

# An integrated approach to climate change adaptation

*It is now apparent that dealing with climate change is unavoidable. Nepal's temperature is rising faster than the global average, and rainfall is becoming unpredictable. Many communities are struggling to cope. Experience from a three-year project indicates that adapting to climate change requires an integrated approach, including socio-economic development, environmental conservation and disaster risk reduction. By focusing on a watershed, each element, such as livestock, infrastructure or education, could be addressed effectively.*

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Climate change is already being felt, and its effects are expected to continue and to increase. In Nepal, the effects of climate change are seen in many ways: the country's glaciers are retreating, and the discharges of snow-fed rivers have fluctuated. Rising temperatures are having a positive impact on agriculture in some areas: farmers in the high altitude areas can now comfortably grow two crops per year (rice and barley). But increasing agricultural production in these areas is threatening the local biodiversity and affecting forests. And as most farmers rely on the monsoon rains for production, climate change, particularly the changes in rainfall patterns, is only making agriculture more difficult. In addition, rural communities are increasingly vulnerable to climate-induced hazards, such as landslides and floods. For different reasons, poor rural communities seem particularly vulnerable to climate change, requiring support in order to successfully adapt to the quick changes they are experiencing.

## Adapting to change

Between 2005 and 2007, Practical Action Nepal carried out a project called "Increasing the resilience of poor communities to adapt to the impacts of climate change". This was implemented in partnership with local communities and ECOSCENTRE (Ecological Services Centre), a local non-governmental organisation. The communities played a key role in mobilising local resources. ECOSCENTRE provided training programmes and technical advice (especially on agriculture), and supplied some inputs. The involvement of a local NGO was meant to help sustain all activities after the main project has ended.

The district of Chitwan, in central Nepal, and within it the Jugedi Khola watershed, was selected for the project because of the perceived severity of climate-induced disasters, and the local communities' vulnerability. This area's climate is subtropical, with temperatures ranging between 18 and 32°C, and with an average annual rainfall of 2000 mm. Agriculture and livestock keeping are the mainstay of the majority of its people. However, only a third of all households produce sufficient food grains to meet their needs throughout the year. All other households have to purchase food.

One of the project's first activities was to carry out a vulnerability context analysis. We asked villagers to rank those aspects which determine vulnerability, considering the environment, and also the



Photo: Practical Action Nepal

*The construction of check dams and other infrastructure goes hand in hand with awareness-raising, institutional development and the diversification of incomes*

## Local perceptions and vulnerability

During recent decades, people in Chitwan have experienced hotter summers, while winters are shortening. Ninety eight percent of all villagers recognise changes in the climate, while 95 percent mention drought and erratic rainfall patterns as the main indicators of this change. Villagers have witnessed an increasing number of floods. Although many see human activities as reasons behind this (such as deforestation, or the cultivation of marginal lands due to an increasing population), villagers feel that the erratic rainfall patterns are equally responsible. The destruction of land by floods and landslides, and subsequent declining land productivity, compels people to occupy forest areas, cultivate steeper land and look for alternative means of living.

Our analysis suggested that poor people are more vulnerable, as they rely heavily on the ecosystem and on its natural resources. They also lack assets and access to resources, and institutional support is weak. Vulnerability is determined by the area's topography and geology (as factors which, for example, contribute to landslides), as well as by the socio-economic activities taking place. Deforestation, shifting cultivation, over-grazing or other practices weaken the ecosystem, making it even more vulnerable.

social and economic context. All of them mentioned landslides and floods as major hazards, and easily linked these to a changing climate (see Box). As part of this analysis, we were able to see that villagers were already following a number of coping strategies, preferring short term strategies, or those which give immediate relief. Due to a lack of resources, and also because of a limited understanding of the long term effect of climate change, most villagers had not planned long-term actions.

