Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

ACCC
Adapting to Climate Change in China
Understanding Risk - Building Resilience

Adapting to Climate Change in China

Final Project Report

Phase II (2014.7-2019.9)

This report was funded by the Swiss Agency for Development and Cooperation (SDC)

This report should be cited as:
«Adapting to Climate Change in China» Phase II, funded by SDC

Cover image
Taken in Ningxia by photographer Guan Yiming

Acknowledgements

We want to express our sincere gratitude for the tremendous support of all the international, national and local counterparts over the past 5 years while working with us for the implement the Adapting to Climate Change in China (ACCC) project. The project encountered huge challenges due to the overall complexity of the topic and a serious institutional crisis during its implementation. The commitment and hard work of all partners greatly helped the project gain valuable results and lessons learnt in its end which are worthwhile being shared at national and regional level.

We would like to take the opportunity to express our gratitude to the expert team, including Roger Street, Paul Sayers, Fuipin Koh, Fu Rao, Sarah Opitz-Stapleton, Ye Qian, Li Yinpeng, Xu Yinlong, Huo Li, Feng Yuying, and the previous project implementation team for their dedication and drive in pursuit of delivering the ACCC project. We also particularly appreciate the strong support from SDC, Swiss Embassy in China, and the long-term and cooperation of the Ministry to Environment and Ecology, provincial teams in Jiangxi, Inner Mongolia, Ningxia, Jilin, Guizhou, Zhejiang and Guangxi, as well as the city teams in Lishui, Baise and Qingdao. We further would like to acknowledge the solid expertise from Peking University, NCSC, CMA, Beijing Normal University, Ocean University of China, and the many other experts. We apologize for not being able to list all the partners as they are numerous and doing so would result in a list longer than the final report.

Climate change adaptation is still challenging process to further translate research and policy into actions. These are time- and resource-intensive and need lots of change maker to push forward the agenda. Gladly, we have been able to support and witness that a strong, enthusiastic and willing climate change adaptation community was established in China. We believe they have become dynamic and capable teams that can shape and deliver China's climate adaptation agenda and pursue research and innovation to further develop the agenda over time.

Felix Fellmann

Counsellor - Head of the International Cooperation division Swiss Embassy in the People's Republic of China

October 15th, 2019

Table of abbreviations

ACCC	Adapting to Climate Change in China
CAAS	Chinese Academy of Agriculture Science
CMA	China Meteorological Administration
CNPACC 2014-2020	China's National Plan for Addressing Climate Change 2014-2020
DEE	Department of Ecology and Environment
DRC	Department of Development and Reform Commission
FYP	Five-Year Planning
IPCC	Intergovernmental Panel on Climate Change
IFPRI	International Food Policy Research Institute
MEE	Ministry of Ecology and Environment
MoHURD	Ministry of Housing and Urban-Rural Development
NAS	National Adaptation Strategy
NDRC	National Development and Reform Commission
NCSC	National Centre on Climate Change Strategy and International Cooperation
SDC	Swiss Agency for Development and Cooperation

Table of Contents

Executive Summary 6

1 Why Risk-Based Adaptation 8

2 Introduction to ACCC 9

3 Where ACCC Worked and How 10

3.1 How ACCC risk-based adaptation planning process worked 10

3.2 How the pilot projects and key sectors were identified 11

3.3 How ACCC supported pilot projects to integrate climate risks into local planning 12

4 Achievements (outcomes and outputs) 14

5 Highlights 14

6 Lessons Learnt and Outlook 15

7 Working partners and stakeholders 16

Annex 1: Overview of pilot projects 17

Understanding and adapting to coastal flood risks in Qingdao 17

Increasing resilience to drought with adaptive governance in pasture regions in Inner Mongolia 19

Sustaining rice production with adaptation planning in Poyang Lake Basin 21

Managing risks of geological hazards in Lishui City 23

Coping with water scarcity in the valley of Baise City 25

Annex 2: Mapping the Drafting Process of China's 13th Five-Year Plan 27

Annex 3: Publications supported by the ACCC project 29

Annex 4: Training module on risk-based adaptation planning 30

Glossary 31

References 33

Photo moments 34

Executive Summary

China has been subject to floods, droughts and heatwaves for millennia, these hazards are not new. What is new is how rapidly climate risks are changing for different groups of people and sectors. This is due to the unprecedented rates of socio-economic development, migration, land use change, pollution and urbanization. It is within this challenging context that China's policy makers, businesses and citizens must manage climate risks and strengthen resilience.

The project «Adapting to Climate Change in China», phase II (2014-2019), is funded by the Swiss Agency for Development and Cooperation through its Global Program on Climate Change and Environment. The project aimed at mainstreaming adaptation measures and policies into socio-economic planning at the sub-national level. It applied risk-based adaptation planning to support an effective and credible way forward to support actions.

In partnership with the Ministry of Ecology and Environment, the project carried out policy research, risk assessment, training and knowledge sharing in various regions of China. Activities are mainly carried out in 5 pilot areas, including Inner Mongolia Autonomous Region, Jiangxi province, City of Qingdao in Shandong province, City of Lishui in Zhejiang province and City of Baise in Guangxi Autonomous Region.

Policy impacts and outreach

- The «Framework and Methodology of the 14th Five-Year Plan (FYP) for Climate Change Adaptation in Inner Mongolia Autonomous Region» developed under the ACCC project served as the decision-making basis for the provincial government to draft the 14th FYP of Inner Mongolia.
- Pilot study results were applied to support the «Climate Change Adaptation Plan of Qingdao City» which also provided a scientific basis for ADB's green climate fund to invest in Qingdao.
- Policy recommendations will be submitted to the newly established provincial climate change advisory board based on findings in the «Adaptation Plan to Climate Change of Paddy Rice Plantation in Poyang Lake Basin».
- An evaluation index system for the evaluation of urban climate change adaptation pilot cities has been developed by the national think tank, the National Centre on Climate Change Strategy and International Cooperation (NCSC). It is expected to be used for the national evaluation for the implementation of climate change adaptation in 28 Chinese cities.
- Policy recommendation on the grassland management in Inner Mongolia and rice production in Jiangxi have been submitted to the national state council by Peking University

Highlights

- Built up awareness and capacity on climate change adaptation through an interactive training module, peer learning and hands-on guidance.
- Developed a practical planning manual with case studies which supports stakeholders to better understand and develop adaptation plans and ultimately to manage climate risks.
- Improved the scientific understanding on impacts and risks of climate change in different sector, e.g. agriculture, water resources, and disaster risk reduction.

— Established a strong, enthusiastic and willing climate adaptation community who are enthusiastic to act on their agenda.

Figure 1: Overview of ACCC project, phase II

1 Why Risk-Based Adaptation

Climate risks are continuously expanding in China and worldwide

In 2018, weather and climate disasters caused economic losses of US$ 215 billion across the world. This was the third consecutive year that such losses have been more than US$ 200 billion. In China, weather and climate disasters have been continuously expanding and increasing in incidence, severity and direct economic losses, although the death toll has declined. For example, in 2017, meteorological disasters in China damaged 2'010 million hectares of crops, causing 913 deaths and disappearances, and direct economic losses of US$ 45 billion. The overall loss was lower than the average level in the previous five years (CMA, 2017) but compared to the global situation the level of losses as well as the long-term trend remain a concern.

China is moving forward on climate change adaptation

China has been subject to floods, droughts and heatwaves for millennia, these hazards are not new. What is new is how rapidly climate risks are changing for different groups of people and sectors. This is due to the unprecedented rates of socio-economic development, migration, land use change, pollution and urbanization. China is facing several key challenges in reducing poverty and maintaining economic growth whilst moving towards a solid sustainable development. It is within this challenging context that China's policy makers, businesses and citizens must manage climate risks and build resilience.

