Addressing Global Natural Disasters and the Significance of Earth Observation

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Introduction

Natural hazards such as floods, droughts, earthquakes, and landslides are becoming more dangerous due to increasing populations living in more vulnerable areas and climatic variability, but our ability to provide warnings and mitigation strategies at short, medium, and long timescales is frequently hampered by a lack of ground observations in the most vulnerable areas. Satellite remote sensing has unique worldwide observational capabilities that can provide critical insights into the multifaceted issues of catastrophe hazard and risk assessment, response, and recovery in ways that ground-based technologies cannot. Satellite platforms can offer estimates of crucial hazard-related variables from space, but their accuracies and geographical resolutions differ. In certain circumstances, these data are utilized to help direct disaster response, such as maps indicating the catastrophe's spatial scope or impact studies based on identifying pre-and post-event changes on the terrain. Examples of such direct assistance include the terrible floods that occurred in Malawi in January 2015 and the southern United States in May and June 2015, as well as the deadly high-magnitude earthquake that struck Nepal in April 2015.

Natural disasters, whether of meteorological origin (such as Cyclones, Floods, Tornadoes, and Droughts) or geological origin (such as earthquakes and volcanoes), are widely recognized for their destructive effects on human lives, the economy, and the environment. Because of the tropical climate and unstable terrain shapes, as well as high population density, poverty, illiteracy, and a lack of infrastructure development, developing nations are more exposed to the harmful potential of such disasters. Though it is nearly impossible to completely mitigate the damage caused by these disasters, (i) it is possible to reduce potential risks by developing disaster early warning strategies, (ii) preparing developmental plans to provide resilience to such disasters, (iii) mobilizing resources such as communication and telemedicine services, and (iv) assist in rehabilitation and post-disaster reconstruction. Space-based systems have shown to be effective in disaster management. While communication satellites aid in disaster warning, relief mobilization, and telemedicine, Earth observation satellites offer the foundation for pre-disaster preparedness programs, in-disaster response and monitoring operations, and post-disaster restoration. The article investigates the information needs for disaster risk management, assesses developing countries' capacity for constructing the requisite decision support systems, and assesses the use of satellite remote sensing. It highlights various examples of actions taken by developing nations in their efforts to build a viable disaster preparedness plan and operational framework for disaster management. Using remote sensing data in conjunction with other secondary data. It finishes with proposals and recommendations for establishing a global network of required space and ground segments to increase technical capabilities for disaster management and mitigation.

Senior policymakers and expert groups from a variety of scientific fields attended the world's first political conference on Earth observation. Its goal was to strengthen worldwide Earth observation collaboration and expand its usage as a decision-making tool for sustainable development and resource conservation. This article provides a brief overview of Earth observation development from its inception, as well as the precise

circumstances that prompted the summit's convening. The summit produced a declaration highlighting four critical areas in need of assistance, and an ad hoc panel was formed to develop a 10-year plan and promote policy implementation.

Disaster Risk Reduction (DRR) is a top issue on the agenda of key stakeholders involved in sustainable development, and Earth Observation (EO) may provide meaningful, timely, and cost-effective information in this context. This brief statement describes the European Space Agency's (ESA) unique program to encourage the use and use of satellite data in the global development community, Earth Observation for Sustainable Development (EO4SD). Disaster risk reduction is one of the EO4SD action areas (EO4SD DRR). A team of European enterprises and organizations has been charged with developing EO services to assist the implementation of DRR in International Financial Institutions (IFI) initiatives as part of this project. As a result, the integration of satellite-borne data and auxiliary data to provide insight and actionable information is seen as a critical aspect of enhanced decision-making. Engagement with technical leaders is critical for complete understanding and accounting for the fundamental user needs (IFI and client states). Data that is fit-for-purpose and thorough capacity building eventually enable scalability and long-term transferability. Future perspectives of EO4SD and DRR in terms of mainstreaming are also discussed.

The impact of natural disasters on lives and economies is critical to society, particularly in developing nations where mortality is disproportionately high and material losses may have a devastating impact on economies. The Sendai Framework for Disaster Risk Reduction 2015-2030 lays out a strategy for mitigating these effects (Sendai Framework). The goal of this project is to limit the number of impacted individuals and disaster-related deaths, as well as direct economic loss and damage to essential infrastructure and fundamental services. The United Nations (UN) 2030 Agenda for Sustainable Development, with its 17 Sustainable Development Goals (SDGs), acknowledges the opportunity to achieve SDGs through catastrophe risk reduction. Finally, as the third pillar of the global policy framework, the Paris Agreement inside the United Nations Framework Convention on Climate Change (UNFCCC) emphasizes the necessity of establishing a risk assessment and management plan, as well as the need to reduce climate change risks.

According to the World Bank (WB), over the last 30 years, more than 2.5 million people have died as a result of natural catastrophes, and 410 million more are anticipated to die as a result of flood events by 2025, only in East Asia and the Pacific area. Furthermore, by 2011, economic damages had nearly surpassed $4 trillion, while occurrences in 2017 amounted to around $337 billion in economic losses. There are some of the most devastating events in the world, including hurricanes in the Caribbean, tropical storms and heavy rains in the Philippines and Zimbabwe, earthquakes in Mexico and Iran/Iraq, floods in India, Sierra Leone, Colombia, Sri Lanka, Peru, and Nepal, snowstorms in Afghanistan and Pakistan, heatwaves in India, and landslides in Congo and Bangladesh. Since 1900, the number of people impacted by catastrophes has been the largest in East Asia (particularly China, the Philippines, Indonesia, Vietnam, and Thailand), South Asia (India), America (Mexico, Central America, and Colombia), and Africa (drought-stricken Sahel region). The historical distribution of events and their impacts on people and assets provide a starting point for disaster risk reduction efforts.

A real disaster management strategy should include concerns such as mitigation, readiness, response, and recovery. To evolve this approach, it is critical to identify the critical information needed for each catastrophe to figure out the risk appraisal, which includes vulnerability analysis of a specific terrain, prediction, warning, and prevention of disastrous occurrences.