

VARUNA MITRA

INTRODUCTION

In India, farming is highly vulnerable to vagaries of weather, largely due to severe fluctuation in monsoon cycle in the region. Deviation in weather, from normal condition, is bound to affect the agriculture and allied activities negatively and in turn the socio-economic life of the dependent population. Understanding the timing, duration and intensity of the monsoon fluctuation is vital for effectively managing many of these sector-specific activities.

In view of its importance, India has had a tradition of undertaking monitoring and forecasting of the weather situations and advising the concerned stakeholders through meteorological forecasts, alerts, early warnings and advisory communication. However, weather condition being local or area specific, higher the resolution of data, better would be the benefits from such weather related communication services.

Agriculture and allied sectors, on which majority of India's population depends for income and employment will stand to benefit immensely from these services. Further, the weather information and forecast services are of great importance in planning and managing the activities of various other sectors including Industries, Urban Development, Disaster Management, etc.

Accurate weather information and related advisories with high spatial and temporal resolution can result in improved decision-making and management of agricultural risks by farmers. Such services help in developing sustainable and economically viable agricultural systems, decrease in use of plant protection chemicals, reduced input costs, losses and risks, improved production and quality, increased use efficiency of water, labour and energy and conservation of natural resources.

Weather information plays a major role in the entire crop cycle right from selecting suitable crop/variety up to post-harvest operations and marketing. Hence, the

meteorological services can help the farmers exploit the potential of good weather and minimise the impact of bad weather on day to day basis as well as long term planning in agriculture.



Fig 1: Different stages of the crops in the field

Precise Weather information is useful for farmers in two different ways.

1. Weather-based strategic agronomic planning resulting in improving yield:

For optimal productivity at a given location, crops and cropping practices must be such that their cardinal phased weather requirements match the temporal march of the relevant weather elements, and at the same time endemic periods of pests, diseases and hazardous weather are avoided. In such strategic planning of crops and cropping patterns, short period weather data, both routine and processed (such as initial and conditional probabilities), have a vital role to play.

2. Minimizing Crop loss due to occurrences of erratic and adverse weather:

Agronomic strategies have to be devised to cope with the effects of erratic and adverse weather on agricultural production. For example, delay in the start of crop season can be countered by using short duration varieties of crops and thicker sowings and the effects of frosts can be prevented by resorting to

irrigation or lighting trash fires. Medium range weather forecasts with a validity period that enable farmers to organise and carry out appropriate cultural operations to cope with, are clearly useful.

It is a common experience that required precise information about the weather is not available, on real/near real time, to the community and response players. It takes long time to obtain the data and lot more time to integrate and generate information/reports/advisories. It is estimated that 40% of the time is spent on searching for the source for information, 30% of time is spent on waiting for the information to arrive and another 30% of the time is spent in understanding and customizing to the users requirement. Therefore, providing timely precise information to the end user will be a key. If the information is provided well in advance, it will help to ease the situation further.

In order to capture the variation in the weather condition and in turn to cater to the needs of weather information to different sectors, including the farming sector, a unique model of Meteorological Advisory Services has been designed, developed and operationalised in the state by KSNDMC. This model is unique in many ways and addresses all the aspects of lab to land concept and caters to the real needs of different communities across the state. One of the important component of the system is information dissemination System Varuna Mitra.

24 x 7 interactive Help-Desk VARUNA MITRA - 9243345433

To disseminate the Agro-Met information, forecast and advisories directly to the farmers, a 24x7 Interactive Help Desk “VARUNA MITRA” has been functioning in Karnataka at KSNDMC. Some of the unique features of this dissemination model are,

- The farmers can get the information on what they need and when they need.
- Provides weather Advisories directly to the farmers through interactive telephony in the language and frequency a farmer can comprehend.

- Information on rainfall, temperature, humidity, cloud cover, wind speed and weather forecast is made available at Grama Panchayat level (highest spatial resolution in the country at present).
- The information and Advisories are based on high spatial and temporal resolution ground level weather observation and same resolution weather forecast.
- Alerts on extreme weather events, information on reservoir status, stream flow etc., are also made available to the users.
- Voice recording of each call is used to improve the service and also to address the complaints.



Fig. 2: VARUNA MITRA Help-Desk Schematic functioning at KSNDMC

The farmers have been calling Varuna Mitra and collecting customized information pertinent to their respective Gram Panchayats and using the information and advisories for planning their agricultural activities starting from land preparation, sowing, inter-crop cultivation, application of fertilizers, spraying pesticides and harvesting. Though it is not a Toll-Free service, the number of calls have been

increasing annually and lakhs of farmers are seen to be benefitting from the Varuna Mitra Services.

