Considering climate risk information in policy planning

Ecosystem-based Adaptation
in High Mountainous Regions of Central Asia

https://eba-centralasia.com/

KEY MESSAGES

Why this policy brief?

This policy brief specifically aims to provide structured guidance enriched with case studies to policy makers in Central Asia on how to analyze and integrate climate risk information in policy planning, in order to streamline adaptation efforts and minimize economic losses. Policy planning is a highly complex exercise. In recent years, the uncertain impacts of climate change have made this task even more complex. Examples from the region and from around the world show that incorporating climate risk information into policy planning makes the process more targeted, meaningful and robust.

Economic loss due to climate change impacts could be severe for all Central Asian republics.

Current climate projections for Central Asia predict increasing temperatures, extreme weather events and glacial melt, with likely impacts of flood, desertification and significant losses and damages. In Kyrgyzstan alone, the total estimated damage from climate change (mainly floods) from 2001-2011 was over USD 74 million. Tajikistan experiences about 50,000 landslides per year, causing millions of dollars in loss and damage. Incidences of pest and disease are exacerbated by climate change; the locust infestation in 1999 caused losses up to USD 15 million in a single year in Kazakhstan.

Adaptation decisions must be entirely dependent on climate risk information and assessment, at any scale.

Climate risk information enables decision-makers to make better informed decisions about how to manage resources and risks for improved livelihood and development outcomes, and which regions and sectors to focus on most urgently. This enables policy makers to adopt no-regret measures, using an economy-wide approach. Developing such data requires strong collaboration between different sectors and ministries. This provides the enabling environment necessary for a strategic, comprehensive approach to adaptation. Taking such climate risk information into consideration in planning, investments and policies will minimize and avoid losses and damages to humans, infrastructure and the economy. The use and presentation of such data also enables countries to access suitable national and international climate financing.

Good quality climate information already exists in all three countries.

Still, climate information is not yet systematically integrated into adaptation planning. A mechanism for delivering and systematically including climate information in the planning is yet to be established in all three countries. Developing expertise is crucial - not only in the institutions that are in charge of climate data, but also for sectors, agencies and ministries.

The policy brief suggests a 5-step process towards integrating climate risk information into policy to avoid maladaptation, which involves a multi-level, multi-sector approach.

Published by:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

In cooperation with:

UNIQUE forestry and land use

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

Definition of key terms as per IPCC AR5

Climate risk

The potential for consequences (i.e. impacts), where something of value (i.e. assets, people, ecosystems) is at stake and where the outcome is uncertain. Risk results from the interaction of vulnerability, exposure, and hazard.

Hazard

The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

Exposure

The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

Vulnerability

The propensity or predisposition to be adversely affected. It encompasses a variety of concepts and elements including sensitivity (whether ecological or social factors) or susceptibility to harm, and lack of capacity to cope and adapt.

Adaptation

The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.

Ecosystem-based Adaptation

Ecosystem-based Adaptation is a particular approach that uses biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change.

1. Background

Current climate projections for Central Asia predict increasing temperatures, extreme weather events and glacial melt, with likely impacts of flood, desertification and significant losses and damages (L&D), particularly in the agriculture and energy sectors. In Kyrgyzstan alone, the total estimated damage from climate change impacts (mainly floods, with Jalal-Abad being the most affected Oblast) from 2001-2011 was over USD 74 million[1,2]. Tajikistan experiences about 50,000 landslides per year, causing millions of dollars in L&D.

From 1992-2016, disasters caused economic losses to a total estimated cost of USD 1.8 billion and affected almost 7 million people (80% of the population).[3] Climate change exacerbates incidences of pest and disease; many still remember the locust infestation in 1999, which caused losses up to USD 15 million in a single year in Kazakhstan[4,5]. Without adequate planning and adaptation, such events can endanger long-term economic growth and food security in the region.

Current and expected climate change related impacts in different sectors in Central Asia

Transport

- Damage to infrastructure due to increased temperatures and precipitation
- Accidents and losses resulting from collapse of road and energy infrastructure (particular dams and bridges)
- Accidents and losses resulting from mudslides, flashflood and avalanches

Agriculture (and other land use types)

- Decreased water availability for irrigation
- Worsening crop yields resulting in risk to agricultural livelihoods as well as to food security in the region
- Degradation of pastures

Biodiversity

- Decline in populations of vulnerable species of flora and fauna
- Decrease in forest area and quality

Energy

- Increased energy demand (increased demand for cooling in hotter summers, and demand for heating in colder winters)
- Decreased energy production (decreased hydropower reliability & productivity) leading to power shortages and associated health impacts from heat stress
- Damage to energy infrastructure due to increase in drought and frequency/intensity of extreme weather events

The project

Te GIZ project on Ecosystem-based Adaptation (EbA) in the High Mountainous Regions of Central Asia is commissioned by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative. It is being implemented in Tajikistan (TJK), Kyrgyzstan (KGZ) and Kazakhstan (KAZ). The target region is characterized by extremely diverse and fragile ecosystems, building the foundation for livelihoods of local communities.

In addition to economic benefits, these ecosystems provide services such as water, pasture, forest products, protection against extreme weather events and impacts, and productive soils. Adverse impacts of climate change, including glacier melt, changing river runoff, and weather anomalies (i.e. in temperature and precipitation), coupled with unwise land use practices in turn worsen the state of these ecosystems, and undermine local populations' livelihoods, as well as health and survival.

