

# Adaptive agriculture in flood affected areas

*Eastern Uttar Pradesh, in the foothills of the Nepal Himalayas, has been prone to floods for centuries. In the last 60 years, however, their frequency has increased dramatically. People living in the region have slowly developed ways to cope with the floods. These adaptive measures had not been documented until now. A booklet has recently been produced detailing adaptive agricultural practices in this specialised region.*

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Although the geography of the eastern Uttar Pradesh region makes the area naturally sensitive to floods, rainfall patterns and the nature of these floods have changed. While there have been changes in natural factors, like deforestation and land degradation, it has been observed that agro-climatic situations are altering. Such changes in climate have caused severe damage and people's lives have been affected. Data is available which indicates a direct linkage with climate change (e.g rainfall, dry spells, floods). Significant changes include: increasing frequency of flash floods; dry spells during floods; flood timings (longer, delayed or early); increased duration and area of water-logging; and changes in time, volume, and pattern of rainfall.

There has also been a significant change in the monsoon period. While August-September was the usual period of floods twenty years ago, at present it is unpredictable. In 2007, there were heavy rains in July causing sudden flooding. In 2008, rains began at the end of May. Heavy rainfall throughout June and July caused floods for which people were ill prepared, and had very little time to respond. Consequently there was considerable loss of life and property.

Eastern Uttar Pradesh is largely dependent on agriculture. The area receives an average of 1200-1400 mm of rainfall per year, with adequate availability of groundwater. Land holdings are quite fragmented with more than 80 percent of farmers having less than one hectare of land. Therefore the main effect of floods and now climate change is on agriculture, and agriculture-based livelihoods. The geo-climatic and livelihood situation of the area means that people depending on agriculture are very sensitive and vulnerable to changes in climate.

## Documenting adaptive agriculture

Government and development organisations' initiatives to cope with floods have been relief oriented, and short-term. People living in the area have integrated floods into their lifestyles and have developed ways and means to get over their flood problems. Some farmers' practices are traditional, while others have evolved over a period of time, generally in response to local agro-climatic changes.

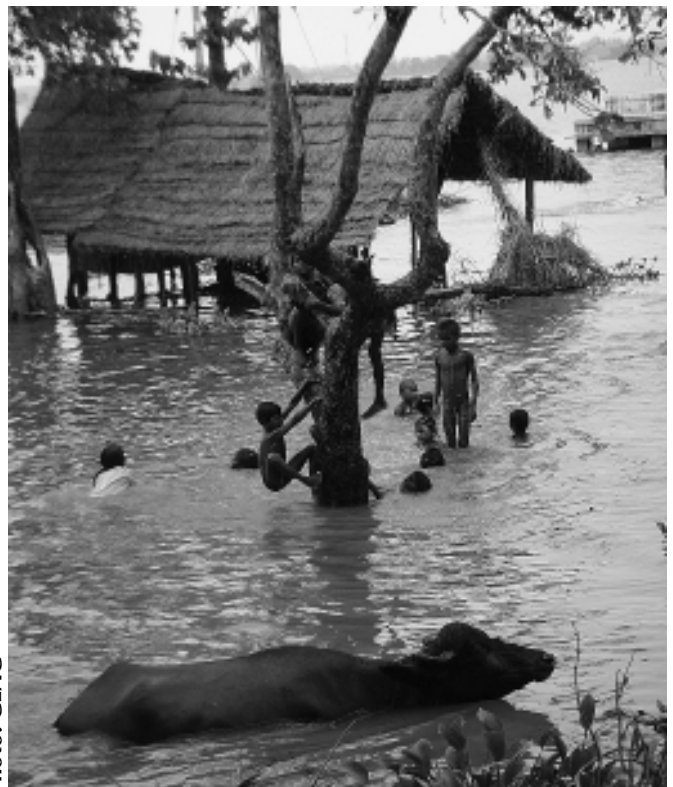


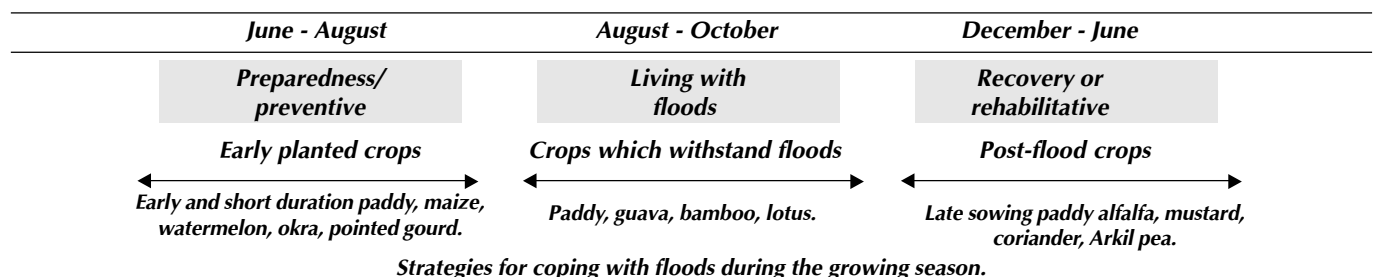
Photo: GEAG

*Scenes such as this are not unusual in eastern Uttar Pradesh, where extreme floods are becoming more common and cause much suffering.*

Today, such capability to adapt is seen as extremely important in dealing with problems related to climate change.

However, adaptive practices have largely remained confined to the respective local areas, and have not been documented for wider dissemination, use and benefit. In response to this, efforts were made by a consortium of 20 NGOs in eastern Uttar Pradesh to compile agricultural knowledge and practices which have helped communities develop their adaptive capacities in response to floods. The objective of compiling these practices was to share these local and traditional flood responsive measures with more people. It is hoped that this will help to build and strengthen people's adaptive capabilities in tackling disasters like floods, thereby mitigating their impacts.

