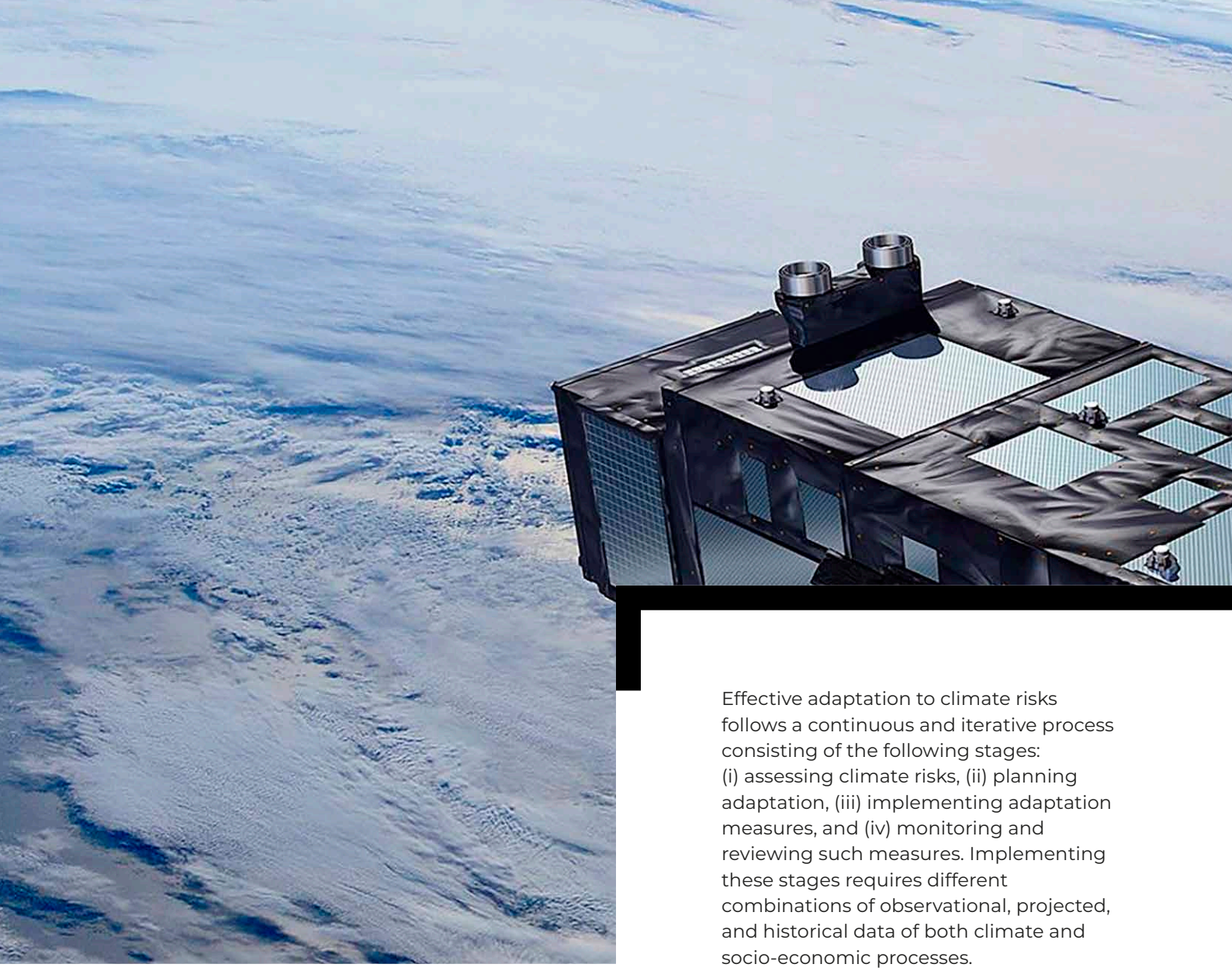
SUMMARY FOR POLICYMAKERS

Data for adaptation
at different spatial and temporal scales

The demand for data for adaptation is growing in response to different political and practical needs. Through the Paris Agreement, Parties to the UNFCCC have called for a strengthening of global cooperation to ensure that adaptation action is based on and guided by the best available science. At national and associated sub-national scales, adaptation, following the process of formulating and implementing national adaptation plans (NAPs) or other plans and strategies, has entered the planning and implementation stage. This requires increasingly diversified and specialized data and related data products. The objective of the paper is to provide an overview of the categories of data that are required for effective adaptation, the forms in which these data are currently provided at different scales, remaining gaps and challenges and opportunities to enhance the provision and use of such data.