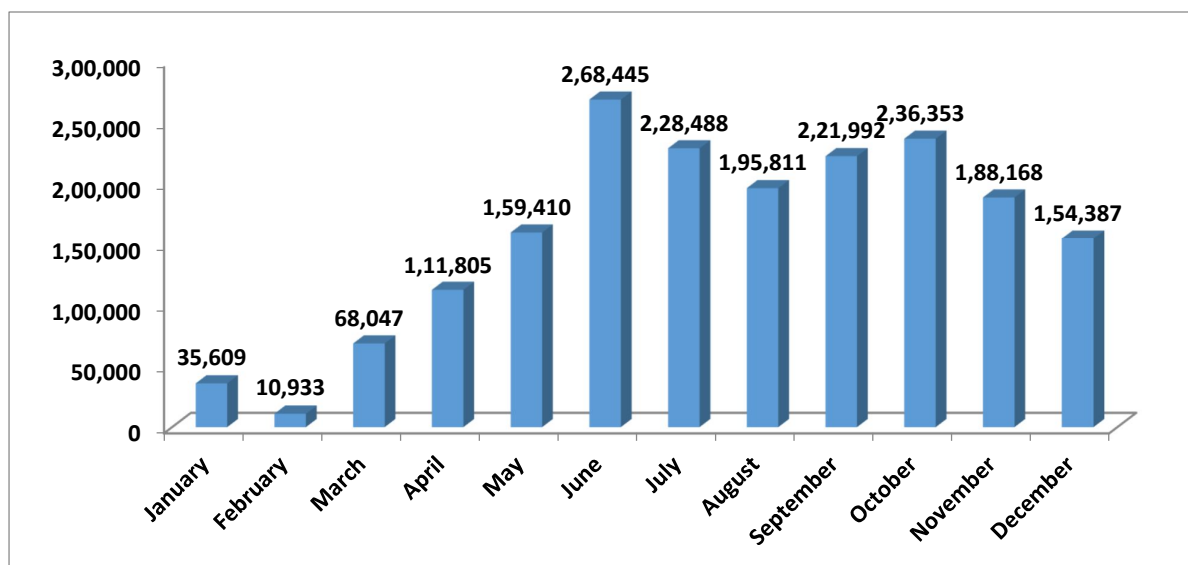


Fig.3: Month-wise Call details for the year 2022

How does VARUNA MITRA help the farmers?

Varuna Mitra virtually guide the farmer to choose the right time to carry out necessary activity in the field using the output from different types of forecast products available for different periods like short, medium & long term predictions. Some of the examples are as follows.

Sowing: The farmers go for sowing by anticipating the Southwest monsoon sets in the normal course and they get seasonal rainfall in their area. But, if there is a delay in the on-set of monsoon and its advancement to the interior regions, the sowing will be a waste and the farmers have to sow the same crop again or some time even have to choose a short-term variety depending on the sowing-window available in that season. Farmers take the advantage of medium-term forecast provided by Varuna Mitra and choose the right time to take up sowing and are successful.

Pest Control chemical (PCC) Application: Pest and insect attack is one of the hazards the farmers face during the season. To protect their crop, farmers spray different Pest Control Chemicals, depending on the crop and also stage of the crop. The application of PCC will be effectiveness only if it done at right time. If there is an overcast weather (cloudy) or windy or there is even a drizzling will diminish the effect of the chemical applied. It is always ideal to apply the PCC during a sunny day. Otherwise the farmers have to redo the PCC application which increase the input cost, waste of time, energy and material. Just by making a phone call to Varuna Mitra, farmers choose the right day and time for effective PCC application and successfully protect the crop.

Irrigation: By taking the rainfall forecast for the next 3 days or 10 days farmers can decide on supplementary irrigation. If the crop is going to suffer due to soil moisture stress and if there is no possibility of rainfall in the next few days, the farmers irrigate their crop either pumping the water from the bore-well or farm pond or canal etc. If there is a prospect of rainfall, then farmers withhold giving supplementary irrigation. It will save them the cost towards electricity / diesel used for pumping the water from the well, secure the most precious natural resource, water for later usage. All this is possible just through a phone call to Varuna Mitra.