The objective of the project is to test and integrate EbA and other climate adaptation strategies into national and multi-national policies in the region. EbA is a nature-based solution that harnesses biodiversity and ecosystem services to reduce vulnerability and build resilience to climate change. The main components of the project are capacity building and stakeholder engagement, specifically with national and multi-national partners from the agriculture, energy, transport, tourism, environment and forestry sectors in the region.

[1] Kyrgyz Ministry of Emergency Situations, quoted in UNDP 2013. Kyrgyzstan Climate Risk Profile
[2] World Bank 2017. Tajikistan aims to better protect people and property from natural disasters and climate change.
[3] Excluding the year 2005, and not including damages from drought.
[4] World Bank 2019. Tajikistan Overview.
[5] World Bank 2016. Kazakhstan Agriculture Sector Risk Assessment.

2. Why consider climate risk information in policy planning?

Being able to make climate-informed investments

Adaptation decisions must be entirely dependent on climate risk information and assessment, at any scale. Climate risk information enables decision-makers to make better informed decisions about how to manage resources and risks for improved livelihood and development outcomes, and which regions and sectors to focus on most urgently. That is to say, it enables policy makers to adopt no-regret measures, using an economy-wide approach. Developing such data requires strong collaboration between different sectors and ministries[6], which provides the enabling environment necessary for a strategic, comprehensive approach to adaptation. This means improved food security, economic growth and long-term planning. Without such considerations, results may include unreliable, costly and underperforming investments with high financial losses.

Avoid loss and damage (both financial and human)

Climate change induced snow melt, drought, torrential rains, flash flooding and landslides are common in Central Asia, and various catastrophes with high associated financial and human losses - such as dam collapses are common. Up to one third of the glaciers in Central Asia is expected to completely disappear by 2050, which will dramatically increase the risk of sudden floods caused by outburst of glacier lakes. This will have significant impacts on the economy at national and regional level. In particular, Tajikistan is ranked the most climate change vulnerable country in the Europe and Central Asia region, as it may lose half its volume of glaciers by 2050.

Current and expected climate change related impacts in different sectors worldwide

- Global: average losses from extreme weather events in 2017: USD 340 billion
- Eastern Europe: estimated losses by 2040: USD 26 billion
- Bangladesh: average losses from cyclone hazard: USD 0.5 billion; 100 year flood event: 4.7 billion
- Miami: Sea-level rise projected annual losses of USD 229 million by 2050
- Mozambique: average L&D from cyclones in 2019: USD 3 billion

The cost of national damage per year from climate change is estimated to increase annually from USD 50.4 million in 2014 to USD 132.3 million in 2030.[7] The box above provides further examples of expected and current climate change linked loss and damage around the world. Taking such climate risk information into consideration in planning infrastructure, investments and policies will minimize and avoid losses and damages to humans, infrastructure and the economy. The cost of inaction, when not taking risks into account, is proven to be high across the world.[8,9,10]

Because it is feasible and data is available

In the context of Central Asia, considering climate risk information in policy is feasible. Climate data is available with relevant agencies (see box on page 5) and is of appropriately good quality and quantity to start incorporating it into the policy process. These data can be further improved with targeted capacity building of climate data services and staff.

Climate risk information can be easily tailored to different policy planning needs

Climate risk information can be considered at various policy levels, whether sectorial or sub-sectorial, as well as geographic scopes, i.e. local, regional, national, or even on a wider scale. The information can be used by technical agencies, ministries, planning committees, private sector and civil society alike, in developing a targeted strategy and prioritizing investments.

[6] GIZ and EURAC 2017. Risk Supplement to the Vulnerability Sourcebook.
[7] Gov. of Tajikistan 2019. National Strategy of Adaptation to Climate Change until 2030.
[8] Brot fuer die Welt 2019. Climate Risk Financing Study.
[9] Mechler et al. 2018. Loss and Damage from Climate Change.
[10] Global Policy Watch 2019. Loss and damage from climate change.

Situation in the target countries – available climate information, data needs and entry points

In order to develop a good knowledge basis for adaptation planning, good quality data from each relevant sector of the three target countries is needed. The categories of data needed can include national meteorological data archives, supranational and global data sets, and climate models. Important parameters of climate indices include current and projected air temperature, humidity, precipitation, air pressure, solar radiation, snow and ice cover. The World Meteorological Organization recommends countries to use a climate base (reference) period of 30 years, if such data is available. The data quality and quantity from relevant sectors also play an important role in developing impact chains to determine climate hazards, exposure and vulnerability. Much of the data necessary to conduct a climate risk assessment is available for Kazakhstan, Kyrgyzstan and Tajikistan, however, targeted capacity building to develop knowledge and technical capacities of staff working with meteorological agencies and relevant ministries would further assist in developing high quality, actionable climate risk information.

A mechanism for delivering and systematically including climate information in the planning (e.g. at sector level) is yet to be established in all three countries. Developing expertise (by strengthening technical staff) not only in the institutions that are in charge of climate data, but also sectors, agencies and ministries is crucial.

The following Box lists general climate data sources, and specific national data sources.

