Global Water Partnership South Asia
India Water Partnership

Development Alternatives

# Farmer's Training

# On

# Climate Resilient Farming Practices For Soil and Water Conservation

**Venue: Farmer Training Centre, Pahuj**
**Date: 04-03-2014**

## TRAINING REPORT

## Snapshots of the Training

**Women farmers learning about farm bunding & rain water harvesting for soil & water conservation**

**Elderly farmer sharing his experiences of climate change impacts observed by his community over last 30 years**


**Scientific experts from NRCAF, KVK & CSWCRTI**


**Interactive powerpoint presentations educating the farmers on climate resilient practices**

## Introduction

Water resources in semi-arid region of Bundelkhand are scarce due to scanty rainfall and high evapo-transpiration rate. It is estimated through climate data analysis that the precipitation distribution and pattern will vary from normal in the future scenario. Water use and demand have been growing with increasing population in the recent time although simultaneously the resource quality and quantity has subsided. The variable rainfall pattern, land use change and high run off rates along with over exploitation and poor management poses threat to ground water resources. Farmers in particular face the challenge of accessing an increasingly scarce resource, groundwater levels are falling further each year. Along with the variable rainfall patterns, geological and topographical conditions make Bundelkhand region prone to water shortages. In most parts of the region, an impermeable rocky layer is found at fairly shallow depths. Low capacity of natural water recharge in the subsoil in most of the areas of Madhya Pradesh is also of concern. Water availability from aquifer is inadequate and non-dependable.

Additionally, Bundelkhand region is rocky and has a high percentage of barren and uncultivable land. 13 districts of Bundelkhand region consists of 7.08 million hectares of ravenous and undulating terrain, making the region prone to high run-off rates and loss of soil fertility[1] . Above an impervious layer of rock that is found at depths of 6 to 15 metres, several kinds and grades of soil are found across Bundelkhand .Broadly, the soil falls into two categories: red soil and black soil. Across Bundelkhand, soils of both categories have poor organic content.

Both soil and water resources play a crucial role in determining the fate of agriculture sector which is central to the livelihoods of communities in Bundelkhand farmers. Agriculture- a climate sensitive sector is affected by variable weather conditions, extreme events which further influences th economy of the region. Resource limitations of water and soil fertility in the region further aggravates these issues. Therefore, it is extremely important for farmers to conserve their natural resource base and increase their resilience against climate change sensitivities.

Understanding the importance of climate change adaptation measures, a **one day farmer's training** workshop was organised **by Development Alternatives with support of India Water Partnership and Global Water Partnership on 4th March, 2014.**

[1] Report on Drought Mitigation Strategy for Bundelkhand Region of Uttar Pradesh and Madhya Pradesh, Inter Ministerial Central Team, Government of India, 2008

## About the Training

One day farmer's training on **"Efficient Water and Soil Management Practices for Climate Resilient Agriculture"** was organised in Environmental Training and Resource Centre of Development Alternatives- **TARAgram Pahuj**. More than 50 farmer participants from Datia block of Datia district of Bundelkhand were trained on soil and water conservation practices for sustainable agriculture. Furthermore, the farmers were made aware about various government schemes and programmes which play an important role in climate proofing the region. Participants in the training workshop included small and large scale farmers, women, youth and elderly farmers.

Scientific experts from different research institutions such as National Research Centre for Agroforestry, Central Soil & Water Conservation Research & Training Institute, Krishi Vigyaan Kendra, India Water Partnership and Development Alternatives trained the farmers on efficient farming practices for climate smart agriculture. Furthermore, the scientists also discussed about climate change, its impacts and the importance of climate change adaptation. These discussions were facilitated to increase the climate change understanding of farming communities.

Objectives of the training workshop were as follows:

- To increase the climate change understanding of farming communities in semi-arid region of Bundelkhand
- To educate the farmers on climate change adaptation and increasing their adaptive capacities against climate risks
- To train the farmers on innovative low input technologies for soil and water conservation

The strategy employed at the workshops included providing both theoretical and practical experience to the attending participants. The participants learned about the fundamentals of climate change as well as directly learned about different adaptation strategies through field demonstration and exposure visit in the Demonstration and Training Resource Centre-TARAgram Pahuj. **Visual presentations and pictorial methods** were used to explain various concepts to the participants. This workshop also provided a platform for knowledge sharing and exchange of experiences between famer participants from different villages of Datia block. Several success stories were also shared by different speakers to motivate the farmers for adopting best adaptation practices.

