spatial resolution of satellites has enhanced the ability to identify point sources of GHG emissions, but data about that source location is key to regulatory or enforcement actions. If asset ownership, land title records, and similar information is not available this point source data is of limited value in building resilience or developing mitigation strategies. The value is unlocked when trusted and authoritative geospatial data can be joined with Earth observation data, to underpin a full spectrum of geospatial information about a location. National mapping and cadastral agencies have a vital role to play, as detailed land administration records can be linked with high spatial resolution data to realize the full potential of value from space-based data sources.

Changing technology – how data analysis is changing

Climate change analysis is increasingly focused on granular details, with each individual component contributing to the comprehensive understanding of the phenomenon. However, there are still gaps in our analysis, our understanding of emission sources, their resulting impacts, and the feedback mechanisms in the environmental systems. Technology is advancing at a fast pace to try and fill these information gaps. As noted above, increased spatial resolution in satellite data has revolutionised the level of analysis that can be undertaken. In the case of GHG emissions, low resolution data can provide an indication of a change in emissions against the expected baseline in a region. Now, with the availability of high-resolution data gathering platforms, analysts can pinpoint individual emission events. When combined with foundational geospatial data a more detailed understanding of the specific context can be drawn. This data analysis can help close the information gap even further, leading to more targeted GHG reduction efforts. In the past, only super-emitters could be detected, while smaller (but equally impactful when aggregated) emissions would go unmonitored.

Today's advances in the spatial resolution of sensors has reduced the threshold of GHG detection, allowing for increased precision in the detection of small emission sources. This has led to the detection of smaller and smaller emissions plumes, allowing the development of targeted mitigation strategies which help to reduce emissions overall. The rapid advancement of artificial intelligence and its application to geospatial data also promises to enhance the types of analysis that can be

completed, further improving our ability to understand and respond to climate change impacts.

Naturally occurring improvements in data analysis have enabled countries to understand their emission profiles in more detail, can encourage green investments, and increase transparency in GHG reporting. Looking ahead there are new satellite programmes scheduled with increased ability to capture data at high spatial resolution, increasing the accuracy of location-based assessments and the effectiveness of site-based mitigation strategies.

Chapter 3 – Enabling Global to Local Decision-making

UN-GGIM as a coordinating mechanism

Established in 2011 by the United Nations Economic and Social Council, the Committee of Expert is in charge of all matters related to geospatial information, geography, land administration and related topics. UN-GGIM fosters and provide a forum for coordination and dialogue among and between Member States and international organisations as well as relevant stakeholders. Its overarching vision is to position geospatial information to effectively address global challenges, specifically in support of the 2030 Agenda for Sustainable Development.

The global geospatial community – through UN-GGIM – has responded to the need to develop and implement effective strategies to build and strengthen national capacity for geospatial information and to assist countries to develop the full potential for geospatial information and its underlying technologies and services.

The keystone activity within UN-GGIM has been the development and implementation of the United Nations Integrated Geospatial Information Framework (UN-IGIF). The UN-IGIF recognises that countries need to unlock the full potential of geospatial information and its applications. The UN-IGIF has been developed as a framework which offers a comprehensive and adaptable blueprint for enhancing geospatial leadership, capacities, and capabilities within countries. It is anchored and implemented through nine strategic pathways split across three areas of influence: Governance, Technology, People. By implementing the UN-IGIF countries have been able to improve their geospatial information management, improve people's lives, protect the environment, and deliver sustainable economic prosperity.

The importance of geospatial information to combat the climate challenge has been an important topic for UN-GGIM throughout all its activities. This can be seen through its preparatory papers by Member States, in its successive programme reviews and reports on Future Trends. Each of the UN-GGIM's functional groups contribute, in their own way, to responding to climate challenges.

This is visible in the programme of work dedicated to the Sustainable Development Goals; we know that the SDGs are highly dependent on understanding and using geospatial information and Earth observations. The development of the SDGs Geospatial

Roadmap in 2021 built the bridge between geospatial and statistical agencies, and underscores the UN Secretary-General's call in 2022 to "rescue the SDGs". Acting as a bridge between the geospatial and statistical communities the Inter-Agency and Expert Group on Sustainable Development Goals Indicators Working Group on Geospatial Information has refined and published a list of SDG indicators where geospatial information has a direct contribution to play. For example, SDG 13.1 "Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries".

Recent work has also focused on the integration of terrestrial, maritime, built and cadastral domains. This consolidates activities within the Land Adminstration and the Marine Geospatial Information domains and focuses on the land and sea interface and the technical complexities of dealing with information related to coastal zones. Coastal zones are often the frontline when it comes to climate change; rising sea levels have an impact on coastal communities, critical infrastructure such as ports or cables and pipelines depend on seamless data about the environment, and there is increased focus on environmental protection both on land and in marine protected areas.