Data sources

National, regional and global sources

- National Communications to the United Nations Climate Change Framework Convention (UNFCCC); Biennial Update Reports
- Nationally Determined Contributions
- GFCS – Global Framework for Climate Services
- World Meteorological (Center) Organization (WMO)
- Central Asia Hydrometeorology Modernization Program; now in final preparation stages
- ICIMOD – International Centre for Integrated Mountain Development
- Think Hazard
- Intergovernmental Panel on Climate Change (IPCC) Assessments
- World Resources Institute
- World Bank Climate Change Portal
- Project documents from key development programmes (UNDP, GIZ, DfID, WB, USAID) etc.
- Climate Data Factory
- Climate and Development Knowledge Network

Kyrgyzstan:

- State Agency for Environmental Protection and Forestry
- Agency on Hydrometeorology under the Ministry of Emergency Situations
- Central Asian Institute for Applied Geosciences
- Kyrgyz-Russian Slavic University
- National Academy of Science of Kyrgyz Republic

Kazakhstan:

- Glaciology center (currently planned)
- Climate Change Department under Ministry of Environment
- Economic Research Institute
- Kazhydromet (under Ministry of Ecology)

Tajikistan:

- State Agency for Hydrometeorology (under Committee for Environmental Protection)
- Research center for climate change
- National University of Tajikistan

Available climate information, data needs and entry points in Kazakhstan

Currently, climate information is not systematically integrated into adaptation planning in Kazakhstan. There is also no specific policy yet that addresses the national adaptation process. EbA measures in particular – which involve the conservation, sustainable management and restoration of ecosystems for climate change adaptation – are not concretely integrated in the policy process. However, Kazakhstan now plans to develop its National Adaptation Plan, and has already elaborated a sub-national adaptation plan for the Eastern-Kazakhstan province, which includes a recommended institutional set-up for integrating climate risk information into Territorial Development Planning (Fig. 1). Such a good practice of using climate information in adaptation policy planning is currently incorporated by the Ministry of Ecology in the national Ecological Code.

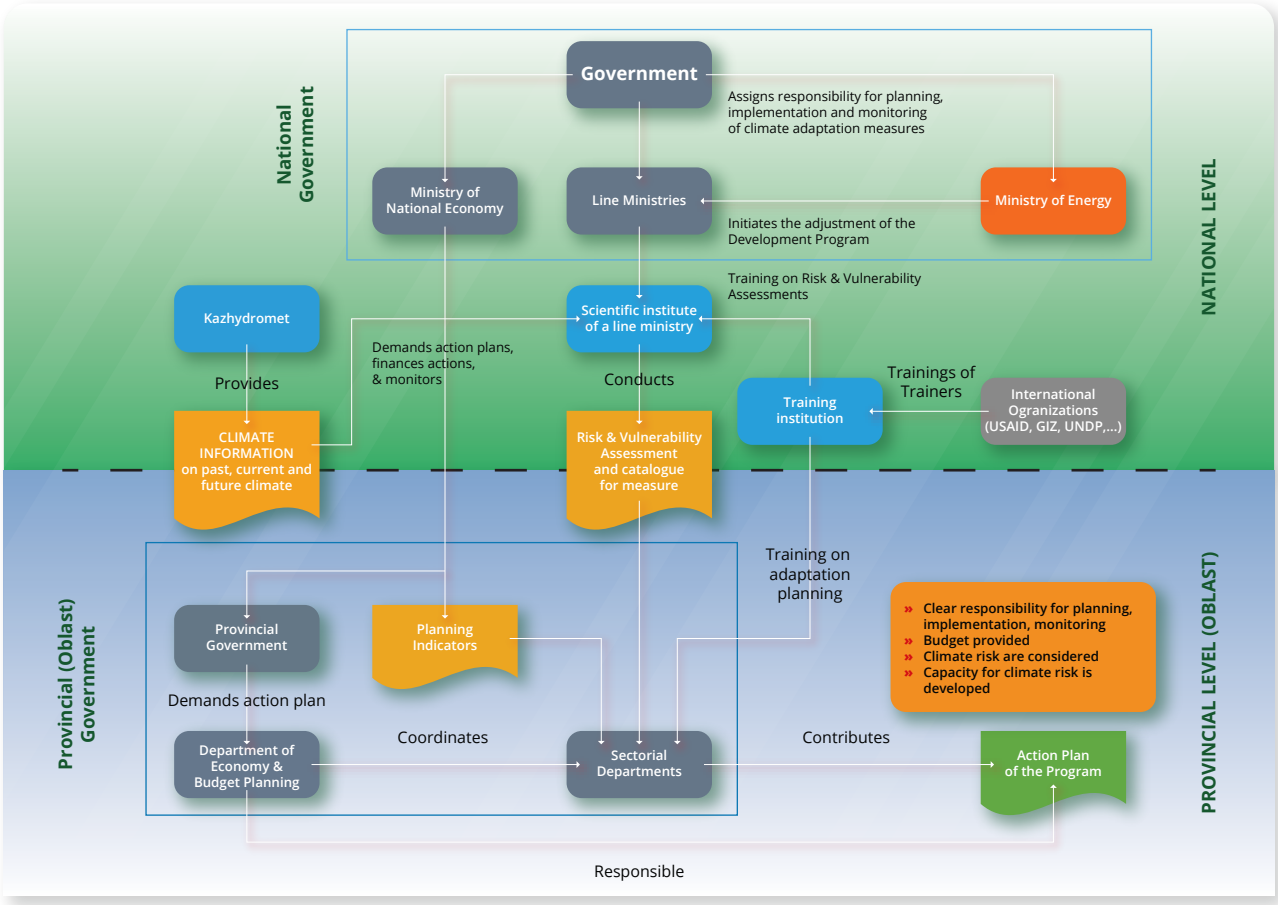

Fig. 1: *Proposed institutional set up to integrate climate adaptation into the sub-national Territorial Development Program in Kazakhstan.*[11] *In this case, the Ministry of Energy needs to initiate and coordinate efforts to adjust the sub-national Development Program and to clarify responsibilities. Action plans for development planning from the provincial government are demanded by the Ministry of National Economy, whereas at the sub-national level, the Department of Economy and Budget Planning coordinates all line ministries that contribute to the action plan. Each line department needs also to coordinate its proposal with the corresponding line ministry at the national level. With the help of Risk and Vulnerability Assessments (RVAs) for defined sectors generated at the national level by scientific bodies, each provincial line department selects and prioritizes adaptation options. Currently, five sectors are defined as priority sectors by the Ministry of Energy: agriculture, forestry, water, disaster risk reduction and health. Scientific bodies responsible for conducting RVAs and elaborating adaptation options need to make this information and knowledge accessible to provincial line departments via reports, databases or catalogues. The scientific institute under the Ministry of Energy can play a coordinating role for all other scientific bodies. Relevant climate information is generated by Kazhydromet and collected and used by the scientific bodies responsible for RVAs. Finally, the Ministry of National Economy revises and approves suggested adaptation options from the sub-national line departments. Provincial departments monitor and evaluate the climate impact-reducing effects of measures with the support of the national level.*