Harvesting: one of the most risky phase in a crop calendar is harvesting. After a lot of hard work farmers grow the crop by nurturing it carefully. Just because of some weather aberration if the crop is lost just during harvesting, then it will be devastating for the famers. If the crop is lost in the early or mid-stage in the crop calendar, an alternate crop can be grown. But if the full grown crop is lost during harvesting stage then everything will be lost and there is no alternate for the farmer but to wait for the next season. The Varuna Mitra services has been helping the farmers to right time harvesting so that their crop is well secured from the weather aberration, if any.

Impact of VARUNA MITRA services on farming in Karnataka

Through Multistage random sampling technique a study has been carried out to evaluate and assess the Impact of Varuna Mitra help desk services on the farmers. The assessment was carried out by directly contacting the farmers in three districts in three regions, with High Rainfall (>1200mm), Moderate Rainfall (600-1200mm) and Low Rainfall (<600mm) based on the annual rainfall which represents 8 of the 10 agro-climatic zones of Karnataka.

In this evaluation, the impact of Varuna Mitra services was assessed on cost of cultivation, yield, income and post-harvest losses was estimated, considering two situations, namely, with and without weather information from KSNDMC. The difference between the decision taken with-information and without-information was expressed in physical and monetary values, which has been considered as an incremental change, which can be positive or negative depending on the impact indicator. Reduction in cost of cultivation, increase in income (attributed to increase in yield and price), increase in yield and decrease in post-harvest losses is considered as gain, whereas increase in cost of cultivation, decrease in income, decrease in yield and increase in post-harvest losses was considered as loss.

Overall impact was estimated by aggregating the stage-wise impact to arrive at per acre and per farm impact by using the information provided by Varuna Mitra. Finally, the impacts were presented in terms of two indicators, namely (i) Net gain or loss using the results of cost of cultivation, net income and post-harvest losses and (ii) Yield.

The results showed that the performance of the Helpdesk has been impressive. This is evident from the increase in number of calls since its inception, from a meagre 6,585 in 2011 to 18.79 lakh in 2022 which is increasing at a Compound Annual Growth Rate (CAGR) of 67.19 per cent.

In terms of frequency of calls during the extreme weather conditions like drought and / or Flood years, it was found that the number of calls increased with the increase in number of districts that experienced drought or flood. During 2022, the state experienced excess rains in both Southwest and Northeast monsoon seasons over the State, resulted in severe floods in many parts of the State, due to this excessive and continues rains; VARUNA MITRA received 18.79 lakh calls mainly from the farming community. Further the number of calls went up to more than 10 thousand in a single day many times during the season.

