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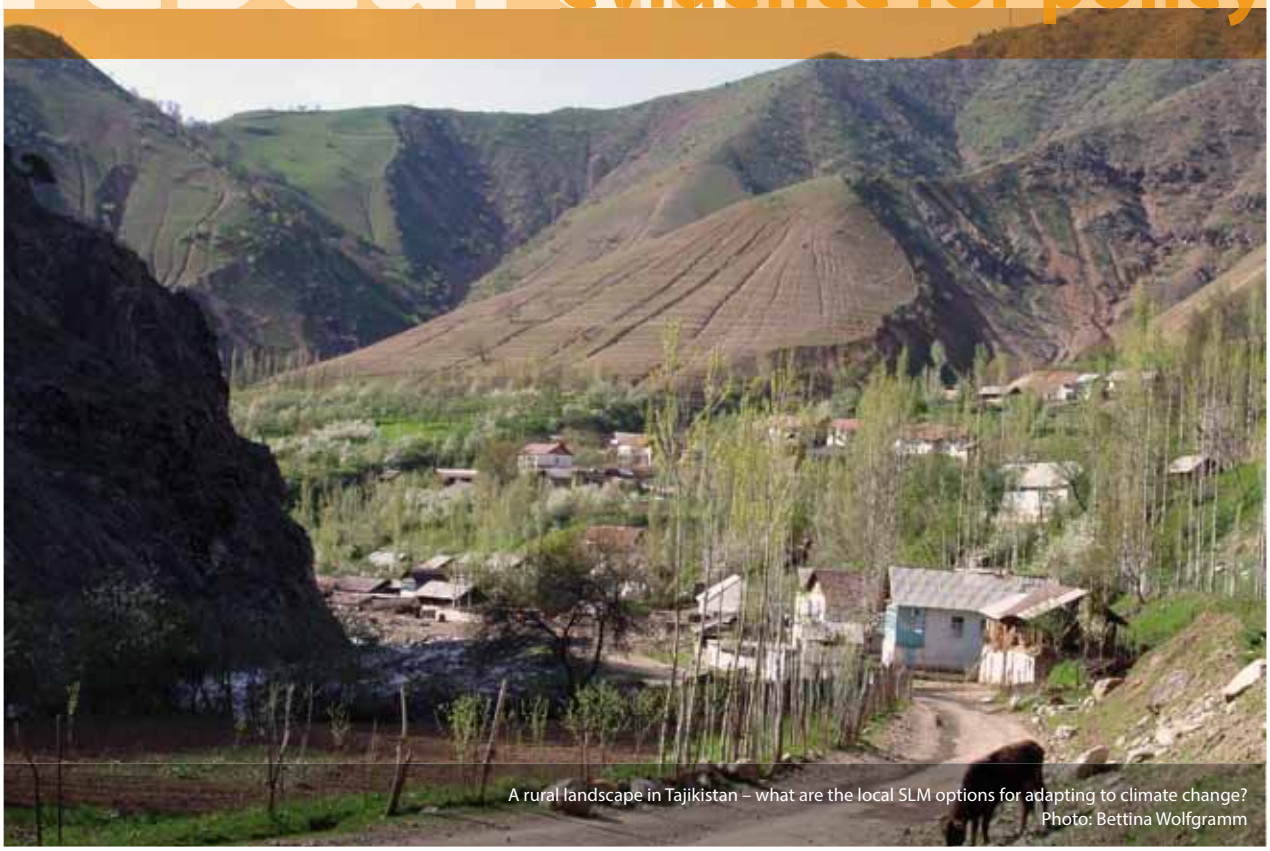
Central Asia research evidence for policy



A rural landscape in Tajikistan – what are the local SLM options for adapting to climate change? Photo: Bettina Wolfgramm

NCCR north south

Adapting to climate change through sustainable land management

Case studies featured here were conducted in Tajikistan and Kyrgyzstan

Policy Messages

- Sustainable land management (SLM) practices can prevent and halt land degradation, and rehabilitate already degraded land. Since healthy land is less vulnerable to climate extremes, implementing SLM will help rural areas to become more resilient to climate change.
- There are many examples of SLM that have been shown to work in the region. Their climate sensitivity must be evaluated and monitored to support effective climate change adaptation.
- To scale up SLM practices for climate change adaptation, integrated and participatory planning at the village level is crucial.
- Videos may be used to share SLM knowledge by documenting land users who have successfully adapted to changed climate conditions.

Tajikistan and Kyrgyzstan are especially vulnerable to the risks of climate change. Their widely degraded landscapes are poorly prepared to cope with changes in precipitation patterns and an increased number of extreme weather events such as heavy rainfall, cold spells, and heat waves. Implementing sustainable land management (SLM) practices will ensure that land is healthy and make it less vulnerable to climate extremes. Even though good SLM practices adapted to conditions in Central Asia exist, they are not widely applied. This issue of *evidence for policy* outlines the resources available for use in adapting to climate change in the region using SLM.