[11] Figure adapted from Gov. of Kazakhstan 2019. Entry Points for Vertical Integration of Climate Action in Kazakhstan.

It is recommended that a dialogue platform between users and generators of climate information is developed. In the absence of a singular Kazakh institute responsible for systematic climate risk and vulnerability analyses, it is also recommended to develop local capacities on this (improve expert knowledge of the natural system in question and develop methodological knowledge on performing assessments).

Kazhydromet - the main body producing climate information in Kazakhstan - and other scientific bodies need to be supported to produce more user-friendly information on climate change scenarios and impacts. Kazhydromet is currently developing and publishing downscaled data; historic/baseline, medium and long term scenarios are provided freely, and more specific data (i.e. from monitoring stations) are available at government regulated prices. These include climate change scenarios for temperature and precipitation based on 21 global climate models (Coupled Model Inter-comparison Project, Phase 5, IPCC). The information is also published in the seventh National Communications of Kazakhstan to UNFCCC.

There are three possible entry points for integrating climate information in policy in Kazakhstan. First, in the implementation process for achieving the Sustainable Development Goals (2030) - particularly the "planet group" SDGs, namely goals 6, 12, 13, 14 and 16 - currently being coordinated by the Ministry of Ecology. Second, is the expected update of the Green Economy Concept in 2020, to be coordinated by the Ministry of Ecology, which will address GHG mitigation and adaptation to climate risks. The third possible entry point is in the formulation of the Sub-National Territorial Development Programs run by the Ministry of Economy, elaborated for all Oblasts. Under these programs, for adaptation policy planning accounting for all priority sectors (currently agriculture, forestry, water and disaster risk reduction), climate opportunities and threats need to be considered within the SWOT analysis conducted by line departments. In addition, a new indicator for climate opportunities and risks could be added to the guidelines of the territorial development programs.[12]

Available climate information, data needs and entry points in Tajikistan

To better integrate climate information into national policies, the National Platform for Disaster Risk Reduction under the Committee for Emergency Situations and Civil Defense (CoESCD) can serve as an entry point. The platform, established in 2012, provides an inter-sectoral coordination mechanism to reduce the impacts of natural disasters. A representative of the Committee as well as representatives of key ministries and departments, and NGOs are involved in disaster risk reduction in the country and take part in this coordination mechanism.

In 2020, another knowledge and data-sharing platform, "Open Centre", was launched under the State Agency for Hydrometeorology of Tajikistan (Hydromet) to support the access to precise and reliable information on disaster hazards and risks. Existing databases under CoESCD and the Department of Geology shall be integrated into this platform, as well as another data centre based in the State Design and Research Institute FAZO on climate-related geospatial information and data, which is currently under development.[13]

The National Strategy for Adaptation to Climate Change until 2030 adopted in October 2019 foresees improving access to climate data and disseminate climate information. Among others, key recommendations mentioned in the strategy include (1) creating a central climate information database and (2) creating and sustaining climate change information centers.

The Committee for Environmental Protection (CEP), together with the subordinated Hydromet and its Center for the Study of Climate Change and the Ozone Layer, is responsible for the UNFCCC implementation. The Committee was also appointed as a National Designated Authority (NDA) to the Green Climate Fund. To operationalize this, a respective Coordinating Council was established under the Government in August 2019.

Climate change adaptation is an important element in the National Development Strategy of Tajikistan, 2030. Tajikistan submitted its Intended National Determined Contribution (INDC) in 2015 that assesses climate trends, develops scenarios for further action to reduce emissions and to contribute to adaptation to climate change. The document is currently under revision in line with the international commitment of updating all National Determined Contributions (NDCs) in 2020 and increasing ambition. The National Strategy for Adaptation to Cli-

[12] Figure adapted from Gov. of Kazakhstan 2019. Entry Points for Vertical Integration of Climate Action in Kazakhstan.
[13] AKDN 2020. Press Release: Disaster Hazard and Risk Data Sharing Platform Launch.

mate Change until 2030 summarises important information on risks, threats and impacts associated with climate change and gives priority to the sectors energy, water, transport and agriculture. Moreover, four national policy processes that consider EbA in particular: The National Disaster Risk Reduction Strategy 2019-2030; the draft Strategy for Development of Forestry, the Pasture Development Program, and the Livestock Biotechnology Program (until 2017).

Despite this, at the sector level, there are no departments or specific specialists who could coordinate the integration of climate information into policies and sectoral plans. Limited strategic guidance and a high level of staff turnover, which impedes capacity building, hamper better mainstreaming of climate change and integration of climate information into policy planning. Promoting technical staff and providing incentives to remain is not a challenge only in Tajikistan but in all Central Asian countries.

