



# Climate Resilient Development In Bundelkhand Region of Madhya Pradesh

## Information and Communication Needs for Adaptation

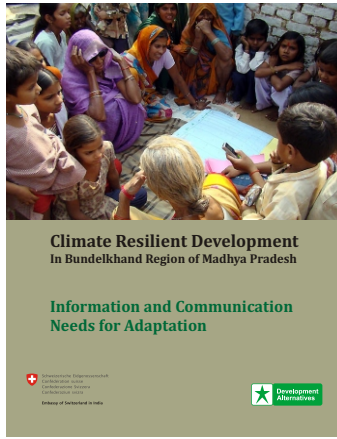


Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Embassy of Switzerland in India



Development  
Alternatives



# Climate Resilient Development In Bundelkhand Region of Madhya Pradesh

## Information and Communication Needs for Adaptation

This report is prepared under the financial support by the **Swiss Agency for Development and Cooperation (SDC)** for the project **Sustainable Civil Societies Initiative to Address Global Environmental Challenges** in Bundelkhand region of India. The objective of the action oriented project was to enhance the adaptive capacities of vulnerable communities in Bundelkhand region, identify strategies for climate resilient development and mainstream climate change in development policy and plans.

### Authors

Ms. Aditi Jha, Ms. Harshita Bisht, Ms. Neelam Ahluwalia, Development Alternatives

### Overall guidance

Mr. Anand Kumar, Development Alternatives

### Reviewers

Dr. Shirish Sinha, Swiss Agency for Development and Cooperation  
Mr. Johan Schaar, Ms. Heather McGray, World Resources Institute

### Acknowledgment

We place on record our gratitude to the Swiss Agency for Development and Cooperation (SDC) for providing the financial and institutional support and guidance to this task, Development Alternatives field team for providing field support, local communities of the project villages, local NGOs for their untiring work and enabling us to broaden our understanding of field realities, Environmental Planning and Coordinating Organization (EPCO) Govt of MP for coordinating and providing inputs in the state level workshops.

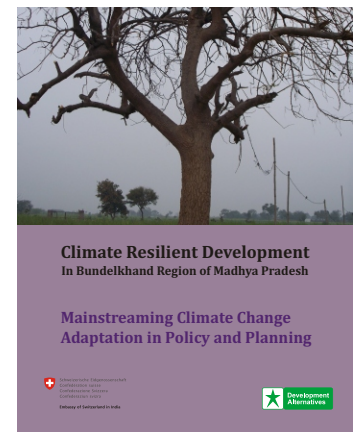
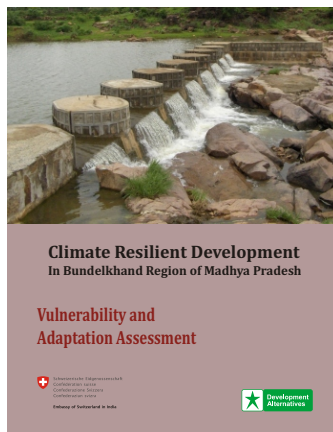
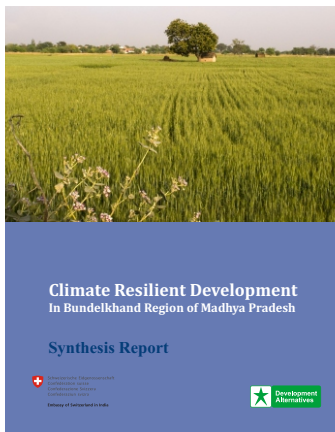
### Design and Layout

Mr. Kamal Grover, KK Graphics & Printers  
Ms. Neha Gupta, Development Alternatives

### Disclaimer

The views, analysis, interpretations and conclusions expressed herein are those of the contributors/authors and do not necessarily reflect or can be attributed to the Swiss Agency for Development and Cooperation (SDC). Information contained herein has been obtained from different secondary and primary sources and deliberations of the consultations/workshops organized by Development Alternatives, which the contributors/authors believe to be reliable and accurate. The contributors/authors, the reviewers and the supporting agency associated with the report are not liable for any unintended errors or omissions, opinions expressed herein. The contents of this report may be used by anyone providing proper acknowledgment.

### Publications in this series:



# Contents

1.	Introduction	1
2.	Institutional Systems for Dissemination of Climate Change Knowledge	5
3.	Climate Change Adaptation: Current State of Information and Knowledge Sharing	7
4.	Recommendations	15



# 1. Introduction

There is a pressing need to integrate more locally focused adaptation dimensions in climate change policy<sup>1</sup>. So far, climate change initiatives in India, such as the process of formulating action plans for climate change, have taken a top-down approach with the national level plan setting the precedent for the state level plans. Additionally, in the country print media that is the major source of information for climate change<sup>2</sup> is not accessible to the largely illiterate population at the village level.

As a first step, there is a need for communicating climate change in locally relevant and culturally appropriate ways<sup>3</sup>. This can enable the formulation of adaptation strategies based on long term impacts and solutions suited to the local populace. Another gap that needs to be addressed is the failure to engage with indigenous ecological knowledge as a valuable source of adaptive practice and a pathway to integrate new approaches to adaptation<sup>4</sup>.

## Key Messages from Policy Brief on Adaptation Knowledge<sup>5</sup>

- Knowledge important to adaptation can come from sources such as science and practice, as well as experience, customs and traditions.
- Knowledge-action gaps arise not only because the needed knowledge is missing, but also because the existing knowledge is impractical, inaccessible or otherwise unused.
- Narrowing of knowledge-action gaps requires active management of boundaries between knowledge holders and users.
- Knowledge is important, but not sufficient for action. There must also be capacity and incentives for motivation.