- In 2013, China published its national adaptation strategy, laying out clear guidelines and principles for climate change adaptation and proposing specific adaptation goals. The strategy included a call for efforts at the regional level to develop adaptation action plans.
- In 2014, China published the National Plan to Addressing with Climate Change (CNPACC 2014-2020), covering mitigation, adaptation, scientific research and public awareness. The plan is underlining that mitigation and adaptation are significant to socio-economic development in China.
- In 2017, the National Development and Reform Commission (NDRC) and the Ministry of Housing and Urban and Rural Development (MoHURD) jointly launched the national pilot of the «Cities action plan for climate change adaptation in China», emphasizing that cities will be important actors in addressing the risks of climate change.

Moving from planning to action: still significant obstacles

Despite recent progress at the adaptation planning level, gaps in moving from national planning to regional adaptation plan and actions are still significant. Today, the lack of legislative requirements and supporting policies, irregular risk assessments, ineffective coordination and evaluation systems as well as limits in research capacity and awareness are the main obstacles of adaptation actions in China. International cooperation and peer learning can be effective tools to support tackling some of these limitations.

Risk-based adaptation planning as an iterative process

The project is applying risk-based adaptation planning in order to help policy maker to developed evidence-based adaptation measures. Consists with the IPCC framing of risks and vulnerabilities, it is an effective and credible way forward to support actions (the risk-based adaptation method is further explained in chapter 3.1). It considers the risks to the natural and the socio-economic systems as well as related operational and strategic goals, integrates knowledge and evidence including associated uncertainties related to these risks, which can help to identify and prioritize risks to be considered in the planning process. Risk-based adaptation planning also provides a basis for identifying and as-

sessing a broad range of adaptation measures consistent with broader sustainable development objectives. In short it is an iterative, systematic and integrated process to support informed adaptation planning and implementation.

2 Introduction to ACCC

ACCC is about anticipating and managing the climate risks in China

The project «Adapting to Climate Change in China», phase II (2014 – 2019), is funded by Swiss Agency for Development and Cooperation (SDC) through its Global Program on Climate Change and Environment. It was implemented in partnership with the Climate Change Division of Ministry of Environment and Ecology[1] , with the total budget of 6 Mio CHF.

Mainstreaming climate risks into local planning processes

Climate change adaptation is about anticipating and managing risks associated with climate change. ACCC phase I [2] has conducted climate change impact and vulnerability assessments for the selected regions in China. Aiming at bridging the gap from impact assessments to climate change adaptation on the local level, the project focused on building capacity and working with policy makers and researchers in understanding climate related risks to key sectors, testing risk assessment model and mainstreaming adaptation measures and policies into socio-economic planning at the sub-national level

The intervention strategy of the project consists of three complementary components, namely (i) the demonstration of solutions through a portfolio of pilot projects, enabling the mainstreaming of climate risks into planning, (ii) developing instruments and methodologies to support such planning process, and (iii) providing hands-on trainings and workshops for capacity building and awareness raising, thereby building up a national climate change adaptation community. These three key components of the intervention strategy are illustrated in Figure 2.

[1] The function of climate change was shifted from NDRC to MEE in China in 2018.

[2] ACCC phase I (2009-2013) was a partnership project involving the UK Department for International Development, UK Department for Energy and Climate Change (DECC), Swiss Development Cooperation (SDC), and China's lead ministry responsible for climate change affairs, the National Development and Reform Commission (NDRC). The project supported integrated climate change impact and vulnerability assessments in selected regions in China including Inner Mongolia Ningxia, Guangdong. With the aim of supporting robust interdisciplinary research and inclusion into policy making process the evidence-based research results

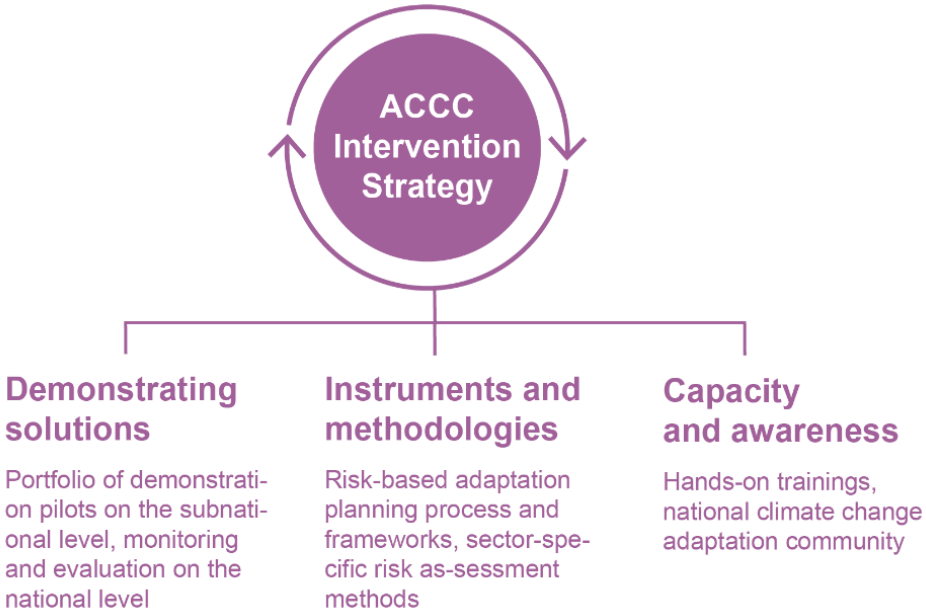


Figure 2: ACCC's intervention strategy

3 Where ACCC Worked and How

3.1 How ACCC risk-based adaptation planning process worked

Risk-based adaptation planning to cope with key climate risks

The pilot projects basically followed the risked-based adaptation process developed in the ACCC project as shown in Figure 3.

The risk-based adaptation planning process and associated framework reflect the current state-of-the-art in risk-based adaptation planning as well as the lessons learnt and challenges experienced during the delivery of the ACCC project (Street et al., 2018). A primary goal of such processes and frameworks is the identification of adaptation and resilience measures that meet an agreed set of objectives and values. A planning manual was produced to guide the practitioners at national and sub-national level who intend to develop and deliver an adaptation plan based on the steps illustrated in Figure 3 the below.

It is an iterative process from structuring and establishing the planning process (Step A), identification of risks and opportunities through risk assessment (Step B), appraisal of adaptation measures (Step C) to the drafting of adaptation plan and strategy (Step D), and periodic monitoring and evaluation (Step E).