Available climate information, data needs and entry points in Kyrgyzstan

The main sources of climate data in Kyrgyzstan are the Ministry of Emergency Situations, including the Kyrgyzhydromet[14], scientific research institutes and the National Statistical Committee. As in other countries in Central Asia, also in Kyrgyzstan climate data is yet to be integrated in the planning process. At the policy level, the main adaptation policies of Kyrgyzstan include the Government Resolution of 2013 on Priority Directions for Adaptation to Climate Change until 2017, and the Program on Adaptation of Agriculture and Water Management to Climate Change for 2016-2020 (which further includes an action plan for implementation). EbA measures are currently being integrated into the policy process through the Program for Development of a Green Economy in the Kyrgyz Republic from 2019-2023, and its action plan for implementation. All climate dependent sectors in the country will participate in implementing the plan. Other examples of entry points for the consideration of climate information in adaptation policy planning include: (i) the National Sustainable Development Strategy for Kyrgyzstan (2018-2040), which sets out a strategy for the adaptation of ecology to climate change; (ii) the Concept Regional Policy of Kyrgyzstan (2018-2022), which stipulates that reducing adverse effects of environmental factors through adaptation measures is key to improving quality of life and maintaining biodiversity. It is recommended that an inter-ministerial working group be created (or an existing one given the explicit mandate) to develop a multi-sector climate risk assessment to identify adaptation measures based on real needs. The group may include ministry experts or international organizations.

Among the Central Asian countries, with the support of GIZ, Kyrgyzstan is a pioneer country that applied the Climate Risk and Vulnerability Assessment methodology at the sector level (tourism and transport), where climate risks in the two sectors were explicitly addressed and adaptation measures identified (in line with the Green Economy Programme for the period of 2019-2023).

Presently, the situation on available climate data, with regards to quantity and quality, can be improved by developing more monitoring stations, unifying the format for data collection and digitizing historical climate data records. To develop climate information based adaptation policy, it is recommended that Kyrgyzstan (i) issues climate projections and scenarios for various time intervals (i.e. 10, 30, 50 years), by involving well-qualified experts and using models with higher resolution; (ii) conduct assessment of risks for various climate and economy related sectors; (iii) develop adaptation measures through institutional dialogue and by taking into account climate information and local conditions; (iv) procure financial and institutional support from the state bodies and the Government of the Kyrgyz Republic; and (v) increase awareness levels of the local population on the impacts of climate change, knowledge on climate products and the goals of adaptation measures. General capacity building measures for policy makers and those working in the field of climate change include trainings and study tours with the support of international organizations.

[14] UNDP 2013. Kyrgyzstan Climate Risk Profile.

3. Recommended 5-step guideline for conducting a climate risk assessment and integrating it into policy planning

A wealth of literature, best practices and empirically sound recommendations exist on how best to conduct a climate risk assessment and use the information to develop action plans and access financing. The following guideline summarizes this process for the context of Central Asia.

A national working group or implementation team should be established or given the explicit mandate in the target countries to oversee the climate risk assessments, dissemination of its results and report compilation at the national level. The team may act as a liaison between policy makers and all other institutions relevant to the process. In addition to coordinating the workshops and meetings, the team can enhance communications, share success stories, coordinate procurement of climate, economic and other information relevant to decision-makers, and support dissemination of knowledge and workshop results.

In Tajikistan, Kyrgyzstan and Kazakhstan, usually working groups are established for developing sectorial plans, national climate related documents or revision of laws. However, a body which assures frequent cross-sectorial exchange as well as climate risk information integration into planning is missing.

Criteria for the selection of such a body may include:

- A formally established body; either already existing or to be newly established
- Body members have been working consistently with climate change issues (technical sectorial experts as well as policy decision makers such as at the sector level)
- A cross-cutting body that works with various sectors and has a national reach
- A focal point to an international convention, such as UNFCCC

Figure 2 visualizes the 5-step process towards integrating climate risk information into policy, which involves a **multi-level, multi-sector approach.** Steps 1-3 describe **how to develop usable climate risk information**, and Steps 4-5 provide guidance on **how to then use this information** in the policy process.