Our initial analysis identified different coping strategies, all of which helped us define our intervention process. For example, when an irrigation canal was destroyed by floods, villagers tried to repair it with their own resources, without relying on new skills or external resources. But if traditional technologies or practices repeatedly fail, villagers follow a different strategy: changing these practices, or incorporating external ideas. In some areas, rice has been replaced by maize or by other crops. Livelihoods do not change, as villagers continue farming, but they incorporate new skills, techniques or resources. When this is not enough, villagers opt for other activities, such as skilled or unskilled wage jobs. In other cases, they diversify their income generating activities by sowing high value cash crops, or by encroaching on the locally available natural resources (such as the forest). Only when these coping strategies prove not to be enough, do villagers migrate, either temporarily or permanently.

### **An integrated approach**

Our project tried to address the communities' coping strategies, as short-term activities, but also looked at their long-term adaptation activities. As climate change affects all aspects of human life, we felt the need for an integrated approach. This meant taking the ecosystem into account, as well as the social and economic aspects which shape local livelihoods. Considering the area's topography, we felt we could benefit from a watershed-based approach, as a particularly relevant strategy in mountainous areas. We then agreed to an integrated approach which considered agriculture and livestock development; water resources management; forest, land and soil conservation; the diversification of incomes and livelihoods; the rehabilitation of local infrastructure; awareness and education; and institutional development. We aimed to reduce vulnerability by identifying locally affordable risk reduction measures, and at the same time developing adaptive capacities. Our ultimate objective was to develop the local communities' capacities to cope and adapt to climate change by building resilience and diversifying their livelihood options.

#### *Agriculture and livestock development*

As a basic coping strategy, farmers have been looking for crops that thrive under erratic rainfall conditions. Some of them replaced their rice by maize, not expecting high yields, but rather so that land would not remain fallow. Most farmers, however, wanted a source of income, looking for crops that do well and have a good market value. Banana and vegetables were seen as better options: local people were encouraged, trained and supported to produce cash crops for the market. Training courses were also given in livestock health management. The trained individuals will then provide services to local people in livestock health care. In addition, villagers have been able to sell their surplus milk and vegetables for additional income. With more income generating activities, villagers have become more resilient.

#### *Water resources management*

A more intensive agriculture needs an improved water management system. But the changes in rainfall patterns have also affected

irrigation. Landslides and flash floods have destroyed the irrigation channels and affected the water discharge into the streams. The streambeds have risen because of deposition of debris, making water inaccessible for irrigation. Where appropriate, farmers have tried to use alternative techniques, such as wooden conveyers or lifting water by pumps for irrigation. When discussed with the communities, one of their priorities was to rehabilitate the irrigation channels. Thanks to the rehabilitation of six irrigation canals, benefiting over 30 hectares of land, farmers can now grow three crops a year. This is in an area where, previously, they could hardly grow one crop (rice), with uncertain harvests. This helped households to increase the total crop production in the area, thereby helping in terms of food security and income generation.

#### *Forest, land and soil conservation*

More than 8 hectares of land were destroyed by landslides and flooding in 2006. One of the communities' requests was therefore to protect their land from potential floods and landslides. Gabion wire boxes were filled up with rocks and laid down on the riverbanks to divert the stream flow away during the flood time. This helped protect the intakes of irrigation channels, land and houses located at vulnerable sites. Some of these, however, were destroyed by the floods and buried by the debris. Later interventions tried to put check dams in upstream micro-catchments. This, together with plantation and forest management, aimed to reduce the deepening of gullies, the occurrence of landslides, and the flow of debris.

Plantations have been established on both community and private lands. The preferred trees include fodder, timber and fruit species. The community members have also promoted grass species for reducing soil erosion. A community managed forest nursery was established to produce seedlings which are suitable to the local environment and economy. Communities have now formed Forest User Groups to manage the forest. They have controlled the illegal intrusion of outsiders who collect forest products.