### Welcome Address by Mr. Avaninder Kumar, Development Alternatives

Mr. Avaninder introduced agenda of the event and welcomed all the guest lecturers from esteemed organisation. He briefly spoke about the topography of Bundelkhand region and

elaborated on the issues related to water conservation in the region. He also set the tone for the importance of climate change adaptations in Bundelkhand region of Madhya Pradesh.

## Session 1: Climate Change & its Impacts in Bundelkhand
## Dr. Krishna Murari, Development Alternatives (DA)

Dr. Murari, the agriculture expert from Development Alternatives used interesting interactive techniques for engaging the farmers to share their experiences on climate change. He moderated discussions to ask different types of participants such as small scale and large scale farmers, women, youth and elderly farmers to share their experiences of climate change. Farmers shared on farm and off farm experiences due to changing climate, variable climatic conditions and extreme weather events. Recent rainfalls and hailstorms that have devastated large agricultural areas in Central India were also brought up by various participants. Different participants have recently incurred huge economic losses and crop destruction due to these extreme events.

Dr. Murari facilitating an interactive discussion with elderly farmer from Datia district

Dr. Murari also familiarised the farmers about alternate adaptation interventions in conditions of case of different and variable rainfall conditions so that the farmers can avail good economic returns.

## Session 2: Climate Resilient Agriculture through Natural Resource Management in Drought Prone Region of Central India
## Dr. Ramesh Singh, National Research Centre for Agroforestry

Dr. Ramesh Singh gave an interesting presentation and touched some of the most crucial aspects for climate resilient development. The unique flow of his discussions moved from global causes of climate change to local impacts in Bundelkhand region. Using unique examples of different countries such as Holland, Switzerland etc. to Indian and Bundelkhand context, he explained that it has now become crucial for us to deal with the effects of climate change. He

then shared the local climatic vulnerabilities of Bundelkhand region. He said that despite of about 700 to 1200 mm rains in the region, Bundelkhand witnesses drying of handpumps and wells in summer months of the year and communities have to travel upto 5 kilometers to meet their water needs. Between 2004 to 2008, the region faced severe droughts which led to non availability of water resources, poor farm produce and huge losses to the farmers. Some of the reasons for scarcity of water resources and droughts include absence of farm bunding, inadequate water harvesting structures, poor water retention capacity of the soil and impervious rocky layers preventing ground water recharge. A large number of farmers committed suicide and several others had to migrate leaving their homes behind. He said that the right kind of rain water harvesting structures and strategies can minimize some of the water issues and help people in coping with climate change.


Moving on, he then shared interventions for conserving water and maintaining natural resource base in the region. He explained the right techniques and procedures for different climate change adaptation practices such as farm bunding, mulching, line sowing, intercropping and tillage activities. He also shared the details for different low cost and cost effective water conservation structures that can be made by farmers through mutual community ownership such as gabions, conservation ditches, contour staggered trenches, check dams etc.



Rainwater harvesting and groundwater recharging structures demonstrated by Dr. Ramesh Singh

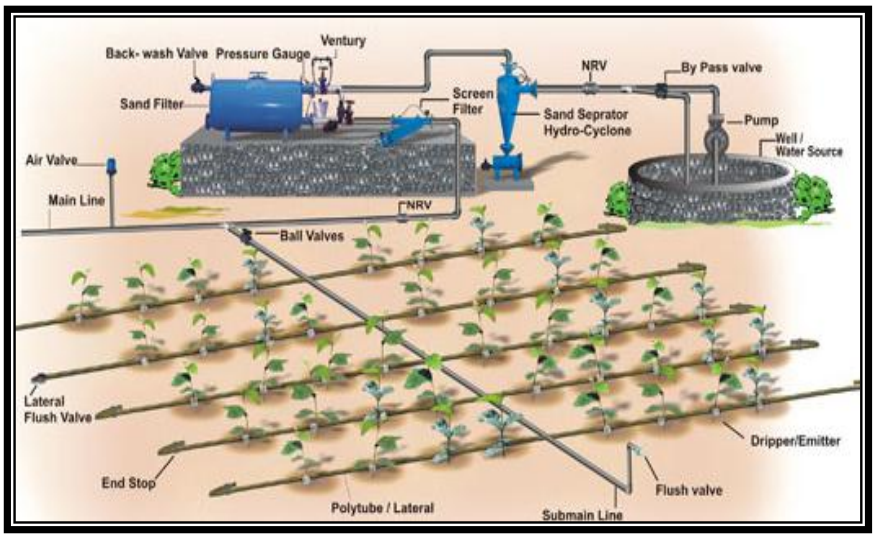
Dr. Singh gave special emphasis to agroforestry as a unique solution for providing various environmental and climatic benefits. He said that agroforestry based models can be integrated

within the watershed models such as boundary plantation, guava and citrus based interventions which are suitable for Bundelkhand area.