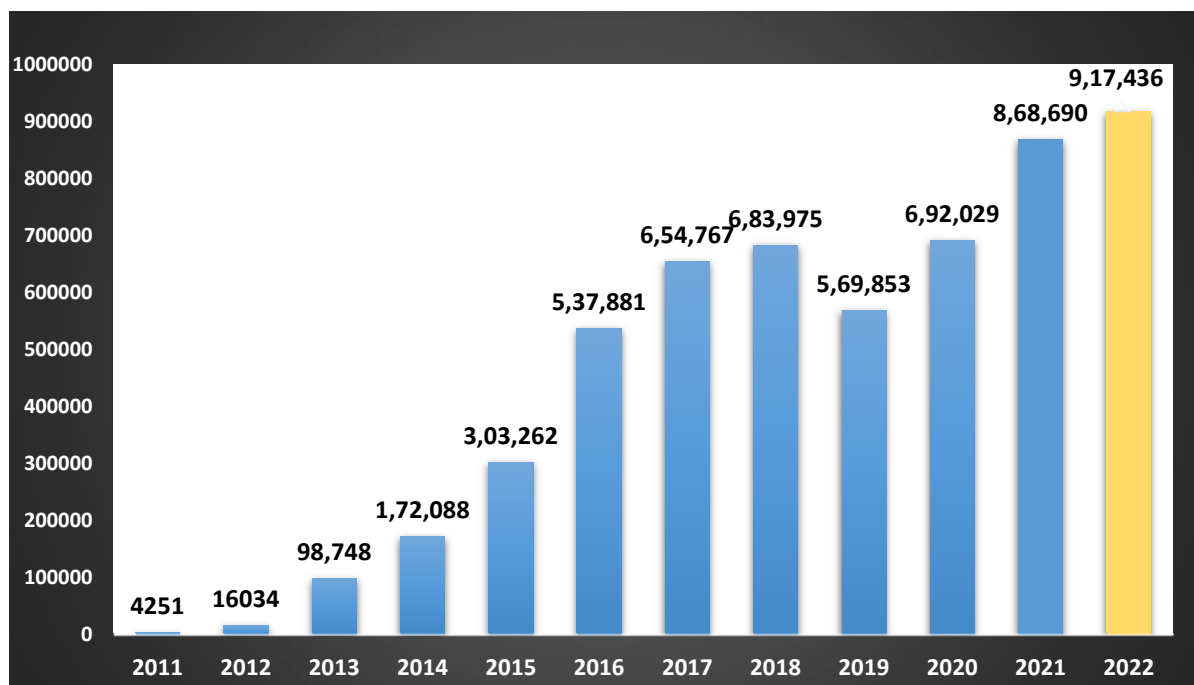


Fig.4: Year-wise Call details from 2011 to 2022

Among the queries made, above 95 per cent of queries were with regard to rainfall and / or weather related which is a very crucial input for planning or executing agricultural operations and securing the standing crop. Of the various purposes for which the calls were made, majority of the farmers sought information relating to agriculture (90.39 per cent), followed by horticulture (8.65 per cent), animal husbandry (0.39 per cent) and sericulture (0.57 per cent).

Almost all the farmers preferred getting necessary information through direct interaction in the local language (Kannada) over the phone as it would facilitate in clarifying doubts, besides raising the confidence level of the information received during the course of the interaction. Each farmer collecting information from Varuna Mitra in turn shared the information with at least 10 farmers in his/her area. Most of farmers across seasons opined that the quality of calls was good. A majority of farmers sought short term rainfall forecast for one to three (1-3) days and indicated a wide range of accuracy levels of these predictions. Overwhelming proportion of farmers (62.50 per cent) indicated that the accuracy of prediction realised was to the extent ranging from 60 to 90 per cent.

Farmers contact Varuna Mitra at different stages of crop cultivation from sowing to harvesting. Most of the farmers have reported that as a result of using the advisories given by the Varuna Mitra, there is a considerable decrease in input cost, increase in yield decrease in post-harvest losses and resultantly there is an increase in Net Income.

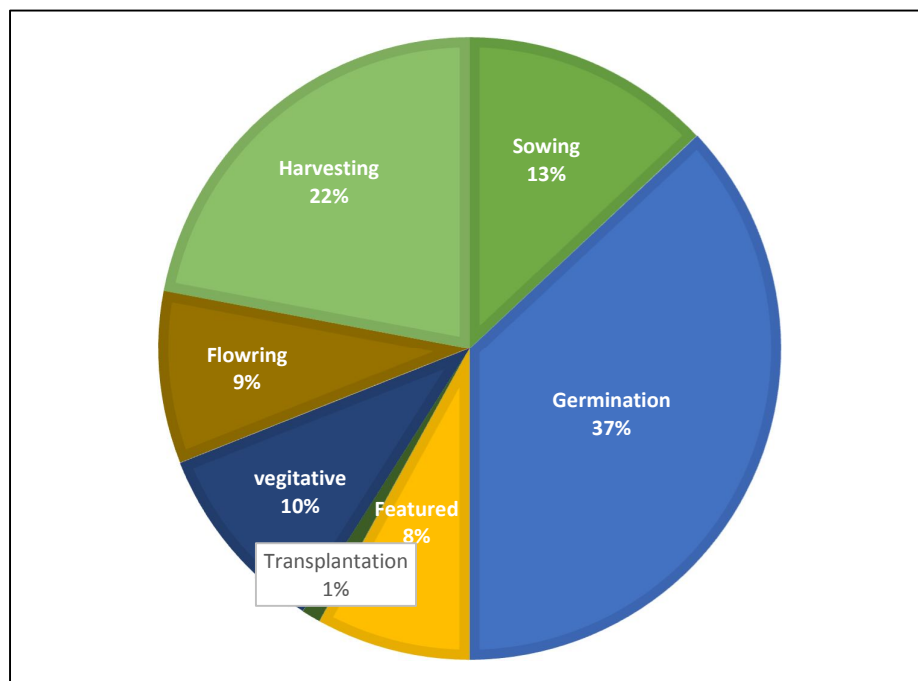


Fig.5: Farmers using VARUNA MITRA advisories at different stages of the crop calendar

Therefore, meteorological services provided by Varuna Mitra with a bouquet of information consisting of alerts, early warnings, forecasts, and advisories based on the ground level observation at a very high level of spatial and temporal resolution have proved to be effective. The farmers and other stakeholders have found these inputs to be highly valuable in planning and execution of suitable crop management strategies at micro-level.