Adaptation knowledge platform [www.climateadapt.asia](http://www.climateadapt.asia)

1. Urwin K. and Jordan R. (2008) 'Does public policy support or undermine climate change adaptation? Exploring policy interplay across different scales of governance' *Global Environmental Change* No.18 pp 180-191
2. Billett S. (2010) 'Dividing climate change: global warming in the Indian mass media' *Climate Change* No.99 pp 1-16
3. Agrawal, A., & Perrin, N. (2009) 'Climate adaptation, local institutions and rural livelihoods' IFRI Working Paper W081-6, University of Michigan
4. Berkes, F., Colding, J., & Folke, C. (2000) 'Rediscovery of traditional ecological knowledge as adaptive management' *Ecological Applications*, 10(5), 1251-1262
5. Lebel L. (2011) Policy Research Brief No 2 Adaptation Knowledge Regional Climate Change Adaptation Knowledge Platform for Asia [www.climateadapt.asia](http://www.climateadapt.asia)

This report focuses on the current systems and institutions that are in place to enable information and knowledge for climate change adaptation to reach the grassroots in the Bundelkhand region of India. In doing so, it also looks at the existing policy framework at the state (Madhya Pradesh) and national level. It is based on the hypothesis that current institutional capacities at the district and state level are inadequate to mainstream locally relevant adaptation concerns into policy and practice. The agriculture sector and farming community have been prioritised in the report due to the felt and potential impacts of climate variability and changes that affect food and water security, along with the sustainable livelihoods in the region.

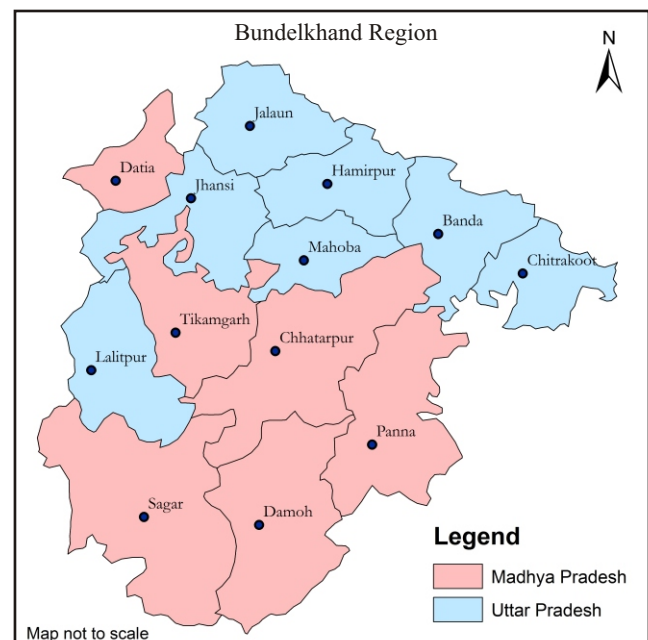


Figure 1: Bundelkhand region of India

The Bundelkhand region in Central India is a typical example of a semi-arid region affected by an overlay of geo-climatic conditions peculiar to the region and further accentuated by human mismanagement of resources, social disparities and institutional incapacities. This has resulted in a poor development base that reduces the capability of the communities and natural systems to cope with emerging climatic variability. Bundelkhand region is a chronic drought prone region of India. Unsustainable water management coupled with climate change and indiscriminate cattle grazing activities has made the problem of water scarcity more critical in this region.

This report analyses systems in place to address the localised adaptation needs. In doing so, it studies the existing policy frame at the national and state level and the mechanisms for implementation of climate change action at these levels. It also identifies information requirements for relevant stakeholders: farmers, local governments (district and state officials) to enable locally relevant climate change adaptation. To facilitate the identification of information requirements the study analyses the existing institutional systems for extending information, technical know-how and other services at the local level. Finally, it also investigates the capacities of these institutions to deliver climate change adaptation support services.

This report is based on primary and secondary research, utilizing the qualitative and quantitative data. An extensive desk research was carried out for collating information on climate change impact and plans for adaptation as well as the existing policy and institutional framework to implement adaptation action. Documents consulted include India's Second National Communication, 2012 to the United Nations Framework Convention on Climate Change (UNFCCC), the National Action Plan on Climate Change, 2008 (NAPCC), Madhya Pradesh State Action Plan on Climate Change, 2012 (MP-SAPCC), National and State level Planning Commission documents and websites along with other reports and articles. Information from secondary sources was validated with some selected institutions as well as on the ground during the primary survey.

To gauge the communication infrastructure and current state of climate change knowledge, a primary household survey was conducted among households in four districts in and around the drought-prone region of Bundelkhand in Madhya Pradesh. Respondents were surveyed for their feedback on perceptions pertaining to climate variability and access to modes of communication and information on agriculture and climate change.

## Climate Change Impacts and Adaptation

Climate change poses a serious threat to the poor in developing countries<sup>6</sup>. India faces a direct and growing threat because of the potential of climate change to alter

6. IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

the distribution and quality of natural resources and affect the livelihood of people (GOI, 2008). Additionally, it will have adverse impacts on food and water security and human health<sup>7</sup>. In rural India, over 700 million are directly dependent on climate-sensitive sectors like agriculture, forests, fisheries and natural resources such as water, fodder and biodiversity for their livelihoods and survival<sup>8</sup>.

Additionally, developing countries are the most vulnerable to climate change because of lower access to resources to enable adaptation including social, technological and financial resources. According to the second national communication to the United Nations Framework Convention on Climate Change (UNFCCC), India has low adaptive capacity to withstand the adverse impacts of climate change due to the high dependence of the population on climate sensitive sectors, coupled with poor infrastructure facilities, weak institutional mechanisms and a lack of financial resources<sup>9</sup>.

The state of Madhya Pradesh (MP) in Central India is considered to be vulnerable in India in terms of addressing impacts of climate change<sup>10</sup>. Here the impact of climate change is increasingly pronounced because of a predominantly agrarian economy and considerable poverty<sup>11</sup>. Some of the climate change vulnerabilities in the state of Madhya Pradesh are summarised below:

- According to the Madhya Pradesh State Action Plan on Climate Change (MPSAPCC), the daily maximum temperature, in the period 2030s, is projected to rise by 1.8-2.0°C (on an

7. GoMP Climate Change Cell (2012) 'Draft Madhya Pradesh State Action Plan on Climate Change' <http://moef.nic.in/downloads/public-information/MP-SAPCC.pdf>

8. Satapathy, S. (2011) 'Adaptation to Climate Change with a Focus on Rural Areas and India' Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, India Project on Climate Change Adaptation in Rural Areas of India

9. India Second National Communication to the United Nations Framework Convention on Climate Change (2012) Ministry of Environment and Forest, Government of India, 2012

10. GoMP Climate Change Cell (2012) 'Draft Madhya Pradesh State Action Plan on Climate Change'

11. Hedger, M. and Vaideeswaran, S. (2010) 'Scoping Study for Madhya Pradesh State Climate Change Action Plan' DFID, India (IDS) <http://moef.nic.in/downloads/public-information/MP-SAPCC.pdf>

average) throughout Madhya Pradesh and the daily minimum temperature is projected to rise between 2.0°C to 2.4°C during the same period. The eastern half of the state is expected to experience more warming than the western half. By 2080s, the maximum temperature is projected to rise between 3.4°C to 4.4°C, with the northern region experiencing warmer temperatures. The minimum temperatures are likely to rise by more than 4.4°C all over MP.