Each of the Committee's functional groups contribute, in their own way, to responding to climate challenges. The discussions that took place during the Twelfth (2022) Thirteenth (2023) and Fourteenth (2024) Sessions have underscored the importance of positioning the global geospatial community to respond to climate change. This can be clearly demonstrated through the number of references to climate and resilience within the decisions of the Fourteenth Session of the Committee of Experts across multiple topics.

In addition to the work achieved through UN-GGIM it is recognised that climate resilience is a topic that many organisations are addressing individually and collectively. This these include, but is not limited to, specific activities linked to the Paris Agreement or the Antigua and Barbuda Agenda for SIDS (ABAS).

14/101 - Enhancing global geospatial information management arrangements

- Recognized the increasingly complex and challenging operating environment for national geospatial, mapping and cadastral agencies... ... stressed the importance to wholistically consider environment, climate, resilience and sustainability [and] consider these items as a matter of priority.

14/108 - Geospatial information for climate and resilience

- Re-emphasized that acting on climate resilience remains and urgent imperative for the Committee of Experts, and that it is critically important to advocate for and raise awareness of the potential of geospatial information for climate resilience.
- promoting awareness and understanding of the importance of geospatial information in all its form to address climate challenges and resilience.
- encouraged Member States and relevant stakeholders to share their national, regional, and global experiences demonstrating the role and relevance of geospatial information for climate resilience and using this body of evidence to advocate for local, national, and regional actions.

14/109 Integration of geospatial, statistical and other related information

- Emphasized the importance of coordination and collaboration... ... noting that the many data integration challenges including for the production of national development indicators, the SDG indicators require the full and coordinated implementation of the UN Global Statistical Geospatial Framework.

14/110 - Integrated geospatial information for effective land administration and management

- ...acknowledged the importance to address the integration of terrestrial, maritime, built and cadastral domains to understand the complexities in addressing the land-sea interface...

14/111 - Integrated marine geospatial information

- Acknowledged the importance and encouraged a coordinated, cross-cutting and wholistic approach in addressing the integration of the terrestrial, maritime, built and cadastral domains, noting its implication for addressing climate challenges, coastal resilience, sustainable coastal communities and blue economy.

Many organisations are working tirelessly to respond to climate challenges and who are at the forefront of climate change initiatives. These range from first responders who directly deal with the impact of disasters, academic and technical institutions who are training the next generation of professionals, global organisations who promote better data for decision making, funding bodies who are able to unlock financing for discrete projects or national development programmes, to bodies within the United Nations System who coordinate and manage activity on the global scale. Each of these organisations have a vital role to play.

Chapter 4 – Geospatial Information as a foundation for climate resilience

Geospatial information plays a vital role in informing resilience, adaption, and mitigation efforts. Many Member States are already using geospatial information, coupled with other information such as Earth observations or environmental data, to make informed policy choices.

In collating the initial set of national experiences, it was decided not to limit the focus to a specific theme or geography. This meant that responses were received covering many different domains. It is clear, even from a small sample size, that geospatial information is already being used across a wide section of climate resilience activities.

These include the response to acute natural hazards such as wildfires in Chile, cyclones in Mozambique, or flooding in Canada.

Geospatial information also plays a role in the monitoring and preparedness for chronic/slower onset hazard events such as coastal zone risk in Barbados, coastal erosion in Scotland or forest health in Austria.

There is also a growing awareness of the potential impact of technology advances such as the use of digital twins in Germany or investing in foundational geospatial data such as the addressing initiatives in the US Virgin Islands.

By interrogating the case studies in more detail, a set of common themes begin to appear:

- The importance of **shareable and public open data** was a prominent theme with the deployment and use of **dashboards and portals** in South Africa, the USA and Brazil. Geospatial data are an integral component for these systems and to further enable climate resilience decision making between organisations, regions, and borders. It is clear that there is a wide range of maturity levels in the use of geospatial information in national climate resilience and mitigation plans.
- Additionally, **collaboration** was mentioned across all case studies, either cross-sector or internationally (particularly small island developing states) highlighting the need for easy means of communication.
- A number of case studies demonstrated how organisations collect and **use in-situ data and recording** stations, including Mozambique, Brazil, Uruguay,

