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Policy Brief:

## Advancing Climate Resilience and Sustainability through Cutting-Edge Space and AI Technologies

April 2025

Abstract

The COSPACE Group, formed under the Horizon Results Booster (HRB) programme, brings together five innovative European projects — MAGDA, RESPONDENT, SWIFTT, 100KTREEs, and BUILDSPACE — to develop and promote cutting-edge geospatial and remote sensing technologies for climate change mitigation, adaptation, and resilience.

These projects focus on leveraging space technologies, AI-driven solutions, and digital tools to support energy transition, sustainable urban development, environmental monitoring, and agricultural resilience, aligning with the EU Green Deal objectives. By integrating advanced forecasting, Earth observation data, and decision-support tools, COSPACE provides policymakers with innovative solutions to drive high-impact environmental change.

Introduction
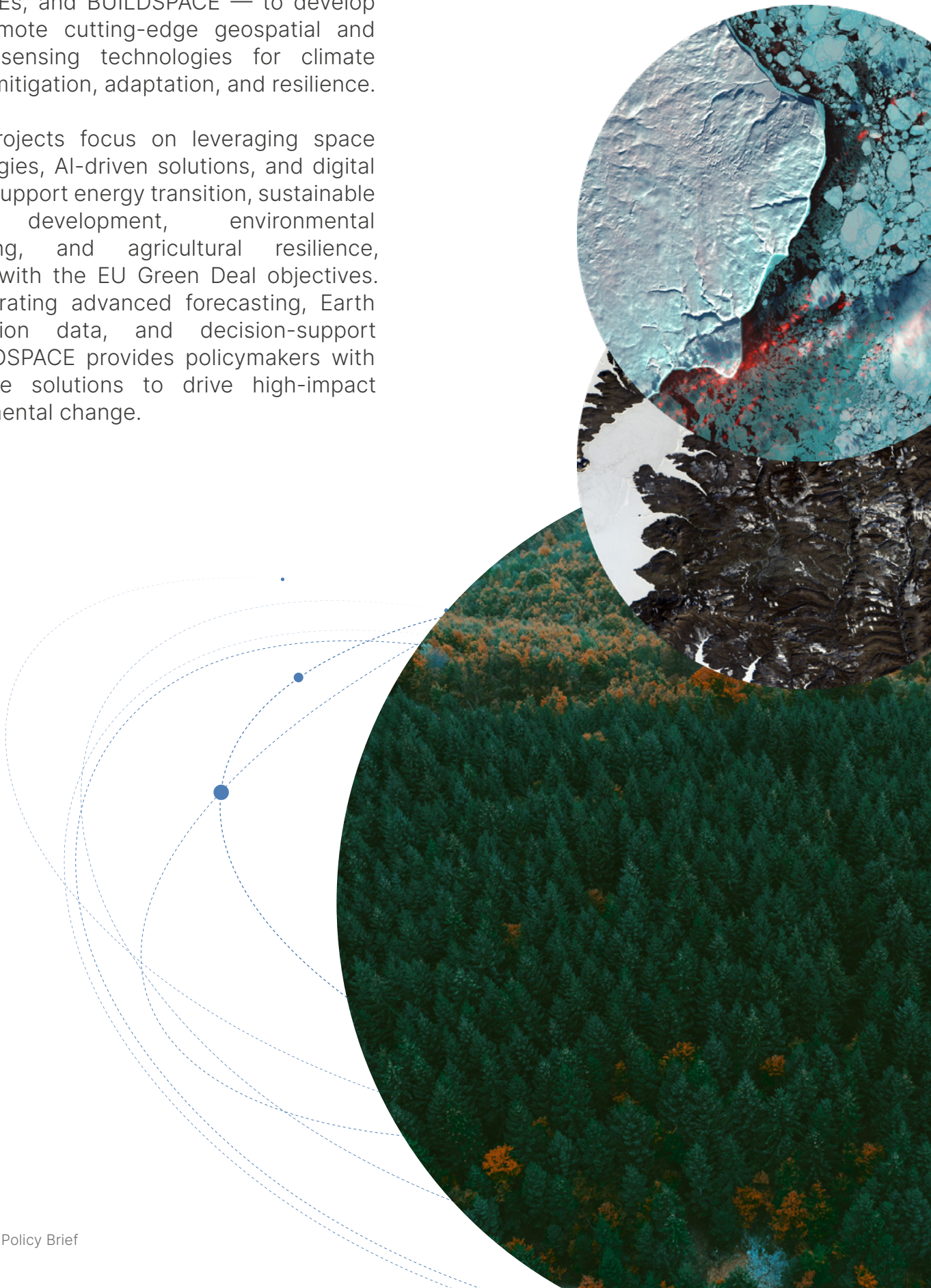
Climate change poses critical challenges across sectors, requiring innovative solutions to enhance energy security, urban resilience, environmental sustainability, and agricultural efficiency. The European Green Deal, along with Sustainable Development Goals (SDGs) 12 and 13, underscores the urgency of developing sustainable consumption patterns and accelerating climate action. The COSPACE Group was established to address these challenges by fostering collaboration among projects using space-based technologies for climate resilience.
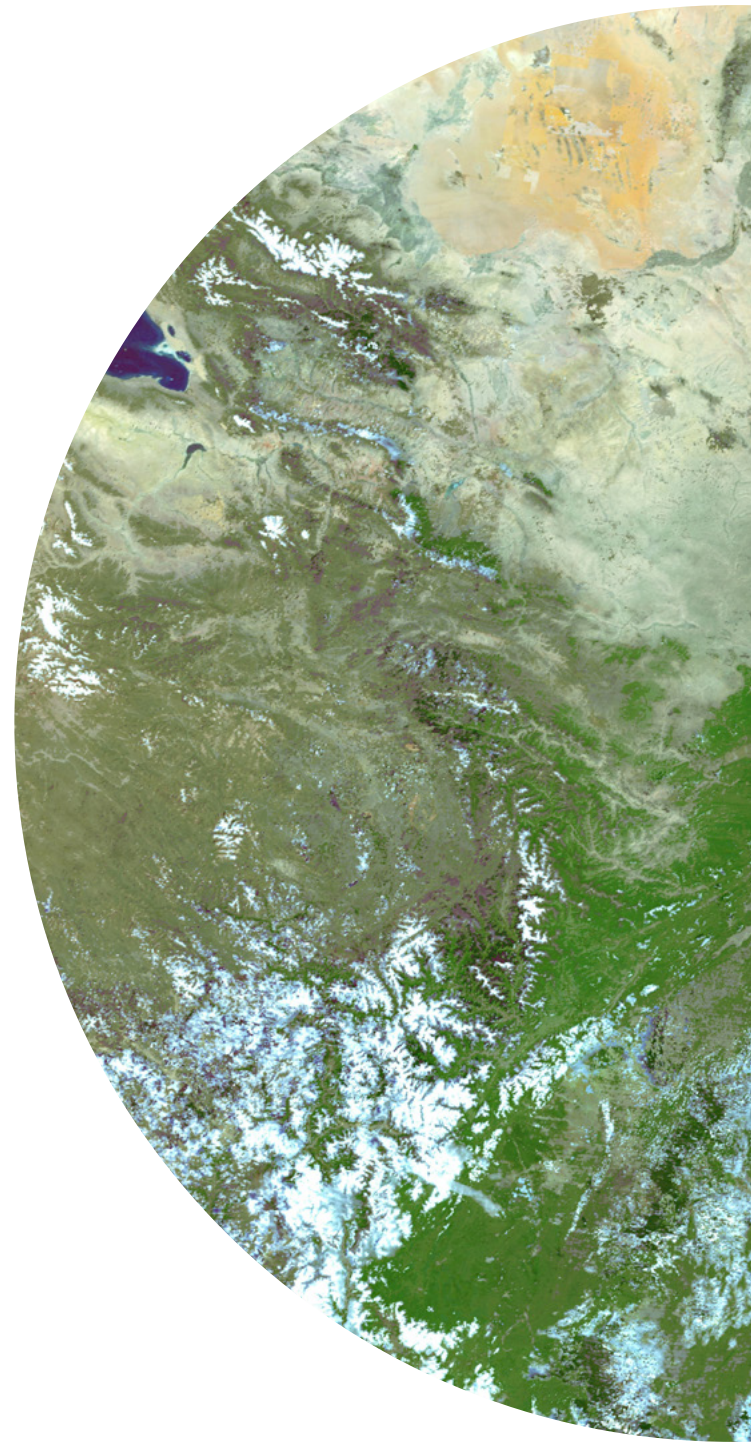
- **MAGDA** enhances weather forecasting and irrigation management to protect crops from climate-related risks.

