

# Challenges and strategies for adapting climate change in rural development

Fahria MASUM, Germany and Michael KLAUS, Germany

**Key words:** Rural development, climate change adaptation, climate-responsive rural development

## SUMMARY

In the face of projected changes in climate, there can be no long-term sustainability in rural development without incorporation of useful synergies for climate change adaptation and mitigation into rural development process. In order to address the key question of what practical adaptation strategies need to be implemented, it's important to know the challenges and opportunities for adapting climate change in rural areas.

The study summarizes the results of a workshop organized by the Hanns Seidel Foundation, held on 26 April 2018 in Qingzhou, China. The workshop helped to understand the views of five different professional groups, i.e. academics and researchers, government employees at central level, development organizations (NGOs), government employees at local level and land consolidation practitioners, on climate-responsive rural development.

The workshop recognized that climate change poses a major challenge to rural livelihoods and rural development at different levels. The participants identified that the most devastating impacts of climate change in rural areas include frequent drought, severe floods, storm and heavy rainfall, thereby affecting agricultural production and food security. The participants suggested that climate change adaptation should be considered as the cross-cutting objectives of rural development. Successful application and implementation of approved rural development instruments such as spatial and land use planning, land consolidation, village renewal should take into account new and regionally appropriate adaptation measures. As the scope of integrated rural development goes beyond agricultural development, climate-responsive rural development should not only focus on agriculture, but also on non-agricultural rural development issues (i.e. infrastructure, land rights, water management).

# Challenges and strategies for adapting climate change in rural development

Fahria MASUM, Germany and Michael KLAUS, Germany

## 1. INTRODUCTION

Rural development is of particular importance in Sustainable Development Goals (SDGs), in part as in many developing countries over half of the population live in rural areas. Without rapid progress in reducing and eliminating hunger and malnutrition by 2030, the full range of SDGs cannot be achieved (FAO 2015). The battle to end hunger and poverty must be principally fought in rural areas, which is where almost 80 percent of the world's hungry and poor live (ibid). Achieving sustainable development goals, therefore, will not be possible unless agricultural productivity and rural incomes increase.

Climate change is one of the greatest environmental challenges at global level. It has major impacts on rural livelihoods or “the capabilities, assets (stores, resources, claims, and access) and activities required for a means of living” (Chambers and Conway, 1992, p. 6 quoted in Dasgupta et al. 2014). There are two distinctive characteristics of rural areas make rural uniquely vulnerable to the impacts of climate change (Dasgupta et al. 2014):

First, greater dependence on agriculture and natural resources makes them highly sensitive to climate variability, extreme climate events, and climate change.

Second, existing vulnerabilities caused by poverty, lower levels of education, isolation, and neglect by policymakers can all aggravate climate change impacts in many ways.

In tropical developing countries, negative consequences already weigh heavily on the livelihoods of households and vulnerable communities. Beyond 2030, the negative effects of climate change on agricultural yields will increase in all regions (FAO 2018, p. 7). According to a recent study, by 2050 crop yield would decrease by 10-25 percent increasing food security and poverty (FAO 2017).

### Box. 1 Climate change impacts in rural areas across the world

The chains of climate change impact may originate with extreme events such as floods and storms, some categories of which, in some areas, are projected with high confidence to increase under climate change. Such extreme events will directly affect rural infrastructure and may cause loss of life. Other chains of impact will run through agriculture and the other ecosystems (rangelands, fisheries, wildlife areas) on which rural people depend. Given the strong dependence in rural areas on natural resources, the impacts of climate change on agriculture, forestry, and fishing, and thus on rural livelihoods and incomes, are *likely* to be especially serious. Secondary (manufacturing) industries in these areas, and the livelihoods and incomes that are based on them, will in turn be substantially affected. Infrastructure (e.g., roads, buildings, dams, and irrigation systems) will be affected by extreme events associated with climate change. These climate impacts may contribute to migration away from rural areas.

