

Figure 1. Cumulative Lorenz curve of F-score versus population.

challenges flexibly and responsively tomorrow, there should be a more equitable distribution across geographical regions as well. We see that a large swathe of India – Bihar, Odisha, Jharkhand, Chattisgarh, Andhra Pradesh and the entire

north-east with the exception of Assam – does not have a single premier institution.

1. Prathap, G., *Curr. Sci.*, 2016, **111**(3), 470–474.

2. http://www.excellencemapping.net/#/view/measure/top10/calculation/a_ohne_kovari-able/field/materials-science/significant/false/org/
3. Bornmann, L., Stefaner, M., de Moya Anegón, F. and Mutz, R., *Online Inf. Rev.*, 2014, **38**(1), 43–58.
4. Bornmann, L., Stefaner, M., de Moya Anegón, F. and Mutz, R., *J. Inf.*, 2014, **8**(3), 581–593.
5. Bornmann, L., Stefaner, M., de Moya Anegón, F. and Mutz, R., *COLNET J. Scientometr. Inf. Manage.*, 2015, **9**(1), 61–68.
6. <http://www.scimagoir.com/>
7. Prathap, G., *Scientometrics*, 2011, **87**(3), 515–524.
8. Anon., Digital Science and the Science Policy Research Unit, University of Sussex, December 2015.
9. Stirling, A., *J. R. Soc. Interface*, 2007, **4**, 707–719.

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Micro-level Agromet Advisory Services using block level weather forecast – A new concept based approach

Agromet Advisory Service (AAS) deals with extension agrometeorology and is defined as ‘all agrometeorological and agro-climatological information that can be directly applied to improve and/or protect the livelihood of farmers’¹. AAS has been adopted at district level since 2008 by the India Meteorological Department (IMD) and is continued even now. The district level AAS is provided to farmers making use of medium range weather forecast of the National Center for Medium Range Weather Forecasting (NCMRWF) and IMD. However, the validity of blanket advisories disseminated at district level has limitations, particularly in view of the large variabil-

ity in terms of crops, varieties and spatial weather anomalies at this level.

Keeping in view the recent variability in weather and climate, the Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad pioneered in starting a flagship research programme of the Indian Council of Agricultural Research (ICAR) named ‘National Innovations in Climate Resilient Agriculture (NICRA)’. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. Under the aegis of NICRA, the All India Coordinated Research Project on Agrometeorology (AICRPAM) of ICAR

took up a pilot project during 2010 to develop and disseminate block level AAS through its 25 cooperating centres spread across the country² towards enabling capacity building of farmers for climate resilience. As part of this, AICRPAM initiated block level AAS in Belgavi district of Karnataka through its Vijayapura cooperating centre. However, the forecasts used in this case were also of district level. After three years of experimentation, it was concluded that the district level forecasts were indeed not sufficient to answer the demands of the block level crop and weather variability within the district. To overcome this constraint, special request was made to

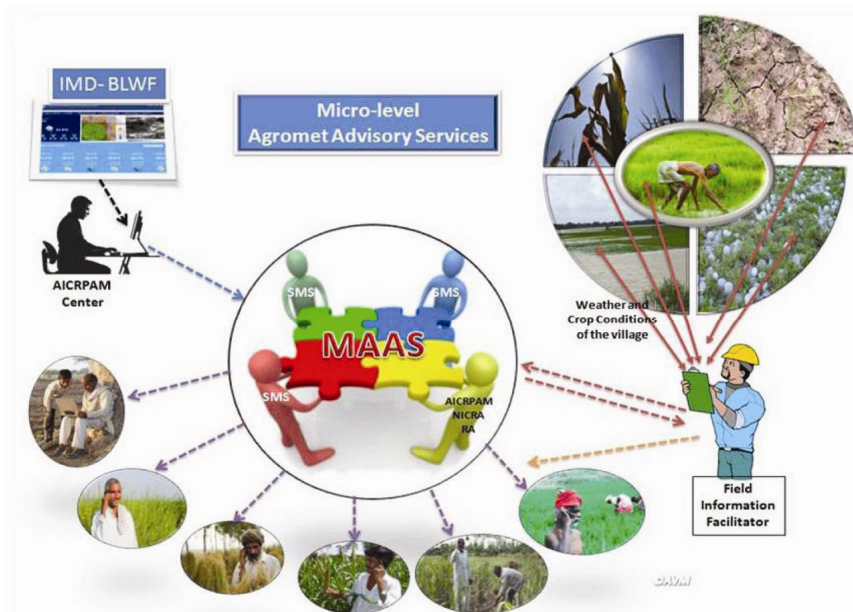


Figure 1. Conceptual diagram of block-level AAS.

IMD to provide block level forecasts for the 25 AICRPAM NICRA districts. Since 2014, IMD is providing 'block level' weather forecast for identified districts.

This has now enabled AICRPAM to ingeniously develop and disseminate AAS at block level through all its 25 co-operating centres and Krishi Vigyan Kendras (KVK) of the respective districts. The conceptual diagram of block-level AAS developed by AICRPAM is presented in Figure 1. Such advisories are now designated as micro-level AAS. AICRPAM centres have initiated micro-level AAS on pilot basis at 50 villages across India under this project in the past two years. The scientific staff receives block level weather forecast from IMD website, and advisories are developed in consultation with Subject Matter Specialists of respective KVKs. Another important and useful concept has been introduced in micro-level AAS in the form of appointing 'Field Information Facilitator (FIF)' to serve as the interface among the farmers, AICRPAM and KVK. Further, FIF collects information (prevailing local weather conditions,

crops and their growth stage, vigour, incidence of pests and diseases, etc.) and disseminates advisories to the farmers. Generally, a young and progressive farmer in the concerned village is identified for this purpose. Feedback from FIF provides real situation at village level based on which and the block level forecast, micro-level advisories are prepared. Thus the Agrometeorologist of the AICRPAM centre develops the Agromet advisory bulletins with the help of SMS at KVK using the field level crop information blended with weather forecasts and communicate to the FIFs by email who pass on the bulletins to farmers. The micro-level AAS is generated in the name of Program Coordinator, KVK and is disseminated by multiple communication modes, viz. mobile text and voice SMS, display at public places, personal contact, etc. The feedback obtained from the farmers is being evaluated for improving and expanding services for the benefit of farming community. The monetary benefits from this AAS ranged from a few hundred rupees to a few thousand rupees per acre depending on the crop and weather situation. Accurate

forecasts and their timely dissemination aided in curtailing the crop losses due to adverse weather. Losses were also reported on occasions due to erroneous weather forecasts.

The methodology can be up-scaled to national level by utilizing the already established infrastructure and human resource by establishing linkage with line departments, state agricultural universities and KVKs established in the country. The next improvement in AAS will be through downscaling AAS from block to village level, for which this methodology will serve as a template, but automation will be required for such a gigantic process.

1. Stigter, C. J., Agrometeorological services: Reaching all farmers with operational information products in new educational commitments, CAgM Report 104, WMO, Geneva, Switzerland, 2011.
2. Rao, V. U. M., Bapuji Rao, B., Sarath Chandran, M. A., Vijayakumar, P. and Rao, A. V. M. S., AICRPAM-National Innovations on Climate Resilient Agriculture, Annual Report 2015-16. ICAR-Central Research Institute for Dryland Agriculture, Santoshnagar, Hyderabad, 2016, p. 52.

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