Fig.6: Meteorological services provided by VARUNA MITRA

The assessment of the Agro-Met Service Model adopted in Karnataka shows that it is helping the farmers in their agriculture as well as allied activities. This model should be customized and emulated in other parts of the country as a useful component of the strategy for doubling farmers' income.

There is scope to replicate a similar institutional mechanism for providing sector-specific Meteorological Advisory Services in respect of non-agricultural economic activities as well.

CONCLUSION

Farming, in tropical regions like India, is highly vulnerable to vagaries of weather, largely due to severe fluctuation in monsoon cycle in the region. Deviation in weather, from normal condition, is bound to affect the agriculture and allied activities negatively and in turn the socio-economic life of the dependent population. Monitoring and forecasting of the weather condition and advising the concerned stakeholders through meteorological services in the form of forecasts, alerts, early warnings and advisory communication will help immensely to take appropriate measures minimise the loss.

The 24x7 interactive meteorological service platform Varuna Mitra operational at KSNDMC has been providing meteorological information and advisories to the stakeholders, especially the farming community in Karnataka. Lakhs of farmers have been making use of the services for minimising the possible crop loss due to adverse weather condition and on the other hand enhancing crop productivity during favourable weather condition.

Southwest Monsoon (June-September) seasonal rainfall contributes more than 70% of the annual normal rainfall in the State and the major agricultural activities will be taken during the season and the farmers dependency on Varuna Mitra inputs were increasing year by year for better farming. During the last twelve years (2011-2022), the farmers interacting with Varuna-Mitra increased by (CAGR) of 63.0 per cent.

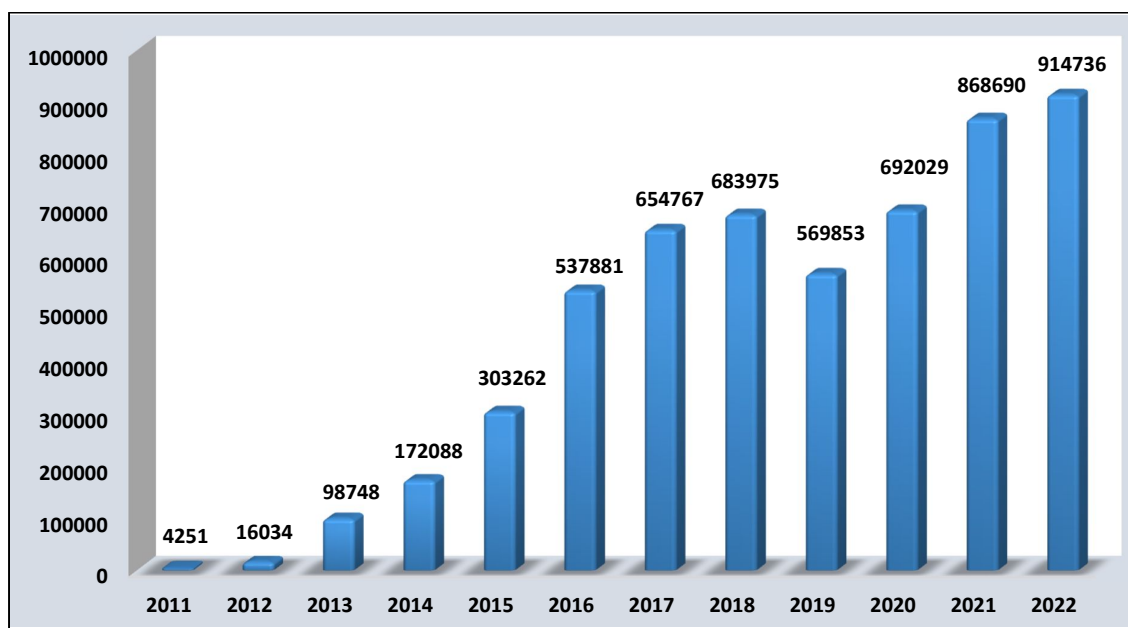


Fig.7: Year-wise Southwest Monsoon (June- September) season call details from 2011 to 2022

As farmers are interacting with VARUNA MITRA on day-to-day basis and sharing their experiences with respect to Agricultural activities in their own farm field and around, the information gathered through the system also being used as a mechanism to monitor, access and manage the intensity, spread and impact of Drought at micro-level in the state.

The VARUNA MITRA Meteorological Services Platform successfully functioning for more than a decade is an exemplary system in this field in the country. Implementation of similar system in other states in the country would help to minimise the burden on the Agriculture and allied sector and also would assist in enhancing the Farmer income and thereby improving the farmer's livelihood.