Source: Dasgupta et al. 2014

Though development of rural areas has received increasing attention globally, especially over the past three to four decades, still the focus on climate responsive rural development policies has not been among the highest national policy in many countries, especially in the third world. In rural areas, very few specific climate change adaptation measures have been implemented so far. As agriculture is seen as a key facet of rural life, in many developing countries a large part of the climate change adaptation policy is confined to the agriculture sector. However, a development model for rural areas should go beyond agriculture and, therefore, a wider scope for effective actions on climate change adaptation and mitigation is necessary.

It is evident that development of rural areas is a key to a country's ability to eradicate poverty, overcome hunger, and create decent rural jobs. But, in the face of projected changes in climate, there can be no long-term sustainability in rural development without incorporation of useful synergies for climate change adaptation and mitigation into rural development process. In order to address the key question of what practical adaptation strategies need to be implemented, it is important to know the challenges and opportunities for adapting climate change in rural areas. Although adaptation measures are context-specific and opportunities, and challenges vary from location to location, the findings of the study would help to get a general picture.

## **2. ADAPTATION TO CLIMATE CHANGE: GLOBAL PERSPECTIVE**

### **2.1 Adaptation to climate change: a continuous process**

Adaptation is increasingly recognized as an important climate risk management strategy complementary to mitigation. It has defined in different ways. IPCC (2007) describes it as adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. UNFCCC defines it as actions taken to help communities and ecosystems cope with changing climate condition. According to UNDP (2005), adaptation is a 'process' by which strategies to moderate, cope with and take advantage of the consequences of climatic events are enhanced, developed, and implemented.

Adaptation can be a specific action such as a farmer switching from one crop to variety to another that is better suited to an anticipated situation (Leary et al. 2008). It can be systematic change such as diversifying rural livelihoods as a hedge against risks from variability and extremes (ibid). However, Pelling (2011) made a key distinction between adaptation that is forward or backward looking. As a backward looking attribute, adaptation is revealed by capacity to cope during moments of stress or shock. As a forward looking attribution adaption cannot be revealed through impacts (which have not happened) and instead is made visible through theoretically identified components associated with adaptive capacity. However, in practice, climate change adaptation is very broad and open ended which encompasses adjustment', 'practical steps', 'process' and 'outcome' that does not include any particular time or subject references (Levina and Tirpak 2006).

OECD (2009) identified four general steps for how to develop adaptation measures in different settings. They are:

- Step 1: Identify current and future vulnerabilities and climate risks;
- Step 2: Identify adaptation measures;
- Step 3: Evaluate and select adaptation options;
- Step 4: Evaluate success of adaptation measures.

UNFCCC (2006) also suggested a similar approach for adaptation as an idealized four-stage sequence considering the technologies for adaptation to climate change:

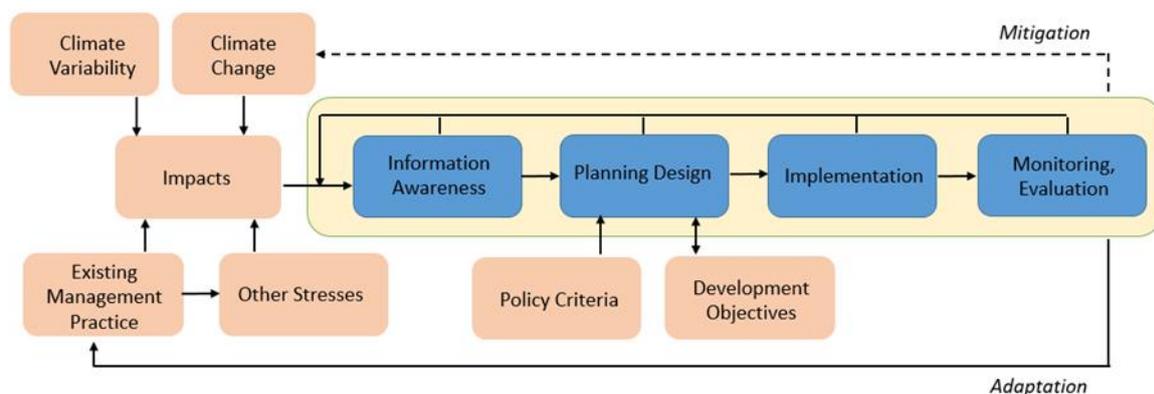
**First**, collect and interpret the necessary information.