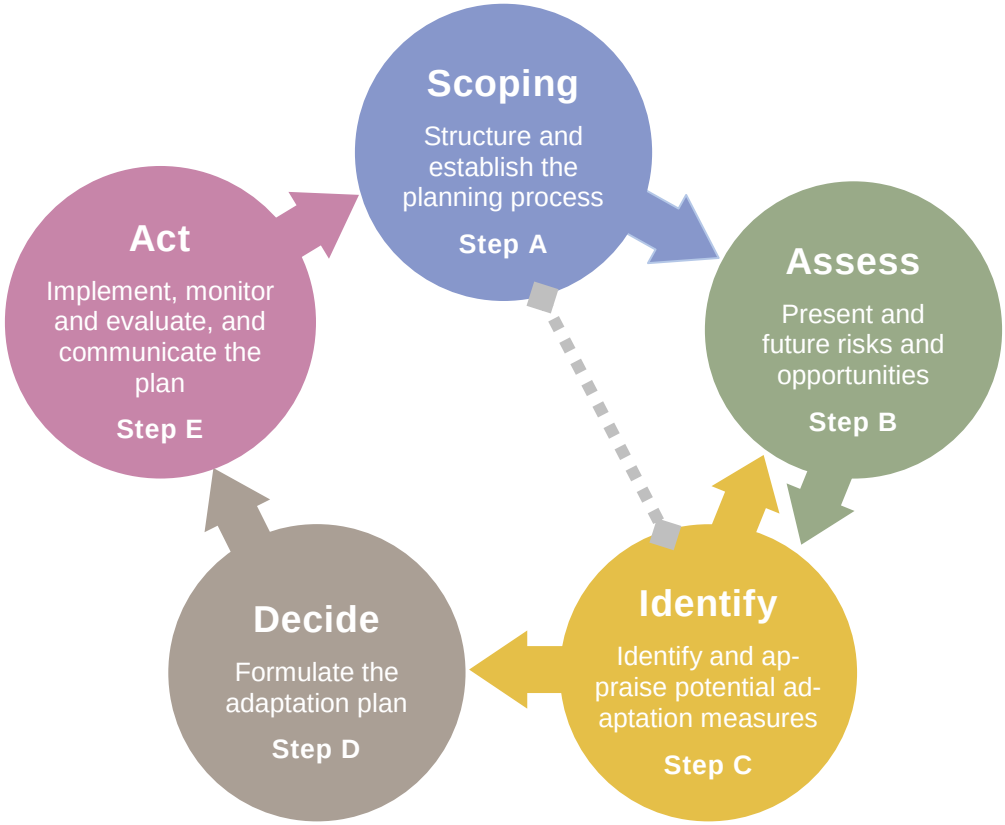


Figure 3: ACCC Risk-based Adaptation Planning Framework

3.2 How the pilot projects and key sectors were identified

Pilots are selected by addressing the most vulnerable issues in China

The selection of pilot projects and project design was undertaken through consultations with the project's national counterpart, by considering political willingness, geographic distribution and the vulnerability issues of the potential piloting partners.

In terms of identifying vulnerability issues to tackle, reference was made to a number of leading global and national assessments and policies on climate change and adaptation, such as the IPCC AR5, the China National Adaptation Strategy (NAS, 2013), China's National Plan for Addressing Climate Change 2014-2020 (CNPACC), and the 13th Five-Year Plan (2016-2020). The key vulnerable sectors are listed in Table1.

National Policy / Vulnerable sectors	NAS	13th FYP	CNPACC 2014-2020	ACCC Projects
Water resources	●	●	●	●
Agriculture	●	●	●	●
Forest and other vulnerable ecosystems	●	●	●	●
Marine and coastal zone	●	●	●	●
Public health	●		●	
Extreme event and disaster risk reduction		●	●	●
Tourism	●			
Critical Infrastructure	●	●	●	

Table 1: Key vulnerable sectors in different leading global and national policies on climate change and adaptation and sectors addressed by ACCC projects

3.3 How ACCC supported pilot projects to integrate climate risks into local planning

Supporting local Five-Year Plans in the pilot regions

The Chinese government applies a Five-Year Plan (FYP) as the most critical tool to guide social and economic development from national to city level. The drafting process for the FYP is time-intensive, taking approximately three years, starting from the mid-term review of the previous cycle and consisting of 10 consecutive steps, as shown in Figure 4. More information on the process of FYP is provided in Annex 2.

Aiming at incorporating the concept of climate change adaptation into the local FYP planning process, ACCC worked with the leading think tanks, namely to:

- Conduct risk assessment and adaptation studies to assist the identification of key research area (step 2 in Figure 4), and
- Explore methodologies and frameworks for the formulation of the general concept of the FYP (step 3 in Figure 4).

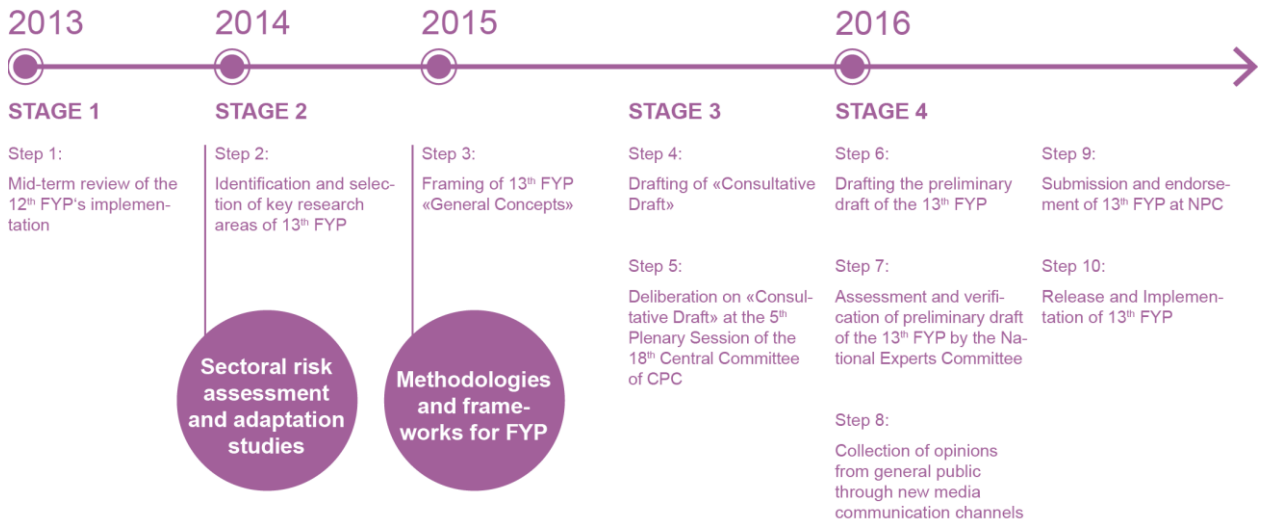


Figure 4: Process at the Central Government Level of the Drafting Process of China's Five-Year Plan. (Source: Koh, F.P., Nadin, R. & Liu, J. (2016). Drafting Process of China's 13th Five-Year Plan (unpublished))

Figure 5 gives an overview of the main sectors and climate drivers the pilot projects dealt with. More details are provided in the case studies in Annex 1.

Pilot projects followed the ACCC planning process focusing on different vulnerable sectors

Following the risk-based adaptation planning process of ACCC, local project teams (think tanks supporting local authorities) conducted studies to understand historical impacts of weather and climate hazards and to identify vulnerability and future risks. These are the fundamental steps for the risk-based adaptation planning since such studies are often missing or not systematically summarized on local levels. Adaptation options were evaluated considering the existing and planned measures of the local government. Policy dialogues were organized to explore suitable strategies to deal with identified future challenges. Recommendations for the FYP were made to the relevant stakeholders on the provincial or city level.

Figure 5: Overview of the five pilot areas

4 Achievements (outcomes and outputs)

Outcome 1: Improved understanding on climate risks and how to integrate climate risks into local planning processes on the provincial and city level

Understanding climate risks and integrating into local planning process

- The project produced a practical guidance of risk-based adaptation planning for practitioners and policy makers. It promotes a better understanding of climate risks and demonstrates a set of planning tools in the pilot projects, from risk assessment to monitoring and evaluation (see Annex 4 for an outline).
- The project supported NCSC to develop an evaluation index system for the 28 national pilot cities for climate change adaptation, reviewed the progress of their actions, and made recommendations to national policy makers on how to facilitate climate change adaptation.
- At the provincial level, the project supported two provinces (Inner Mongolia and Jiangxi) to integrate climate risks into their FYP through stakeholder engagement, surveys, studies, policy dialogue and recommendations.
- At the city level, the project supported three pilot cities to carry out risk assessments on their vulnerable sectors. Adaptation options were suggested in line with local sectoral planning.

