Evaluation of interventions for climate change adaptation: Instruments for managing residual climate risks

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EVALUATION OF INTERVENTIONS FOR CLIMATE CHANGE ADAPTATION

Instruments for managing residual climate risks

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Climate change is causing increasingly high losses and damages, particularly in developing countries. Typically, this is a consequence of residual climate risks. 'Residual climate risks' are those climate risks that remain after risks have been reduced through mitigation and adaptation. To achieve the Sustainable Development Goals, residual climate risks need to be managed effectively. So far, only sporadic evidence is available on the effectiveness of instruments for managing these risks. Against this background, the present evaluation module report fills the knowledge and evaluation gap on the relevance and effectiveness of the instruments applied so far to manage residual climate risks. For this purpose a theory-based approach was selected that integrates qualitative and quantitative methods of analysis. The instruments considered were assigned to four instrument groups, and then analysed: third-party risk finance, risk pooling, risk preparedness and transformative risk management. Overall, the findings show that the relevance of the instruments depends strongly on their design and implementation. They also demonstrate that the benchmark of comprehensive residual climate risk management is partly met, and that German development cooperation already has a wide range of experience with implementing instruments for residual climate risk management. These prove to be effective, once the initial obstacles are overcome. Based on the findings, the evaluation makes recommendations concerning the use of instruments, needs orientation, comprehensive risk management, portfolio expansion and results orientation.

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EXECUTIVE SUMMARY

Background

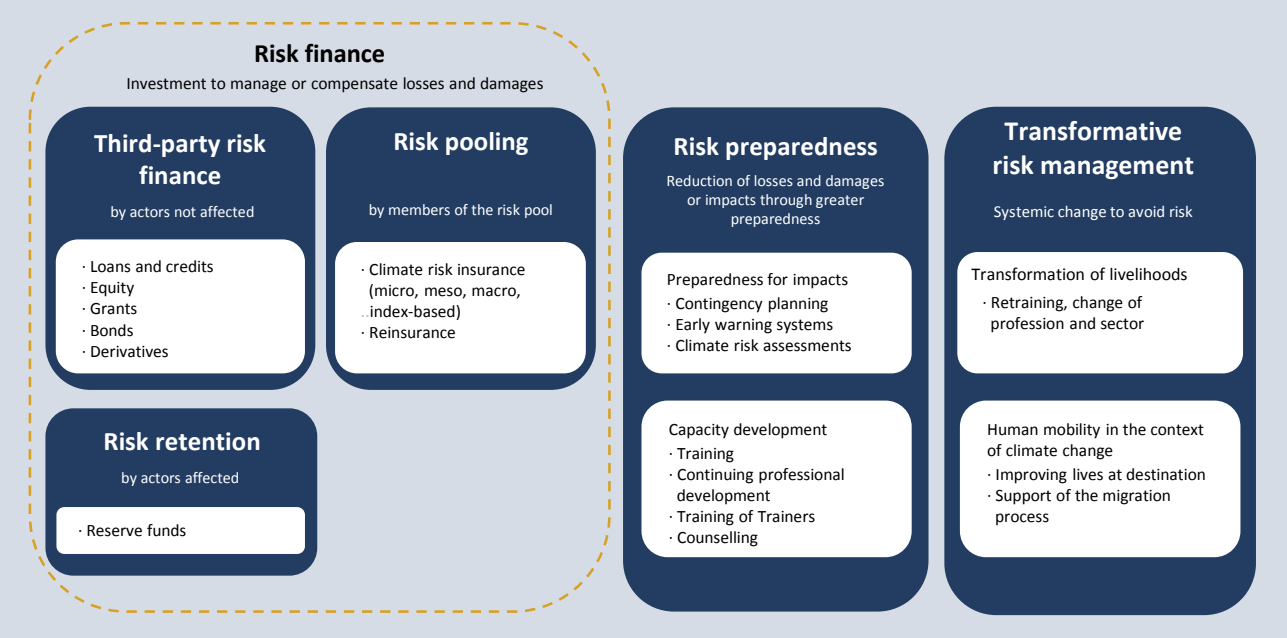
Climate change is causing increasing levels of loss and damage, particularly in developing countries. These threaten development results, especially in the poorest and most vulnerable countries such as the small island states (BMZ, 2019; UNISDR, 2018). Even after climate risks have been reduced through adaptation and mitigation, some risks remain – so-called 'residual climate risks'. Typical effects of residual climate risks are losses and damages. These can be of an economic nature and may be measurable in monetary terms, such as crop losses. Yet losses and damages are often difficult to quantify monetarily. This is the case, for example, with the loss of biodiversity, ecosystems or cultural assets. In combination with other factors, such as unsustainable land and resource use, climate change is exacerbating residual climate risks increasingly. This evaluation module focuses on residual climate risks. It is part of a DEval modular evaluation of climate change adaptation interventions.

