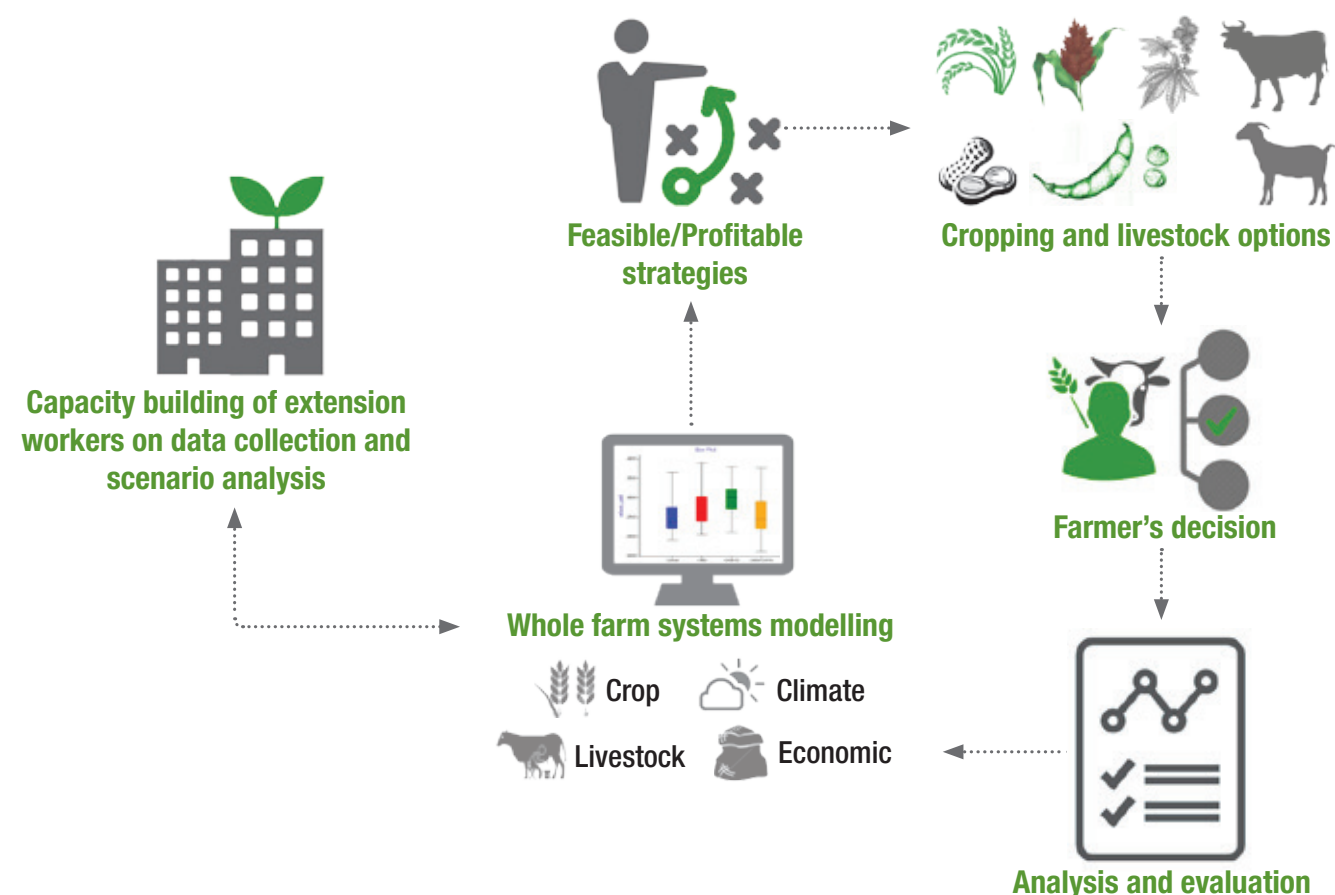


## Whole farm simulation model

Integrated Assessment Tool



**Project:** ICAR-ICRISAT Systems Modelling Project – Integrating Systems Modelling Tools as decision support for scaling up climate smart agriculture (CSA)  
**Funder:** Indian Council of Agricultural Research (ICAR), CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and Grain Legumes and Dryland Cereals (GLDC)  
**Partners:** 12 Krishi Vigyan Kendras from ICAR in Telangana, Andhra Pradesh, Maharashtra and Tamil Nadu  
**CRP:** CCAFS and GLDC

### Further Reading:

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2. Kumar Shalander, Sravya M, Pramanik S, DakshinaMurthy K, Balaji Naik B, Samuel J, Di Prestwich and Whitbread A. 2017. [Potential for enhancing farmer income in semi-arid Telangana: A multi-model systems approach](#). Agricultural Economics Research Review. 30 (3) conference issue, page 300, ISSN : 0974-0279.
3. (APSIM, Holzworth et al. 2014), <https://www.sciencedirect.com/science/article/pii/S1364815214002102>
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For more information