**Second**, design an appropriate response that is not only technically feasible but also is consistent with the country's development objectives, as well as some key policy criteria – the technologies will need to be cost effective, environmentally sustainable, culturally compatible and socially acceptable.

**Third**, move to implementation, which in addition to installing systems means ensuring that these are actively supported by effective institutions, formal and informal, from national organizations to village communities.

**Fourth**, continually monitor and evaluate the technologies to allow for adjustments, course corrections, and further innovation and feedback.

**Figure 01: Iterative steps in planned adaptation to climate change**



Source: UNFCCC 2006 (re-drawn)

## 2.2 Adaptation to climate change: International response

International community has acknowledged the importance of climate change adaptation. This issue has been addressed by different international organizations at policy level.

The EU Adaptation Strategy (EC 2013) aims to make Europe more climate-resilient. By taking a coherent approach and providing for improved coordination, it aims to enhance the

preparedness and capacity of all governance levels to respond to the impacts of climate change. The adaptation strategy further highlighted the need for new knowledge on adaptation.

Paris Agreement from 21<sup>st</sup> conference (COP21) highlights the importance of adaptation at the same level as climate change mitigation. It recognizes the importance of support for and cooperation on adaptation and particularly the importance of accounting for the needs of developing countries that are especially vulnerable to climate change impacts.

Sustainable Development Goals (SDG) adopted by the UN in 2015 also raise the issue of adaptation to climate change (Goal 13: Take urgent action to combat climate change and its impacts). The targets linked to the environment includes strengthening resilience and adaptive capacity to climate-related hazards, and integrating climate change measures into national policies, strategies and planning.

The Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted at the third global conference on disaster risk reduction in Sendai, Japan in March 2015. It states, “Addressing climate change as one of the drivers of disaster risk [...] represents an opportunity to reduce disaster risk in a meaningful and coherent manner [through] intergovernmental process.” It urges to reduce the impacts of natural disasters by implementing measures such as awareness raising, early warning systems and financial assistance programmes at times of crisis.

### **3. METHODOLOGY**

This paper summarizes the key findings of a workshop took place on April 26, 2018 during the international conference on ‘Land Use Management and Adaptation to Climate Change’ organized by the Hanns Seidel Foundation, April 25-27, 2018 in Qingzhou, China. The workshop was conceptualized as a sequence of presentations and panel discussions. The participants engaged in a group work to flesh out the discussion in relation to a set of questions provided to them. Around 60 participants worked in a homogeneous professional group, i.e. group members were having the same professional background. This helped to understand the views and experiences of 5 professional groups (i.e. academics and researchers, government employees at central level, development organizations (NGOs), government employees at local level and land consolidation practitioners). The participants were high-level ministry and provincial officials, project leaders from international development organizations, academics, eminent researchers and practitioners from Germany, Australia, China, Myanmar, Philippines, Lao PDR, Cambodia, South Korea and Vietnam.

Each group was asked to elaborate on the following questions within the working group and present answers.

1. What are the climate change challenges rural areas face? How do they affect rural development?
2. What remedies can be taken to overcome the challenges?

3. What should be the role of government and local administration?
4. What should be the role of rural people in climate change adaptation?

### **3.1 Hanns Seidel Foundation at a glance**

The Hanns-Seidel-Foundation (HSS) is one of the seven non-profit political organizations in the Federal Republic of Germany. It runs around 100 projects in more than 60 countries worldwide, which has unique implementation process with direct funding from the German Government. The focus of these projects is on strengthening civil society, civic involvement and promoting the rule of law, education and management training, raising environmental awareness, advising decision-makers in politics, and business and administration. Core concern of the international cooperation is fighting poverty and to enhance sustainable development.

