Climate challenge: Bridging information gap through innovative climatic information products

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Never in the recent history has Sri Lanka faced as many challenges due to disasters as the country did in the last decade. It experienced major floods in May 2016, a prolonged drought in 2016-17 Maha season and once again flash floods this May. Before that, flash floods disrupted the livelihoods of people in Anuradhapura in 2014.

In 2013, fishermen lost lives and assets due to torrential rains and stormy conditions. Major floods in 2011 affected nearly all the districts. In just over 12 years, the country faced several other major disasters including, a tsunami, numerous landslides as well as the collapse of the largest waste dump yard, all of which claimed many lives, caused insurmountable damage to property and had long-lasting impacts on the economy.

For instance, the prolonged droughts in 2016 affected food production and consumers were still experiencing higher retail prices in the markets when they were hit by floods in the Southern and Sabaragamuwa Provinces. Except for the 2004 tsunami and the Meethotamulla tragedy, which have geological and anthropogenic origins, the majority of other hazard events are climate driven. Consecutive climate-related disasters in recent years indicate the urgent need for disaster-resilient coping mechanisms.

Climate change and disasters

There is significant evidence to indicate that climate change due to global warming is a factor responsible for the growing incidence of disasters. While sudden catastrophic disasters, with tremendous economic impacts, usually grab public attention more frequently, climate change is also likely to generate slow onset impacts such as the gradual rise of air temperature, alteration of established patterns of rainfall, rise in sea level and inundation of low-lying coastal areas.

Due to the gradual long-term nature of such impacts, the losses and damage caused by them hardly capture public attention. However, scientists caution that in the future, the magnitude of losses and damages due to such slow-onset impacts may even exceed the losses caused by the growing incidence of catastrophic disasters.

Making an informed effort to face this reality requires filling major gaps in the current system with respect to information, policy, institutions, technology and resource mobilization. While actions in all these areas are equally important, access to the right information is fundamental to succeed in all other areas.

It is no secret that there is a huge gap in climate information. This gap needs to be bridged through appropriate types of climate information products (CIPs) and Sri Lanka has to take meaningful steps towards the development of reliable CIPs.

Table 1: WMO Classification of Forecast Information Products

Lead time	Information product(s)	Remarks
0-2 hours	Now casting	Description of forecasted weather parameters
Up to 12 hours	Very short-range weather forecasting	
12-72 hours (half-3 days)	Short-range weather forecasting	
72-240 hours (3-10 days)	Medium-range weather forecasting	
10-30 days	Extended-range weather forecasting	
From 30 days upto 2 years	**Long-range weather forecasting** • Monthly outlooks • 90 day (Quarterly) outlooks • Seasonal outlooks • Multi-seasonal outlooks	Description of average weather parameters expressed as a departure (deviation, variation, anomaly) from climate values of that period (e.g., month, season
Beyond 2 years	**Climate forecasting** • Climate variability predication • Climate predication	Description of expected climate parameters associated with the variation of inter-annual, decadal and multi-decadal climate anomalies, including the effects of both natural and human influences

Climate information products

Information is an economic commodity with scarce supply relative to demand that possess an economic value and CIPs are no exception. The value of climate information arises from its usefulness in avoiding losses and damages caused by climate disasters/impacts and its prospects for making use of favourable climate conditions to gain benefits.

There are many types of CIPs, such as short- to long-range weather forecasts, monthly to seasonal outlooks, long-term climate projections, early warnings, information packs such as agro-climatic calendars, and customized weather information for shipping and aviation. Anomalies caused by rising turbulence in the climatic system all over the world have increased the demand for CIPs. As a result, various types of CIPs that operate at global, regional and national levels are being introduced by climate information providers.

The main purpose of any CIP is to predict the future state of climatic parameters with a specified period of lead time. Among many CIPs, short- to long-range weather forecasts are the most demanded products. In addition, many countries are now attempting to develop reliable seasonal outlooks that are especially useful for highly weather dependent economic sectors such as agriculture and primary industries. The World Meteorological Organisation (WMO) has classified CIPs in the following manner.

Information products could be private or public and they involve supply chains that extend from producers (information providers) to consumers (information users). Since a majority of CIPs are considered as public information products, private producers have little incentives to supply CIPs. As a result, a majority of CIP providers are state, inter-governmental or international technical agencies.