- Analysis carried out by Indian Institute of Tropical Meteorology (IITM) Pune indicates a declining trend for rainfall over the state of MP from 1901 to 2000, with an accelerated decline over the last five decades.
- The MPSAPCC also mentions that an inter-annual variability of annual rainfall has been observed in all agro-climatic zones of the state in a 41 year period<sup>12</sup>.
- A study carried out for observations spanning fifty years in the Central India region including MP, indicates that the extreme precipitation events which are above 100mm are increasing in terms of their intensity and frequency, with low and moderate events becoming more and more infrequent<sup>13</sup>.
- Projections of rainfall in Madhya Pradesh for the period 2021 to 2050 indicate that there is likely to be a decrease in the winter rainfall as you shift from the eastern part of MP to its western part<sup>14</sup>.

### Other Potential Impacts of Climate Change

- With 31% of the geographical area in Madhya Pradesh under forest cover, the changing climate may affect the composition and distribution of the various types of forests, impacting millions of livelihoods in the state.
- Climate change impacts will adversely affect irrigation and hydropower projects, besides

reducing the availability of water for other purposes.

- About 70% of the rural population of Madhya Pradesh is engaged in agriculture and agro-based activities. Some of the impacts on agriculture could be:
  - Extreme events like frost, excess rain and high temperatures cause huge losses in productivity. Extreme events such as hailstorms and storms can damage crops during flowering and fruit bearing stages and rainfall deficit and droughts can significantly impact agricultural production, which is predominantly rain-fed.
  - There will be an increase in pests and diseases which will also impact crops.
  - Animal husbandry can potentially be impacted through an increase in vector borne diseases, reduced productivity, and impacts of heat and water stress.
  - Fishing will be affected because of increasing temperatures that will affect the suitability of fish species to certain temperatures. A shift in breeding period and growth retardation of inland fish species is predicted.
- Health of the local populace is likely to be aggravated by climate change. Increased heat waves and cold waves will also impact the health of the vulnerable human population in Madhya Pradesh<sup>15</sup>.

### Policy and Planning Framework for Climate Change Adaptation

At the national level, the National Action Plan on Climate Change (NAPCC) has set the precedent for climate change action in the country. It formulates a plan of action through the establishment of eight national level missions that focus on promoting understanding of climate change, adaptation and mitigation, energy efficiency and natural resource conservation and green India. Among the eight missions, certain missions address adaptation like the national water mission, national mission on sustainable

12 GoMP Climate Change Cell (2012) 'Draft Madhya Pradesh State Action Plan on Climate Change'  
13<http://moef.nic.in/downloads/public-information/MP-SAPCC.pdf>

13 Goswami B. N. , Venugopal V. , Sengupta D. , Madhusoodanan M. S., Xavier K. (2006) 'Increasing Trend of Extreme Rain Events Over India in a Warming Environment', Science 1 December 2006: Vol. 314. no. 5804, pp. 1442 - 1445

14 GoMP Climate Change Cell (2012) 'Draft Madhya Pradesh State Action Plan on Climate Change'  
13<http://moef.nic.in/downloads/public-information/MP-SAPCC.pdf>

15 GoMP Climate Change Cell (2012) 'Draft Madhya Pradesh State Action Plan on Climate Change'  
<http://moef.nic.in/downloads/public-information/MP-SAPCC.pdf>

agriculture, national mission on green India and the mission on sustaining the Himalayan ecosystem. The national mission for strategic knowledge is important aspect of building scientific knowledge and science capacity in the areas of adaptation and mitigation<sup>16</sup>.

In order to integrate climate variability concerns and robust adaptation measures, the objectives and strategies from the MP-SAPCC should get translated into schemes and initiatives of the government through the state plans. At present this is not the case, although certain central and state sponsored schemes do address issues of climate variability and agriculture such as the schemes on crop insurance, promotion of certain types of seeds and irrigation facilities. However, at present, regional climate variability and specific interventions based on agro-climatic zones are not addressed in these plans and they remain top-down in their approach. State plans have become an aggregation of state line department plans, which in turn tailor their plans to fit in with resources available under central funding schemes.

Currently, most states (including Madhya Pradesh) have put in place District Planning Committees. However, as stated by the Manual for Integrated District Planning, the process is a vertical one with line departments working in silos with little or no participation from the people and a high degree of reliance on the District Commissioner/ Magistrate to tie these plans together<sup>17</sup>. Currently, the primary focus

in the process is on capacity building of district planning committees to ensure that this level of planning is participatory. While this may enable cross-sectoral planning that is required to enable adaptation to climate change, district level planners (especially at the *gram panchayat* level ) who have a critical role to play have a poor knowledge of the impact of climate change and how adaptation can be integrated into their priorities.

The use of practical components of anticipatory climate change adaptation including improving information, strengthening institutions, and devising sustainable climate resilience strategies for reducing the negative impact on vulnerable communities is the need of the hour. However, a clear understanding of sustainable adaptation and climate resilient development is still missing at the grassroot level. Helping the local communities to understand, access, and utilize climate change related information is still a huge challenge. This is further hindered because efforts creating climate change awareness and the necessity for adaptation are still met with low interest levels. This is partly due to the inappropriate nature of the awareness efforts and partly due to the cynicism that has developed among the communities towards any sustainable solutions without immediate benefits. New means and interesting ideas of outreach to the communities are thus required to propel them towards adopting sustainable adaptation measures.