The scientific and development communities are currently discussing the area of transition between adaptation to climate risks, and the limits to adaptation. Adaptation aims to moderate harm or exploit beneficial opportunities (IPCC, 2018a). For example, raising a dike can reduce climate-related losses and damages resulting from the rise in sea level. An intervention of this kind comes up against a limit to adaptation that is 'soft' – because it can be moved, inter alia by technological means. On the other hand, when intolerable climate risks cannot be reduced through further adaptation options, 'hard' limits to adaptation are reached. In our example, this means that new technologies can ensure that the dike is higher and safer. However, once the sea level has risen beyond a certain point, or once storm surges have reached a certain level of intensity, even if the dike is higher it will no longer be able to prevent flooding. When other flood management options also fail, and land becomes uninhabitable as a result of climate change, a hard limit to adaptation is reached.

One should also note that both 'soft' and 'hard' limits to adaptation are dynamic and context-specific. Consequently, both the scientific debate and this evaluation module use the term 'limits' in the fluid, extensional sense of an 'area of transition'. The limits to adaptation are a function of risk characteristics and effects, as well as various factors, trade-offs and barriers within the system in question. These include technological feasibility and subjective risk tolerance, but also economic, cultural, capacity-related, political and ecological factors. The limits are reached when intolerable risks can no longer be reduced, and either no further adaptation options exist, or these are not currently available to the affected system.

The theoretical discussion and knowledge of the limits to adaptation are highly relevant for the practical implementation of development cooperation. If climate risks have not yet reached the limits, they or the losses and damages caused by their occurrence can still be mitigated by risk reduction interventions. One example often used here is declining precipitation, which can be offset by sustainable agricultural irrigation systems that reduce crop losses. When climate risks do reach the limits, for instance through more frequent and more severe droughts, not even better irrigation systems and other accompanying measures can then prevent substantial crop losses. At this point, the climate risks become residual. This means that, in addition to risk reduction, additional interventions are needed to manage residual climate risks, such as monetary compensation for crop losses.

The instruments implemented in interventions to manage residual climate risks can be assigned to specific instrument groups based on a categorisation by Lal et al. (2012): risk finance, risk preparedness and transformative risk management. To better differentiate and reflect the breadth of the instrument group 'risk finance', this group can be further broken down into the subcategories 'third-party risk finance', 'risk pooling' and 'risk retention'.



Source: DEval, authors' own graphic, based on Lal et al. (2012)

Adopting this categorisation, and based on Germany's development cooperation portfolio, this evaluation module focuses on the following groups of instruments for managing residual climate risks:

- **Third-party risk finance:** This group includes instruments for emergency financing and financing of losses and damages such as loans, grants and equity (in some cases through funds) and bonds. Third-party risk finance involves third parties compensating losses and damages and providing finance for them. It also includes supporting these parties in providing and accessing financing instruments for managing residual climate risks. One example is the financing of technology companies, insurance companies and microfinance institutions along the value chain of climate risk insurance (CRI) through the InsuResilience Investment Fund (IIF). In the case of the IIF, financing through credits and equity supports the companies' activities to develop and expand CRI.
- **Risk pooling:** This group includes the instrument of climate risk insurance, including its reinsurance. Climate risk pooling aims to transfer risks to international, regional or national risk pools. In risk pooling, the units of the risk pool (usually all the insured parties) transfer the risks to the joint risk pool. These units, which are located at the national, local or individual level, are usually exposed to the risk themselves. One example is the development of CRI for poor and at-risk households, and micro, small and medium-sized enterprises (MSMEs). The CRI enables them to pool their losses from climate risks such as storms and floods, in cooperation with private insurance companies. This is found in the intervention Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III (RFPI III), which is included in the evaluation.
- **Risk preparedness:** This group includes tools for developing capacity to manage residual risks and deal with losses and damages. It also includes strategies for proactively and reactively managing climate-related natural disasters. These include contingency planning, early warning systems, evacuation, and preparedness for reconstruction and recovery. One example is the integration of residual climate risks into State Action Plans on Climate Change (SAPCCs) to increase response capacity for climate-related natural disasters. This is found in the intervention Climate Change Adaptation in Rural Areas of India (CCA-RAI), which is included in the evaluation.