- **RESPONDENT** optimises renewable energy integration through a combination of AI-driven forecasting models and European space-based technologies.

- **SWIFTT** improves forest protection by monitoring risks such as fires, storms, pests, and droughts via satellite imagery.

- **100KTREEs** promotes urban greening strategies to mitigate the effects of climate change in cities.

- **BUILDSPACE** strengthens urban resilience and energy efficiency using geospatial data for climate-responsive infrastructure planning.

Key Challenges Addressed

1. Energy Transition & Security

The growing share of renewable energy sources, such as solar and wind, presents challenges for grid stability due to variability in energy production. RESPONDENT addresses this issue by integrating AI-driven forecasting models with European space technologies, providing real-time, accurate predictions of energy generation and demand. These insights help energy providers balance supply and demand more efficiently, reducing reliance on fossil fuels and strengthening Europe's energy security. Similarly, BUILDSPACE enhances energy resilience by assessing residential energy demand, retrofitting potential, and rooftop solar capacity. Its interactive tools help municipalities, businesses, and homeowners adopt clean energy, complementing RESPONDENT's efforts in securing Europe's energy future.

2. Urban Resilience & Sustainability

Climate change is exacerbating extreme weather events, increasing the frequency of heatwaves, flooding, and poor air quality in cities. BUILDSPACE and 100KTREEs tackle this challenge by using digital twin technologies, AI-enhanced urban planning tools, and satellite data to monitor and improve city infrastructure. BUILDSPACE provides real-time insights into urban thermal environments and energy efficiency, while 100KTREEs promotes strategic tree planting to mitigate heat islands, enhance biodiversity, and improve air quality in densely populated areas.