---

16 Prime Ministers Council on Climate Change (2008)  
'National Action Plan on Climate Change'  
[www.indiaclimateportal.org/the-napcc](http://www.indiaclimateportal.org/the-napcc)

17 Para 1.2.5 of the 1st chapter of the Manual for Integrated District Planning, Planning Commission, Government of India



## 2. Institutional Systems for Dissemination of Climate Change Knowledge

There are currently several institutions at the national level that are conducting research on climate change. However, in the state of Madhya Pradesh the nodal agency leading policy and action on climate change is the Environmental Planning and Coordination Organisation (EPCO). While EPCO has in place initiatives to strengthen the climate change cell within the Government of Madhya Pradesh, the institutional systems that disseminate climate and related information to the grassroots are as follows:

### Agriculture Related Meteorological Information

Weather services in the country are provided by the India Meteorological Department (IMD), Pune. IMD is mainly responsible for the meteorological observations, communications, forecasting and weather services. Under its aegis, it has established a specialised division of Agricultural Meteorology to give relevant information to the farming community.

### Integrated Agromet Advisory Services (IAAS)

In order to meet the farmers information needs in real time the IMD has an initiative that collaborates with relevant agricultural research institutions such as the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture (Centre & State) and State Agricultural Universities (SAUs) and is called Integrated Agromet Advisory Services (IAAS). The kind of information provided through the IAAS is as follows:

- Sowing/ transplanting of *kharif* crops based on the time of onset of monsoon
- Sowing of *rabi* crops using residual soil moisture
- Fertiliser application based on wind conditions
- Delay in fertiliser application based on the intensity of rain
- Prediction of occurrence of pest and disease based on weather
- Preventive measures at appropriate time to eradicate pests and diseases
- Weeding/thinning at regular intervals for better growth and development of crops
- Irrigation at critical stages of the crop cycle

Bulletins for Agromet advisory services are prepared at the national, state and local levels. At the national level, the bulletins are issued by the National Agromet Advisory Service Centre, IMD, Pune. These are aimed to cater to the information needs of the national level planners e.g. Department of Agriculture & Cooperation, Ministry of Agriculture and are also communicated to the other related ministries. At the state level, the State Agromet Service Centre at the Regional Meteorological Centre issues the bulletins. These are for state level planners e.g. the State Crop Weather Watch Group and other organisations which provide inputs in agriculture such as the fertiliser industry. At the district level, the bulletins are issued by the Agromet Field Units for the farmers.

**These bulletins contain the following types of information:**

- Summary of previous week's weather
- Medium range weather forecast information (for the next 5 days)
- Crop management advisory, consisting of standard agronomic management practices under normal weather conditions
- Suitably modified agronomic management advisory under the forecast of transient weather conditions
- Any other crop-related information beneficial to the farmers<sup>18</sup>.

**This information is broadly required for two major purposes:**

- Long and short term planning and management at the national or regional level.
- Practical application under field conditions for day-to-day agricultural operations, contingency planning and crisis management in times of abnormal and adverse weather occurrences.

18 Agrometeorological Services in India (no date) eds. Rathore L.S, Samui R.P. and Chattopadhyay N. Agricultural Meteorology Division, India Meteorological Department, Shivajinagar, Pune

## District Level Advisory Services

IMD also issues quantitative district level weather forecasts, including daily and five-day forecasts. They comprise quantitative forecasts for seven weather parameters rainfall, maximum and minimum temperatures, wind speed and direction, relative humidity and cloudiness. In addition, a weekly cumulative rainfall forecast is also provided.

## Dissemination of Advisories

The forecasts and advisory services are disseminated from IMD Pune to Regional Meteorological Centres and Meteorological Centres of IMD located in different states. These offices undertake value addition to these products and communicate the information to 130 Agromet Field Units (AMFUs) that are located in various agro-climatic zones.

IMD organises District Agromet Advisory Service meetings in each of the state of the country inviting the officers/ scientists and all the stakeholders with objectives to create appropriate information generation- cum-dissemination mechanisms as well as extension mechanisms at the district level for communicating the Agromet advisory to the farmers.

### Dissemination of Agromet advisories is done through:

- All India Radio (AIR) and Doordarshan
- Private TV and radio channels
- Newspaper
- Internet
- ICAR and other related Institutes / Agricultural Universities/
- Extension network of State / Central Agriculture Departments
- Krishi Vigyan Kendras

## Agriculture Extension Services

The **Krishi Vigyan Kendra's (KVK)** are spread at the grassroots level across the country. These function with a mandate of **technology and information dissemination to the farmer level**. This is done through frontline demonstrations on farmers fields, training of farmers to update their knowledge and skills by creating awareness about frontier technologies

through a large number of extension activities like farmer fairs, field days, strategic campaigns, scientists visit to farmer's fields, exposure visits etc.

KVKs are an important link between research institutes and farmers. There are almost 600 KVKs around the country and they are the most accessible institutions for farmers to get information and advice. However, KVKs have specific extension areas and beneficiary farmers they work with. Their research findings can go a long way if they are linked with ICT tools such as community radio and local newspapers. A system to disseminate information in a timely and cost effective manner, such as the use of community radio in the case of climate variability and extreme events, would be helpful to farmers.

**Functions** of KVK include on-farm testing and demonstration of technologies, training of farmers, awareness generation about new technologies and provision of seed and planting materials. Currently, the **extension activities** of the KVK include field days, *kisan melas* (farmers fairs), soil health camps, agromobile clinics, soil testing campaigns, workshops, group meetings, newspaper articles, visit to farmers' fields, exposure visits and occasional radio talks and TV shows. KVK is predominantly a research extension organisation and actual dissemination of information and knowledge is not a priority on their mandate. This role is supposed to be played by the Agricultural Technology Management Agency (ATMA).

**The Agricultural Technology Management Agency (ATMA)** is set up under a centrally sponsored government scheme. ATMA is basically responsible for technology dissemination at the district level. It is a nodal centre to combine research extension and marketing. The agency aims to identify location-specific needs of the farming community for sustainable agricultural development and to execute and coordinate plans through line departments, training institutions, NGOs, farmers' organisations and allied institutions. Currently, almost 600 ATMAs have been established. ATMA has a provision to designate one 'farmer friend' (or *Kisan Mitra*) for every two villages. In fact, the provision of a 'farmer friend' or *Kisan Mitra* from the ATMA is an excellent mechanism to ensure that the information that is significant for farmers to adapt to climate change reaches them.

# 3. Climate Change Adaptation: Current State of Information and Knowledge Sharing

Adaptation in the context of climate change refers to 'adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change'<sup>19</sup>.

As established in the previous section, one of the major challenges in enabling adaptation is ensuring that a dialogue on climate change between the local level and other stakeholders is initiated in the country. Additionally, local adaptation concerns need to feature in climate change policy at the state and national level.