- **Transformative risk management:** This group involves instruments designed to remove target groups from risk by facilitating systemic change. These include instruments for managing human mobility in the context of climate change, and for livelihood transformation. One example is improving the lives of climate migrants at their destination, as seen in the intervention Urban Management of Internal Migration due to Climate Change (UMIMCC), which is included in the evaluation.

In German development cooperation, the international frameworks form the basis for orienting the portfolio of instruments for residual climate risk management discussed here. These include the Paris Agreement, the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM), the 2030 Agenda for Sustainable Development adopted by the United Nations (UN) and the Sendai Framework for Disaster Risk Reduction. When dealing with disaster- and climate-related risks, German development cooperation pursues a comprehensive risk management approach. This also includes managing residual climate risks and non-climate-change-related hazards.

However, DEval's portfolio and allocation analysis clearly showed that German development cooperation still lacks a comprehensive strategy for climate change and adaptation (Noltze and Rauschenbach, 2019). The BMZ's climate policy priorities currently remain embedded in a large number of sectoral and regional strategies. As part of the 'BMZ 2030' reform process, which aims to make German development cooperation more effective and efficient, the core area strategy 'Responsibility for our Planet – Climate and Energy' was recently published (BMZ, 2021). This also includes the area of adaptation to climate change. However, this is no substitute for a fully-fledged and ideally interministerial adaptation strategy.

The existing strategies make barely any explicit reference to managing residual climate risks. Nevertheless, German development cooperation is committed to the comprehensive risk management approach, which has implications for the design and implementation of relevant instruments (BMZ, 2019). It has increasingly addressed residual climate risks over the past decade, using several of the instruments mentioned above. In practice, development cooperation interventions to address residual climate risks often comprise several instruments – both from the same instrument group and from different instrument groups. For example, the IIF included in the evaluation implements third-party risk finance by providing credits and equity through an investment fund. At the same time it supports risk pooling by financing companies in the CRI value chain.

The topic has also gained in importance globally. This module identified a total of 46 German development cooperation interventions that implemented instruments for managing residual climate risks. Some of these implemented several instruments. Eleven of these instruments can be assigned to third-party risk finance, 32 to risk pooling, 27 to risk preparedness and seven to transformative risk management. However, it is not possible to distinguish unequivocally the German portfolio of interventions and individual instruments for managing residual climate risks. This is because the limits to adaptation fall within a fluid area of transition that is not shown separately in the reporting on the interventions.

As was also made clear in the DEval portfolio and allocation analysis, German development cooperation as a whole is increasingly focusing on the introduction and expansion of climate risk insurance as an important instrument in the adaptation portfolio (Noltze and Rauschenbach, 2019). Between 2011 and 2017, funding commitments for this risk pooling instrument amounted to some 623 million euros (Noltze and Rauschenbach, 2019). The BMZ also sees risk preparedness and transformative risk management as further important instruments (BMZ, 2019). Compared to insurance-based approaches, instruments for transformative risk management, for example to manage human mobility in the context of climate change, have so far only been implemented sporadically by German development cooperation. As the evidence of existential and irreversible climate impacts has increased, transformative risk management has become more of a focus for the scientific and development communities. To manage residual climate risks appropriately and effectively, long-term sustainable approaches to transformative risk management are needed. These are also required in order to operationalise transformation as an option for political decision-making and action. Synergies with the broader development cooperation portfolio and the overarching BMZ prioritisation of displacement and migration can support the development of sustainable and effective approaches for transformative risk management.

