Climate Change in Rural Landscapes –

Systemic Solutions for a Sustainable Future

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Climate change significantly impacts rural areas, affecting both their ecosystems and the livelihoods of residents. Fortunately, there are numerous solutions to promote climate-resilient and low-emission rural development, ensuring food security within planetary boundaries. But how can we realize climate-sensitive rural development, and how does it contribute to transforming our agricultural and food systems? This paper explores these interconnections, presents strategic solutions, and illustrates them with practical examples.

Climate change presents profound challenges for rural populations worldwide. Livelihoods are increasingly threatened by extreme weather events such as heavy rainfall and storms. Rising temperatures, droughts, irregular rainfall, and shifts in cultivation periods lead to crop failures, reduced yields, and generally more challenging farming and living conditions for smallholder farmers, exacerbating hunger and malnutrition. Violent conflicts, economic shocks, and pandemics often worsen the situation. Additionally, population growth and migration increase pressure on the natural resources in rural landscapes.

In **rural regions**, land and biodiversity are crucial for livelihoods and well-being. However, land is becoming increasingly coveted, and non-climate-adaptive land use practices are proliferating. These changes lead to soil degradation and deforestation in many countries, reducing the capacity to sequester carbon in plants and soil, thereby worsening climate change and species loss.

Effective **climate mitigation** requires land for implementing nature-based solutions, such as reforestation and peatland rewetting, and for building photovoltaic or wind power plants. Our current agricultural and food systems, primarily based in rural areas, contribute significantly to climate change, accounting for about one-third of global greenhouse gas emissions. Therefore, successful climate protection is vital for the sustainable transformation of our agricultural and food systems. Achieving this requires a fundamental change in how we produce and consume food in the future.

The ability of people to **adapt to the consequences of climate change** is significantly influenced by access to land and water, but it also depends on various other factors such as political participation, government services, education, and diverse income opportunities. Structurally marginalized groups, including Indigenous communities, ethnic minorities, women, young people, and people with disabilities, are particularly vulnerable to the impacts of climate change. Therefore, promoting climate resilience and mitigation must also address issues of justice, particularly climate justice. This involves ensuring equitable access to resources, participation in decision-making processes, and the distribution of benefits from climate adaptation and mitigation efforts.

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In short: **systemic approaches** are needed to meet the complex challenges of climate change.

Liveable Rural Areas in Times of Climate Change

Developing rural areas must focus on climate resilience and low emissions to ensure a sustainable future. As climate change affects landscapes, ecosystems, economies, and individual households, strategies must be implemented at multiple levels, integrating **different sectors and stakeholders**. Climate-sensitive rural development should promote systemic approaches that mitigate risks for vulnerable groups and consider structural factors within the political framework. This approach can significantly contribute to **transforming agricultural and food systems**.

Resilient and low-emission rural development requires **equitable and holistic approaches**. The following **fundamental principles** guide the development of rural areas and form the basis for planning and implementation:

→ Climate risks:

Conduct climate risk assessments to analyse the risks of climate change, particularly for highly vulnerable groups, and align strategies accordingly.

→ Conflict sensitivity:

Integrate 'do-no-harm' principles into conflict-sensitive measures.

→ Human rights and inclusivity:

Focus on the rights and protection needs of particularly disadvantaged population groups.