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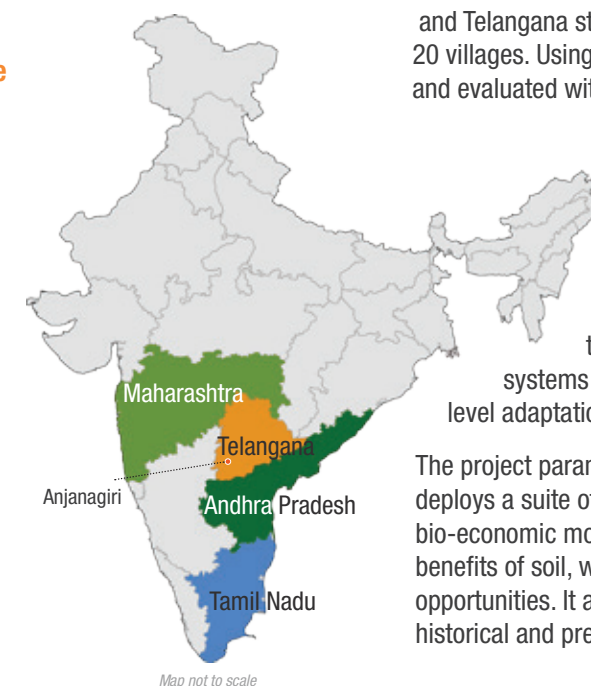
## The potential of systems modelling to inform farm decisions for higher resilience and profit

Mid-monsoon as you drive into Anjanagiri village, everything looks green, thanks to a rainy spell. Talk to the farmers and a different story of water scarcity and poor quality seed unfolds.

### Common challenges farmers face

- ▶ Unpredictable rainfall
- ▶ Water scarcity
- ▶ Poor quality seed
- ▶ Insufficient fodder
- ▶ Gender issues

This Indian village in Telangana State with 150 families was selected for pretesting a questionnaire developed by ICRISAT to gather data to run a whole farm simulation model. The Indian Council of Agricultural Research (ICAR) is playing a key role in this project to help farmers take informed decisions.



### Capacity building of extension system/agencies

Enumerators from 12 Krishi Vigyan Kendras (KVKs) of ICAR in Tamil Nadu, Maharashtra, Andhra Pradesh and Telangana states were trained to gather data from 20 villages. Using the data, scenarios will be generated and evaluated with KVKs and farmers.

### About the ICAR-ICRISAT Systems Modelling Project

The major aim of the project is to enhance the capacities of partners and stakeholders in identifying key opportunities for market-led transformations and for enhancing farming systems resilience to enable household or community level adaptation.

The project parametrizes an integrated system model which deploys a suite of tools such as farm systems models, household bio-economic model and value chain model to capture the benefits of soil, water and fertilizer management and market opportunities. It also integrates Climate Risk Analysis using historical and predicted future climate data from study locations.

Collage: Meeravali SK, ICRISAT



# How systems modelling can help farmers take informed decisions

Challenges

It's all gone...  
all that I have  
sown is gone!

## Unpredictable rainfall, spells crop loss

In 2018, the monsoon arrived on time and this woman farmer sowed rice, castor and sorghum. A dry spell thereafter wiped out everything except the sorghum.



Water scarcity  
is the biggest  
problem

## Water scarcity dries up farm returns

There is no river or lake in the village vicinity. Bore wells and farm ponds dry up quickly. Attempts at digging farm ponds in the village were a dismal failure.



The groundnut  
I am growing is  
yielding less

## Crops fail due to poor quality seed and knowhow

Farmers say that in a bad season, rice is not profitable, castor brings in some income, while sorghum provides food. However, groundnut growers say that even with good rain the yield is bad.



In summers  
we have to  
buy fodder

## Insufficient fodder for livestock

Livestock farming, especially rearing cows and water buffaloes is on the decline, while small ruminants like sheep and goats are favored.



Weeding is  
always a  
woman's job

## Gender issues

While women say they are consulted on farm decisions, they never get to handle any money. In addition to child rearing and household work, women often taking up back-breaking farm jobs like weeding.



## Minimizing shocks

Scenario analyses using models and historical weather information and practices can inform farmers' decisions to better manage risk. A whole farm analysis using historical data can suggest which combination of enterprises (crops and livestock) can result in stable returns and minimize shocks in bad seasons.

## Investment analysis

For digging a farm pond, the optimal size, appropriate location and lining of the farm pond needs to be decided depending on farm size, rainfall, slope, soil type, etc. The model provides scenarios as to what combination of crops will make the investment on digging a farm pond profitable.

## Customized options

When a new variety or crop is available, the model can reveal the potential returns from it when compared to the old one. Various scenarios with varying parameters such as different time spans, with or without livestock, climate variability, market price fluctuations and labor availability can be created.

## Livestock integration

Livestock play a critical role in dryland farming, especially small ruminants. Modelling the various options can assist in deciding which breeds of animal and how many of them (i.e. the size of the herd) might be profitable to a particular farmer.

## Reducing drudgery

The model can run scenarios on the cost economics of mechanized weeding with the adoption of row planting. In cases where women take up labor jobs in the off-season, the model can show scenarios if substituting labor jobs with livestock rearing can bring in better returns to the farm as a whole.

Solutions