Residual climate risks have only been a prominent topic at the international level since 2007. Consequently, they remain a relatively new issue for German and international development cooperation. At present, only isolated evaluations are available that can be used to further develop the instruments and the portfolio. Also, due to very demanding methodological challenges, only few comprehensive scientific studies have become available so far. It is therefore highly important to generate more evidence on instruments for managing residual climate risks. This report aims to help fill the knowledge and evaluation gap on the relevance, effectiveness and impact of the instruments applied so far to manage residual climate risks. In so doing it will contribute to evidence-based decision-making and further strategic development of the German portfolio.

Object, purpose and objectives of the evaluation

The object of this module (module 3) is instruments for managing residual climate risks in German development cooperation, looked at systematically in line with the aforementioned instrument groups. The Federal Ministry for Economic Cooperation and Development (BMZ) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) are largely responsible for the use of instruments within these instrument groups. The instruments are implemented through Germany's official implementing organisations, which in this case means primarily the KfW Development Bank (KfW) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The purpose of this module, and of the evaluation as a whole, is to support the further strategic development of the climate change adaptation portfolio. Doing so is important, as this is one of the core areas for German and international development cooperation.

Due to the major importance of residual climate risks in the current international debate, this module – module 3 – was brought forward in DEval's overall evaluation on climate change adaptation, and completed before module 2. The modular structure of the evaluation as a whole is described below.

- **Module 1:** A portfolio and allocation analysis has already been published (Noltze and Rauschenbach, 2019). This addresses issues of the relevance and coherence of the adaptation portfolio at the overarching, strategic level. Issues of complementarity were also included when analysing relevance.
- **Module 2:** This evaluation module focuses on the effectiveness, impact and sustainability of adaptation interventions for risk reduction. It aims to support processes and structures in key sectors of German development cooperation that are relevant to adaptation.
- **Module 3:** The present module examines the relevance and effectiveness as well as the (potential) impact of instruments for managing residual climate risk.
- **Synthesis:** To conclude, a synthesis report will synthesise the findings, conclusions and recommendations of modules 1 to 3, and identify overarching conclusions and recommendations.

The aim of this module is to assess the relevance, effectiveness and impact of the instruments used by German development cooperation to manage residual climate risks. For this purpose, the evaluation uses the OECD-DAC[1] evaluation criteria 'relevance', 'effectiveness' and 'impact':

- The criterion 'relevance' encompasses the development needs of the target groups[2], and the policies and priorities of the development partners and the German Federal Government.
- The criteria 'effectiveness' and 'impact' involve measuring the outcomes and (potential) impacts of the instruments considered in the module.

1 OECD: Organisation for Economic Co-operation and Development, DAC: Development Assistance Committee.
2 Referred to by OECD DAC as beneficiaries' or users' requirements and needs.

As part of the evaluation as a whole, this module on managing residual climate risks focuses on the above-mentioned OECD-DAC evaluation criteria. Some of the instruments for residual climate risk management looked at were at early stages of implementation. In these cases it is only possible to assess their potential impacts. This is also the reason why the evaluation module decided not to look at the criterion 'sustainability' separately.

This module evaluates development cooperation instruments. These instruments unfold their strengths for managing residual climate risks comprehensively particularly when different instrument groups are interlinked, when different instruments in the same instrument group are combined, and when the instruments are seen as complementary due to their different features. Since many instruments were at an early stage of implementation, which already posed challenges for impact analysis, the efficiency of some instruments groups was not a focus of the evaluation and was not examined in this module. On the other hand, the module does include aspects of the new 'coherence' criterion now added to the OECD-DAC criteria. This is the case particularly when evaluating the instrument groups for comprehensive management of residual climate risks in evaluation question (EQ) 2.

Residual climate risks are a relatively new area of development cooperation, and the implementation of some of the instruments began only recently. Consequently, this module aims to generate learning areas, insights and recommendations for future interventions and for portfolio development. All aspects of the module naturally also serve to provide accountability for German development cooperation.