## 3.1 Local Level (Farmers)

A total of hundred farmers in the districts of Lalitpur, Shivpuri, Ashok Nagar and Tikamgarh in the Bundelkhand region of MP were surveyed for responses on perceptions on climate variability/ change and access to modes of communication and information on agriculture and climate change. The geology and topography and pattern of rainfall in Bundelkhand depict that it is prone to both droughts and floods. According to the report on Drought Mitigation Strategy of Bundelkhand 2008, moderate to severe agricultural droughts occurred for two to four years in all the 13 districts of the region.



*Farmers surveyed for responses on perceptions on climate variability and access to modes of communication and information on agriculture and climate change*

19 Smit B., Pilifosova O., Huq S., Challenger, B. and Burton I. (2001) 'Adaptation to Climate Change in the Context of Sustainable Development and Equity

The findings relevant to perceptions on climate change and sources of information are highlighted below:

## Climate Change and Participants' Responses

Respondents in the study area were not able to fully comprehend the concept of climate change. They were equating climate change with shifts in weather patterns. Communities continue to take decisions as and when climate varies rather than come up with a long term strategy for coping with impacts that include a shift in the onset of the monsoon and lesser number of rainy days.

Communities simply do not have access to relevant meteorological and scientific data and continue to rely on indigenous indicators such as the observation of the eggs of the *titri* bird. During discussions, many interesting remarks emerged about insect and plant behaviour that promoted a need for better understanding of the traditional know-how of the region. Agriculture being the mainstay of this region, any impact on agriculture is of utmost importance to the community. Responses of the farmers were categorised under five main classes: rainfall behaviour, inadequacy of water resources, increase in expenditure, change in cropping patterns, and increase in diseases.

Majority of the responses verify the fact that the **farmers' lands are not getting enough water**. Already a rain-starved area, the farmers feel that there has been a decline in the number of rainy days in past two to three decades. Also the **pattern of rainfall** has undergone a drastic change. Some of the farmers responded that, there is very intense rainfall all at one time, with the water flowing away before it percolates down. Half of the farmers noticed high variability of rains in the region. According to the elders in the village, in recent years the onset of monsoon has delayed as compared to the monsoon in the past two to three decades.

The **inadequacy of water resources** with rivers running dry most of the times, as opposed to earlier times when minimal flow was reported, is affecting the lives of the people here as water resources are becoming increasingly scarce. The various rivers and rivulets that criss-cross the terrain were once adequate

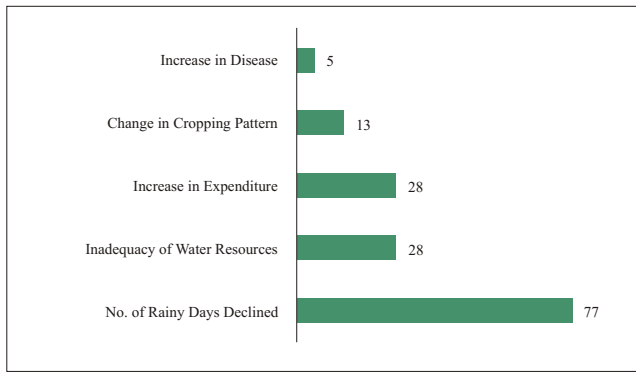


Figure 1: Responses about Climate Change Scenario

for sustenance of the region throughout the year, but now they run dry for most part of the year. Farmers responded that loss of traditional water management practices and insufficient water harvesting structures have further added to the cause of water scarcity in the region. Respondents have also confirmed that the groundwater table is continuously falling since there is no check dam in the vicinity. Even the vegetation of the area is also affected due to the inadequacy of water. The villages have fewer trees than before, cited many respondents. Privately owned boring wells are being used in the region for irrigation as the traditional water points have dried up, added the respondents.

Respondents have also reported a distinct **change in the cropping pattern** in the recent decades, as compared to earlier generations. Respondents claim that now days the households grow only one main crop, usually wheat, whereas in past they used to grow a second crop as well, such as gram or *jowar*. Cropping patterns have also undergone a tremendous change with what the respondents claim as - **land going bad** - meaning thereby a fall in productivity, rise in pest attacks and crop failures. A lot of respondents claimed



An elder farmer discussing the changes in climatic patterns observed in the last thirty years

that the sowing season for the *kharif* crop commenced after *Dussehra* festivities, but now it has changed and the sowing time has postponed to sometime later.

Some respondents in the study area have reported an **increase in expenditure** due to increase in agricultural inputs. They have cited reasons, such as declining land productivity that requires enhanced application of fertilisers, which further undermines the quality of soil. To compensate this, better seeds are required. The cycle of expenditure, the respondents claim, thus rotates in an upward spiral and in most cases the expenses are far beyond their means, forcing them to leave the land fallow and migrate to urban areas for work. About 12% respondents have claimed a doubling of expenditure in the recent years. Seven per cent respondents have vouched that traditional seed varieties were certainly better and hardier, with stable productivity. However, today, the seeds are not of good quality, escalating their efforts to search and purchase better seeds.

A small portion of the respondents cited a **rise in diseases** due to lack of fresh water and changing weather patterns. An in-depth analysis of this very interesting aspect is warranted. Some respondents also cited the lack of quality education to be the source of all the agriculture-related problems of the region.

### Current Communication Means in the Study Area

The people of this region are well connected to several means of communication. They are avid television (TV) and radio fans and almost every individual has a mobile connection. Telecommunications has rapidly improved in India and this region too has benefitted from the growth of this sector.

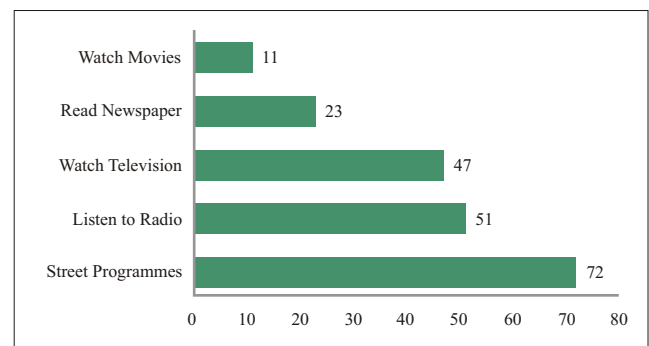


Figure 2: Mediums of Communication

TV seems to have made sizeable inroads into this community, with more than half the surveyed population viewing television on a regular basis. The most highly viewed programmes are the News and Reality Shows, apart from entertainment programmes like soaps, songs and movies. The TV is viewed generally in the privacy of homes, where women are exposed to a new world of knowledge. TV is also viewed in open spaces, where discussions and forums among villagers enhance the day-to-day information, primarily pertaining to current politics, political leaders and parties.