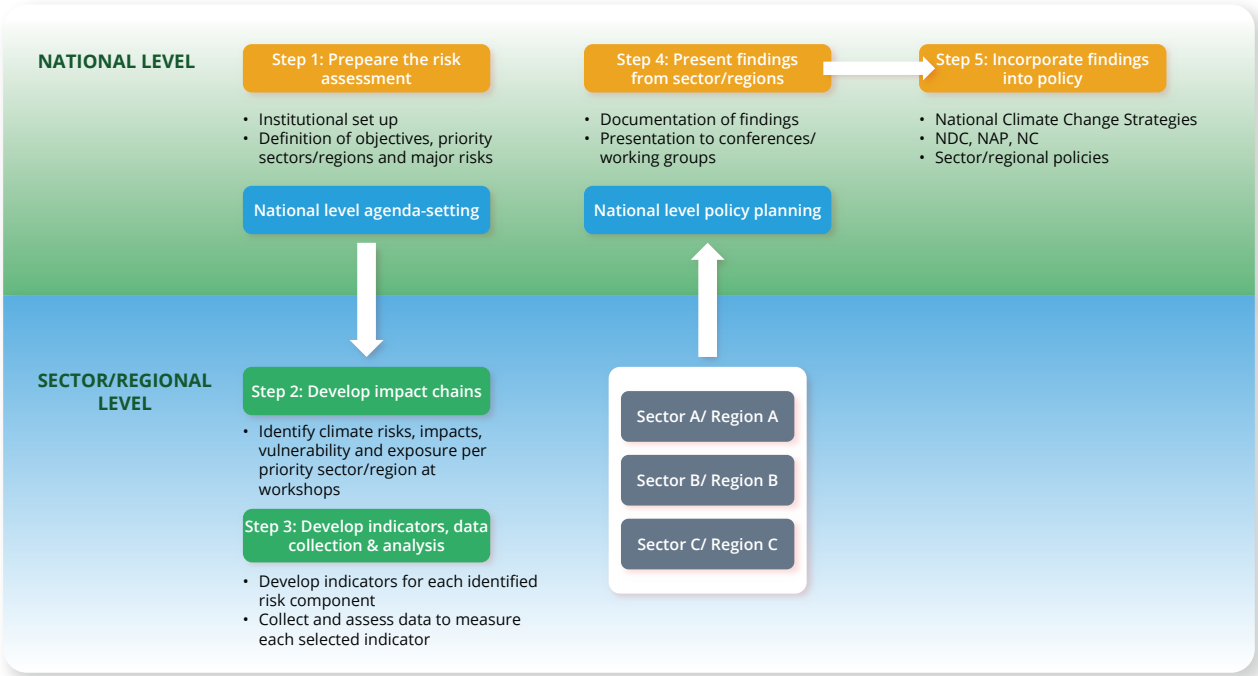

Fig 2: *Guidance to develop climate risk information at sector/regional level and incorporate it into the national policy process*

Step 1: Prepare the risk assessment

First, the appointed implementation team must facilitate the agenda setting at the national level. This means setting the context for the risk assessments by reviewing existing climate strategies and information, stocktaking of key stakeholders and available capacities, identifying overall objectives and expected outcomes of the process, and determining the desired scope. This involves the selection of priority or target sector(s), the geographic scope and the appropriate level for analysis, whether local, watershed, regional or national level.

Step 2: Develop impact chains

It may be most appropriate to define priority sectors and/or regions (based on existing climate change related documents such as the National Communications to the UNFCCC, NDC, CBD report etc.), and execute individual risk assessment workshops for each of these sectors/regions. This approach will produce the most in-depth and comprehensive knowledge, and results can later be accumulated and discussed at the national level.

Hint: In the case of time or budget restrictions, related sectors (e.g. agriculture and water), or regions with similar biophysical features and climate risks (e.g. neighboring oblasts) may hold a joint assessment. Alternatively, the process can be implemented directly at the national level. A national workshop may be held with the participation of all priority sector representatives, to conduct a rapid risk assessment and impact chain development for the priority sectors, regions or watersheds identified in Step 1. In this case, Step 3 may be skipped. Using this information, an implementation plan for next steps can be produced.

Each sector/regional workshop should include participants from the sector ministry, meteorological agency and regional representatives. If desired, other relevant actors, such as major NGOs or universities may also attend. Considering expert opinions and climate data projections, participants can use impact chains as an analytical tool to better understand, systemize and prioritize factors driving risks in their sector or region.

The workshop is best conducted as a brainstorm session, with key stakeholders, using pin boards and cards. First, the major climate risks facing the sector or region must be identified, and their associated impacts[15]. If the discussion yields numerous answers, they can be clustered into larger groups united by similar topics or themes, which can then be prioritized and selected for further analysis. Using this as a starting point, current or expected hazardous events (i.e. climate signals) must be determined per priority area, as well as resulting physical impacts posing a risk to the system. Next, the observed vulnerabilities (socio-ecological factors and available or lacking capacities), and the exposure of people or assets to this risk must be noted. Finally, participants can brainstorm adaptation measures targeted towards each identified risk, impact and vulnerability. The use of arrows helps to visualize the cause and effect of these climate risk factors, and would allow for a structured method to identify targeted adaptation measures.

Example: For instance, in the agriculture sector, a risk to the livelihoods of wheat farmers may be identified as a priority. Hazardous climate signals contributing to this risk may include increased intensity and occurrence of rainfall. Associated impacts can include flash floods and landslides. Sensitivity factors in this scenario would include steep slopes (ecological) and poverty (socio-economic), while a lack of alternative livelihood sources and low capacity to plant resilient crops indicate poor adaptive and coping capacities. Finally, the exposed elements in this scenario can be smallholder farmers (human) and the farms themselves. Especially in cases where different regions within the country face largely differing risks and impacts, multiple impact chains can be developed to identify a full range of problems and potential solution.

[15] If the risk assessment covers more than one topic (for instance water and health), discrete impact chains should be developed for each topic, which can later be combined and interlinked at the national level.

General guidance on developing and utilizing climate risk information

A general guideline, adapted from the 2017 GIZ-EURAC publication titled "Risk Supplement to the Vulnerability Sourcebook: Guidance on how to apply the Vulnerability Sourcebook's approach with the new IPCC AR5 concept of climate risk", has been developed.[16] The general guideline has been further developed to consider the EbA approach and can be found in English[17] and in Russian[18]. The approach posits that baseline climate data and projections of future climate change are needed to define the nature and magnitude of climate risks, and to select adaptive options required to manage these risks at sector, regional or national level.

Step 3: Develop indicators and measure using data

Next, participants must select indicators to measure and track each of the risk components, i.e. indicators for the identified hazards (e.g. number of days with more than 50mm precipitation), vulnerabilities (e.g. % of land cover classes with high risk for erosion) and exposure (e.g. number of smallholder farmers in area). The indicators chosen must be specific (preferably quantitative), measurable, relevant to the process, realistic in terms of attaining the data to monitor it, and finally, time-bound. Data must then be collected and assessed for each of the identified indicators. Much of this data already exists for the three target countries, and must only be extracted from within ministry published documents, relevant project documents and national communications to the UNFCCC. These data must then be organized into sector specific profiles or reports. The reports will contain an indication of the most urgent risks to tackle and suggest a list of priority adaptation interventions.