Through the analysis and assessment it contains, this report helps to provide more evidence on the relevance, effectiveness and impact of instruments for managing residual climate risks. The overarching evaluation question (EQ) of the module is:

How, and to what extent, do Germany's development cooperation instruments contribute to managing the impacts of residual climate risks?

The overarching question is comprised of the following three specific questions:

EQ1	To what extent are German development cooperation's instruments for managing residual climate risk relevant to partner countries and target groups?
EQ2	To what extent do German development cooperation's instruments manage residual climate risks comprehensively?
EQ3	How, and to what extent, are instruments for managing residual climate risks effective (in terms of their outcomes) and impactful?[3]

Methodology

The methodological approach and the selection of case studies are derived from the evaluation's focus of interest. This methodological design therefore has a formative focus, but also includes summative elements, for instance in the assessment of (potential) outcomes and impacts.

The evaluation followed a theory-based approach, applying a contribution analysis (Mayne, 2008). This means that comprehensive Theories of Change (ToCs) were reconstructed and verified on the basis of scientific literature, project documentation and empirical data. By identifying detailed impact pathways, the module is able to draw sufficiently robust conclusions on the contribution made by the interventions to the causal relationships and assess the effectiveness and impact of the instruments. The data collected along the impact pathways were systematically analysed, and triangulated by applying various methods and analyses

[3] The measurement of effectiveness revolves around the outcomes of an instrument. According to the OECD, outcomes are defined as 'the likely or achieved short-term and medium-term effects of an intervention's outputs' (OECD, 2009, p. 28). In other words, they are defined as products, capital goods and services that result directly from a development intervention. The impact is measured at the impact level. Impacts are defined as 'positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended' (OECD, 2009, p. 24).

(method integration). This enabled the team to obtain general findings in relation to the evaluation questions, and assess the relevance of the instrument groups, how they work, and their (potential) outcomes and impact. This approach allows the analysis to then help generate conclusions and recommendations that are transferable to similar instruments in the same area, or beyond it.

To answer the evaluation questions, the team first of all analysed the German development cooperation portfolio. In a next step, based on processes and criteria eight case studies were selected that covered the four instrument groups: 'third-party risk finance' (RF), 'risk pooling' (RPo), 'risk preparedness' (RPr) and 'transformative risk management' (TRM):

Case studies	RF	RPo	RPr	TRM
Strategic Alliance GIZ and Allianz, Advancing Climate Risk Insurance+, Private Sector Adaptation to Climate Change (SAGA)		x	x	
Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III (RFPI III)		x		
African Risk Capacity (ARC)	x	x	x	
Projet Adaptation des chaînes de valeur agricoles au changement climatique (PrAda)		x	x	
InsuResilience Investment Fund (IIF) (including sub-case studies of two investees)	x	x		
Climate Change Adaptation in Rural Areas of India (CCA-RAI)	x		x	
Urban Management of Internal Migration due to Climate Change (UMIMCC)				x
Human Mobility in the Context of Climate Change (HMCCC)				x

Key: RF = third-party risk finance, RPo = risk pooling, RPr = risk preparedness, TRM = transformative risk management. Source: DEval, authors' own graphic

In the case studies, qualitative and quantitative data collection methods were used, and subsequently integrated in the analysis. Qualitative data collection methods such as ToC workshops and semi-structured interviews were used. Here, various actors such as implementing organisations, policy-makers, beneficiaries and experts were interviewed. As part of the RFPI III case study, a quantitative standardised survey of households, micro-enterprises and other actors was also conducted in the Philippines. The primary data collected were complemented with secondary data from the scientific literature, strategy documents and project documentation, or secondary data from databases. In the Strategic Alliance GIZ and Allianz (SAGA) case study, flood modelling was also undertaken using meteorological and geographical data to determine the relevance of the risk pooling instrument. A literature review on human mobility in the context of climate change was conducted in order to investigate transformative risk management.

