Embracing EO To Understand the Challenges Associated with Environmental Risk

One characteristic of climate change is that Earth is experiencing intensified extremes in environmental conditions, and at a greater cadence. Recently for example[1], California was planning for drought whilst in floods, and this phenomenon of environmental extremes, effecting global regions of populace or commerce, are increasingly common.

Global population growth and business also continue to pressurise resources as land use is maximised. The result is increased exposure by populations and business to extreme weather conditions in areas affected by environmental anomalies.

Over the past 30 years, the portion of the world's population living in flood-prone river basins has increased by 114%, and that of those living along coastlines threatened by cyclones has increased 192%. Today, over half of the world's cities of 2-15 million people are in areas of seismic risk. In parallel, anticipated climate change will likely bring further environmental impacts that will compound existing threats to coastal and flood-plain settlements, as well as increase wildfire hazards and bring stronger and more frequent hurricanes and cyclones. The world's population has never been exposed to such a high level of risk, and this is likely to grow in the coming years as the same trends continue.[5]

To reduce the impact of environmental risk, an understanding of the predicted or potential for catastrophe to inflict damage needs to be understood. In the context of climate change, understanding this risk needs to be managed at pace, disseminated to multiple stakeholders and to multiple locations.

Environmental Risk

The ability of man to understand his natural environment has been a critical part of his evolution and an intrinsic part of mankind's history. In this regard, environmental risk has always played a significant part in man's engagement and natural decision-making processes through the ages. The information age has however allowed man to push the traditional boundaries of land and environmental exploitation. With increased access to information, man has been increasingly able to manage the risk to his investment, predict possibly calamity and then make the necessary plans to reduce loss.

Climate change however, brought on by the unchecked exploitation of Earth, has heightened environmental risk further and created more extreme conditions on Earth[3]: high temperature extremes, high wind extremes, rising sea levels, and more. These phenomena have in turn contributed to other increased environmental risks such a wildfire and flooding[4]. With global supply chains now commonplace, product exposure to environmental risk now has significant commercial and humanitarian implications.

In NOAA's 2021 Annual Climate Report[2], the combined land and ocean temperature has increased at an average rate of 0.08 degrees Celsius per decade since 1880; however, the average rate of increase since 1981 has been more than twice as fast: 0.18 °C per decade. The resulting environmental risks brought on by these changes are bad for populations and bad for business.

Types of environmental risks that disrupt business include:

- Produce and service delivery failures due on unpredicted / changed / extreme environmental conditions (agriculture)
- Unprecedented conditions that disrupt the normal flow of services (disruption of water or electricity), goods or production
- Transport routings / supply chain dynamics (transport)
- Insurance and financial consequences that limit
- commerce (finance/insurance)
- Compliance standards related to regulations, health or safety
- The requirement to design better solutions to mitigate the effects of environmental conditions

Knowledge is Power

Knowing in advance what the potential risk is, allows for business (and populations) to make choices to mitigate exposure to that risk. A simplistic example would be pre-knowledge of an impending hurricane in a region, and then to move mobile assets away from the threat.

One such source of gained knowledge is derived from using satellite images of Earth. The use of Satellite technology to observe the Earth, called Earth Observation (EO), has enjoyed exponential growth in the last few decades as launch costs constantly reduce and as commercial orientated applications drive new possibilities.

With constant advances in EO technology to observe and predict extreme weather conditions, there is a new a paradigm shift in business to incorporate this evolving resource as a mainstream business function. Increasingly embedded in the agriculture, finance, mining and transport sectors, this trend has also resulted in new business support services to verify assets and report on landscape changes. The use of EO technology is also useful post-event, producing data to understand the resulting situation that can be used to minimise the impacts and maximise recovery.

The benefits of EO technology for business are that the data provided is unbiased, independent, cheap, continuous and repeatable.

In the modern era, the use of EO to deliver a service has also been accelerated by societal pressure to preserve the environment. The protection and preservation of the environment are now key issues for society, governments, and corporations. In addition, there is increased pressure from consumers not wanting to put the environment at risk by purchasing non-sustainable products. Regulatory pressure is also very real for business producers as new compliance laws dictate the environmental impact allowed for product. EO verification and EO data analysis answer all these service requirements.

EO can add unique value to companies wishing to monitor and control their environmental impact. It provides the necessary insight via unbiased data for predicting and measuring how different aspects of the environment may be affected by a business's actions.
An example of this would be food production companies using knowledge gained from EO to alter farming practices to promote the uptake of carbon in the soil, or any business needing to observe and monitor how their work may affect deforestation: either by using nature to create their product or by creating a workplace that requires an area of nature to be cleared. EO can predict the impact of this, as well as monitor the impact once the event has taken place, allowing businesses to make data driven decisions to show their support for sustainable practices and mindfulness of the importance of the environment.

Getting Business and EO to Meet

For business, understanding what EO technology can deliver can be a daunting task. Equally significant is overcoming the perception held that the space sector is aloof, government controlled or run by academics. Who to ask and engage with? What technology is relevant to my business and sector? What new technology will advance my product offering? What environmental risks are monitored by EO technology aligned to my business model? What new business functions are needed to incorporate the use of this technology? How do I access open data and analysis? The above can be perceived barriers to entry on the update by business to benefit from EO technology.

In addition, even when business recognises the value of EO technology in mitigating risk to their business, the challenge is managing and monitoring data analysis across their organisation. This is especially relevant for multinational companies with global footprints.

For EO service providers, the task is equally challenging. How to disseminate the technological benefits and innovation on what EO can deliver to real-time business needs?

Once engaged though, the knowledge and ability for non-space businesses to become proactive to mitigate potential environmental risk has significant advantages. Not only can the inclusion of this technology use enable a business or product advantage, but it also can provide a long-term savings in time and resources.

Lastly and of equal importance is the ability of EO to manage for business their efforts to quantify new strategic objectives. Reputational drivers, changes in investment guidelines or new regulatory policies, are forcing business to verify and provide legitimate proof of their environmental impacts around operations or,

to account for a reduction in impacts resulting from production. Being independent and with the ability to capture large areas under investigation, EO data is increasingly being used as an evidence collection tool for businesses wanting to measure their progress on targets such as GHG emissions, regenerative agricultural practises to maximise carbon sequestration, produce product (eg cocoa) without deforestation or reduce water pollution levels. These EO evidence-based solutions for business are propelling the acceptance and use of this information as a mainstream business function.

Enabling partnerships between non-space businesses and Earth imagery service providers, the Space Commercialisation Engine (SCE) can help your business understand and embrace the advantages of EO technology.

The SCE is a national UK business support programme offering EO expertise to non-space businesses of all sizes; aimed at accelerating innovative and commercially viable EO ideas into the market.

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