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Abstract

Climate and weather conditions affect almost every industry in nearly every country. Over the coming decades climate change could potentially have adverse impacts on many countries and on a range of industries. For example, agricultural production, particularly in some of the developing regions of the world is likely to be hard hit by climate change over the coming decades. Hence, adaptation to climate change and mitigation of greenhouse warming are critical for regional and global sustainability. In this context, the importance of collection, dissemination and use of climate information across many countries as a global public good is highlighted in this paper.

Keywords: climate change, climate information, agriculture, public goods, socio economic benefits

1. Introduction

Addressing the global sustainability problem will require an optimal balance of economic growth and development, supply of food and other basic necessities and adaptation to climate change and mitigation of greenhouse warming [1]. One of the areas vulnerable to climate variability and change is global food production and hence food security. It has been projected that climate change could potentially lower global agricultural production by 16 per cent (without carbon fertilisation) by 2080, relative to what would otherwise be [2]. South Asia and Southern Africa are two key regions that, without sufficient adaptation to climate change, could experience adverse impacts on major food crops [3]. Climate information (including observations, research, predictions and projections) has a central role to play in both adapting to and mitigation of climate change [4].

Virtually every economy and every industry is directly or indirectly affected by climatic and weather conditions. For example, an airline company could demand flight specific presentation of certain types of meteorological information for use by individual flights using particular routes. Climate and weather information acquires economic value by influencing the behaviour of users whose activities are sensitive to climatic and weather conditions. The socio-economic value of climate and weather information tends to increase with the quality, accuracy, timeliness, locational specificity and the user friendliness of the information [5].

2. Climate information as a public good

The effectiveness of increased use of climate information across many countries is underpinned by the treatment of such information as a global public good. This implies free and unrestricted access to climate information for everyone. Climate information embodies two important features of a global public good [5, 6]. First, climate information is said to be non-rivalrous: once generated, the marginal cost of reproducing and supplying climate information to another user is very low; and the use of climate information by one user does not infringe on its usage by others. The cost of disseminating climate information will continue to fall in the current digital age. Second, climate information is non-excludable. This means, it is very difficult and potentially expensive to exclude users from benefiting from the climate service.

3. Use of climate information: some empirical evidence

Adapting to climate change requires improved understanding of the linkages between climatic conditions and the outcomes of climate sensitive processes or activities. For example, agricultural production in a certain area could be influenced by the availability of water resources and their management. Below are several examples where the use of climate information can have a positive impact:

- It has been estimated that the value of "modest" and "high" skill ENSO predictions for US agriculture is $240m and $266m respectively per year (1995 US dollars) [7];
- A recent study has analysed the use of seasonal climate forecasts in drought mitigation strategies (including seed distribution, emergency drought relief and water reservoir management) in Northeast Brazil. This study has highlighted the

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potential to offer considerable opportunity for state/local government level planners to undertake proactive drought relief planning using climate information [8]; and

- An analysis of the economic value of climate forecasts for livestock production in the Northwest Province of South Africa has demonstrated that, for the commercial farmers, long term average annual income could potentially be increased through using ENSO predictions [9].

Most empirical studies on the socio-economic value of climate information have focussed on the agricultural sector of developed countries with very limited analysis of developing countries [10]. Analysis beyond the agricultural sector is also limited. There is, however, a growing recognition of the economic value of climate information for farmers and other potential users in developing countries. The value of climate information in these countries is likely to increase as greater progress toward overall economic growth and development is made and the relevant technological alternatives allow the use of climate information to reduce their vulnerability to climate variability and change [8]. There are current and potential applications of meteorological information (including weather and climate information) in a range of other activities including fisheries management, energy supply-demand management, natural disaster management, adaptive responses to public health risks and biosecurity risk management [10]. Such applications could substantially improve the decision making processes relating to these activities generating potentially beneficial effects. It is also important to recognise the significant value of meteorological information (including climate information) in undertaking IPCC assessments in informing policy development on climate change.

4. Challenges for service providers and users

Past empirical studies on the use of climate information have highlighted a number of impediments to effective use of such information for economic benefits. These include: (a) low accuracy and lack of lead time; (b) institutional constraints relating to, for example, the availability of credit funds; (c) lack of decision models to use climate information; (d) lack of knowledge in climate information; (e) lack of locational specificity of climate information; and (f) lack of knowledge about climate variability impacts and the associated decision responses [10, 11].

The key challenges for climate information providers and users involve removing these impediments to ensure further facilitation of effective use of such information. This could be assisted by a “multi disciplinary approach” to using climate information by employing relevant analytical tools such as bio-physical models, crop and pasture growth models, water management models and economic models. This would involve a closer collaboration between scientists (from the physical, social and economic sciences), users and policy makers. Such efforts need to be complemented with effective “outreach programs” coupled with educational initiatives to help users of relevant climate information to realise its full potential. This will involve giving greater priority to extension and communication activities (including the communication of forecast uncertainties and probabilistic climate information) and improving the relevant institutional and policy environment [10, 12].

5. Way forward

Given the challenges in facilitating greater use of climate information in decision making, setting up the necessary infrastructure, skills and expertise for the provision of comprehensive user-focussed climate services is paramount [4). In this context, the proposed development of a Global Framework for Climate Services (GFCS) to link climate predictions, projections and information with climate risk management and adaptation across the globe is timely. GFCS will help improve access to climate services to those most at risk but are least able to do so. Given the unprecedented challenge of climate change, the success of GFCS and the accompanying national efforts is predicated on significant public and private sector investment in basic research and innovation-driven solutions for the grater public interest [13].

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