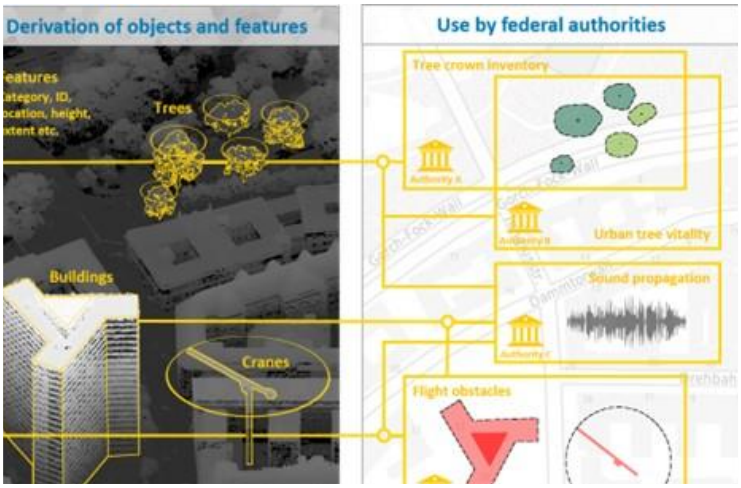
and Germany. Closely linked to this is an emphasis on the importance of **standardisation** of data for the purpose of creating and sharing datasets to inform decision making.

- Location data is imperative as it unlocks value by providing context to different types of data and helps to visualise data on the ground, **simulate and model** processes and **monitor** change. Satellite and LiDAR data were mentioned as core data sets across the case studies (South Africa, Canada, Germany) especially when integrated with geospatial and relevant *in-situ* data.
- Finally, there was a clear focus on the need for **delivery against international policies**, such as the 2030 Agenda and the Sustainable Development Goals and the use of international standards such as those from the Open Geospatial Consortium (OGC) and International organization for Standardization (ISO) (Chile, Germany, Mozambique, Brazil, the Arctic SDI, and Barbados) as important collaborations to support interoperable and centralised use of data sets.

This analysis has been undertaken on a small sample of case studies that have been collected for the project. These case studies are a valuable resource for Member States and international organisations to learn from one another.

It is often the case that national scale case studies are promoted; these are important to showcase alignment and action with international frameworks. However local scale case studies are equally important. They demonstrate how smaller-scale, often community-led activities lead to more positive change in communities that are most affected by climate change.

Cumulatively small actions have a big impact, and these local actions should be promoted.



A Digital Twin for Germany

A tool to predict how humanitarian crisis and natural disasters will affect infrastructure and resources.

BKG is responsible for the development of a geospatial digital twin for Germany.

It operated an immersive 3D world digital lab, which allows decision makers to more directly experience disaster events and to develop better solutions for the future.

Geospatial data coordination, sharing and visualization in order to provide informatio for decision making in the context of wildfires in Valparaíso Region, Central Zone of Chile.

Chile SDI promotes technological neutrality, so a variety of technologies are used as necessary.

The SDI centralizes the storage of geospatial layers so that various institutions can conduct territorial analysis, visualize the deployment of authorities and aid services, and make evidence-based decisions.

Chile's response to wildfires - Janurary 2024

Harmonizing Climate Resilience in South Africa

Integrating Geospatial Insights for Community Empowerment and Ecosystem Services: Isimangaliso Wetland Park, Umkhanyakude District, Kwa Zulu Natal, SA

The urgent need for building and harmonising climate resilience in iSimagaliso wetland Park, ecosystem is driven by the pressing need to address the adverse consequences of back-flooding and water ingress in the lower section of the Mfolozi floodplain

The utilization of geospatial information resulted in guiding proposals to mitigate the effects of climate change-induced back-flooding and water ingress on agricultural and settlement areas.

Chapter 5 – Enabling action: Accelerating implementation, achieving resilience

In his opening remarks during the Summit of the Future, UN Secretary-General António Guterres spoke about how the climate crisis is destroying lives, devastating communities and ravaging economies.

Geospatial information, in all its forms, is recognised as a fundamental data which is being used as a powerful tool being used to assist decision-makers, to align government priorities, and support national climate adaptation plans and mitigation policies. This report demonstrates how the global geospatial community has been stepping forward and applying geospatial information to climate challenges.

Every day geospatial information is used by citizens, companies, and governments alike. It plays a crucial role in many aspects of daily life, such as providing clean water for drinking, putting food on the table and providing power to homes. It is also fundamental for environmental monitoring, the development of public health initiatives, or supporting disaster preparedness and response.

