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Author: Ms. Sahba El-Shawa
Jordan Space Research Initiative (JSRI), Jordan, sahba.elshawa@spacegeneration.org

Mr. Steven George
European Space Agency (ESA-ESTEC), The Netherlands, steven.george@ext.esa.int
Mr. Jordan Stone
Imperial College London, United Kingdom, j.stone22@imperial.ac.uk

SPACE FOR ENVIRONMENTAL DISASTER MANAGEMENT: FLOOD MITIGATION AND ADAPTATION CASE STUDY

Abstract

Countries in the Global South which have a relatively low contribution to climate change are bearing the largest impacts of it. It is therefore essential to develop global mitigation and adaptation strategies to ensure that countries can recover from disasters, but also to proactively prevent them from happening. Recent floods in Pakistan have devastated the country, affecting over 33 million people. The disaster has displaced millions, destroyed infrastructure and crops, and left a third of the country under water. The country does not have the infrastructure or resources to deal with the overwhelming effects, showing the importance of climate resilience. Space technology and science represents a powerful tool to manage such natural disasters. When combined, different tools from space science and technology are able to monitor effects, direct response action, predict future disasters, and prevent severe impacts.

In terms of Earth Observation (EO), satellite imagery can be used to map the extent of floods over time, assess damage, as well as assist in the monitoring and support of population migration. To mitigate climate change impacts, EO data can be used for urban mapping and planning, weather prediction models, and monitoring reservoir water levels. Spin-off technologies, on the other hand, can especially be used for climate adaptation and resilience. This may include advanced robotics for search and rescue, in-situ monitoring systems, ISRU construction for temporary housing, remote medicine and telehealth services, as well as structural airlocks and insulation - to name a few. Finally, planetary science research allows us to cross-reference our understanding of Earth's climate and geosphere with other planetary bodies in order to broaden our understanding and gain new insights into Earth's natural processes. For example, the runaway greenhouse effect on Venus warns of the danger of water vapour as a greenhouse gas, and the power of positive feedback loops, such as those caused by the release of CO2 from permafrost. This understanding can help us with mitigation strategies, whereas new ideas from the space community such as terraforming offer radical solutions to challenges on Earth may offer adaptation solutions. While extreme geoengineering strategies may be out of the question, other geoengineering strategies such as afforestation can reduce ground saturation, absorb emissions, and slow down threats such as avalanches and mudslides.

In this talk, the combination of EO, spin-off technologies, and planetary science for flood mitigation and adaptation will be explored as a case study for climate action.