Outcome 2: Enhanced capacity to cope with climate change among the key stakeholders on the national and sub-national level:

Interactive training workshops as the highlight among knowledge sharing activities

- Training modules have been developed in line with the structure of the risk-based adaptation planning process. More than 500 stakeholders from local governments and think tanks joined these hands-on sessions (see Annex 4 for the main content of the training modules).
- International best practises have been introduced to the practitioners and decision makers through various project workshops.

Outcome 3: improved knowledge basis for shaping policies and drafting FYPs at sub-national level:

Pilot projects directly contributed to local Five-Year Planning

- The «Framework and Methodology of the 14th Five-Year Plan (FYP) for Climate Change Adaptation in Inner Mongolia Autonomous Region» developed under the ACCC project served as the decision-making basis for the provincial government to draft the 14th FYP of Inner Mongolia.
- Pilot study results were applied to support the «Climate Change Adaptation Plan of Qingdao City» which also provided a scientific basis for ADB's green climate fund to invest in Qingdao.
- Policy recommendations will be submitted to the newly established provincial climate change advisory board based on findings in the «Adaptation Plan to Climate Change of Paddy Rice Plantation in Poyang Lake Basin».

5 Highlights

- Aiming at closing the knowledge gaps within the newly established climate adaptation team in the Department of Ecology and Environment (DEE) at provincial and city level, the ACCC project enhanced the ca-

pacity on climate change adaptation through an interactive training module, peer learning and hands-on guidance during more than 20 training workshops. High satisfaction rates among training participants were reached.
— A scalable planning manual with case studies has been drafted. It can help stakeholders to better understand and develop adaptation plans to mitigate or manage the negative impacts of climate risks.
— A number of models on how to carry out integrated risk assessment for sectoral/cluster issue were demonstrated, which help to improve the scientific understanding on impacts and risks of climate change in different sector, e.g. agriculture, water resources, and disaster risk reduction.
— The project established a strong, enthusiastic and willing climate adaptation community who are enthusiastic to act on their agenda.

6 Lessons Learnt and Outlook

Lessons Learnt

— The project design was rather ambitious in terms of number and diversity of piloting partners and type of considered climate risks. Retrospectively, a narrower focus on the most critical, climate-induced hazards – such as droughts, floods or heat stress – could have eased the process of scaling up project findings in other regions in a more effective manner.
— The aim of the project is to mainstream climate risks into local planning process by supporting policy makers at sub-national level. However, we found out that the obstacles are significant as the legislative requirements and adequate institutional setup for climate change adaptation are still missing. This made the project implementation especially difficult as China follows a top-down approach.
— Although a risk-based adaptation framework and guidebook were developed and introduced, it is still challenging for teams at the local level to carry out a robust risk assessment due to the lack of data and the complexity of models. There is a trade-off between providing scientifically sound conclusions on the impact of climate change and the robust decision-making with limited time and resources.
— The working partners are various, ranging from national to local level. It took years to build up trust and understanding them and most of them have also become the key stakeholders in this filed. In future, SDC will apply a demand-driven manner to pursue cooperation with the government of China, trying to work with champions. We believe it can generate enormous changes or impacts from long-term perspectives. Contribution from Chinese part should be also provided in order to demonstrate ownership and engagements for the cooperation.
— Communication with the public and policy makers need to be enhanced as adaptation is still a new topic for the public and policy makers. Awareness raising is the very first step to bridge gaps and to take out actions on the ground.

Outlook

— SDC is one of the very few donor agencies which works on climate adaptation in China. SDC has accumulated valuable experience over the years and has recognized the potential to leverage this experience and

to scale up the achievements through new partnerships. In this spirit, SDC has started a new partnership with GIZ. This can also create potential opportunity for south-south knowledge sharing, making sure more south countries can benefit from the collaboration.

— During the project implementation, we found out that the knowledge gaps are still enormous. During the training workshops, we often had to start with “what is climate change adaptation”, rather than discussing how to develop adaptation measures. The transfer of responsibility for climate change adaptation from Reform Commission (DRC) to Department of Ecology and Environment (DEE) at provincial and city level has made this issue more prominent. Thus, capacity building and awareness raising shall be continued, extending also to communities and the public.
— As one of the convening countries of Global Commission on Adaptation, China is taking more attention to tackle issues on climate risks and resilience. However, how to develop the adaptation plan and how to carry out adaptation measure accordingly to reduce economic and human life losses still remain a hug challenge. This also opens an opportunity for Switzerland to share and exchange knowledges with China.

7 Working partners and stakeholders

Stakeholders engaged within the framework of the project were:

Policy Makers	— MEE-leading counterpart — DEE-leading counterpart on the provincial and city level — DRC-leading counterpart on the provincial and city level, if DEE team is not yet established
National Think Tanks and Educational Institutions	— NCSC — CMA — Peking University — Beijing Normal University — CAAS — Ocean University of China
International Experts	— Roger Street. University of Oxford, UK — Paul Sayers, Sayers and Partners LLP, UK — Fu Rao, EBP, Switzerland — Fuipin Koh, Malaysia

Annex 1: Overview of pilot projects

Understanding and adapting to coastal flood risks in Qingdao

Figure 6: Focus of the pilot area: Coastal flooding arising from storm surge influenced by typhoon and sea level rise.

Region
Shandong Province, People's Republic of China

Study location
Qingdao City

GDP
1.1 trillion RMB

Main sectors
Important trading port with significant secondary and tertiary industries in addition to primary agricultural production (coastal fisheries).
Top 12th wealthiest cities in China and is one of China's six golden cities as defined by the World Bank.

Context

Climate risk of interest: The coastal zone of Qingdao is heavily developed under the 13th Five-Year Plan. Further development is anticipated through the 14th Five-Year Plan. The focus here is the impact of coastal flooding (associated with typhoon induced storm surge) on people and businesses. In doing so, consideration is given to the economic impact of individual (extreme) coastal flooding due to typhoon events as well as annual average economic damage.

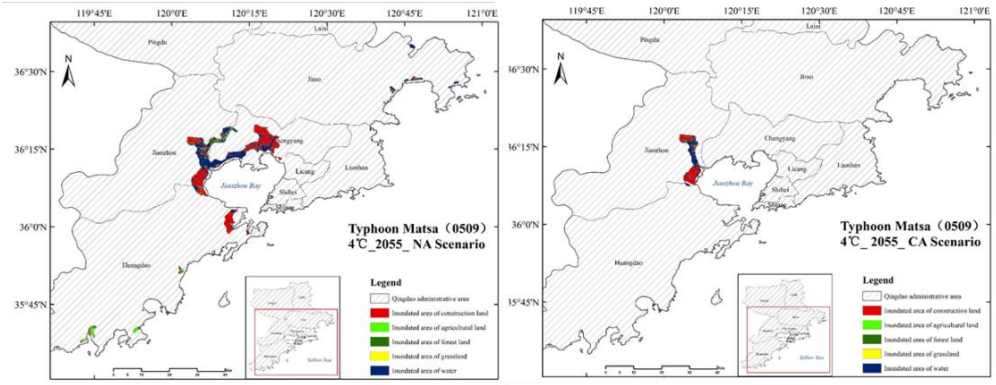
Importance of climate change: Coastal flooding arises typically from typhoon and storm surge and sea-level rise. Consequently, both sea-level rise and changes in the wind speed of typhoons present significant future challenges. Under a 2˚C global warming future, Qingdao coastal sea-level rise is projected to be between 14 and 28 cm (21 ± 7) and between 16 and 32cm (24 ± 8) by 2050 under the 4°C global warming scenario. Wind speed of typhoons is projected to increase between 1.4% and 3.0% by 2050.