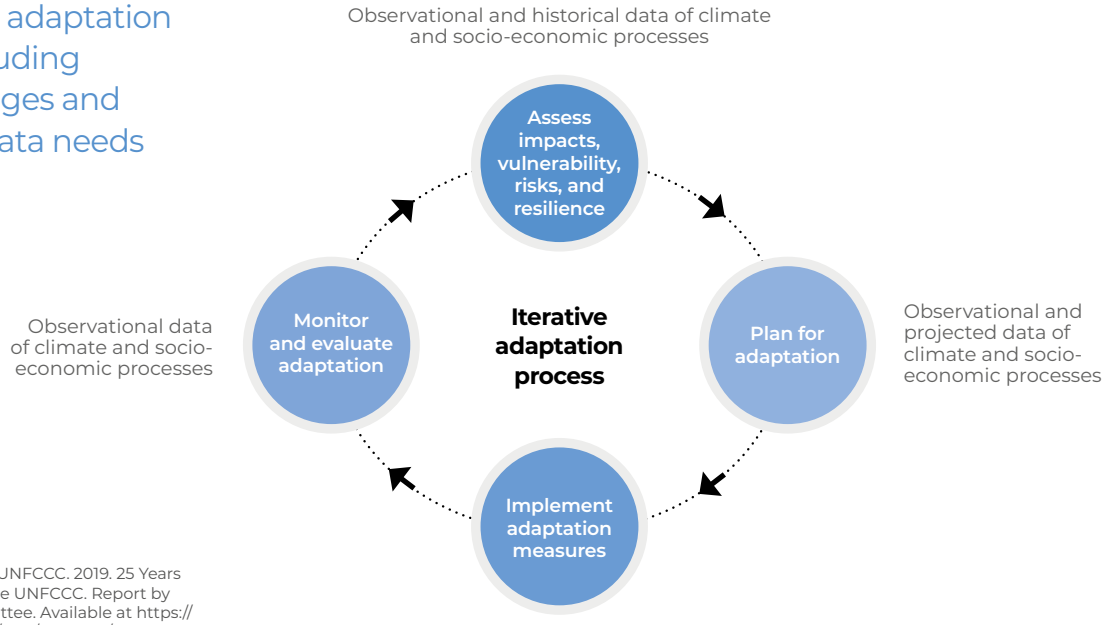
Technical paper by the Adaptation Committee

United Nations
Climate Change



Effective adaptation to climate risks follows a continuous and iterative process consisting of the following stages: (i) assessing climate risks, (ii) planning adaptation, (iii) implementing adaptation measures, and (iv) monitoring and reviewing such measures. Implementing these stages requires different combinations of observational, projected, and historical data of both climate and socio-economic processes.

The iterative adaptation process including four core stages and respective data needs



Source: Adapted from UNFCCC. 2019. 25 Years of Adaptation under the UNFCCC. Report by the Adaptation Committee. Available at https://unfccc.int/sites/default/files/resource/AC_25%20Years%20of%20Adaptation%20Under%20the%20UNFCCC_2019.pdf