Radio ranked second in terms of preference. Although most mobiles are equipped with radios, users in an



Farmers listening to agriculture related information on Radio

energy-starved region prefer to keep their mobiles switched off for most part of the day to conserve the charging of their mobiles. Battery-operated radio sets are still used for listening to the radio.

The preferred radio programmes are related to entertainment, followed first by news and then agriculture-related programmes. The respondents surveyed revealed that they regularly listened to programmes of community radio stations such as Radio Bundelkhand, Chatterpur station, Radio Dharkan, Lalit Lok Wani and Big FM.

### Audience Response

According to this study conducted in the Bundelkhand region, a lot of farmers who access radio on a regular basis listen to agricultural programmes and news. However, most of the audience is more interested in entertainment programmes. Thus new means and interesting ideas are required to deliver necessary information on sustainable farming and adaptation options to the farmers. This could be further

strengthened by tapping the potential of ICTs (Information and Communication Technologies) and mass media tools to upscale the outreach of this information.

Newspaper-reading ranking fourth, as per this study, directly correlated to the fact that literacy rates are abysmally low in Bundelkhand. Some of the newspapers in this region are *Khabar Lahriya* - a weekly newspaper in Bundeli, *Akhand Bundelkhand* in English and Hindi, *Awaz-e-Bundelkhand* in Hindi, *Bundelkhand Darshan* in Hindi, *Datia Prakash* Newspaper in Hindi, *Bundelkhand Samachar* in Hindi, *Zuban-e-Bundelkhand* in Urdu. However, there is a sizeable number of readers, highlighting the fact that this mode of communication is an important tool that can be used to spread information about recent happening and changes that are affecting agriculture. But, the fallout of having a low readership is the fact that there seems to be a lag in disseminating up-to-date information to the masses here. The preferred medium being TV or radio, any new programme or effort needs to be processed into a radio/TV output in order to reach the people here. This may not always be the case with many of the government schemes. Thus, the lag has to be addressed in order to get the real time information to the local people both on climate change and climate-related adaptation measures and government schemes therein.

The top-ranking communication tool preferred in this region is street programmes that have been traditionally practiced by local groups. *Nukkad natak* and *nautanki* are theme-based presentations that are made by local specialised roaming groups, the former being based on any contemporary theme, while the latter is based on traditional and mythological stories. The groups practicing these arts move from village to village, making their presentations. The renditions are usually made during festival seasons as communities are oriented towards interaction during those periods. The stories relayed are short and stand-alone, an all out entertainment package. This is a really important communication tool whose identification and efficacy in the study region should play an important role to access climate change information so that people can learn about adaptation means.

### Listening Time

TV watching is subject to the availability of electricity which is a rare commodity in this region. Generators are used by those who are more affluent and their TV

watching is fairly regular, ranging from one - three hours per day. The listening time of radio for the respondents usually varies from two - four hours each day and the most preferred channel, as reiterated earlier, is FM radio. *Nukkad Nataks* and plays are watched seasonally/ during festivities for several nights in a row, while newspaper and other communication mediums are used sporadically during election time or for some specific work.

### Sources of Information

At the all-India level, of the 16 different sources sought for accessing information on modern technology for farming, the most popular source was through 'other farmers', with 16.7% of farmer households accessing information through this source, followed by input dealers (13.1%), radio (13.0%) and television (9.3%). Other farmers, who were usually large farmers, family members or neighbours and input dealers are contacted by farmers mainly either on a need's basis or seasonally<sup>20</sup>.

Table 1: The Sources of Agricultural Information

Source of Agricultural Information	Rank
Other farmers/elder persons	1
Government officials/Gram Sewak	2
Shopkeepers/companies/market	3
NGO	4
Radio	5
TV	6
Other Sources	7

The field level study reveals that government officials and *gram sevaks* at the block level are the chief sources of information for the villagers. Although the *Sarpanch* does have information about different government schemes (construction of ponds, NREGA, JRY, Indira Awas Yojana etc.), villagers deny to attend village meetings (*gram sabha*) on a regular basis. They ask

20 Mittal S., Gandhi S. and Tripathi G. (2010) 'Socio Economic Impact of Mobile Phones in Indian Agriculture' <http://www.colombiadigital.net/newcd/dmdocuments/89.%20Socioimpact%20agriculture.pdf>

their neighbours and other progressive farmers when they need the requisite information. So, attendance at these village meetings is poor. They feel that most information is not useful for them at that exact time and they can always meet the official if required. The farmers make trips to visit the block level office at their own cost to seek help about the different activities taken up by the government. This monetary barrier, in addition to the long travel distances, further reduces farmers' interest in seeking the benefits of the government.



Farmers discussing about government initiatives on agriculture schemes in village level meetings

The downside to this mechanism is that interpersonal communication with the 'identified' progressive farmer for dissemination of the information may be skewed and imperfect. There is ample scope of information loss and bias. It has been revealed in the study that the village teacher, shopkeeper (cloth merchant) and local leaders have also been accessed for information. This leads to complications as the information dissemination may not only be erroneous but also partial and the person in question may withhold information. Sometimes it so happens that the village leader (school teacher, unemployed youth, government officials, etc.) gets the information from both government and non-government organisations and spreads that in the villages. There lies a problem in this model as the village leader does not always want to reveal the full information. Sometimes, villagers get the information directly from government and non-government organisations, but this is very rare. Also, this process is limited to higher class (and higher caste) rich villagers<sup>21</sup>. Also, the information related to

21 Panda D. K. (2007), 'Power of Information in the Indian Rural Set Up an Analysis' - <http://www.vrionline.org.uk/ijrs/April2007/Information%20dissemination%20in%20rural%20India.pdf>

different farming inputs are sometimes disseminated through companies, seed or fertiliser sellers with the hidden agenda of maximising their sales.