Results and insights

Developing the Qingdao System Risk Model (QSRM): ACCC has supported Ocean University of China (OUC) in engaging City Government stakeholders in identifying coastal flooding as a priority reason for concern and developing the Qingdao System Risk Model (QSRM), a system risk model of Qingdao City (including 900 km of coastline) instrumental to explore present and future changes in coastal flood risk. The analysis of future risks in 2050 includes future scenarios of socio-economic development (taking into account the planned development and possible future trajectories), climate change and the ability of alternative adaptation strategies to manage future risks. The ACCC programme has facilitated the sharing of international best practice on all of these issues and supported the OUC in developing a coherent analysis and narrative. The ACCC has also supported various stakeholder meetings to help guide the approach and encourage its relevance (and take-up) by city planners.

The scoping and assessment of climate risks: The broad risk scoping process identified coastal flooding as a high likelihood hazard event of significant consequence, forming the basis of the development of the QSRM. It includes an assessment of economic risks based on hazards, exposure (population and land use) and vulnerability (described through the potential economic damage in different land use categories). The QSRM has been used to explore future changes in risk given climate, population and alternative adaptation futures.

Without further adaptation, climate risks are projected to increase (Figure 7). Continued adaptation is central to managing these risks. An adaptation response which ensures that coastal flooding is considered within the development planning in the coming 5 to 10 years and improvements of building regulations and investments in both coastal defences and realignments of the coastline (to provide environmental benefits and a natural flood defence) offer the potential to reduce future risk. Under the assumption of an ambitious adaptation programme, future risks can be expected to be reduced by 82% on average compared to the “no further adaptation” assumption.



Flood risk in 2050 (4°C future);
Left: No further adaptation;
Right: Current adaptation objectives are implemented.

Figure 7: The Qingdao System Risk Model (QSRM) allows to explore future risks

Engagement and outreach

Implementation Partners	Ocean University of China and Sayers and Partners/University of Oxford
Stakeholders	DRC with close coordination by DEE in Qingdao
Outreach	*International*: oral presentation on the 5th German-Polish Seminar on the coasts of the North Sea and the Baltic Sea under climate change – synthesis of German and Polish strategies for development and prediction, 2016, Hamburg.
Highlights	The result of the ACCC phase II project is used as a basis for the design of the Asian Development Bank Green Investment Project. The project result is use to support City Adaptation Planning in Qingdao.

Increasing resilience to drought with adaptive governance in pasture regions in Inner Mongolia

Region
Autonomous region of Inner Mongolia, People's Republic of China

Study location
Selected pasture regions

GDP
1.6 trillion RMB

Main sectors
Agriculture (43% of which is animal husbandry) and the tertiary industry

Figure 8: Focus of the pilot area: grassland degradation due to enhanced drought under global warming

Context

Climate risk of interest: Natural grassland area of Inner Mongolia covers 71.9 million hectares, approximately 83% of the total pasture area of the autonomous region. It is also one of the most vulnerable ecosystems of Inner Mongolia, being especially vulnerable to droughts and heat waves. The accelerated grassland degradation has been observed in the past several decades due to the obvious warming and enhanced drought with water shortage and annual average runoff decrease. Survey results show that the area of degraded grassland in Inner Mongolia has expanded from 18% in 1960s to 39% in 1980s up to 62.7% in 2003. Livestock suffers from a series of ecological consequences due to drought, such as the outbreak of grassland diseases, insects and rodents, and stockbreeding got harder due to a loss of biodiversity, weaker carrying capacity of grassland, loss of flesh, and finally resulting the instability of livestock husbandry.

Importance of Climate Change: In the past five decades, the annual mean temperature, extreme maximum and minimum temperatures increased with the rate of 0.39°C, 0.24°C, and 0.54°C per decade. The obvious warming is observed since the 1980s and most significant in the past two decades. Meanwhile, the precipitation decreased with larger variability and the scenario projections showed that the drought would be enhanced in frequency and intensity with a continuing warming trend in this region.

Results and Insights

From assessment to planning: In phase I of ACCC (2010-2014), ACCC project supported Inner Mongolia teams to assess impacts of climate change on water resources, grassland and livestock, to better understand the vulnerability (historically) and develop roadmap at the initial stage. However, it has been realized that more efforts should be given in order to translate scientific research and support policy making. After negotiation with local DRC, it was determined to support the leading think-tank to develop in-depth study which will be used to inform 14th FYP. These will the ideal way to leverage policy impacts, and maximum research result in China.

The leading implementation partner of the pilot project is the think tank of the provincial DRC who supports the drafting of provincial FYPs. The «Framework and Methodology of the 14th FYP for Climate Change Adaptation in Inner Mongolia Autonomous Region» was

developed under ACCC project, which summarized the major climate risks of the province on the basis of historical and projected climate change and socio-economic developments of different sectors, and suggestions on how to consider those issues in the provincial socio-economic FYP. It served as the decision-making basis for the provincial government to draft the 14th FYP of Inner Mongolia.

Two key policies against grassland degradation were analysed in terms of their synergies to climate change adaptation. Survey of herdsman were carried out 216 herders household in 36 villages to assess their feedbacks on the existing policy, existing measures against climate hazards and their resilience to climate change.

Analysis of policy impacts on grassland degradation: In order to cope with climate change and realize the sustainable utilization of grassland resources, the Chinese government has implemented several policies in Inner Mongolia. Two main policies, namely the grassland circulation policy and the grassland ecological compensation policy were selected for narrative analysis, with the focus on synergies with the provincial climate change adaptation actions.

— **Grassland circulation policy (GCP):** GCP is a grassland tenure reform started in Inner Mongolia with the Dual Contracts system that are managed by the communes during the collective period of China. It is aiming to give herder the incentive of improving production and spur the market. In comparison with crop farming areas, the implementation of the land tenure reform on grassland is relatively complex and has taken a long time. Conclusion shows that the degradation of grassland was not reversed by implementation of the GCP but helped to improve livestock productivity (Liu and Jikun Huang, 2017); therefore, it offers herdsman a certain income to support their livelihood, offering opportunities to search for means of living, which could increase their resilience towards negative climate change impacts.

— **Grassland ecological compensation policy (GECP):** The GECP is a large-scale public investment program in which China since 2011 alleviates grassland degradation and increase herders' income. The analysis showed that the GECP provided biophysical relieve to the grasslands, while the GCP showed less effects. From a socio-economic point of view, the herdsmen's income was more obviously increased with grassland circulation policy than GECP, thereby contributing to enhanced resilience of the pastoral regions to climate change and its inhabitants

Engagement and outreach

Implementation Partners	Inner Mongolia Development Research Center, Inner Mongolia University, Inner Mongolia Agricultural University, Peking University
Stakeholders	Department of Development and Reform Committee
Outreach	*Local*: policy dialog based on survey conducted with over 100 herdsmen, policy recommendations *National*: ACCC training workshops
Highlights	The «Framework and Methodology of the 14th Five-Year Plan (FYP) for Climate Change Adaptation in Inner Mongolia Autonomous Region» developed under the ACCC project served as the decision-making basis for the provincial government to draft the 14th FYP of Inner Mongolia.

Sustaining rice production with adaptation planning in Poyang Lake Basin

Region
Jiangxi Province, People's Republic of China

Study location
Poyang Lake Basin

GDP
2.0 trillion RMB

Main sectors
Agriculture (53% of the total GDP), one of main rice production areas of China

Figure 9: Focus of the pilot area: climate change adaptation of rice production

Context

Climate risk of interest: Boyang lake basin is the historical main rice production area of China. Heat damage and forced ripening of early rice due to high temperature has been enhanced due to warming. Great variability is shown for the affected rice planting areas due to drought and flooding: while the average areas affected by drought and flooding were 16'100 and 24'400 hectares respectively for between 1984 and 2015, it is shown an increasing trend of flooding disasters with a rate of 0.89 per year and more occurrence of drought disasters since 2000. Damage from outbreaks of pest and diseases has been heavily exacerbated, the soil fertility decreased, all greatly threatening the rice yield.