Agro-horti models shared by Dr. Ramesh Singh to explain the concepts of agroforestry

Furthermore, he discussed about irrigation technologies which can not only help farmers in water conservation but also help them with increasing farm returns. Some of these technologies include drip irrigation, sprinkler irrigation etc. Some of the benefits from sprinkler irrigation include 50-80% increase productivity, 30-50% water saving, 20-25% savings in water, lesser weed outgrowth and lesser labour required.




The technique for laying out drip irrigation shared by Dr. Singh for water conservation and efficient farming

Submergence bunds and vegetative bunds explained to farmers during the training

Dr. Ramesh also invited farmers to see some of the successful interventions that have been initiated by NRCAF and adopted by different progressive farmers in the region. This will be a good opportunity for farmers to watch, learn and replicate successful adaptation interventions.

## Session 3: Enhanced Climate Change Resilience through Resource Conservation Practices
## Dr. S.P. Tiwari, Central Soil & Water Conservation Research & Training Institute


Using a visual/ pictorial power point presentation, Dr. Tiwari gave valuable insights to the farmers and motivated them to adopt different adaptation technologies. He first familiarised the farmers about the concerns related to climate change. He said that after 1850, the period between 1995 to 2006 has witnessed 11 warmest years out of 12 recorded years. Explaining the causes of climate change he explained about greenhouse gases such as $CO_2$, $CH_4$, $N_2O$, Ozone and water vapour. He elaborated on excessive deforestation and exploitation of natural resources and mentioned their impacts for increasing climate risks further. In order to relate the impacts of climate change with degradation of soil resources, he shared that according to Soil and Water Conservation Society, at some places climate change has resulted in 4-95% increase in soil erosion and land degradation and 6-100% increase in water runoff. He also shared some of the experiences of farmers with respect to changing climate. Some of the observations made by different farmers over the years include

- Changes in flowering patterns
- Increase in insect number and behaviour
- Changes in plant and animal behaviour
- Increased and new number of diseases
- Changes in rainfall patterns (intensity, amount, distribution in number of days)
- Varying farm productivity
- Extreme temperature (both during summers and winters)
- Increase in number of drought struck days etc.

In his presentation he shared different statistics showing the direct correlation between extreme events (such as drought) and decrease in farm productivity.

He then moved into the importance of soil conservation in increasing climate change resilience. He said that in a 100×100 m plot area, 5334 metric tonne of top soil layer is lost by runoff. It takes around 200 to 300 years to reclaim the lost fertility of soil layer. He further elaborated that a fallow ridge land faces land degradation of about 80 tonne/ha/year, whereas a land area with dense forest cover faces less than 1tonne/hectare/year of land degradation.

Further elaborating on issues of soil conservation, he first discussed the physical, chemical and biological properties of soil and then discussed different types of soil erosion such as sheet erosion, rill erosion and gully erosion. Dr. Tiwari then shared the statistical data for soil composition of local areas of Datia district. Further elaborating on the soil conservation he explained how different organic manure such as compost, vermi-compost, green manure and farm waste can increase the humus content in soil, thus increasing the binding capacity and reducing the run off in Bundelkhand region. Focussing on green manure, he informed that its cultivation not only minimises land degradation but also increases its nutrient content. Use of green manure in wheat crops increases its productivity by 35% and increase the efficiency of crop water utilisation by about 30%. He also motivated the farmers to grow leguminous crops to increase the nitrogen content in the soil.

Dr. Tiwari then explained the importance of line sowing and intercropping in increasing farm productivity and maintaining soil fertility. Giving special focus to farm bunding, he explained the procedure and dynamics of farm bunding.


Following the discussions on soil conservation, he explained the importance of water conservation. He explained the importance of different structures such as check dam, gabions, contours, trenches, farm ponds and stop dams in managing the water resources in Bundelkhand.

**Contours & trenches demonstrated by Dr. Tewari as effective adaptation strategies**

Various success stories on effective structures from the region were shared to highlight the difference that can be made after water conservation. He also explained the methods to made low cost and effective watershed structures made from locally available boulders (e.g. boulder check dam). Making special mention of farm ponds, he elaborated on its significance by giving the example of a pond in Jigna village of Datia district.