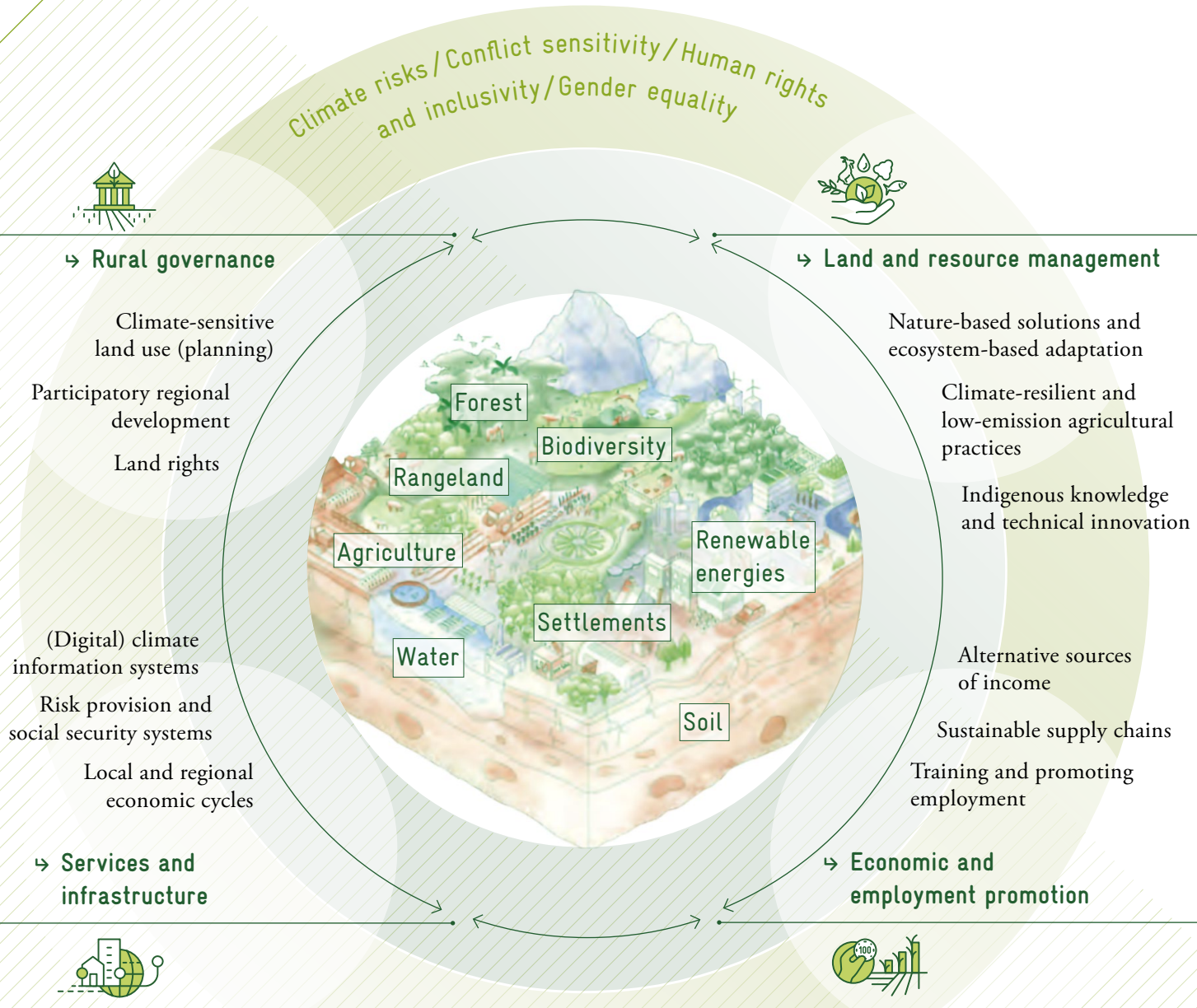
→ Gender equality:

Promote the rights, representation, and access to resources for all people, regardless of gender (identity) or sexual orientation.

The design of climate-sensitive rural development can be categorized into four key **areas of intervention**, based on the aforementioned fundamental principles:[1] **(1) Rural Governance, (2) Sustainable Land and Resource Management, (3) Rural Economic and Employment Promotion, and (4) Services and Infrastructure.**

These areas are closely interlinked and are prioritized and combined differently depending on the specific context. Various practical measures with climate relevance can be attributed to these four areas of intervention. Examples of these measures, along with corresponding project examples are provided in the green boxes.

**Climate-resilient and low-emission rural landscapes –
Four relevant areas of intervention and how they interact.**



Source: Own illustration based on ↳ WGBU 2020

1 The categorization into areas of intervention and fundamental principles is based on ↳ GIZ (2023): Den ländlichen Raum stärken – Hintergrundpapier zur Entwicklung ländlicher Räume

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Rural Governance

Effective governance in rural areas must address **various types of land use and user groups**. For instance, certain areas serve as cropland for smallholder farmers and as pastureland for pastoralists. Additionally, the growing demand for land for reforestation measures and renewable energy projects to mitigate climate change can further intensify competition for land. To prevent or resolve land use conflicts, it is crucial for rural communities to have well-defined individual and collective **land rights**, as well as negotiated utilization rights for natural resources.

Social dynamics and political power structures play a key role in determining access to information and decision-making regarding possible courses of action. Sound decisions require adequate information, particularly when developing strategies to adapt to climate change. Indigenous Peoples and other marginalized groups often face discriminatory norms that restrict their decision-making power. These groups need active support to ensure their voices are heard.

Inclusive and participatory land use planning and regional development are therefore of central importance. By involving government representatives, civil society, and the private sector in the decision-making process, collaborative solutions can be developed.

Example: Climate-Sensitive Integrated Land Use Planning (ILUP)

Inclusive planning for sustainable land use is based on dialogue among various stakeholders and grassroots democratic principles. The initial step involves analysing the vulnerability of communities to the impacts of climate change. Subsequently, stakeholders collaboratively develop strategies to mitigate these risks. Such strategies may include promoting sustainable agricultural practices and designing climate-sensitive infrastructure.

The ↳ **Regional Programme for Integrative and Climate-Sensitive Land Use in Central Asia** promotes comprehensive, climate-sensitive land use concepts and resource management, particularly in forests, pastures, and protected areas. These initiatives are integrated in national policies and aim to foster regional cooperation and knowledge exchange across five Central Asian countries.

Sustainable Land and Resource Management

Climate-resilient and low-emission practices in agriculture, forestry, animal husbandry, and fisheries, along with the **protection, conservation, and restoration of biodiversity and ecosystems**, are essential for adapting to and mitigating the effects of climate change. At the landscape level, implementing more **resilient and low-emission agricultural techniques** is crucial for preserving natural ecosystems under climate stress. It is imperative to avoid or reduce the conversion of carbon-rich landscapes, such as forests and peatlands, into agricultural land. Approaches should integrate **local and Indigenous knowledge** with new scientific findings and adapted **technical innovations**.