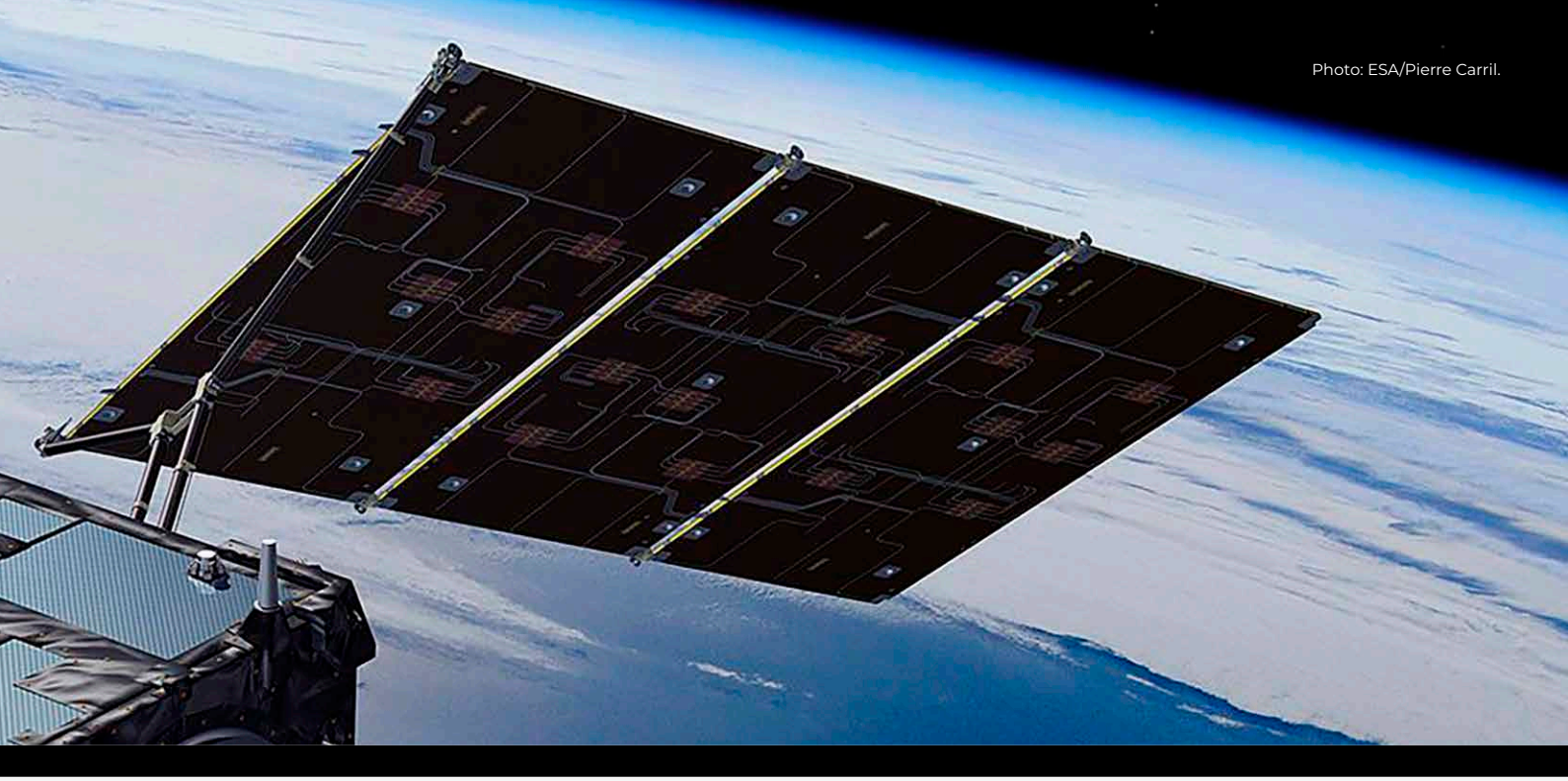


Photo: ESA/Pierre Carril.

Observational data supports all stages of the adaptation process. It includes observations of the atmosphere, land and ocean as well as of socio-economic processes. Projected data is mainly required during the planning stage and is provided in the form of forecasts, predictions, and projections, which meet the needs for short-, medium-, and long-term planning, respectively. Historical data complements recent observations and outlooks to form the basis of understanding climate processes and their impacts at all scales from the past into the future.

Example of hazard and vulnerability analyses related to flood risk and according data requirements for adaptation decision-making, as facilitated by the Global Framework for Climate Services

Hazard Analysis and Mapping →

Heavy Precipitation and flood mapping

Need for ... historical and real time hazard data. Meteorological, hydrological and climate forecasts and trend analysis

Exposure and Vulnerability →

Assets:
- Urban grid
- Infrastructure
- Population density
- Agricultural land
- Businesses
- Etc.