In Poyang Lake Basin, there is still a lot of farmland with low and medium yield today, with an agricultural mechanization lower than the country average and insufficient to prevent meteorological and ecological disasters. The industrialization of rice production is hampered by decentralized operation and the rice value chain is not well developed.

Importance of Climate Change: Between 1961 and 2017, the warming rate in Jiangxi Province was 0.19°C per decade, with a slightly increasing trend of precipitation with regional differences, more dry days, higher rain intensity, resulting in a more likely occurrence of hot temperature events, enhanced droughts and intensified precipitation, all posing a threat to rice production in the Poyang Lake Basin.

Results and Insights

From planning to the Adaptation Action Plan: Under the ACCC project, climate change data from the past decades and the features of climate change impacts on the rice production in Poyang Lake Basin were reviewed, the methodology of Risk-based Adaptation Planning Process was used to summarize the key vulnerabilities of rice production and to present climatic hazards and the urgent risks based on climate scenario projection. An Adaptation Action Plan for Rice Production in Poyang Lake Basin was made including adaptation objectives based on the vulnerability and risk analysis. Based on this Action Plan, a series of adaptation activities and key adaptation programmes were designed to realize

the adaptation objectives with well organised, effective measures to ensure the success of adaptation actions implementation.

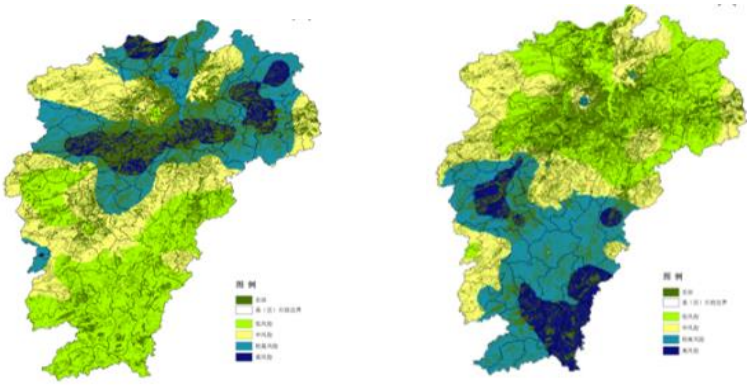


Figure 10: Flood (right) and drought (left) risk map for agricultural areas of Jiangxi province (green: low risk, yellow: medium risk, blue: high risk, dark blue: very high risk).

Some highlights of the concrete actions in the Adaptation Action Plan:

— **Adapt rice crop selection:** An adapted rice cropping system and layout of rice varieties, multiple cropping methods adapted to the changed climate, and a rice variety with a longer phenophase to make use of the increased climatic resources are recommended. Japonica species with the feature of preventing from lodging and the chilling injury in autumn shall be adopted in Poyang Lake Basin to produce high-quality rice.

— **Enhance the infrastructural capacity:** Completion of the irrigation system and adoption of water-saving technology to increase water use efficiency, to build high standard farmland to increase the resilience to cope with exacerbated drought.

— **Increase resilience with ecological measures:** Biological measures adopted for pest and disease control, including adoption of the optimized rice varieties and biopesticides, field management for biodiversity and employment of natural enemies.

— **Develop the disaster reduction system:** The technology systems resilient towards meteorological and biological disasters shall be developed, an early-warning system, and index-based crop loss insurances

— **Promote adaptive management:** Encourage building high-standard demonstration farmland to test stress-resistant and high-quality rice varieties and low-carbon cropping patterns, prompt land circulation for scale operation, and prolong the rice value chain.

Engagement and outreach

Implementation Partners	Ecological and Meteorological Center of Jiangxi Province
Stakeholders	Department of Ecological Environment, Development and Reform Committee, Meteorological Bureau, Department of Agriculture of Jiangxi Province
Outreach	*Local*: capacity building of DEE members on the city level, policy recommendations *National*: ACCC training workshops
Highlights	Policy recommendations will be submitted to the newly established provincial climate change advisory board based on findings in the «Adaptation Plan to Climate Change of Paddy Rice Plantation in Poyang Lake Basin».

Managing risks of geological hazards in Lishui City

Region
Zhejiang Province, People's Republic of China

Study location
Lishui City

GDP
139 billion RMB

Main sectors
Mainly secondary and tertiary sector

Figure 11: Focus of the pilot area: Geological hazards including mountain torrents, landslides and mudflows

Context

Climate risk of interest: As the focus area of the «Great Garden Construction Program» in the Zhejiang Province, massive investments in public infrastructure are planned. 88% of Lishui City is covered with mountain and damages due to increasing geology-related incidents have drawn significant attention. Mountain torrents, landslides and mudflow were thus identified as the main climate risks for this piloting area.

The importance of climate change: Areas with potential risks of mountain torrents, landslides and mudflows are widely distributed in the valleys and mountainous regions of Lishui. The increasing intensity and frequency of heavy rainfall events due to climate change is expected to increase the occurrence of the geological hazard events and thus the risks of fatalities and significant damages of public and private infrastructure and assets. In the last 10 years, direct damages due to mountain torrents amount to 123 billion RMB, 48 billion of which are damages in the agricultural sector.

Results and insights

Assessment of geological hazards: The ACCC project has supported the think tank of the provincial Development and Reform Commission (DRC) to conduct a comprehensive assessment and modelling of main geological hazards including mountain torrents, landslides and mudflow. Areas at risk have been mapped and categorized.

Integrated disaster risk management: The ACCC project has facilitated the introduction of international experiences and best practises of the integrated disaster risk management concept, with a special focus on the steps of preparedness and recovery.

Synergies and financing mechanisms: The ACCC project supported discussion of financial regimes and financing mechanisms of disaster prevention measures. Potential synergies between climate change adaptation measures and ongoing and planned actions in the province (based on DRC's project database) have been explored.

Scoping and assessment of climate risks: The broad risk scoping process identified mountain torrents, landslides and mudflows as the hazard types with the most significant

risks. Areas lying in the valley with highest population density have the highest risks. This scoping activity initiated a more detailed assessment of flooding with the *FloodArea* software. An integrated risk map including mountain torrents, landslides and mudflows was produced considering the occurrence probability and potential damages (Figure 12), which serves as a basis for climate change adaptation and disaster risk management planning. A set of engineering and non-engineering measures were suggested considering the ongoing programs, such as the «Great Garden Construction Program» and the planned «Grand Resettlement Program». Reorganisation of the institutional set-up to cope with the future challenges are also suggested.

