

## 1. Development of transformative index-based crop insurance solutions using geospatial technologies

### Aim

The existing crop insurance scheme guarantees a certain percentage of normal yield in an insured area. Its major drawback is the lack of reliable yield data. The scope for improving the crop yield estimates to suit the requirement of crop insurance is limited due to various challenges. Therefore, an alternate approach is required to link insurance payouts to crop performance proxies rather than measured losses. Using the massive repository of earth observation data, weather stations, and Mobile Apps, a composite index of crop performance was proposed to replace the yield data in the existing crop insurance scheme.

### Scope

A composite index of crop performance called 'Crop Health Factor (CHF)' was synthesized from the proven crop condition-related indices – Normalized Difference Vegetation Index (NDVI), Land Surface Wetness Index (LSWI), Cross-polarized (VH) backscatter from Synthetic Aperture Radar (SAR) data, Fraction of Absorbed Photosynthetic Active Radiation (FAPAR), Rainfall, etc. CHF data was generated for all the Insurance Units for the current and past years (Fig.1). CHF values range from 0-1 and are directly proportional to crop performance. All possible crop risks are accounted for in CHF. Deviations in CHF and yield between the years showed a good correlation.

This new approach was implemented for jute, paddy, and potato crops in West Bengal in the 2021-22 season and is used with slight improvements in 2022-23. The crop loss assessment and insurance payout in the new method is given under, for paddy crop -

*Claim payable =  $\{(Threshold\ CHF - 2020\ CHF) / (Threshold\ CHF)\} * Sum\ Insured\ (min.\ of\ 0)$ , Threshold CHF is 90% of normal CHF*

The approach was well accepted by the Department of Agriculture, Cooperation and Farmers Welfare (DACFW), Ministry of Agriculture, and Farmers Welfare and agreed to up-scaling to the national level.

### Current constraints / Challenges

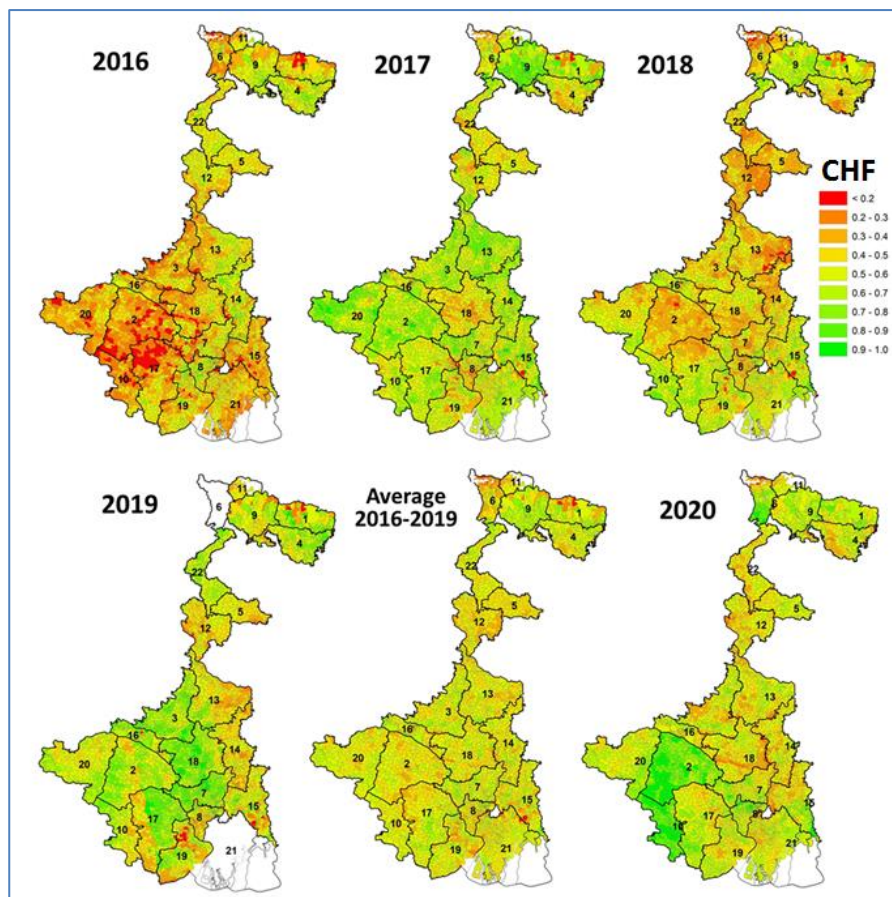
The major challenges for implementing the current approach are the generation of crop-specific maps for current and historical years at medium resolution (10-30m) and also non-availability of cloud-free satellite datasets. These can be addressed by multi-year crop mapping using medium-resolution satellite data and incorporating SAR-based crop growth proxies.

## Expected outcome

The new methodology is recognized as the country's first-of-its-kind *transformative crop insurance solution*. It is planned to demonstrate the CHF-based crop insurance at the national level for all major crops like Paddy, Wheat, and Potato. The upscaling will be beneficial in the reduction of the premium rates and transaction costs while enhancing transparency, objectivity, and timeliness in claims settlement.

## Time frame

The up-scaling is planned for the next 2-3 years.



CHF maps of Aman Paddy in West Bengal showing temporal changes in crop performance in different Insurance Units