



Briefing Note

Adapting agriculture to climate change

The background

The effects of climate change include changes to regional temperatures and precipitation patterns. As a consequence, climate zones are shifting, and hence also cultivable zones. Climatic regions that have been suitable for certain crops until now will no longer be able to be used in the same way in future. On the other hand, previously unusable zones – especially in northern latitudes – will become usable for agriculture as a result of the changes.

The shifting of production zones is forcing the adaptation of cultivation systems and the associated infrastructure – such as transport, systems for preserving and processing agricultural products or social infrastructure in the event of population displacements. Crops with poor climate adaptability, such as coffee and tea, are particularly affected by the shift in growing zones.

Agriculture in developing countries is greatly under threat from these changes. Small-scale farmers with no income other than from agriculture are particularly vulnerable because they are entirely dependent on their natural resources. They have neither sufficient income nor are they adequately trained to protect themselves against the impacts. Furthermore, they have little access to information or social security systems. In many cases there is uncertainty regarding user rights to land and other natural resources. Over the centuries, small-scale farmers in developing countries have constantly adapted to changes to the climate and their environment. The current rate of change is exceeding their capacity for adaptation, however.

In Africa it is estimated that between 75 and 250 million people will suffer from water shortages as soon as 2020. Yields from rain-fed farming will decline by as much as 50%. The number of undernourished or malnourished people will significantly increase as a result. Low-lying coastal regions will be adversely affected by the rise in sea level, while the area of inland arid and semi-arid regions will expand by between five and eight per cent by 2080.

In Asia, the availability of fresh water will change considerably as a consequence of the melting of the Himalayan glaciers. Initially, the additional meltwater will boost availability until about 2050, and increasingly frequent extreme events will lead to flooding. Over the long term, however, experts expect water levels to drop. Even slight delays to the summer monsoon will then have a detrimental effect on crop growing. These changes jeopardise production by millions of small-scale farmers living in the catchments of major river systems such as the Yangtze, Mekong, Brahmaputra, Ganges and Yellow River.

In Latin America, as the availability of water declines, savannah will replace part of the tropical forest. Arid zones will expand. This will be accompanied by the loss of valuable biodiversity. Production of crops and livestock will fall in the majority of countries, leading to a worsening of food security. In the temperate zone the rise in temperatures will result in an expansion of more heat tolerant crops, such as soya and maize.

Supporting adaptation to climate change is a relatively new field for international development cooperation. It contributes to global food security and to poverty reduction. It must not be forgotten, however, that food security is also greatly affected by other factors, such as post-harvest protection, storage capacities, land law, trade policy and population policy.

Our position

Contributions to climate change adaptation must strengthen the capabilities of the affected population groups and countries in such a way as to make them less vulnerable to the consequences of climate change. International cooperation can support adaptation in two ways: partly through dedicated climate change adaptation projects, and partly by systematically integrating climate change adaptation into ongoing and new rural development projects.

In this context, GIZ takes the following positions:

- 1. Diversity strengthens the resilience of production systems**

The sustainability and buffering capacity of production systems are strengthened by support for a variety of elements that stabilise yields. This may comprise using adapted varieties and species or improving soil fertility and soil structure to increase its capacity to absorb and store water. Other strategies also strengthen the resilience of production systems, such as integrating agroforestry into production systems, diversifying the crops grown and adapting livestock production by raising appropriate breeds and improving grazing management.
- 2. Preserving agricultural diversity is important**

It is important to conserve agricultural biodiversity (agrobiodiversity). It holds the potential for breeders to adapt agricultural crops and farm animals to meet future requirements. International cooperation can apply measures that help to promote such diversity on farms and in gene banks. Many wild relatives of our cultivated plants and domesticated animal breeds can be found in natural ecosystems. This is why it is essential that international cooperation also supports the conservation or careful, sustainable use of natural ecosystems.
- 3. Multifunctional agriculture must be promoted**

Climate change will make it ever more difficult to provide sufficient food to the growing global population. Besides, as aridity increases, water will become increasingly scarce. It is therefore vital to promote multifunctional measures. Protecting water catchments by soil and water conservation comes into this category, as does the use of surface water for small-scale irrigation, or the protection of areas with high biodiversity within the context of land-use planning.
- 4. Precautionary measures increase resilience**

Smallholder households and marginalised rural population groups need protection against the consequences of extreme events. Introducing and improving agricultural insurance and credit systems is one such means of protection. Developing and promoting early-warning systems in collaboration with agrometeorological services and improving disaster risk management also serve to guard against future eventualities.
- 5. Hotspots must be at the heart of national adaptation strategies**

In order to achieve maximum effect, national adaptation strategies must be focused on top-priority areas, referred to as hotspots. These are areas where irreversible damage is being caused, for example soil degradation or the desertification of entire regions. Existing adaptation methods must be disseminated more widely, as only then can they produce sufficient adaptation results and reach as many people affected by climate change as possible.
- 6. Intermediaries need targeted capacity development**

International cooperation can support partner countries in providing state and non-state institutions, non-governmental organisations and state-owned and private service providers with capacity development in matters relating to climate change. This is a prerequisite for them to be able to advise smallholder farmers on what action they can best take to cope with the challenges of climate change through their own efforts.

7. Adaptation to climate change in agriculture requires adjustments to standards

Good Agricultural Practice (GAP) incorporates Integrated Crop Management (ICM) and Integrated Pest Management (IPM). At international level it is necessary for the inclusion and implementation of these and other measures to be recognisable and be part of climate change adaptation measures. To achieve this, existing certification and quality standards need to be developed further.

Our recommended actions

In countries affected by climate change it is vital to secure the livelihoods of smallholders and ensure the provision of nutrition to the population; damage must be minimised. This is why it is particularly urgent to support small-scale farms in adapting to climate change and safeguarding and further increasing agricultural production. There are a considerable number of best practices already available to improve land management, institutional settings and legal conditions. These must be supplemented and optimised.

GIZ considers the following the most important recommendations for action:

1. Improve forecasting models and early warning systems

Further efforts need to be made to inform decision-makers and target groups about climate change impacts and existing options for adaptation, and to raise their levels of awareness. This calls for more precise information about the local impacts of climate change. Therefore forecasting models and early warning systems must be further refined and local analytical and evaluation capacities improved. That will require targeted support for and further expansion of agrometeorology, and training of additional personnel.

2. Align agricultural research more closely with smallholders' needs

Agricultural research should focus in future on developing adapted agricultural production systems on the basis of indigenous knowledge. The breeding of adapted plant varieties and animal breeds calls for a reorientation towards multifunctionality. This means that ensuring crop yields, tolerance towards diseases and pests and resistance to stress from temporary periods of drought or flooding are all equally important. Smallholders also need reliable access to appropriate seeds and improved animal breeds.

3. Build the technical and institutional capacities of decision-makers

Decision-makers, state, non-state and private service providers and target groups must play an active and effective part in adaptation to climate change. To be able to do so they need intensive training and institutional strengthening in the fields of planning, policy and strategy development and in the learning of methods and techniques to adapt to climate change.

4. Adapt value chains to climate change

Existing and future value chains must be adapted to climate change. As a result they will give farmers greater incentives to produce and diversify while at the same time improving the supply of food to consumers. Value chains that have been reshaped along these lines are also referred to as "green value chains".



5. Create new financing systems

The financing of adaptation measures needs to be expanded. There are various means of doing this, for example by creating new systems. The private sector can be brought in, or greater use can be made of environmental payments. Another possibility would be to use funds from integration of agriculture into the international emissions trading system in future.

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