The effects of climate change and extreme weather events on land use

A World Bank assessment in June 2009 ranked Tajikistan, Kyrgyzstan, and Albania as the "most vulnerable to climate change" of 28 countries in Eastern Europe and Central Asia. The present policy brief examines Tajikistan and Kyrgyzstan in particular, and Central Asia in general. It is based on findings made within the NCCR North-South in Central Asia and activities carried out under the Pilot Program for Climate Resilience (PPCR) in Tajikistan and in conjunction with other partners. The PPCR assessed possible effects of climate change on land use by reviewing literature, conducting a farm survey, and analysing the results of participatory rural appraisals. The PPCR highlighted different aspects of land use sensitivity to climate change: (1) sensitivity

Featured case studies

Preparing for dry spells: mulching in vineyards

In a terraced vineyard at the Karsang field station of the Soil Institute of the Tajik Academy of Agricultural Sciences, mulching was tested as a water conservation measure. Mulching reduces evaporation in the short term, providing a substantial increase in soil moisture (+10–20%) that immediately benefits plant growth and crop yields. In the long term (8 years), mulching significantly increases soil organic carbon content and thus improves overall soil health. On average, plots with mulch showed 1.3% soil organic carbon, whereas control plots showed only 0.4% soil organic carbon at depths of 0–15cm (Shokirov 2012).

Simulation game "Adaptation to climate change"

In the game, three villages share irrigation water from the same river. The climate change scenario anticipates a diminished water supply in the future. Thus, to safeguard future income from irrigated agriculture, each village must elaborate its own adaptation strategy. The strategy must account for possible consequences of climate change – namely, changes in seasonal water regimes – by improving water use efficiency. At the same time, the strategy must secure residents' livelihoods by increasing their income from irrigated agriculture (CAMP Alatoo 2012).

Online Knowledge Hub for Central Asian mountain societies

Knowledge exchange is key to adapting to climate change. The Mountain Societies Research Centre (MSRC) of the University of Central Asia (UCA) has developed an online Knowledge Hub. The hub serves as an interactive source of information on Central Asian mountain societies and as an interface for researchers, practitioners, and policymakers. It includes the MSRC Library, an Experts Database, and a range of databases and applications to enable users to search for information and networks. See: http://msrc-hub.ucentralasia.org

Long-term mulching, done here with vine branches, substantially increases soil moisture and soil organic carbon. Photo: Konstantin Pachikin

to weather extremes (e.g. droughts) relevant to all land use types; (2) sensitivity exacerbated by land degradation such as severe erosion after extreme rainfalls on land where vegetation cover is degraded; and (3) sensitivity of specific land use types such as apricot orchards, which are sensitive to frost, hail, and heavy rainfalls during flowering (Wolfgramm et al 2011).

How SLM is useful

SLM can increase land productivity, improve livelihoods, and protect ecosystems – all of which will increase the resilience of rural livelihoods to climate change. While land degradation in Tajikistan and Kyrgyzstan is widespread, there are also many initiatives to prevent it and abundant local experience with SLM practices. These include traditional practices; practices introduced during Soviet times; practices developed by innovative farmers since the 1980s when farmers were given access to private land plots; and practices introduced through international projects since the 1990s.

Using the tools provided by the World Overview of Conservation Approaches and Technologies (WOCAT), researchers documented and analysed existing SLM practices in Central Asia, assessing their usefulness for climate change adaptation. These local SLM technologies and approaches were entered into WOCAT's online database, which currently contains 106 SLM technologies and approaches from Central Asia. Most of the SLM practices were documented in Tajikistan under the PPCR and in collaboration with 13 different institutions and projects. Additional practices were documented within the Central Asian Countries Initiative for Land Management (CACILM). These SLM practices offer adaptation opportunities for diverse land use types.

How can SLM be used in climate change adaptation?

SLM technologies documented in Tajikistan were divided into 10 different groups according to their ability to address climate change impacts (Table 1).

While SLM practices generally increase land's health, and thus improve its resilience to climate change and weather extremes, more must be learned about what works in each region and why. For this, WOCAT and the NCCR North-South team working in Tajikistan developed a new Climate Change Module. It builds on WOCAT's standard questionnaires on SLM technologies and approaches, and additionally evaluates SLM practices' resilience or vulnerability to climate change.