One hundred practices were documented, all of which are time tested and have especially helped small-scale and women farmers in the area. Fieldwork took place between April 2006 and November 2007. After holding a writeshop and getting feedback, a booklet in Hindi was published in January 2008, describing all 100 practices. Forty-three of the practices have been translated into English and also published in a booklet. (Both booklets are downloadable from <http://www.geagindia.org>). Forty practices were video documented for the benefit of illiterate farmers. The target users are farmers and facilitators (be they government, NGO, or from academic institutions) who are working directly with farmers. There has



already been much interest in the manual: we have received several requests for it from donors, academic institutions, NGOs and government agencies.

### Livelihood resilience

The development and adaptation of practices has not only helped reduce the impact of climate change-induced floods, but also considerably helped secure people's livelihoods. Where adaptive activities are practiced more intensively, the easier it becomes for the people to return to their normal lives once the floods recede. It has been observed that people's livelihood resilience depends a great deal on how well the community uses the available resources in its adaptive strategies. Generally, and in the particular context of agriculture, it has been observed that people's livelihood resilience and their adaptive capacities are inter-dependent. The major factors helping people develop their adaptive capacities in agriculture, as observed during the study, can be grouped as follows:

*a. Intensification.* Though the floods cause a dramatic effect, people are still able to recover some harvest or income because of crop intensification and related activities. For example, people grow hemp and vegetables like okra with sugar cane. Farmers also have established grain and seed banks, and engage in vegetable growing, fish culture, fodder production, or livestock rearing.

*b. Diversification.* The flood-affected region is richly bio-diverse. People adapt with the help of a diversity of crop varieties, trees, plants, grass and animals besides the diversity in people's knowledge, skills, experiences and enterprises. The landless are able to make a living from small animals. When silt and sand spreads over paddy fields, people learn to grow watermelons, gourds and other vegetables and fruits.

*c. Value addition.* Local women's groups are engaged in processing activities to add value to paddy, milk, sugar cane or vegetables. The possibilities are immense, but due to lack of resources and information, the initiatives by farmers remain incompletely harnessed as yet.

*d. Indigenous technical knowledge.* Various adaptive practices in agriculture have a strong element of indigenous knowledge. Without any organised mechanism of developing and imparting technical know-how for people to survive in floods and other climate change induced situations, it is people's knowledge which has helped them to adapt and survive.

*e. Marketing.* Markets are an important factor in adaptation. Although farmers are able to sell products made from sugar cane or milk, as well as vegetables, or fish, they do not get an appropriate price for their products.

*f. Crop cycle management.* To cope with the flooding, farmers have adapted the crop cycle so as to reduce crop losses (see figure). The main strategies are: pre-flood cultivation (so farmers can harvest before the floods); cropping with floods (crops which grow well even in floods); and post-flood cultivation (planting late varieties or those which withstand waterlogging).

Such practices either evolve spontaneously (independently by farmers) or in agricultural universities or NGOs. The knowledge behind some practices is the outcome of a synergy between farmers' indigenous knowledge and technological know-how. Even if the practice or technology is "imported", the practice style is often innovative, according to local conditions (farmers land holding, flood area, needs or other crops). The adoption of any of these practices is generally needs-based, with farmers in the most adverse

situations more likely to adopt. During the documentation process, it was also noted that people's adaptive capacities are affected by other factors, including:

- The state of natural resources in the area.
- The livelihood system and opportunities at the local level.
- Income generating opportunities in the nearby areas.
- Basic physical infrastructures, services and facilities (like roads, housing, drinking water) at the local level.
- The area's socio-economic and gender sensitivities.
- Access to information and know-how.
- The existence of social networks in the community, as well as formal sector organisations like banks, government departments, or voluntary organisations.

As such, in order for people to deal better with floods and their changing character, one of the ways is to build people's adaptive capabilities through raising their awareness, knowledge and capacities to earn a living through a selection of appropriate crops and techniques.

### Finding other ideas

*Sri Shambhu Sharan Nishad of Thakurnagar village, Gorakhpur District, has four acres of land, located near the Sarua lake, which is annually affected by floods. In October 2006, on an officially organised tour to Madhubani in Bihar, he learnt about the 'Turanta' paddy being cultivated in the flood-affected areas there. It was not just the paddy's ability to tolerate water that impressed Shambhu Sharan Nishad, but also that it was fast growing. He decided to cultivate 'Turanta' the next season in his own fields. In June 2007, he sowed this paddy, albeit only on half an acre for want of seeds. Then on 30 July, the floods came and along with other rivers, the Sarua lake swelled and all nearby fields were inundated. When the water receded after 15 days, Shambhu found that there were no negative effects on the 'Turanta' crop. On the contrary, new shoots had emerged from the sides of the plants. The paddy continued to thrive and in time it was harvested. From a mere half an acre, he got a yield of seven quintal (700 kg). Encouraged by this, other farmers from the nearby villages too are now keen to plant this rice variety.*

It is clear that people living in flood stressed zones have their own traditional practices and knowledge that help them to cope effectively. But such knowledge is not given importance by people such as policy makers, or agricultural scientists. Documentation efforts such as this one can assist in making adaptive practices more widely known and valued.

More broadly, research and extension needs to continue supporting adaptive agriculture. Support at the policy level is also needed, with flood disasters being placed at the centre of development planning and execution. While the farmers of eastern Uttar Pradesh have already come a long way in adapting to the changing climate, their innovativeness, knowledge and skills, as well as external support that has enabled them to do this, will all continue to be essential for them to keep adapting in an uncertain future.

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