**A watershed model in Jigna village of Datia district has resolved the water issues & increased water availability for livestock**

He also mentioned the benefits of new age water conservation technologies such as rain gun in increasing farm productivity and conserving water resources.

**Modern technological interventions such as Rain Gun introduced to the farmers**

Moving on, he lastly explained the importance of forest and fodder resources in the region. He therefore, emphasised on agroforestry as an importance means to increasing economic returns and decreasing sensitivities to climate change.

He concluded by motivating the farmers to adopt these interventions and minimise their risks to climate change.

## Session 3: Dr. Nishi Roy, Krishi Vigyaan Kendra

Dr. Roy welcomed the farmers and shared that Krishi Vigyaan Kendra is always obliged to interact with farmers at such a personalised level where knowledge is exchanged and new farming practices adopted by the farmers is also appreciated. She introduced the National Initiative on Climate Resilient Agriculture (NICRA) to farmers and told them the importance of

climate smart agriculture. She said that Krishi Vigyaan Kendra is also focussing on weather forecasting for disseminating early warning farming systems. She also told the farmers about rearing livestock so that alternate livelihood and resilience options are available for them.


**Dr. Roy educating the farmers about NICRA**

## Moderated Farmer Discussions
## Facilitated by: Ms. Harshita Bisht, Development Alternatives
## Mr. Deeraj Koul, India Water Partnership

Ms. Harshita Bisht first motivated the farmers to share their definitions of climate change and then asked the farmers to share their recent experiences from extreme rainfalls and hailstorms. Farmers shared the destruction caused to mustard, wheat and other crops as a result of devastating hailstorms recently. They not only talked about crop destruction but also discussed quantified the economic losses. Mr. Deeraj Koul further motivated the elderly farmers to talk about their experiences of climate change. Further, the farmers shared how simple adaptation interventions such as field bunds, contours and drought resistant varieties have helped them increase their adaptive capacities.

## Demonstration of Climate Smart Agriculture Practices

Realising the importance of practical learning and on ground understanding of climate change adaptation, the participating farmer's of training saw different sustainable agricultural practices demonstrated in TARAgram Pahuj for climate proofing agriculture. TARAgram Pahuj, the **sustainability resource centre** of Development Alternatives Group is working to help rural communities cope with climate change vulnerabilities by promoting climate resilient farming. The training centre tests resilience of different adaptation practices and demonstrates robust adaptation solutions for

sustainable agriculture, efficient resource use, land-water management practices and afforestation. The objective of demonstration visits was to generate awareness and build capacities of the local communities by demonstrating models of improved farming practices, water conservation and harvesting and land use planning by utilisation of available resources organically. The demonstration activity focussed on natural resource management practices for climate resilient agriculture and provided training services to local farmers on:

- Rainwater harvesting
- Soil & moisture management practices
- Land reclamation & development (especially using green organic manure)
- Energy & water efficient farming practices

Green shade nets that help in temperature control for germination of seedlings were also demonstrated in the centre to help farmers grow cash crops like vegetables and reduce adversities to changing climate.

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**Venue: Farmer Training Centre, Pahuj, Madhya Pradesh**
**Date: 04-03-2014**

## AGENDA

| S. No. | Time | Session | Resource Person |
|---|---|---|---|
| | | | |
| | 09.30a.m.-10.00a.m. | **Farmer's Registration & Tea** | |
| 1) | 10.00a.m.-10.10a.m. | Welcome Address | **Dr. Shailendra Nath Pandey**<br>Development Alternatives |
| 2) | 10.10a.m.-10.30a.m. | Brief Introduction-Climate Change & its Impacts in Bundelkhand | **Dr. K. Murari /Ms. Harshita Bisht**<br>Development Alternatives |
| 3) | 10.30a.m.-11.15a.m. | Climate Resilient Agriculture through Natural Resource Management in Drought Prone Region of Central India | **Dr. Ramesh Singh**<br>National Research Centre for Agroforestry (NRCAF) |
| 4) | 11.15a.m.-12.00p.m. | Role of Women in Promoting Climate Friendly Agriculture | **Dr. Nishi Roy**<br>Krishi Vigyan Kendra |
| 5) | 12.00p.m.-12.45p.m. | Enhanced Climate Change Resilience through Resource Conservation Practices | **Dr. S.P. Tiwari**<br>Central Soil & Water Conservation Research & Training Institute |
| 6) | 12.45p.m.-01.30p.m. | Climate Based Cropping Systems in Bundelkhand | Dr. K. Murari/ Dr. Shailendra Nath Pandey<br>Development Alternatives |
| | 01.30 p.m. onwards | **Lunch** | |