Step 4: Present outcomes and recommendations of the risk assessment at the national level

The national working group shall finally gather all sector or regional risk assessment profiles within the target country and present the main findings at the national level, for instance at a conference, relevant workshop attended by policy makers and ministry representatives, or policy development working group. At this stage, specifically by targeting the identified risks in order of urgency, national level actors can finalize and validate the list of priority adaptation measures to be incorporated into policy. The list will, therefore, be validated, based on real needs faced by sectors, and feasible to implement. The final outcomes of the discussion must be documented for further use.

Step 5: Incorporate climate risk information into the policy process

A major challenge is that interventions are often developed and applied as stand-alone measures, incorporated into single-sector strategies, rather than developed using scientific data and incorporated into an overall integrated adaptation strategy discussing multiple needs across various sectors and levels. To resolve this, it is essential that the results and the documentation from Step 4 be disseminated across all sectors and ministry representatives. Assessment results from the sub-national level may then be discussed nationally and taken into consideration during the next updating process of the National Adaptation Plan, National Communications to the UNFCCC, National Determined Contributions, as well as any national climate change strategy, or climate relevant sector strategy. Focus should be given to developing policies that are responsive (targeting existing climate risk impacts), proactive (targeting expected climate risk impacts), and robust (allowing for flexible policies that respond to climate change uncertainty). Based on the results of the risk assessment, sectors should be jointly and formally prioritized within policies, to determine funding allocations and capacity building based on needs or urgency.

[16] GIZ and EURAC 2017. Risk Supplement to the Vulnerability Sourcebook.
[17] GIZ and EURAC 2018. Climate Risk Assessment for Ecosystem-based Adaptation.
[18] GIZ and EURAC 2018. Оценка климатическихрисков для адаптации на основе экосистем.

4. Case studies

The following are two practical examples of the use of climate information for adaptation planning (one regional example from Central Asia, and one international example from Pakistan). In both cases, the climate assessments conducted in an effort to bolster and utilize climate information in policy planning followed the IPCC AR5 guidance to focus on the concept of vulnerability. Since then, more up-to-date guidance has promoted the use of the term climate "risk", which encompasses the concept of vulnerability. The overall methodology of conducting the assessment, however, remains the same.

Case Study 1: Climate risk and vulnerability assessment for the transport and tourism sectors in Kyrgyzstan

Background

A Climate Risk and Vulnerability Assessment (CRVA) has been undertaken for the transport and tourism sectors in Kyrgyzstan. The tourism sector is strongly reliant on snow cover and the transport sector is adversely impacted by strong and increasing precipitation events causing damage to roads and infrastructure. Both are major issues worsening with climate change. The aim of the exercise has been to support and contribute to the Green Economy (GE) modelling process by piloting a CRVA for these two highly climate sensitive sectors, which have not been considered properly in the past. This approach to planning and implementing adaptation measures is not only cost-effective and targeted, it also presents a potential way for countries to access international climate financing.

CRVA methodology

In the absence of hard data and economic modeling, the study undertook a CRVA; the methodology was derived from Climate Risk Assessment for Ecosystem-based Adaptation - a Guidebook for Practitioners (GIZ, EURAC & UNU-EHS, 2018). CRVA connects available climate change scenarios with information on socio-economic systems. This is crucial as an informing basis for the effective economic evaluation of adaptation options that support decision-making.

Main findings of the CRVA

Tourism

The selected scope for the assessment were currently best-known areas for winter tourism in the country; Karakol (from Barskoon to Jyrgalan) and Bishkek South (from Ala Archa to Issyk Ata); and for summer tourism, the Southern Shore of Issyk Kul Lake, mountains around Karakol and mountains of Naryn Province. This allowed for the delineation of a system and geographic area which are specific enough to allow for relevant and useful insights on the one hand, yet general enough to allow for conclusions which are applicable elsewhere on the other.

The major climate hazard identified for the sector is an increase in mean temperatures and increasing summer precipitation. Impacts and risks resulting from this were found to be economic loss for winter skiing and snowboarding operations, glacial melt, landslides and floods, pasture degradation, and increasing heat waves. Human and environmental vulnerabilities include a decrease in number of tourists, a lack of alternative sources of income, reduced options for tourist activities, difficulties in seasonal planning, and a lack of awareness on capacity building. Finally, the exposed elements in the system include slopes, operating infrastructure, skiing facilities, community-based operations and various employees and operators.

For tourism, measures are suggested to develop ecologically and socially sustainable diversified options and alternatives. Options include building yurt camps, introducing mountain biking and horseback riding, agro-tourism, developing infrastructure for hiking and trekking and installing summer lifts. Furthermore, installing snow cannons, setting up monitoring systems, planning trees and restoring slopes and pastures will develop local capacities and reduce vulnerability to climatic changes.

Transport

The selected scope for the assessment of the transport sector was mountainous road infrastructure, specifically, the international road corridor crossing Kyrgyzstan from China to Uzbekistan across the Taldyk pass at an elevation of 3600m. The mountainous topography and geographical location of the Kyrgyz Republic in Central Asia strengthen the role of the transport sector in achieving sustainable economic development; the scope of the study is therefore targeted to priority needs and potential for loss and damage. The study categorizes issues into climate hazards (increasing winter precipitation and temperatures); impacts and risks (slope instabilities, concentrated water flows and avalanches); human and environmental factors and exposure (protective structures and infrastructure).