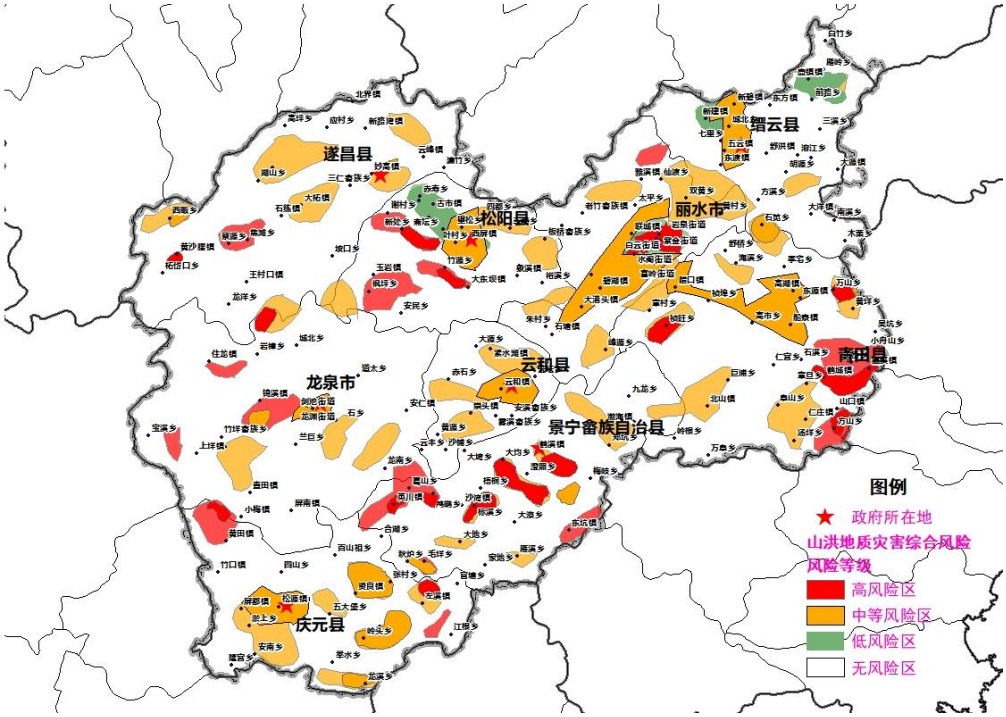


Figure 12: Geological Hazard Map of Lishui City, with Areas of high (red), medium (yellow) and low (green) risks of mountain torrents, landslides and mudflows

Engagement and outreach

Implementation Partners	Economic Centre of Zhejiang Province, DRC of Zhejiang Province, DRC of Lishui City
Stakeholders	Bureau of Natural Resources, Bureau of Water Resources, Meteorological Office, Bureau of Ecological Environment, local communities
Outreach	*Local*: suggestion on climate change adaptation measures, capacity building through workshop on climate change adaptation. *National*: ACCC training workshops
Highlights	Direct contribution to the ongoing Great Garden Program and Grand Resettlement Program

Coping with water scarcity in the valley of Baise City

Region
Guangxi Province, People's Republic of China

Study location
Valley of Baise City

GDP
3.5 billion RMB

Main sectors
Non-ferrous metal mining;
Agriculture (renowned for mango and sugar-cane)

Figure 13: Focus of the pilot area: Water resources management primarily for the domestic and agricultural sectors

Context

Climate risk of interest: Apart from the mining industry, agriculture is the key sector for livelihoods of the local community. Agriculture is also the main water consumer. Lying in the karstic region of southern China, Baise City suffers from seasonal water shortages on a yearly basis. Thus, water scarcity is identified as the priority climate risk to be assessed.

Importance of climate change: Historical trend analysis shows that although an overall slight increase of total precipitation can be observed, there is an increasing trend of drought events with reduced precipitation and runoff. With the projected, increasing water demand due to economic development, water scarcity is expected to increase even with planned water saving measures. In addition to water shortages, high temperature and increased heavy precipitation can also affect the yields and quality of key agricultural products such as mango and sugar cane.

Results and insights

Stakeholder dialog for climate change risk assessment and adaptation planning: The ACCC project facilitated the climate adaptation dialoge by bringing in stakeholders from relevant sectors in the scoping process and involving them in the climate change risk assessment and adaptation planning process. International experiences on climate change risk assessment in the water sector and in stakeholder involvement were introduced. Focus was set on the scoping and assessment, since Baise is still at its very initial stage to carry out study on climate change adaptation. The ACCC project mandated the provincial Meteorological Disaster Reduction Institute to conduct the risk assessment in cooperation and with strong support from the local Development and Reform Commission (DRC). Local expertise on sugar cane and mango production under extreme weather conditions were considered in the suggestions for adaptation measures.

Future water balance: The assessment of Baise's future water balance reveals a very challenging picture for its water management: even if all the water saving and water use efficiency measures are implemented, the future water scarcity still remains as it is today.

Therefore, awareness raising as well as the construction of water storage and more water efficient infrastructure are required to meet the future water demands.

Opportunities and threats to agriculture: Climate change can bring both opportunities and threats to the agricultural production: on one side, yields of sugar cane and mango can benefit from increased temperature – provided that water demand can be satisfied. On the other side, heat waves may cause crop losses (e.g. withered flowers of mango) or heavy rainfall during harvesting period may cause low sugar content and mechanical harvesting of sugar cane may become more difficult (see Figure 14).

Figure 14: Impact of climate change on sugar cane sugar content and mechanical harvesting (left) and mango yields (right, withered flowers)

Engagement and outreach

Implementation Partners	Meteorological disaster reduction institute of Guangxi Province, DRC of Baise City
Stakeholders	Bureau of natural resources, Bureau of Water Resources, Meteorological office, Bureau of Ecological Environment, local communities
Outreach	*Local*: suggestion on climate change adaptation measures, capacity building through workshop on climate change adaptation and survey on farmers and authorities. *National*: ACCC training workshops
Highlights	The project supported the project application of the key research projects of Guangxi province of 2019

Annex 2: Mapping the Drafting Process of China's 13th Five-Year Plan

The 13th FYP covers the period 2016 – 2020 and was drafted under leadership of President Xi Jinping. The National Development and Reform Commission (NDRC) is responsible for producing the draft plan and adoption of the plan by the National People's Congress of the People's Republic of China (NPC). The drafting process is time-consuming, taking approximately three years to complete and consists of 10 steps (Figure 15). The overall timeline, stages and steps are scheduled around the meetings of National People's Congress of the People's Republic of China (NPC) as the documents produced at the various steps require endorsement from the NPC.

Following the endorsement of the final draft of 13th FYP by the NPC, provincial, local and district governments, as well as ministries, government agencies and industry regulators are then expected to draft their five-year and thematic plans, within the guiding principles detailed in the national five-year plan and implement the plan over the subsequent years. It is anticipated that the national-thematic sub-plans will be released in the first year of the 13th FYP, and the follow-on implementation documents will be released in the following years.

This 13th FYP is an important one: the year 2020 marks the centennial anniversary of the founding of the Communist Party of China, and the target year set for realizing China's goal of becoming an «all-around well-off society» (*quanmian xiaokang shehui*). The concept of «well-off» (*xiaokang*) was first introduced in 1979 by Deng Xiaoping as a Chinese concept of country modernisation. The «all-around well-off society» is the next development goal for China after achieving its first goal – «well-off society» (*xiaokang shehui*).

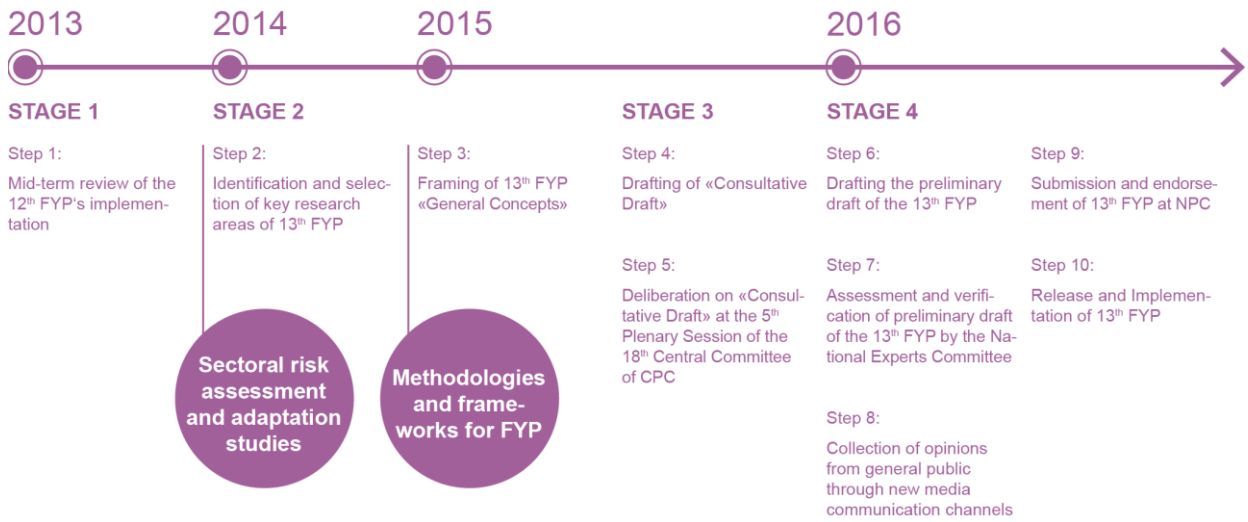


Figure 15: Process at the Central Government Level of the Drafting Process of China's 13th Five-Year Plan. (Source: Koh, F.P., Nadin, R. & Liu, J. (2016). Drafting Process of China's 13th Five-Year Plan (unpublished)).