Need for ... historical loss and damage data. Development and engineering data

Potential Loss Estimates →

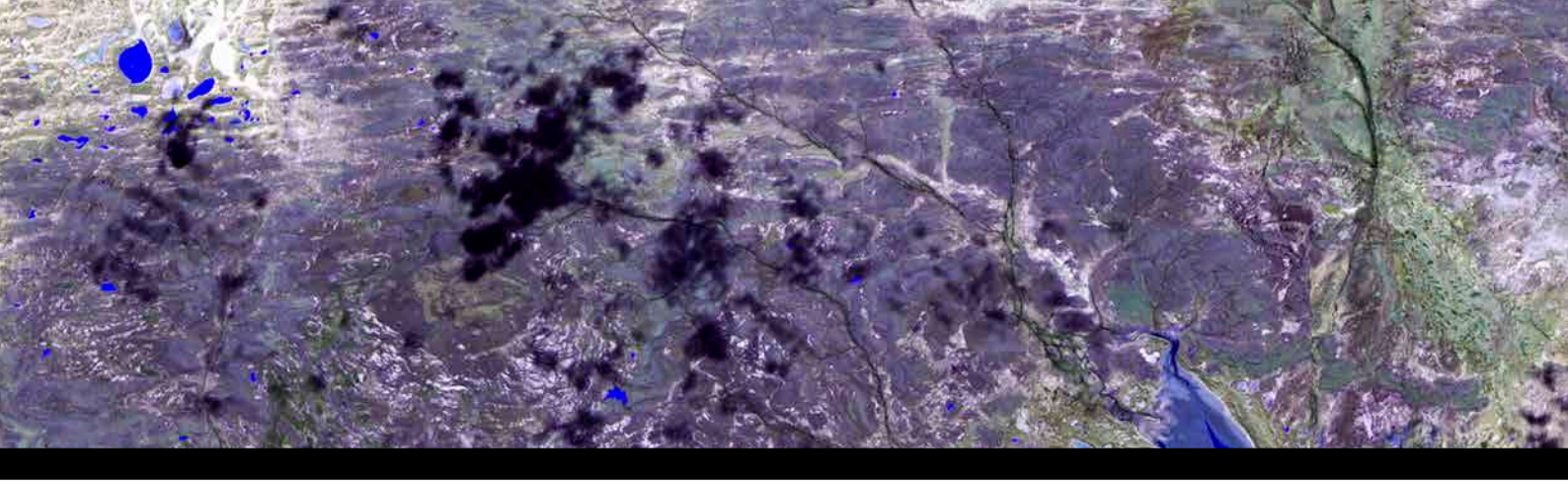
Number of lives at risk

$ at risk:
- Destruction of buildings and infrastructure
- Reduction in crop yields
- Business interrauptions
- Etc.

Decisions

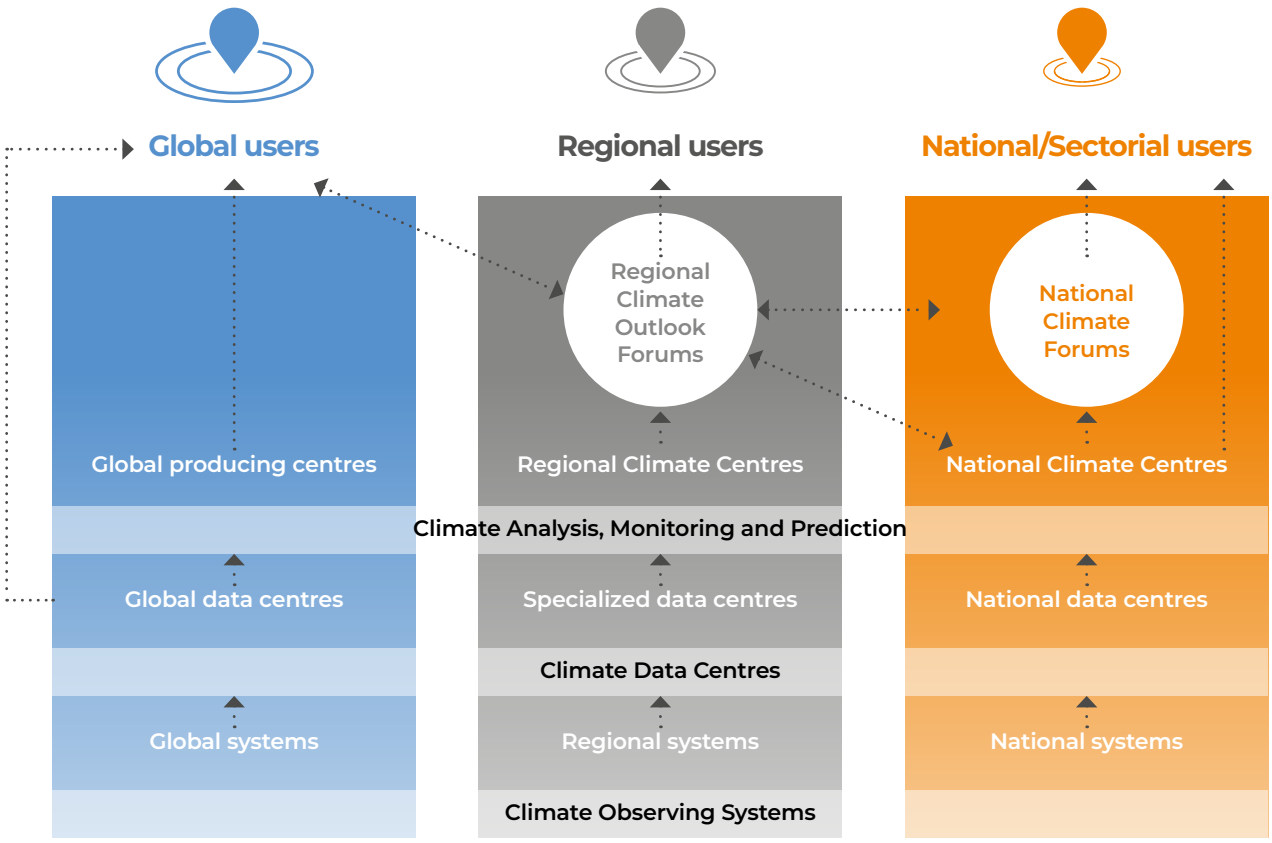
- Policy and planning
- Disaster Risk Financing
- EWS
- Sectoral Risk Management