The region seems to have discerning farmers that do not rely on a single source for information but use an intelligent mix. For crop, seed, fertiliser and animal-care related information they seek the help of 'other farmers' and 'elders' primarily (41%); followed by government and semi-government officials, hospitals and workers. Radio is at rank 5, while TV is still lower at rank 6 as a source of agricultural information.

Information and communication technologies (ICTs) have been in our lives for many years and have played a vital role in promoting agricultural and rural development during the last few decades. The role of TV and radio in rural education and extension services has been well documented. These technologies will continue to play a critical role in development communication along with new information and communication technologies such as the mobile phones and perhaps computers and internet, the latter however, is a distant dream for the region. But, there is now a qualitative difference in the way we can generate, disseminate and transfer knowledge and thus contribute to development. What seems pertinent, however, is that NGOs have made a sizeable impact in this area and are seen as important information provider, ranking number 4.

### Understanding Seasonality

Farmers use traditional knowledge to understand weather and climate patterns in order to make decisions about crop and irrigation cycles. This knowledge is adapted to local conditions and has been gained through many decades of experience passed on from generations. However, in recent years, **farmers have been seeking out scientific weather forecasts** as opposed to **traditional rainfall predictions** that were based on knowledge and evolved through observation and experience over a considerable period of time in response to the variability of climate and weather as well as the uncertainty in their forecasts.

Understandably, farmers have also evolved several coping strategies and mechanisms in rain-fed systems across the country. Traditional knowledge is learned and identified by farmers within a cultural context, and the knowledge base reflects the specific language, beliefs, and cultural processes. The local weather and climate are assessed, predicted, and interpreted by

locally observed variables and experiences using combinations of plants, animals, insects, and meteorological indicators<sup>22</sup>. The study in the Bundelkhand region thus attempts to highlight the traditional knowledge networks in the area and also attempts to understand the traditional markers of climate change.

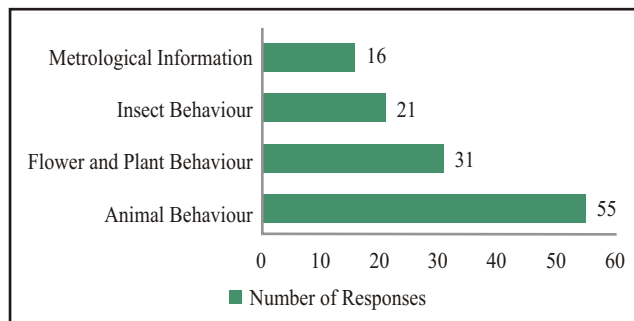


Figure 4 : Traditional Information Sources

A shift of season is primarily identified by the farmers by the leafing, flowering and seeding patterns in *Neem* trees. Untimely falling of seeds, or flowering (in the wrong season), alerts them to a change in the atmospheric parameters. In recent years, the number of such shifts are claimed to have risen as compared to the earlier times.

A large number of households claimed that they come to know about the changing weather pattern through conventional markers observed in animal behaviour, such as when they see that lizards change their colours, or they hear louder bird calls or observe frogs croaking, or see several eggs of butterflies on leaves or observe the eggs of the *titri* birds, etc.

A large number of respondents revealed that they come to know about climate and weather changes through other sources, such as when the underground water from wells in the house starts getting warm (which is an indicator for a particular time each day), particular cloud formations, or when northerly winds start to blow, etc.

Although the traditional markers make for interesting reading, their scientific efficacy is yet to be ascertained and would need deeper probing in the said area of study. What emerges significantly is that traditional markers do exist and that farmers are still observant. Perhaps,

22 Raj R. (2010) 'Harmonizing Traditional and Scientific Knowledge Systems in Rainfall Prediction and Utilisations', <http://www.maweb.org/documents/bridging/bridging.12.pdf>

future communication needs could orient themselves to such climate change markers to understand seasonality through animal, plant and insect behaviour.

### 3.2 District Level

To overcome the gap of planning in silos (line department based planning), the manual for Integrated District Planning prepared by the Planning Commission stresses the need for use of ICTs for better participative planning and representation of data. They mention the provision of spatial, graphical and even animated data for prioritisation of selected projects and works along with which community radio (rural) and the internet (urban) can play an important role here to open planning processes to public view<sup>23</sup>. The process of assessing climate vulnerability at the district level and grassroots priorities need to be integrated into district plans and this can be facilitated through trained intermediaries, such as journalists and radio broadcasters (especially in rural areas).

Another gap in ensuring adaptation-relevant information reaches the grassroots is found in the contingency planning of the agriculture department at the district level. These plans are prepared to advise farmers on appropriate adaptation responses in the situation of a delayed or deficient monsoon. They are supposed to advise the farmers on drought-resistant and short duration crop varieties, improved crop management techniques, and soil nutrient and moisture conservation measures that can help to mitigate potential impacts in different rainfall situations. However, responses received during primary consultations signalled that the dissemination of this information to the grassroots farming communities is limited due to inadequate implementation of policies, lack of institutional capacity and manpower, weak agricultural support delivery mechanisms, poor outreach to interior villages and a limited number of information centres.

### 3.3 State Level

At the state level, the nodal agency for all climate change related matters is the Environment Planning and Coordination Organisation (EPCO). The Climate Change Cell of EPCO intends to establish a mechanism that facilitates management of long term climate risks and uncertainties as an integral part of the state

23 Planning Commission 'Manual for Integrated District Planning', Planning Commission, Government of India - [http://planningcommission.nic.in/reports/genrep/mlp\\_idpe.pdf](http://planningcommission.nic.in/reports/genrep/mlp_idpe.pdf)

development planning. The basic purpose of establishing the cell is to build the capacity of the state government officials to coordinate and mainstream climate change issues in development activities and policies. The Climate Change Cell will manage information and knowledge and provide services to ensure environmental sustainability through facilitation, identification and implementation of development projects.

The state is currently looking at strengthening the MP-SAPCC through enhancing information and accuracy on Regional Climate Models (RCMs), undertaking vulnerability assessments at the spatial, temporal and sectoral levels and coming up with an action plan on mitigation through GHG inventories.

### Information Sources and Use

There is a strong need for climate change communication which cannot only create awareness but can also provide information and prepare communities thus inspiring behavioural change. So far there are several technical and institutional barriers for making robust climatic information available to the grassroots.

