

*Magazine on Low External Input Sustainable Agriculture*



# LEIS INDIA



**Climate change and  
agroecological approaches**



*Growing drought resistant seeds reduces climate risks*

# Developing climate resilient farming

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*Small farmers in Bundelkhand are adopting agricultural systems that cope with climate change, with support from Development Alternatives. The initiatives undertaken at the farm level and landscape level, are being upscaled building long term sustainability of climate resilient agriculture systems in Bundelkhand.*

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**A**griculture has a high degree of sensitivity to both short-term weather changes and long term seasonal changes. Agricultural productivity is impacted by changes in temperature, precipitation and carbon dioxide levels as well as infestation by pests, diseases and weeds. Economically, it has an impact in terms of profitability, prices, supply, demand and trade. In the long run, such impacts could disturb development processes and food security.

Bundelkhand, due to its rugged, ravenous, undulating terrain is among the most vulnerable regions in India. Repeated droughts have severely affected the livelihoods, the agricultural practices and the livestock in Bundelkhand. Nearly 80% of the farming households own less than two hectares. Heavy dependence on a climate sensitive sector as agriculture has made Bundelkhand, a high risk region.

Farmers in Bundelkhand have been practicing traditional methods of cultivation that are rendered insufficient in the current global environmental scenario. They also rely on market forces for decision making, leading to poor economic choices. As government efforts haven't been able to reach them, Development Alternatives (DA) has been promoting initiatives to address issues, which Bundelkhand farmers face due to climate change.

## Perspectives from the ground

Studies done by DA have revealed that the farmers in Bundelkhand do perceive the decrease in the number of rainy days and gradual rise in temperatures in summers, when compared to previous years. They complain of the decrease in the number of days in winter affecting the wheat cultivation. Traditional knowledge methods are still dominant to address the climate impacts. Due to decreasing productivity in agriculture, a lot of young people are migrating in search of jobs to the urban areas.

Farmers are aware and feel unhappy about the environmental degradation owing to overuse of forest resources. But, they find no means to address or complement their livelihood needs. It has been a general refrain among the populations of Bundelkhand that deforestation is a cause for a lot of their issues.

## Action framework

There are three primary phenomena that reflect the potential impact of climate change on agriculture. These are water scarcity; weather aberrations like untimely rainfall and extreme weather events like droughts and floods. These phenomena manifest into production loss or/and crop failure in the agriculture systems of the country.

DA takes two-pronged approach for building resilience in agriculture systems and building mechanisms to cope with or reduce the impact of climate change in agriculture systems:

### 1. *Efficient use and management of water at farm and landscape level*

This includes systems and steps for water conservation and management, in order to build and rejuvenate the existing water resources of the region. Further to the water resource management at the landscape level, this component includes efficient and equitable use of water resource at the farm level; this means distribution and optimal use of water for irrigation at one time but mechanisms and means to manage with limited or excess water due to untimely events or extreme events, where drought is a regular phenomenon in the region.

### 2. *Agriculture technology models that reduces risks to incomes dependent on agriculture production*

DA promotes models in agriculture such that the chances of total crop failure income loss are at the minimum. This includes models that promote diversification of production and also use technologies that are more suitable to the drought and other extreme weather conditions in the region.

## Key changes in practices

Some of the key changes in practices through DA's intervention are:

**Improved seeds:** Small and marginal farmers have tried improved seeds/change of seeds after introduction of TAG-37, TG-41 for groundnut and Swarna (HI 1479), Poorna (HI 1544), Naveen Chandawari (HI 1418), Vidisha (DL 788) for wheat. These are better quality, disease resistant varieties and help in change of seed pool in case of repeated cultivation of the same crop. The estimated increase in yield potential was around 20% owing to introduction of new variety.

**Line and dry sowing** was not a common practice in the area prior to DA's intervention. Dry sowing for wheat was also a new practice that was introduced. Despite general lack of acceptability of practice, farmers who had tried this under expert supervision reported positive results in terms of production and weed control. Impact of dry sowing not only reduced the water requirement, approximately by 30 per cent (of single irrigation) but also had positive influence on the production – its impact was found to be 29.4 per cent increase in production.

**WADI model** has helped tribal communities of Bundelkhand use their under-utilised resources for sustainable small farm based livelihoods. The practice of agro-forestry has enhanced livelihood security through the creation of multiple revenue streams for the farmers. Major interventions under this agri-horti farming model include horticulture plantation, soil conservation, water resource management, development programmes for women and drudgery reduction activities for increased resilience against variable climatic conditions.



Farmers practiced line sowing for better water efficiency and productivity

Photo: Development Alternatives

***"These farm bunds have helped the farming community greatly"***

One of the major highlights of the soil and conservation works under the project has been the development of farm bunds on 60 fields with 50 per cent contribution from the farmers. On realising the positive results on local ecosystem and agriculture by check dams and gabion structures developed in Year 1, the farmers expressed interest in infrastructure and land treatment on their own farms that would reduce water and soil erosion.

The possibilities were discussed in meetings of the farmer clubs and village development committees. The project team suggested the development of farm bunds with 50 per cent contribution from the farmers. These structures would not only ensure the retention moisture on farm fields even after monsoon and but also prevent running water in the water channels from damaging their crop. A total of 60 farmers invested INR 64,000 in the development of

farm bunds on their fields to positively affect 30 acres of land. This is an achievement as it demonstrates that farmers value the need to invest in the restoration and management of natural capital. All 60 farmers now report at least 10-20 per cent benefit in agri returns from reduced erosion on their fields.

Kashiram Kushwaha from Pipra village says: *"Since my farm is next to the water drain line, often post the monsoon, I would not be able to take an extra crop because the running water in the drain used to wash over my crop leading to loss in investments. This year, owing to the farm bunds, the running water did not damage my crop and I was able to take an extra vegetable crop in the summer season helping me earn an extra income of INR 15,000".* He further added, *"These bunds have not only helped me but all the farmers whose lands are next to the drain."*

This model reduces climate risks, regenerates production potential of the land and ensures that farmers enjoy a regular flow of income due to diversification of production. There has been a 25% increase in farm returns and more than 700 acres are under climate resilient farming with 80% reduction in migration amongst the beneficiary population. An important co-benefit of a Wadi is that it contributes to climate change alleviation by converting atmospheric carbon into tree biomass and soil carbon that act as long term carbon sinks.

Some of the other interventions with promising results for climate adaptation include use of organic fertilisers accompanied by the minimal use of chemical; mixed cropping; use of optimal seed rate ensuring optimal density of plants, dry sowing and line sowing, new variety of treated seeds preventing crops from fungal and viral attacks; raised bed cultivation with bio-measures having desired effect on the yield.

### **Reaching out and scaling up**

In order to expand and take these climate resilient models across the population of Bundelkhand and to sustain the intervention of adaption and resilience building in agriculture, Development Alternatives adopts three pronged strategy: communication of climate change information at

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the grassroots through Community Radios, building farmer based community institutions like Harit Kisan Mandal and climate adaptive planning at Panchayat level, to ensure effective management and conservation of the environment at the village level.

Through series of initiatives, Development Alternatives have brought the cumulative water harvesting potential to approximately 135 million litres each year, which is about 30 per cent of the rainfall received in this area. The cumulative area under direct action reached up to 31,500 hectares to cover 14,000 farmers, in 250 villages of 11 administrative blocks. In the coming year, Development Alternatives aims to work with communities in Bundelkhand in setting up local institutions to promote and facilitate widespread adoption of climate resilient and sustainable agriculture practices across the region and making these the 'new normal'.

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