Source: WMO. Climate Services for Supporting Climate Change Adaptation. Supplement to the Technical Guidelines for the NAP Process. Available at https://www4.unfccc.int/sites/NAPC/Documents%20NAP/Supplements/WMO_climate%20change%20services%20for%20climate%20change%20adaptation.pdf



Actors at different spatial scales contribute to the global provision of observational, historical and projected climate and socio-economic data. National Meteorological and Hydrological Services (NMHSs) play a central role in this regard and closely cooperate with international and regional data centres. The provision of climate data, in particular, guided by the vision of global sharing and open access, is facilitated through international coordination, the setting of quality standards and capacity building while socio-economic data is provided by a multitude of sources without global coordination under the climate regime. In most cases data is further processed into a variety of data products that meet different user needs across spatial and temporal scales and can also assist in closing gaps in observational coverage. Local-level stakeholders play an increasingly important role in complementing or validating top-down generated products with local knowledge and experience.

Data and information exchange as part of the Climate Service Information System (CSIS) of the Global Framework for Climate Services



Source: Presentation by the WMO on the CSIS available at https://gfcs.wmo.int//sites/default/files/Rupa%20Kumar%20Kolli%20CSIS.pdf

Photo: USGS – Unsplash.

Important gaps and challenges remain with regard to all categories of adaptation data. In situ observation systems are still lacking in some regions of the world, most critically in regions where populations are at elevated risks, such as in coastal areas, or where local changes have global impacts, for example the melting of ice-sheet outlet glaciers and its contribution to sea-level rise. Modelled data is hardly downscaled to local levels where it is mostly needed. The interpretation of data is afflicted with major challenges that relate to rather technical issues around the measurements and models but also to deep uncertainties regarding future drivers of climate change, the response of the atmosphere and the effectiveness of adaptation measures in light of changing norms and values. Ensuring the quality of data is also becoming increasingly difficult as demands for the timeliness of data supply and its availability at various scales and for ever more specific adaptation situations are on the rise.

However, there are also important opportunities to further enhance data provision and use.

- Provision could be increased by focusing on three aspects: (i) exploiting the big data that is yet to be produced by space-based observations and through innovative solutions like machine learning and cloud and edge computing; (ii) further ensuring open access to all existing data, including through the rescue of historical data and the lifting of restrictive data policies; and (iii) closing remaining data gaps through long-term funding of in situ observational systems and innovative ways of providing interdisciplinary data and information for local adaptation decision-making.

- Capacity development of both providers and users of data in countries where it is needed would enhance both the provision and uptake of data. This should include the improvement of infrastructure as well as the training of personnel regarding the generation and interpretation of high-quality data that is relevant to local contexts.

- An indispensable aspect of encouraging data use is the provision of guidance in dealing with uncertainty that is an intrinsic part of data and its interpretation. There are various approaches and methods that can help in managing uncertainty, ranging from iterative risk management and participatory approaches to multi-criteria analysis and robust decision-making. The provision of climate services can be one way of supporting the application of these tools.

- Climate services is a concept that is intended to build a bridge between scientifically generated data supply and the demand of end users for information that supports adaptation decision-making. For this to achieve, data providers, service providers and end users closely interact. It is still a young field with mostly uncoordinated actors and activities but bears great potential once fully developed.