In Osh oblast (where the highway runs), emergency situations caused by debris flows and floods account for 29.7%; landslides and rockfalls for 18.8%; earthquakes for 13.6%; avalanches for 15.7%; meteorological hazards for 8.8%; man-made accidents and major fires for 7.6%. Embankments and cut-off slopes occur along many sections of the road and are subject to erosion from adjacent streams, which turn into mountain streams during spring and summer thaws. The impact of events related to natural hazards in the Kyrgyz Republic can be estimated at an average of USD 35-50 million per year. Estimated landslide/grassland reclamation costs generally range from USD 6,000 to USD 11,800 per km. The cost of periodic repairs and rehabilitation averages USD 23 million per year, of which 90% is spent on reconstruction, mostly as a result of natural hazards and degradation. The annual cost of landslide damage can be around USD 3.5 million.

Based on the CRVA, for the transport sector, the study proposes a number of possible green solutions, such as using bioengineering or vegetation to decrease road maintenance costs by protecting road infrastructure, zoning and land management efforts, civil structures, improving standards for green construction, improving drainage, etc.

Case study 2: Vulnerability Assessment in Khyber Pakhtunkhwa, Pakistan

Pakistan is ecologically unique. The Himalayan mountain ecosystem in the country is one of the main biodiversity hotspots worldwide. In addition to their ecological importance, they also play an essential role for economic and social development. Ecosystems and the services they provide to humans are crucial for the over 3.5 million people living in Khyber Pakhtunkhwa province. However, these resources are seriously threatened by human made factors such as the overuse of natural resources, which is further reinforced by population growth as well as an influx of displaced persons. Moreover, natural hazards and negative effects of climate change such as heavy rainfall events, floods and earthquakes considerably affect livelihoods in Khyber Pakhtunkhwa province.

A GIZ project 'Conservation and Sustainable Management of Biodiversity in Khyber Pakhtunkhwa' was implemented on behalf of the German Federal Ministry for Economic Cooperation and Development in 2013. To support the process, Adelphi organized a 3 day stakeholder and capacity building workshop in Islamabad, the capital of Pakistan. The outcome was a vulnerability assessment for two pilot regions (Swat and Chitral, both mountainous valley regions, similar to many ecosystems found in Central Asia), together with local, regional and national stakeholders. The assessments were used as a basis to identify suitable adaptation measures to be implemented by the project and recommended for scaling up to other regions, and integrated into national policy processes. An additional goal was that repeated vulnerability assessments would be used to monitor and evaluate the success of the selected adaptation measures over time.

In the first 1.5 days of the workshop, the concept of the assessment was introduced to the wide range of stakeholders from national, regional and district level (in this case, 35 stakeholders attended the national workshop). The participants' expertise on climate change vulnerabilities and possible data sources for the assessment was gathered. In the final 1.5 days, the climate assessment was prepared together with the implementation teams and GIZ project staff.

Step 1: To gain a solid understanding of the context in which the climate assessment would be implemented, a local consultant was commissioned in advance to prepare a scoping study, which covered local vulnerabilities, ongoing adaptation activities in the region, and possible data sources and availability. The objective, scope, methodological approach, required resources and major stakeholders were also defined at this stage.

Step 2: A brainstorming session together with all stakeholders resulted in the development of impact chains for identified priority climate impacts (i.e. land degradation, erosion and landslides). Then, related climate vulnerabilities and risks were systematically identified and visualized with arrows into cause-and-effect relationships. Targeting the specific climate impacts and vulnerabilities, participants then brainstormed and "assigned" adaptation measures to each issue, based on their expertise, know-how and varying perspectives from different sectors.

Step 3: Through intensive consultation with the implementation team and stakeholders, two of the most important vulnerability factors were selected for further development of indicators (i.e. deforestation/unsuitable cultivation and lack of farmers' knowledge). Using the scoping study and ideas of stakeholders, data was collected to quantify the chosen indicators and build up their information base. Key findings and recommendations from the assessment were then documented and discussed with stakeholders. The weak points identified within the regions served as ideal entry points for the brainstorming and discussion of adaptation options from the national level. Options included afforestation on vulnerable slopes with indigenous species and provision of training courses. These measures, other lessons learned from the process, as well as recommendations for scaling up and broadening the reach of such a process on a national level were shared widely.

The most significant outcomes of the process were the satisfaction of key stakeholders regarding their ability to be involved in the policy process, as well as the development of key recommendations to be scaled up and integrated into local and regional adaptive management plans. For instance, a major priority identified was the need to produce a joint pasture management plan backed by the newly established Village Development Committees, taking into account the climate vulnerability information produced in the assessment. Potential afforestation areas were also identified in the assessment, and shared with the forest and agriculture department to take further action (agroforestry and horticulture). Finally, the assessment also identified priority capacity development and training needs of communities, which will focus on the efforts of local trainers and bring efficiency.

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn, Germany

Project:
Regional Project "Ecosystem-based Adaptation to Climate Change in High Mountainous Regions of Central Asia"

22, Erkindik Blvd.
20040 Bishkek, Kyrgyz Republic
T + 996 312 90 93 40
F + 996 312 90 90 80
E paul.schumacher@giz.de
I www.giz.de

This project is part of the International Climate Initiative. The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

Authors:
Dr. Bunafsha Mislimshoeva, Ms. Renuka Srinivasan, Dr. Jochen Statz, Mr. Anvar Homidov, Ms. Aliya Medebaeva, Ms. Makhbuba Kasymova

Responsible:
Paul Schumacher, Bishkek

Design/layout:
Zhanyshbek Botoev

Photo credits/sources:
GIZ

GIZ is responsible for the content of this publication.

Bishkek, 2020