The HSS has been represented in People's Republic of China for more than 30 years. The organization undertook and implemented projects within the development cooperation. From the beginning, the projects in China are funded by the Federal Ministry for Economic Cooperation and Development. Therefore, the HSS is a part of the Official Development Assistance of the Federal Republic of Germany. Based on the guiding principles of the HSS, the foundation addressed issues in the field of politics and society, education, vocational training, and development of rural areas. A joint declaration on the Establishment of Friendly Relations between Shandong Province and the State of Bavaria was signed on 9 July 1987. The HSS, in collaboration with the Bavarian State Ministry for Food, Agriculture and Forestry, established a pilot project in 1989 for land consolidation and village renewal, which can be regarded as first modern approach in China that still shows an improvement of living condition and increased income. The success was clear and it became evident that there must be more research and training to implement and adapt the measures.

Through the development of concepts and model projects for the development of rural areas, the HSS is showing ways to improve the living and working conditions of the rural people aiming at balancing rural and urban areas, while taking into account the ecology and broad citizen participation.

In the field of land management the HSS has a very close cooperation with the Chair of Land Management at the Technical University of Munich and the School for Public Administration of Policy at the Renmin University in China. The organization intends to implement the global academic partnership in the field of land management, which is an inevitable component of systematic capacity development (see Magel et al. 2009).

## 4. FINDINGS AND DISCUSSION

### 4.1 Climate change challenges and its impact on rural development

Climate change poses a major challenge to rural livelihoods and rural development at different levels. The participants identified that the most devastating impacts of climate change in rural areas include frequent drought, severe floods, storm and heavy rainfall, thereby affecting agricultural production and food security.

Given the example of the Yellow River delta in China, it was discussed that, along with sudden-onset events (e.g. floods), rural areas can experience slow-onset events, such as the development of saline-alkali soil, which limits agricultural production.

Impact of climate change on forest also triggers the changes in biodiversity followed by the changes in forest growth and productivity. Such impact constitutes additional stress to rural livelihoods, especially for the people who depend on forest resources for all or part of their livelihoods.

Climate change can amplify the political, economic and social stress through political destabilisation, regional imbalance, economic collapse, financial crisis, lack of investment and inadequate service, including education, loss of jobs and social dispute. The increased vulnerability of rural areas owing to climate change also causes migration or internal displacement.



Photos: Participants working in a group

## **4.2 Remedies to overcome the challenges**

Early warning systems can facilitate the preparedness of rural people for climate-related hazards and vulnerabilities, and their readiness to respond appropriately to the calamities. Priority in investment in rural sector, especially in climate adaptation measures including monitoring and warning systems, was highly recommended.

Agriculture is one of the important sources of greenhouse gas. Given the importance of agricultural subsistence in rural areas, a reduction of greenhouse gas emissions from farming is quite challenging. Nevertheless, the participants suggested that it is necessary to reduce greenhouse gas emissions from agriculture and adapt food production systems to cope with climate change. In this respect, a regulatory framework for the agriculture sector should be undertaken.

The participants suggested that the adjustment of cultivation period and crop variety should be a core strategy in the agricultural sector. Climate change vulnerability requires comprehensive measures that link climate change adaptation with management of land. This calls for sufficient investment and research in climate-responsive land management.

Forest conservation, through community forest management practice, can bring about change in forest cover in a relatively better way and bring reduction in the rate of deforestation and degradation.

The participants discussed the use of climate adaption technology (e.g. risk assessment technology) and innovative green tools (e.g. green facades, green roofs) to address climate change adaptation.

The participants suggested that, in order to develop a standardised procedure and to assess the effectiveness of climate adaptation measures, more pilot projects need to be undertaken by development organisations.