The module encompasses a set of standardised questions that enable conclusions about the vulnerability/resilience of each land management system (Figure 1). A range of key information is recorded, including: local observations of how climate change is affecting SLM practices (exposure); farmers' assessments of how easily their cropping system is affected (sensitivity); possible land degradation and productivity decreases due to climate change and extremes (potential impacts); and existing adaptation measures and farmers' capacity to adapt to the changing situation (adaptive capacity).

Awareness-raising and decision support

SLM is a classic multi-stakeholder issue, involving individual and community land users, agricultural advisors, natural resource managers, government authorities, civil society, and researchers alike. Selecting appropriate SLM technologies for

NCCR North-South workshop in the Sokuluk watershed, Kyrgyzstan (2012): In a simulation game, participants try to find ways of adapting to reduced water supplies due to climate change. Photo: CAMP Alatoo

Table 1: Overview of SLM technology groups and specific climate change impacts addressed		
Potential climate change impact	**Technology group(s)**	**Example of climate change adaptation (WOCAT code)***
Vegetation degradation due to decreased soil moisture availability in early summer	Improved grazing land	Rotational grazing supported by additional water points (TAJ100)
Changed patterns of water availability and water shortage	Irrigation infrastructure management	Irrigation of orchards by using low cost drip irrigation technique (TAJ107)
Less frequent, but extreme rainfalls	Water harvesting	Roof top rain water harvesting stored in polythene lined earth retention tank (TAJ104)
Less cold winters and more pests and diseases	Land productivity enhancement	Phytopesticides (TAJ380)
Extreme rainfall events causing erosion	Cross-slope measures: onsite protection	Drainage ditches in steep sloping cropland (TAJ010)
Extreme rainfalls causing landslides	Cross-slope measures: offsite protection	Infilling of gullies with vegetative structures (TAJ356)
Crop failure in monoculture systems due to change in temperature and rainfall	Agroforestry	Orchard-based agroforestry (establishment of orchard) (TAJ008)
Riverbank erosion due to extreme rainfall events	Planted and natural forest	Planting poplar trees in the flood plain of high mountain river areas (TAJ342)
Change in microclimate caused by drought	Tree belts	Shelterbelts with Russian Silverberry for the protection of irrigated fields (TAJ110)
Desertification	Indirect SLM measures	Reduce pressure from forest resources by improved thermal insulation in private houses (TAJ102)

*** To access the examples search the WOCAT online DB at http://cdewocat.unibe.ch/wocatQT/qt_report.php and enter the WOCAT code provided.**

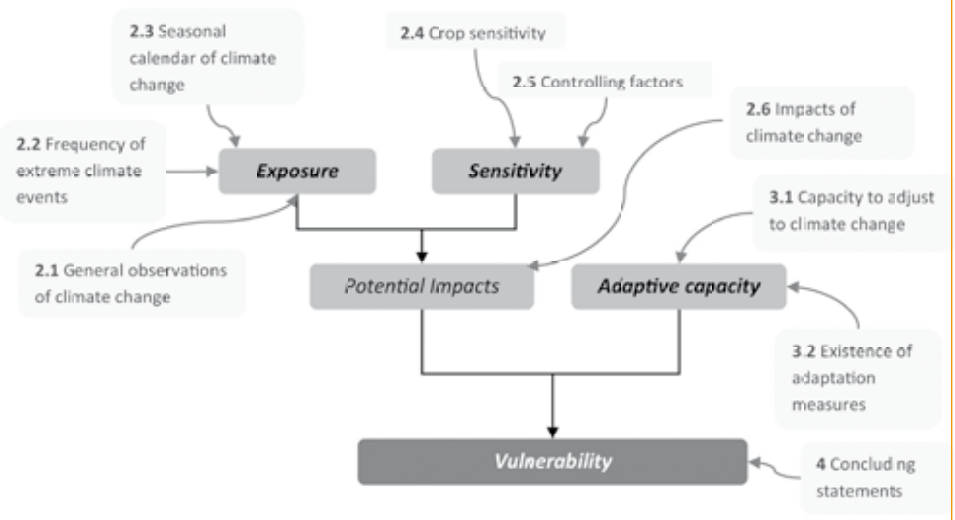


Figure 1. How vulnerable are SLM technologies to climate change? Source: WOCAT Climate Change Module 2012

Definitions

Sustainable land management (SLM) is the use of land resources, including soils, water, animals, and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and ensuring their environmental functions (WOCAT 2007).

Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (IPCC 2007).

Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, in order to alleviate adverse impacts of change or to take advantage of new opportunities (IPCC 2007).

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes (IPCC 2007).

implementation requires an approach capable of integrating various stakeholders' diverse knowledge, perceptions, and judgements (Schwilch et al 2012). Learning for Sustainability (LforS) is such an approach. It is an integrative, learning-oriented approach that is based on three crucial elements: stakeholder dialogue, knowledge management, and organisational development (Gabathuler et al 2011). LforS provided the basis for development of a new capacity-building effort aimed at improving water users' climate-change risk management (CAMP Alatoo 2012; see: "Featured case studies").