Research for an article on the process of the 13th FYP [3] was conducted under the ACCC project. The article aims to map the complex drafting process of the 13th FYP identifying the

[3] The article was published and is available at http://www.neehao.co.uk/2016/04/mapping-the-drafting-process-of-chinas-13th-five-year-plan/.

various steps, sub-steps and timelines, as well as the key actors. This will be of particular use to those interested in the Chinese policy making processes, especially those seeking to engage in the policy implementation period between 2016 and 2020.

The ACCC project was delivered in partnership with the China's National Development and Reform Commission and was supported by the Swiss Agency for Development and Cooperation. The ACCC project worked with subnational policymakers and technical experts involved in the drafting, development and delivery of climate risk and resilience planning into provincial 5 Year Plans.

Annex 3: Publications supported by the ACCC project

Journal Publications：

Liu M , Dries L , Heijman W , et al. (2018). The impact of ecological construction programs on grassland conservation in Inner Mongolia, China [J]. Land Degradation & Development, 29(14): 326-336.

Hu Y, Huang J, Hou L. (2019). Impacts of the Grassland Ecological Compensation Policy on Household Livestock Production in China: An Empirical Study in Inner Mongolia [J]. Ecological Economics, 161: 248-256.

Liu M, Huang J, Dries L, et al. (2017). How does land tenure reform impact upon pastoral livestock production? An empirical study for Inner Mongolia, China [J]. China Economic Review

Xie Wei, Huang Jikun, et al. (2019): Climate Change Impacts on China's Agriculture: The Responses from Market and Trade, China Economic Review

Wang D, Huang J (2018). The Impact of Grassland Ecological Compensation Policy on Livelihood of Herdsman [J]. Resources Science (Chinese), 40(07):1344-1353.

Xie W, Wei W, Cui Q (2019). The Meta Literature Analysis on the Impact of Climate Change on the Main Crops in China. Chinese Population, Resources and Environment (Chinese): 79-85.

Graduation Thesis：

Liu M. (2017). China’s grassland policies and the Inner Mongolian grassland system [D]. Wageningen University.

Hu N. (2019). Impacts of the Grassland Ecological Compensation Policy on the Husbandry Industry and Grassland：Evidenced-based Research of Inner Mongolia [D]

Liao, Q., Yu, G., Jiang, W., Lu, C., Ma, Y., Liu, K., Lin, Q., Wang, Y., 2019. Research on the Risk Assessment of Qingdao Marine Disaster Based on Flooding. Sustainability 11, 468.

Annex 4: Training module on risk-based adaptation planning

ACCC | **Capacity Building on Risk-based Adaptation Planning**

Steps of Risk-based Adaptation Planning

Training Programm

The training aims at helping participants with basic understanding of climate change adaptation:

- ✓ To understand the concepts and key processes of risk-based adaptation planning
- ✓ To understand why and how to use risk-based adaptation planning

Session 1: Why we adapt

- ✓ Understanding of climate change
- ✓ Reasons for concern

Session 2: Scoping

- ✓ Identify boundaries of the system and timescale of interest
- ✓ Establish objectives and criteria for adaptation
- ✓ Identify key stakeholders and available information and evidence

Session 3: Assessing

- ✓ Assess vulnerabilities and risks
- ✓ Identify prioritized fields of action

Session 4: Options

- ✓ Explore and identify adaptation options
- ✓ Evaluate and select adaptation strategies and options

Session 5: Taking the Assessment forward and Act

- ✓ Implementation
- ✓ Monitoring and evaluation
- ✓ Linkage between the different steps

Glossary

2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

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. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

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.

Mainstreaming: The integration of climate change adaptation into related government policies in several sectors. It sometimes is also referred to as 'climate policy integration' and, therefore, adaptation would not be 'added' through dedicated policy instruments. The assumption behind mainstreaming is that a project or policy has a goal – related to for example mobility, population well-being or health care – and that the sustainability and impact of the initiative can be increased by taking into account potential climate change impacts. (Source: Climate Policy Information Hub accessed at: https://climatepolicyinfohub.eu/mainstreaming-climate-change-adaptation-eu#footnote1_ntc7r15)

Other interested parties: beyond stakeholders (see stakeholder definition below), persons or organizations (e.g. academics, NGOs and other scientific, technical, social, and political experts) whose prime interest in the adaptation planning process is related to the relevant evidence, expertise, knowledge or external influence that they can bring to the process, or whose prime interest is related to dependencies and interdependencies from outside the area of concern that could affect, be affected by, or perceive they could be affected by a decision or activity.

Resilience: The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

Risk: The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure, and hazard. In this report, the term *risk* is used primarily to refer to the risks of climate-change impacts.

Stakeholders: An individual or group influenced by - and with an ability to significantly impact (directly or indirectly) the adaptation planning process – potential to influence or to be influenced by the decisions comprising the adaptation planning process. (Source: Street, R.; Opitz-Stapleton, S. ACCC Resource Manual: Reflections on Adaptation Planning Processes and Experiences. DfID-China, Beijing, China (2013) 140 pp.)

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Water Shortage: A shortage of water supply of an acceptable quality; low levels of water supply, at a given place and a given time, relative to design supply levels. The shortage may arise from climatic factors, or other causes of insufficient water resources, a lack of,

or poorly maintained, infrastructure; or a range of other hydrological or hydro-geological factors. (Source: FAO AquaStat, http://www.fao.org/nr/water/aquastat/data/glossary/search.html)

Water Scarcity: An imbalance between supply and demand of freshwater in a specified domain (country, region, catchment, river basin, etc.) as a result of a high rate of demand compared with available supply, under prevailing institutional arrangements (including price) and infrastructural conditions. Its symptoms are: unsatisfied demand, tensions between users, competition for water, over-extraction of groundwater and insufficient flows to the natural environment. (Source: FAO AquaStat, http://www.fao.org/nr/water/aquastat/data/glossary/search.html)

References

CMA (2017), Climate Change Centre, China Meteorological Administration. The latest monitoring information on climate change in Asia and the world.

IPCC AR5 (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability.* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, Part A 1132pp, Part B 688pp.

Koh, F.P., Nadin, R. & Liu, J. (2016). Mapping the Drafting Process of China's 13th Five-Year Plan. http://www.neehao.co.uk/2016/04/mapping-the-drafting-process-of-chinas-13th-five-year-plan/

Liu, M., China Economic Review (2017), http://dx.doi.org./10.1016/j.chieco.2017.09.009

NAS (2013), China National Adaptation Strategy. Accessed at: http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/laws/1313.pdf

NCSC (2018). Studies on the international mechanism on climate change adaptation

Street, R.B., Pringle, P., Lourenco, T.C., and Nicolletti, M. (2018). Transferability of decision-support tools, Special Issue on Decision Support Tools for Climate Change Adaptation, Climatic Change 153(4), April 2018 pp 523-538.

Photo moments