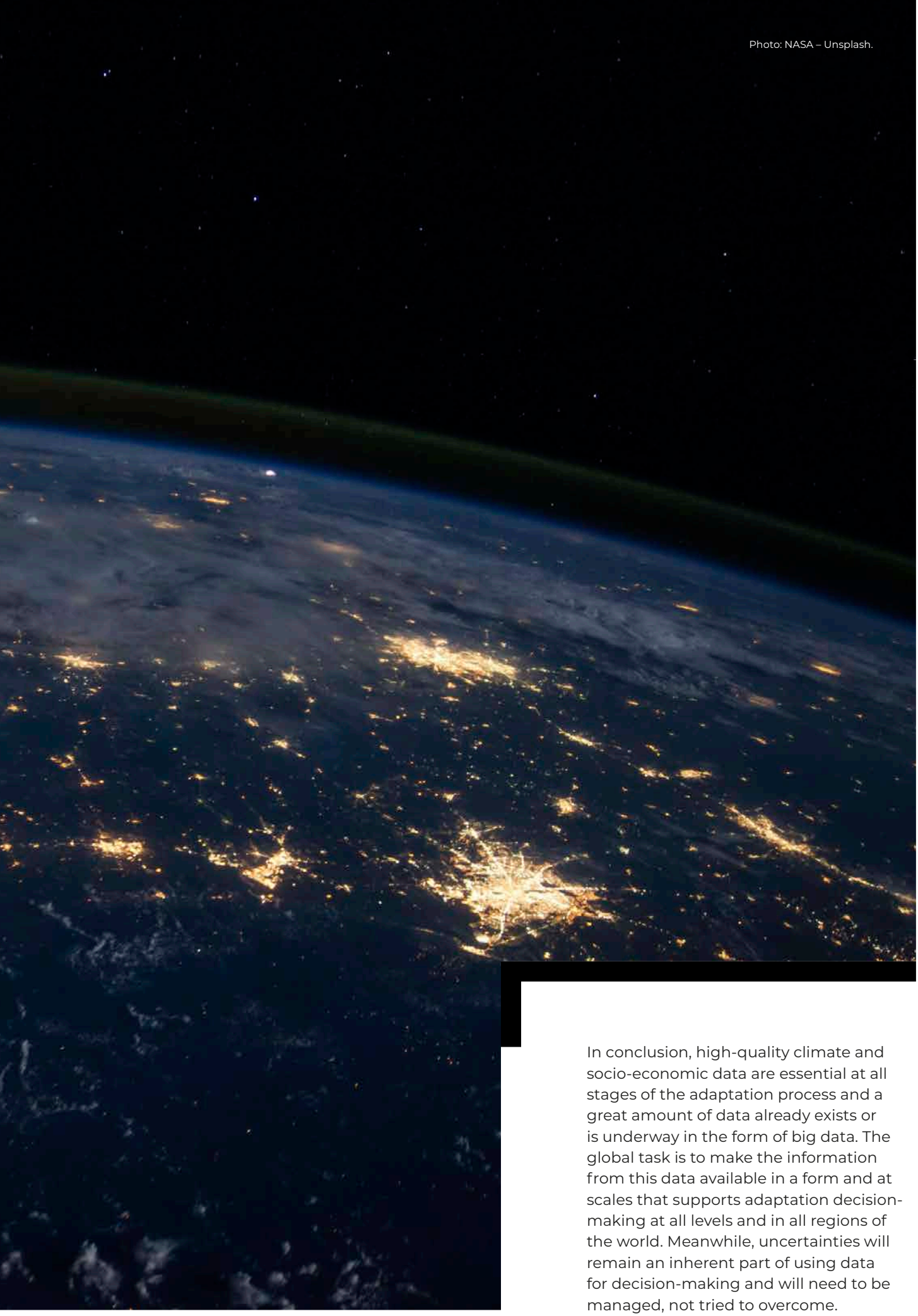


Photo: NASA – Unsplash.

In conclusion, high-quality climate and socio-economic data are essential at all stages of the adaptation process and a great amount of data already exists or is underway in the form of big data. The global task is to make the information from this data available in a form and at scales that supports adaptation decision-making at all levels and in all regions of the world. Meanwhile, uncertainties will remain an inherent part of using data for decision-making and will need to be managed, not tried to overcome.

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