## **4.3 The role of government and local administration**

Climate change adaptation is not only a technical or managerial process. As it should be included in political discourse, it is also a political process. Participants stressed that political will is first and foremost important for climate change adaptation. They further stressed that significant financial resources are needed to deal with climate change adaptation. To face the climate change challenges government should arrange climate finance from the public budget and from other development finance institutions. Government should also ensure effective monitoring and evaluation methodologies and processes to the initiatives to address climate change.

Participants agreed that, to understand the importance of climate change adaptation in rural development, it is necessary to have agreements on climate change at international level, a

framework on climate responsive rural development at national level, and climate adaptation policies at regional and local level.

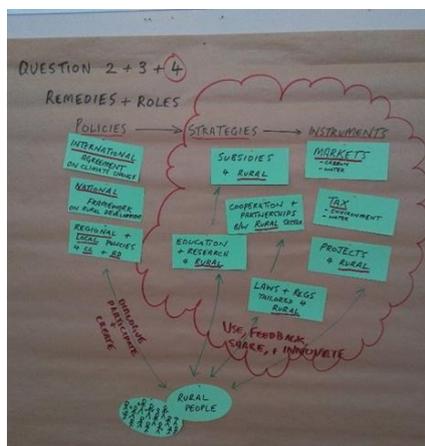
Participants identified that a bottom-up approach is necessary to build a partnership with local people. Government should take favourable action for inclusion of rural people into climate adaptation actions. A knowledge sharing platform should be developed whereby rural people can gain better understanding of the implications of climate change and, at the same time, community knowledge can be tapped into climate adaptation, especially in early warning systems.

Capacity development was recommended as an instrument of reducing the knowledge gap. The importance of capacity development was realised, not only for local people, but also for institutions and experts. The participants suggested that government should provide advisory services to the experts to broaden their horizon on climate change adaptation and management. Similarly, capacity development at institutional level is required to enhance the capacity of the institutions to enforce and monitor the adaptation measures.

To address the long-term impacts of climate change and to prioritise adaptation actions, participants stressed the importance of having favourable policy and legal framework at the national level. The following were suggested:

- Good spatial planning for climate change adaptation
- Adaptation of climate-responsive rural development policy
- Legal basis to declare a state of emergency
- Levying carbon tax emissions of greenhouse gases

Government should facilitate universities and research institutions to undertake research addressing climate change problems through contextualised knowledge. The participants also suggest that it is necessary to move from theory to practice through taking different practice-oriented pilot projects.



Photos: Presentation of findings

#### **4.4 Role of local people in climate adaptation**

The participants stressed that there is a need to combine local knowledge into adaptation measures, especially into early warning systems. The rural people can provide information and knowledge to facilitate to capture local know-how, when local information on the issues are scant at national and institutional level. Furthermore, in order to minimise the impacts of climate change, adaptation and resilience strategies should explicitly consider the involvement of local people, particularly those who are vulnerable to the effects of climate change, in the adaptation process, from planning to implementation phase.

A recommendation was made for awareness raising and capacity development for local people. Training and advisory services in the form of capacity development can empower the rural people to face the climate change challenges and increase their adaptivity. Farmers should gain sufficient knowledge about alternative choice of crops and management practice. The rural people should have a sense of accountability to and ownership of the adaptation process.

#### **5. CONCLUSIONS**

There is no ‘one size fits all’ solution in response to climate change challenges. As adaptation and mitigation inevitably take place in the local context, without a better understanding of local know-how, there is a risk that climate change adaptation issues are over-looked when rural development programmes are undertaken. Therefore, particular attention should be given to the ability to develop and implement the measures that can build on local knowledge and resources. Taking into account the urgent need for actions to address the effects of climate change, vulnerability and adaptation planning should be implemented across different sectors of rural development, and at different scales with a participatory approach.

#### **REFERENCES**

Dasgupta, P., J.F. Morton, D. Dodman, B. Karapinar, F. Meza, M.G. Rivera-Ferre, A. Toure Sarr, and K.E. Vincent (2014). Rural areas. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press: United Kingdom and New York, NY, USA, pp. 613-657.