#### *Diversifying incomes and livelihoods*

Farmers' first priority is to seek opportunities to make their existing livelihoods, like agriculture, more resilient. The second priority is to seek alternative livelihoods, like additional income generation activities. Goat raising, vegetable cultivation and fruit farming are some of the activities which make agriculture more resilient, while at the same time help diversify livelihood options, and thus reduce the potential risks coming from climate change. Starting new enterprises, such as selling milk and vegetables to the local market, has also resulted in a good source of income. The project looked at the link between the communities and the external market, and provided specific training, with various results. One of the trainees, for example, was able to establish a "service centre", from which villagers receive regular services (especially in terms of livestock health, feed, seeds and selected inputs). At the same time, the same person helps villagers sell their products to outside middlemen, increasing their income.

#### *Reconstruction of local infrastructure*

Intensive rains and landslides also destroy local infrastructure such as bridges, canals, trails or community buildings. Communities need to be prepared for such events, considering all possibilities at the time of planning, construction and rehabilitation of the local infrastructure. Although the communities in the project area still need to repair a number of roads and buildings, we started with a local bridge at a strategic location. This bridge now allows villagers (and in particular students) access during heavy rains, while plans for future repairs are also being considered.



*Meetings with all villagers helped define the intervention process*

#### *Awareness and education to local people and school students*

Local communities are not fully aware of the wide impact of climate change. When talking about climate change, most think of the local environment, and not about a worldwide phenomenon with lasting consequences. We therefore organised a number of awareness-raising activities, among which we included slide shows, focus group discussions and educational visits, especially targeting young students. We also prepared a documentary, and helped set up a meteorological station, where students take records of temperature and rainfall. Information materials on climate change and on its global and local impacts, such as booklets and posters, were also produced and disseminated.

#### *Institutional development*

Having noticed the changes in the climate, villagers have taken individual action. But local organisations do not always seem ready for the challenge. Considering the importance of coordinated action, the project also looked at these institutions, and at the opportunities they can bring. A Climate Change Impacts and Disaster Management Group (CCIDMG) was set up in the project area, to prepare plans, raise money for specific activities, and co-ordinate the response of all villagers. This group was recently registered at the District Administration Office. Its activities started with the election of an executive committee, with representatives who were trained in administrative and financial management. The group co-ordinates with the local government and with external service providers, helping villagers to access resources and services. Most importantly, the group has prepared a watershed management plan, pooling the necessary skills and resources and aiming at an increased resilience.

#### **Increasing awareness for building resilience**

The most studied impact of climate change in Nepal is the disappearance of glaciers and the formation of new glacial lakes. But global climate change is having a much wider impact at a village level, and there is not always sufficient information available about landslides, floods or about cold and heat waves. Also lacking are studies on the impact of climate change on agriculture or biodiversity. This is linked to the low awareness level we found among the professionals who are working in government and non-government organisations in the field.

Rural communities are already experiencing the impacts of climate change, and most are trying their best to adapt. Being based on the

villagers' interests and motivations, as well as on their skills and knowledge, their coping strategies are a good starting point. But local efforts frequently have a short-term focus. Additional efforts are therefore needed to successfully adapt to change in the long term. These need to minimise an area's vulnerability, and help build resilience.

In order to help communities build resilience, a single sector or programme approach does not work. Adaptation to climate change should therefore be integrated, multi-dimensional and multi-sectoral. The experience from this project suggests that the climate change adaptation approach should include a diverse range of conservation and development activities, including strategies for disaster risk reduction. The approaches might be promoted as "Integrated Conservation and Development Approach" or "livelihood strategy approach", with the ultimate goal of sustainable development. In a given location, the severity of the impact on different sectors could be at different levels. It is therefore suggested that the most affected sector should be taken as the entry point on which the integrated programme should be developed and promoted.

#### *Acknowledgements*

*We would like to thank the Allachy Trust, UK, for providing the necessary funds to implement the project. Our sincere thanks also go to the communities who co-operated with the implementation of all activities and who were involved in strengthening their own capacities to adapt to climate change. We are thankful to Hilary Warburton and Rachel Berger, Practical Action UK, for giving us the opportunity to manage the project in the field.*

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