Videos to share experiences

WOCAT has begun making innovative videos to support and complement existing SLM knowledge available in its database. In the videos, land users personally describe their SLM practices' key benefits, including control of climate change impacts. Standardised questions ensure that interviewees touch on common points, but space is provided for land users to introduce other valuable information. The videos have proven useful in decision-support workshops designed to help farmers find ways of adapting to climate change; individual video clips can be used to initiate discussions on different groups of SLM technologies, how they function, and their benefits.

More efforts needed

Despite these promising developments, more must be done to advance the application of SLM as a climate change adaptation measure in Central Asia and elsewhere. Joint SLM/climate-change knowledge-management is needed to make efficient use of available resources, to support evidence-based decision-making regarding SLM and climate change, and to scale up SLM practices that show promise in adapting to climate change (see: "Featured case studies"). In addition, it is crucial to:

- Provide training and other technical support for continued standardised documentation, evaluation, and dissemination of SLM practices;
- Monitor and critically evaluate the performance, outcomes, and impacts of past and current SLM practices in different environments;
- Further develop contextualised analytical and decision-support tools that make it possible to scale up effective SLM practices.

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NCCR north south

Policy implications of NCCR North-South research

Halting land degradation with SLM

Vulnerability to climate change in Tajikistan is exacerbated by severe land degradation. SLM provides ways of improving degraded land. Guiding principles for making land more resilient include: diversifying land use practices and farm incomes; sustainably intensifying the use of natural resources; scaling up highly productive land use practices; and protecting land and livelihoods from extreme weather events.

SLM practices in the WOCAT database and on video

WOCAT's online database features 106 SLM technologies and approaches applied in Central Asia. Suitable for a range of land use types, agro-climatic conditions, economic and social settings, these SLM practices provide efficient means of climate change adaptation. It is important to identify, recognise, and financially/technically support innovative land users, in addition to getting them involved in disseminating and scaling up their SLM practices. Video documentaries featuring land users can be used to illustrate their ways of adapting to climate change, enabling SLM knowledge to be shared between land users, planners, and the global community.

Participatory planning for climate change adaptation

Adaptation to climate change is a process, which, in order to be sustainable, must be embraced by communities themselves. Communities must have significant say in what types of SLM technologies are locally tested, the support they require to test them, and the criteria for measuring success. Community workshops should include sessions on observing local climate change, mapping climate change impacts, rating SLM technologies, and identifying SLM approaches.

Further reading

Gabathuler E, Bachmann F, Kläy A. 2011. *Reshaping Rural Extension - Learning for Sustainability (LforS): An Integrative and Learning-Based Advisory Approach for Rural Extension with Small-Scale Farmers.* Weikersheim, Germany: Margraf Publishers.

Schwilch G, Bachmann F, de Graaff J. 2012. Decision support for selecting SLM technologies with stakeholders, *Applied Geography* 34:86-98. DOI:10.1016/j.apgeog.2011.11.002

Shokirov Q. 2012. *Comparative study of two different soil conservation practices from the vineyard mulching treatment in Faizabad region of Tajikistan* [MSc thesis]. Keene, New Hampshire, USA: Antioch University New England.

Wolfgramm B, Stevenson S, Lerman Z, Zähringer J, Liniger H. 2011. *Final Report for Tajikistan Pilot Programme for Climate Resilience, Component A5: Phase 1 on Agriculture & Sustainable Land Management.* Dushanbe, Tajikistan. Available here: http://tinyurl.com/cecpoae

WOCAT. 2012. *A Framework for Documentation and Evaluation of Sustainable Land Management. CLIMATE CHANGE: Knowledge for developing SLM adaptation strategies.* Version 2. Bern, Switzerland: WOCAT, University of Bern. http://tinyurl.com/dyzfnds

World Bank. 2009. *Adapting to Climate Change in Europe and Central Asia.* Available here: http://tinyurl.com/ceppolm

WOCAT on the web:
WOCAT technologies: http://cdewocat.unibe.ch/wocatQT/qt_report.php
WOCAT approaches: http://cdewocat.unibe.ch/wocatQA/SearchApproach.php
WOCAT videos: https://www.wocat.net/en/knowledge-base/documentation-analysis/videos.html

evidence for policy

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The National Centre of Competence in Research (NCCR) North-South is a worldwide research network including six partner institutions in Switzerland and some 140 universities, research institutions, and development organisations in Africa, Asia, Latin America, and Europe. Approximately 350 researchers worldwide contribute to the activities of the NCCR North-South.

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