**There were certain technical barriers in terms of making robust climatic information available to the grassroots. These are as follows:**

- Data related to climatic variables are available only for a single point within a district, making it difficult to provide localised information to farmers. Even downscaled temperature rise projections are currently available only at spatial resolutions that consist of two to three districts.
- Limited and unreliable data hindered on-ground interventions that DA could recommend to farming communities. Adaptation strategies like altering sowing dates were not always recommended because of its likelihood for failure due to the use of deficient information.
- Uncertainty linked with climate model predictions was also a barrier. For example, a recent research study published in Nature-16 reported that the estimates generated by models such as CERES may underestimate the decline in yields of wheat crops by as much as 50 percent.
- To overcome some of these barriers, DA organised demonstration trials in various



villages within the project area. DA also sought to provide flexible and low regret options. An example was the promotion of crops such as millets (*Sorghum bicolor*), which require less water for cultivation and are traditionally grown in the region. Even in the absence of climate change, increased cultivation of millet could be beneficial, given Bundelkhand's propensity to drought.

**There were also certain institutional barriers for accessing and using information for climate change adaptation:**

- It was found that the institution that provides hydrological and climate data is separate from the institution responsible for declaring floods or droughts. Hydrological and climatic data is provided for Bundelkhand by the Indian Institute of Technology, Delhi, and the Indian Institute of Tropical Meteorology. However, they do not indicate which years experienced flood or drought. This task falls to the Indian Meteorological Department. This institutional division is problematic because the government and civil society need to wait for data interpretation from a second set of institution before they can begin adaptation action. Flood or drought declarations enable the release of state or federal relief funds.

- Rural farmers in the project area understood the weather variations but had more difficulty in understanding the idea of longer term changes in the climate.

**To overcome the abovementioned barriers, interface institutions are required to fill in the following functions:**

- Generating usable information;
- Validating information and effective adaptation options;
- Disseminating information using innovative means (*Nukkad Natak*, community radio);
- Facilitating knowledge exchange among various stakeholders to spark cooperation and effective policy formulation; and
- Building capacity of stakeholders through demonstration and farmer clubs.

New investments by the government and donors are needed to strengthen and expand the ability of such existing institutions to integrate a wide range of information for climate change adaptation and translate this information into more decision-relevant forms. In places where such institutions are absent, there is a need for government and donors to consider creating institutions/ organisations to fill this niche<sup>24</sup>.

---

24 Khan M. A., Kumar A. and Vijayalakshmi K. (2012) 'Applying Information for Adapting the Agriculture Sector in Bundelkhand, India, World Resources Institute Case Study, Washington DC, USA



## 4. Recommendations

While on paper, there is a well developed system for dissemination of advisories to the villages, the primary survey revealed slightly different results. In the project area, farmers continue to rely on local indicators for weather as well as local sources of information such as other farmers and elders for information on climate and agriculture. This is further hindered because efforts creating climate change awareness and the necessity for adaptation are still met with low interest levels. This is partly due to the inappropriate nature of the awareness efforts and partly due to the cynicism that has developed among the communities towards any sustainable solutions without immediate benefits. New means and interesting ideas of outreach to the communities are thus required to propel them towards adopting sustainable adaptation measures.

There is a need for a better system that can disseminate agro-meteorological information in a timely and cost effective manner and community radios are one way to ensure this.

- More systems for provision of simplified and relevant data/information for farmers are required to enable robust adaptation options. Currently this role is being played by 'interface' organisations and new investments by the government and donors are needed to strengthen and expand the ability of such existing institutions to integrate a wide range of information for climate change adaptation and translate this information into more decision relevant forms. In places where such institutions are absent there is a need for government and donors to consider creating institutions/organisations to fill this niche.
- There is also a need to disseminate findings from local research being conducted by KVKs to farmers who are not beneficiaries of extension programmes, and improve the profile of ATMAs, so that farmers find it more accessible.
- Additional Rural Agriculture Extension Officers (RAEOs) are needed to reduce the number of villages and area designated to each officer. This will allow better outreach of climate adaptation information and schemes. Alternatively, civil society groups can also be utilized to assist in outreach in areas where RAEOs are not able to adequately serve.
- Database should be generated for the different users for the data accessibility and knowledge

flow. This will contribute in the building up of strong scientific evidences through vulnerability assessments, risk assessments, climate change projections, impacts of climate change and allied sectors etc.

- There is a need to develop a more robust system to ensure that meteorological information useful for adaptation is reaching grassroots in a timely and cost effective manner. The community radio can contribute effectively to all these processes.
- Institutional mechanism should give importance to the primary evidences collected through various developmental studies or pilot projects and integrate the findings into the planning strategies.
- For climate adaptive planning the right balance of top-up and bottom-up approach in the planning process should be maintained. The challenge is not only to deal with the existing vulnerabilities but also to cope up with the additional threats posed by climate change in the coming future. This can be facilitated by:
  - Connect (with the communities directly facing the brunt of climate change)
  - Communicate (to inform the decision makers about the need of climate smart planning)
  - Collaborate (between the departments for convergence and thus implementation of adaptation measures)
- There is a need to strengthen the existing knowledge sharing platforms. Bundelkhand Knowledge Platform (BKP) needs to be further developed for sharing and disseminating the climate change adaptation knowledge across all the stakeholders.

Although several adaptation measures have been implicitly included in the planning process, inefficient delivery mechanisms at the ground level and communication gaps has led to weak implementation. Therefore efficient delivery mechanisms need to be strengthened through exposure visits, trainings etc.) Increasing the institutional capacities of local government on long term climate adaptive planning is required. Communication of climate change related information needs to be enhanced to enable both communities and local government to adequately respond to the threats posed by climate change in the region.



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

**Embassy of Switzerland in India**

Climate Change and Development  
Chandragupta Marg, Chankayapuri,  
New Delhi - 110021  
Phone: +91 11 4995 9570  
Email [delhi@sdc.net](mailto:delhi@sdc.net)  
Website: [www.swiss-cooperation.admin.ch/india](http://www.swiss-cooperation.admin.ch/india)



**Development  
Alternatives**

B-32, Tara Crescent,  
Qutub Institutional Area,  
New Delhi -110016 (India)  
Tel.: +91-11-26564444, 26544212  
Fax: 91-11-26851158  
E-mail: [akumar3@devalt.org](mailto:akumar3@devalt.org)  
Website: [www.devalt.org](http://www.devalt.org)