Example: Nature-based Solutions (NbS) and Ecosystem-based Adaptation (EbA)

Nature-based solutions (NbS) and ecosystem-based adaptation (EbA) operate at the intersection of climate mitigation, climate adaptation, and biodiversity conservation. For example, the protection and restoration of mangrove forests contribute to biodiversity preservation, climate adaptation, and mitigation. Mangroves help mitigate rising sea levels and storm surges, provide habitats for various animal species, and store significant amounts of carbon.

The project ↳ **'Scaling Up Ecosystem-based Adaptation Measures in Rural Latin America'** enhances the climate resilience of vulnerable communities and ecosystems in rural Ecuador, Guatemala, and Costa Rica through innovative, gender-sensitive ecosystem-based adaptation strategies. These strategies are increasingly integrated into National Adaptation Plans and Nationally Determined Contributions to the Paris Agreement of the UN Climate Change Convention.

Rural Economic and Employment Promotion

In rural areas, agriculture often serves as the primary source of livelihood. Given the impacts of climate change, it is essential to develop **additional sources of income** and create better marketing opportunities. This also includes developing alternatives for areas where agriculture will no longer be viable in the long term. **Sustainable supply chains** originating in rural areas offer excellent starting points for retaining value creation within the producing region and creating jobs with fair pay for local people. Economic and trade relations between rural areas and growing cities also present opportunities for sustainable economic development. **Training and employment promotion** are crucial for the fair and equitable organization of climate-resilient and low-emission rural development. Specifically promoting the employment of women and young people is essential to open new income opportunities for them.

Example: 'Water-Energy-Food' Nexus

The Nexus encourages integrated efforts across various sectors in rural landscapes. Solar-powered irrigation systems enhance agricultural productivity, while the use of renewable energy for seawater desalination helps conserve resources. Access to energy and water not only creates new employment opportunities for the rural population but also diversifies and improves their food security.

The global project ↳ **'Water and Energy for Food'** develops and disseminates innovative approaches for climate-sensitive, energy- and water-efficient technologies. This includes, for example, approaches like bio-treatment plants that process waste to produce clean energy and organic fertilizers.

Services and Infrastructure

Access to climate information systems and the ability to process this data are becoming increasingly important in the face of accelerating climate change. Integrating **social security systems** for smallholder farmers with **risk prevention** and climate change adaptation measures enhances protection during disasters. Risks can also be minimized through greater **use of digital tools**, such as weather information systems. Investments in infrastructure can strengthen the local circular economy by enabling short and direct transport routes for perishable goods, energy-efficient and location-adapted cooling systems, and the recycling of processed organic waste back into agricultural production. These benefits often extend not only to rural areas but also to neighbouring cities.

Example: 'Participatory Integrated Climate Services for Agriculture (PICSA)'

PICSA is a participatory tool designed to enhance farmers' access to and understanding of climate-related information. This enables farmers to remain proactive and make informed decisions despite increasing climate risks.

The ↳ 'E-PICSA' project uses a digital tool for agricultural advice and climate services in Zambia and Malawi, enabling farmers to make more informed cultivation decisions. This allows them to increase their yields, food security, and resilience.

Example: Agroecology

This overarching approach aims at systemic social change to strengthen food sovereignty. Agroecology integrates all aforementioned areas of intervention for climate-resilient and low-emission rural development through the following aspects:

- Strengthening social organizations, enabling broad participation in decision-making processes and disseminating knowledge horizontally **(Rural Governance)**
- Promoting local genetic diversity and biodiversity as well as implementing territorial approaches that enhance landscape functions **(Sustainable Land and Resource Management)**
- Promoting resource-conserving production processes based on circular economy and income diversification **(Rural Economic and Employment Promotion)**
- Developing fair, diverse, and preferably local food systems **(Services and Infrastructure)**

The project **↳ 'Support to Agroecological Transformation Processes in India (SuATI)'** promotes agroecological transformation processes in the Indian agricultural and food systems through improved knowledge exchange, agroecological cultivation practices, market development as well as the establishment of agroecological principles in national and state programmes.

Relevance for the Goals of the United Nations Rio Conventions

Climate-resilient and low-emission rural landscapes are central to the **integrated implementation of the three Rio Conventions of the United Nations: United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD), and United Nations Convention to Combat Desertification (UNCCD)**. There are various opportunities to incorporate the challenges and solutions of rural development into these international processes and, conversely, to use them to advance integrated solutions. These opportunities include the revision of the Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs), the revision of National Biodiversity Strategies and Action Plans (NBSAPs) to the new Global Biodiversity Framework (GBF), and the Land Degradation Neutrality plans (LDN targets). The implementation and reporting of national plans under all three conventions also offer opportunities to raise ambition and promote systemic solutions. These opportunities should be utilized to put measures for a climate-resilient and low-emission development of rural landscapes into practice.

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