At the state level, the main providers of CIPs are national meteorological services (NMS) represented by national meteorological departments or weather bureaus (e.g., Meteorology Department of Sri Lanka). Examples for inter-governmental bodies are WMO and the Intergovernmental Panel for Climate Change (IPPC).

In addition, there are international technical agencies, sponsored by developed nations, such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and International Research Institute for Climate and Society (IRI). Often, NMS in developing countries have to depend on products from international information providers for preparing national level CIPs due to their limited technical capacity.

With the spread of information technology, new business models for supplying information products have emerged. As a result, profit-oriented private providers of CIPs that are based on innovative web-based platforms have materialized. These platforms combine various business models for multiple information products that range from subscribed customized private weather reports to free supply of public weather information. These privately run CIP networks appear to be getting more and more popular with the spread of smartphones and tablet PCs.

With ongoing advancements in ICT in areas such as Internet of things (IOT), big data, artificial intelligence and drones revolution, prospects for private providers of CIPs are expected to increase tremendously in the future.

Climate information gap in Sri Lanka

The dearth of reliable CIPs to cater to the growing demands from various stakeholders is a challenge faced by many developing countries, including Sri Lanka. The Meteorology Department is the national climate information provider in Sri Lanka and is the national focal point for the WMO and IPCC. At present, the Meteorology Department offers a limited portfolio of CIPs to the public as well as stakeholders from weather dependent economic sectors, such as agriculture, energy, fishery, shipping, aviation and insurance, which are communicated through public media and its website. These CIPs include routine daily weather forecasts, monthly and seasonal outlooks, sea-area and city forecasts, forecasts for aviation and shipping, warnings and advisories on bad weather situations due to events such as cyclones, heavy rains, lightning and high wind.

It has also started offering three-day and 10-day model forecasts and making continuous attempts to develop long-term climate projections through downscaling of global models. Despite the efforts of the Meteorology Department to improve the availability of CIPs in the country, significant gaps persist. Broadly, they can be categorized into three major types, namely, supply gaps, credibility gaps and communication gaps.

With the gradual unfolding of climate change impacts, the demand for CIPs is rising. Compared with the growing demand, the current supply of CIPs is limited in Sri Lanka. This is particularly felt in more weather dependent sectors such as agriculture, fisheries, water resources management, energy planning and disaster-risk management.

Even the available CIPs appear to have credibility gaps due to poor compatibility and quality. Poor compatibility implies a gap between the coverage of the forecast and users' needs of information. The quality of forecasts is determined by accuracy and reliability of predictions.

Low levels of compatibility and quality reduce the confidence of users about the CIPs, thereby resulting in a credibility gap. Finally, it seems that the existing CIPs are not properly communicated. A communication gap occurs due to problems in format and content of messages, low access by users due to lack of targeting and poor selection of media for dissemination. These gaps in climate information have led to frequent criticisms directed at the Meteorology Department, both by politicians and the public.

Bridging climate information gaps

Bridging climate information gaps in Sri Lanka is an essential precondition for facing the challenges caused by climate change. The limited supply of information products, low confidence of users on the existing products and poor communication contribute to climate information gaps in Sri Lanka. One major reason for information gaps is the capacity limitations of the Meteorology Department and other relevant stakeholder agencies.

Developing quality CIPs requires state-of-the-art technical facilities and a high level of expertise and skills. The existing technical facilities and the limited professional manpower at the Meteorology Department, as well as at other relevant agencies, are not adequate to meet the challenge. Hence, the necessary policy and management measures should be taken to improve the situation. This involves making investment on upgrading technical facilities, recruitment of additional staff, building skills of staff through training, arranging technical assistance from international agencies for developing sophisticated forecast information products, networking operationally with global/regional/national agencies and building research and development capacity.

The range and quality of CIPs should be upgraded through continuous assessment of user information needs, validating and monitoring of products with the participation of users and exploring effective communication channels for targeting specific user groups.

Besides improving the technical capacity of the Meteorology Department to produce reliable CIPs, awareness and capacity of other stakeholders in areas such as agriculture, fisheries, water, energy and disaster management should also be raised to facilitate the effective use and communication of information at times of need.

The capacity of universities to offer courses on relevant technical areas have to be strengthened and the level of awareness among media on effective communication of climate information should be increased. All these interventions require significant foresight and determination for action from policymakers and continuous vigilance from the side of the public. Overall, bridging the current climate information gap in the country, calls for a consolidated effort by all relevant stakeholders.

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