3. Climate Adaptation in Agriculture

Agriculture is highly vulnerable to climate-related risks, including droughts, heatwaves, torrential rain, and hail. MAGDA enhances farmers' resilience by providing site-specific weather forecasts and irrigation advisories using advanced GNSS and satellite Earth Observation technology, in-situ weather sensors, Meteodrones, and hydrological models. By improving irrigation efficiency and optimising water management, MAGDA supports sustainable food production and minimises water wastage, aligning with the EU's Common Agricultural Policy (CAP).

4. Forest Conservation & Disaster Prevention

European forests are increasingly under threat from wildfires, storms, droughts, and pest outbreaks, all intensified by climate change. SWIFTT provides an innovative solution by leveraging Copernicus satellite imagery and AI models to offer early detection and monitoring of forest health. This allows forest managers to identify risks proactively and take preventive measures, helping to mitigate environmental degradation and economic losses linked to forest disturbances.

By addressing these key challenges, the COSPACE Group strengthens Europe's ability to mitigate and adapt to climate change through technological innovation and strategic policy implementation.

Policy Recommendations

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1. Enhance Data-Sharing Frameworks

Recommendation: Develop standardised data-sharing policies to improve cross-sector collaboration, ensuring that satellite and AI-driven climate data is accessible to key stakeholders, including policymakers, energy providers, city planners, and agricultural professionals.

Climate resilience relies on accurate, timely, and comprehensive data. Establishing frameworks that facilitate real-time data sharing across energy, forestry, urban planning, and agriculture will enable decision-makers to make informed policy choices. Improved interoperability between Copernicus and Galileo services with national data infrastructures can support evidence-based climate action and disaster response.

2. Invest in AI and Digital Innovation

Recommendation: Establish targeted funding and regulatory support for AI-based forecasting models in energy, urban planning, forestry, and agriculture to improve climate adaptation and resource efficiency.

AI-driven solutions, such as RESPONDENT's energy forecasting and SWIFTT's forest risk monitoring, enhance climate resilience by providing predictive insights. BUILDSPACE leverages AI and geospatial data to improve energy planning, infrastructure monitoring, building retrofitting, solar integration, and flood resilience. By integrating these technologies, BUILDSPACE promotes sustainability and disaster preparedness in urban areas. Policymakers should prioritize funding for AI-driven innovations to accelerate climate resilience.

3. Promote Nature-Based Solutions in Urban Planning

Recommendation: Encourage large-scale urban greening initiatives, integrating solutions like tree planting, green roofs, and vertical gardens to mitigate urban heat islands, improve air quality, and enhance biodiversity.

Cities face growing climate-related challenges, including excessive heat, air pollution, and biodiversity loss. By incorporating green infrastructure solutions such as those proposed by 100KTREEs, urban policymakers can enhance environmental quality, reduce health risks, and foster economic opportunities linked to nature-based solutions. Incentives for municipalities to prioritise green urban planning should be included in policy frameworks.

4. Strengthen Climate-Resilient Agriculture

Recommendation: Support the adoption of precision agriculture technologies, such as weather forecasting tools and irrigation advisories, to improve food security and reduce water consumption.

Climate variability significantly impacts food production and water availability. MAGDA's precision farming tools provide real-time guidance for farmers, improving efficiency and sustainability. Policymakers should promote these innovations through financial incentives, training programs, and integration with the EU's Common Agricultural Policy to ensure widespread adoption and long-term agricultural resilience.
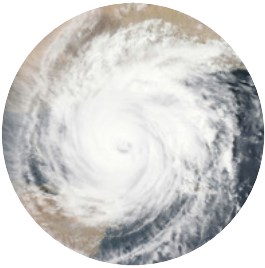
5. Expand Climate Monitoring Capabilities

Recommendation: Boost Copernicus and Galileo data integration in climate action policies to enhance environmental monitoring, support early warning systems, and improve disaster preparedness at local and national levels.

Strengthening climate monitoring through satellite-based technologies is essential for proactive risk management. Policymakers should facilitate collaboration between public and private sectors to maximise the potential of space-based data in tracking deforestation, monitoring air pollution, and forecasting extreme weather events. Establishing national policies that prioritise satellite-based environmental monitoring will significantly enhance Europe's capacity for climate adaptation and mitigation.

Conclusion

The COSPACE Group demonstrates the power of space technologies and AI in addressing pressing climate challenges. By adopting the policy recommendations outlined, European policymakers can drive forward sustainable urban development, energy transition, and climate resilience, ensuring a greener, more sustainable future for all.

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Discover how COSPACE enhances climate resilience and sustainability!

RESPONDENT | 100K Trees | SWIFTT | MAGDA | BUILDSPACE

respondent-project.eu | euspa.europa.eu | 100ktrees.eu
swiftt.eu | magdaproject.eu | buildspaceproject.eu

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