To maximise the societal and economic value that geospatial information can unlock, it must be seen as a foundational information resource for nations. Geospatial data, comes in many different forms and is available from many different providers. In positioning it as a foundational to national data infrastructure at country level, the global geospatial community has a responsibility to ensure that geospatial data is readily accessible, up to date, trustworthy and relied upon. Underpinning with national and internationally agreed standards is an essential component of enabling data re-use, access and sharing – all necessary for data to serve as an enabler and driver for change.

Investment in geospatial information and infrastructure at national scale is a strategic necessity. It is challenging with competing priorities for limited resources, but such investment has been demonstrated as being an economically sound decision, especially when taken in the context of wider national data programmes. The sharing and promotion of use cases, national experiences and business cases will continue the wider advancement of progress at global level.

The case studies in this report demonstrate that geospatial information is being widely used for climate planning and decision making, and that the tools, frameworks and guidelines created by UN-GGIM can be used as part of a collective

effort working in partnership towards achieving a resilient planet for all.

We still have a long way to go before to meet the ambition of the 2030 Agenda. We face pressing challenges now, and there will be plenty of challenges in the next few years. The decisions we take today, the actions we take tomorrow, and the seeds we sow for the future will continue to make the world a better place for generations to come.

As the world starts to edge towards the 2030s and beyond, collaboration will remain key. The critical need for geospatial information and statistics, geographers and data scientists, to be working together, using our skills knowledge and experiences to apply geospatial information will remain. Equally as important is the need to engage with stakeholders outside the traditional geospatial ecosystem. By bringing our geospatial lens to the problem we are able to connect local actions together to solve larger-scale problems, we are able to unlock the finance needed for climate change interventions, we are able to highlight the importance of geospatial information and technologies which can strengthen political awareness to pursue climate change initiatives using trusted, authoritative geospatial data and services.

Climate change impacts us all, but the effects are not equal. We need to work together so our data works together, monitoring, analysing, reporting, and importantly supporting policy interventions which respond to our changing climate.

Change is happening. Our geospatial community, in all its forms, should be advocates, enablers and agents of urgent response.

National Examples of Good Practice

Member State	Key Message	Topic(s)
Austria	The impacts of climate change on human health and the healthcare system exhibit complex interrelationships, varying across time and space.	Health
	AI frameworks for the prediction of bark beetle infestation risk in a continuous monitoring scenario	Forest Health, Biodiversity, and AI
	Landslides are one of the most widespread geohazards in Europe, which are further responsible for significant social and economic impacts.	Landslides
Barbados	Improved resilience to natural hazards, including those affected by climate change	Natural Hazards
Brazil	Environmental monitoring and applied research to monitor hydrometeorological disasters	Hydrometeorological Disasters
	Knowledge of the territory and its population	Statistics and NSDI
Canada	Improving knowledge of where floods can occur helps plan mitigation and adaptation efforts	Flooding
Chile	Geospatial data coordination, sharing and visualisation to provide information for decision-making in the context of wildfires in the Valparaíso Region, Central Zone of Chile	Wildfires
Germany	Digital Twin for Germany: A tool to predict how humanitarian crisis and natural disasters will affect the infrastructure and resources	Digital Twins
	Mapping the Effects of Heavy Rainfall: Germany-wide standardised simulation of flood situations due to heavy rainfall	Rainfall and Flooding
Mozambique	Increasing climate resilience using geographic information system technologies	Climate Resilience
South Africa	Integrating Geospatial Insights for Community Empowerment and Ecosystem Services: Isimangaliso Wetland Park, Umkhanyakude District, Kwa Zulu Natal, SA	Community Empowerment and Ecosystem Services
United Kingdom (Scotland)	Adapting to our future coastal change: GIS analysis of coastal erosion and rising sea levels inform coastal erosion risk assessment and adaptation planning to kick-start national adaptation actions	Coastal Erosion and Sea-level Rise
United States (United States Virgin Islands)	US Virgin Island's Street Addressing Initiative - Building Geospatial Infrastructure for Climate Resilience. USVI's Street Addressing Initiative (SAI) is building the basic geospatial data infrastructure needed for climate resilience, disaster planning, and disaster recovery efforts.	Addressing
Uruguay	The Military Geographic Institute of Uruguay and its efforts to promote Climate Resilience (EN/ES)	Geodesy
Other		
Arctic SDI	Circumpolar Arctic – Canada (*Case study submitted by Canada), Finland, Iceland, the Kingdom of Denmark, Norway, the Russian Federation, Sweden, United States	Spatial Data Infrastructure
	Spatial data infrastructure enabling seamless sharing of geospatial data across borders and time for the Arctic region. Enables discovery, accessibility, and use of pan-Arctic geospatial information for diverse applications, including decision-making for climate resilience	

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