EC (2013). The EU strategy on adaptation to climate change. Available at [https://ec.europa.eu/clima/sites/clima/files/docs/eu\\_strategy\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/eu_strategy_en.pdf)  
Accessed on March 03, 2019.

FAO (2015). FAO and the 17 Sustainable Development Goals. Rome: Food and Agriculture Organization of the United Nations

FAO (2017). Leaving no one behind. Addressing climate change for a world free of poverty and hunger.

FAO (2018). Food security and nutrition in the age of climate change. Proceedings of the International Symposium organized by the government of Québec in collaboration with FAO Québec City, September 24-27, 2017. FAO: Rome.

IPCC-Intergovernmental Panel on Climate Change (2007). M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden, C.E. Hanson (Eds.), Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press: United Kingdom/New York, NY, USA

Leary, N., Adejuwon, j. et al. (2008). A stitch in time: general lessons from specific cases. In: *Climate change and adaptation*. The International Earthscan Secretariat.

Levina, E. and Tirpak, D (2006). Adaptation to climate change: key terms. OECD: Paris

Magel, H., Espinoza, J., Klaus, M. and Masum, F. (2009). Capacity building in land management. The need for establishing a global academic partnership. In: Proceedings of 7th FIG Regional Conference on Spatial data serving people: Land governance and the environment – Building the capacity, 9-22 October 2009, Hanoi, Vietnam.

Pelling, Mark (2011). Adaptation to climate change: from resilience to transformation. Routledge: New York

UNDP (2005). Adaptation Policy Frameworks for Climate Change. Developing Strategies, Policies and Measures, Ed. Bo Lim, Erika Spanger-Siegfried, Co-authors Ian Burton, Elizabeth Malone, Saleemul Huq

UNFCCC (2006). Technologies for adaption to climate change. UNFCCC: Bonn

## BIOGRAPHICAL NOTES

**Fahria Masum** is a consultant in Land Management and Land Policy. She gains more than 10 years of international experience in education and capacity development with key expertise in education strategy and policy development in land sector. She took part in consulting projects funded by the World Bank, GIZ, GLTN/UN Habitat and Hanns Seidel Foundation. She served

Chair of Land Management at the Technical University of Munich (TUM), Germany as a scientific staff during 2007-2016. She was the coordinator of the Master's Programme and Doctoral Studies Land Management and Land Tenure at TUM. Fahria Masum holds a PhD from the Technical University of Munich in urban land management.

**Michael Klaus** is the Director of the Hanns Seidel Foundation (HSS) Representative Office Shandong, P.R. China. He is leading the Project "Development of Rural Areas in China" as a component of the "Regional Project China" of the Hanns-Seidel Foundation. From 1995 to 2012 he worked at the Chair of Land Management, at the Technical University of Munich. Since May 2017 he is appointed as a Visiting Professor at the Department for Public Administration and Policy of the Renmin University Beijing, China. He studied Geodesy at the Technical University of Munich and in 2003 he received a Doctoral Degree in sustainable land development. His specialization is geodetic engineering and land management.

## CONTACTS

### **Dr.-Ing. Fahria MASUM**

Land Management Consultant

Connollystrasse 26

80809 Munich

Germany

Tel.: 004917665649725

Email: [masum@landguidance.com](mailto:masum@landguidance.com)

### **Dr.-Ing. Michael KLAUS**

Hanns Seidel Foundation

Chief Representative of Hanns-Seidel-Foundation Office Shandong

Programm Director Development of Rural Areas in China

Sino-German Research and Training Center for

Land Consolidation and Development of Rural Areas

Ling Long Shan Nan Lu 7399

262500 Qingzhou

PR China

Tel.: +86-(0)536 3857 299

Fax: +86-(0)536 3857 399

Email: [Klaus@hss.de](mailto:Klaus@hss.de)

Website: <https://www.hss.de/china/de/home.htm>