The totality of the data was used to answer the evaluation questions for each instrument group. Based on corresponding documents of the OECD and the BMZ, the guiding questions of the DEval guideline on the OECD-DAC criteria were applied. From each guiding question a benchmark was derived that enables the finding to be rated (see Annex 7.5 and the beginning of each section of the findings chapter). The benchmark indicates the conditions under which the evaluation team consider a development intervention to be appropriate and successful. The findings for each instrument group are then assessed using the DEval evaluation rating scale:

Category	Explanation
Over achieved	The intervention clearly exceeds the benchmark for the evaluation criterion applied.
Achieved	The intervention meets the benchmark for the evaluation criterion applied.
Largely achieved	The intervention largely meets the benchmark for the evaluation criterion applied.
Partly achieved	The intervention partly meets the benchmark for the evaluation criterion applied.
Barely achieved	The intervention barely meets the benchmark for the evaluation criterion applied.
Not achieved	The intervention does not meet the benchmark for the evaluation criterion applied.

These ratings formed the basis for the general discussion on the conclusions to be drawn for German development cooperation.

Finally, based on these conclusions the team drew up recommendations for German development cooperation actors on managing residual climate risks.

The table below provides an overview of the volume and nature of the interventions:

Case study abbreviation		Term	Volume (in EUR million)	Commissioned by, IO	FC/TC	Scale	Location of case study considered
SAGA	SAGA	2015–2019	5.3	BMZ, GIZ	TC	global	Morocco
	ACRI+			BMU-ICI, GIZ	TC	global	
	PSACC			BMZ, GIZ	TC	global	
RFPI III		2019-2022	2.0	BMZ, GIZ	TC	regional	Philippines
ARC		2014-2034	92.2	BMZ, KfW	FC	regional	multi-country
PrAda		2017-2022	17.5	BMZ, GIZ	TC	bilateral	Madagascar
IIF		2013–2029*	74.8	BMZ, KfW	FC	global	multi-country, 2 investees
CCA-RAI		2015-2019	17.6 (IGEP-RA)	BMZ, GIZ	TC	bilateral	India
UMIMCC		2015-2022	20.0	BMZ, GIZ	TC	bilateral	Bangladesh
HMCCC		2017-2020	4.0	BMZ, GIZ	TC	global	Philippines

*Key: IO = implementing organisation, TC = Technical Cooperation, FC = Financial Cooperation, * until 2017 known as the Climate Insurance Fund*

The methodological approach is subject to some unavoidable limitations. The way interventions are currently coded, and the lack of information collection and reporting, made it difficult to reconstruct Germany's development cooperation portfolio for residual climate risk management for all stakeholders. This made case selection more difficult. Some of the instruments included are at an early stage of implementation. In many instances, this means that as far as measuring outcomes and impacts is concerned, only potential outcomes and impacts can be studied. For the theory-based method of contribution analysis, mainly qualitative data were used. This enabled the team to work out how the instruments work, and to estimate both the contribution of German development cooperation and the (potential) outcomes and impacts. However, it was not possible to triangulate this with quantitative analyses in order to corroborate the qualitative results. Last but not least, the COVID-19 pandemic limited possible follow-up data collection. It will also significantly affect the future development and further implementation of the interventions considered.

Findings, conclusions and recommendations

The findings, conclusions and recommendations are presented below for each evaluation question and OECD-DAC criterion. The findings are assessed in relation to benchmarks derived from the guiding questions for the OECD-DAC criteria. For each evaluation question, the relevant benchmarks are presented at the beginning of the discussion. They are presented in the order indicated for the four instrument groups (third-party risk finance, risk pooling, risk preparedness and transformative risk management). The conclusions and recommendations apply to all the instruments.

Relevance to partner countries and target groups (EQ1)

The benchmarks for rating the findings on the relevance of the considered instruments and the instrument groups as a whole (which are derived from the guiding questions) are:

- The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.
- The objectives of the interventions align with the needs of the target groups and the objectives of the partners.

Different ratings arise for the benchmarks regarding the two guiding questions on the relevance of the three **third-party risk finance** instruments considered in the ARC (African Risk Capacity), IIF and CCA-RAI case studies. The ARC and IIF meet the benchmark for alignment with relevant strategies and agendas by providing increased financing and global/regional outreach to finance residual climate risk management. The IIF's mobilisation of private capital and private sector support also meet the benchmark for alignment with international agendas in order to achieve the Sustainable Development Goals (SDGs) and the goals of the Paris Agreement. The approach of implementation by national or local institutions of countries – in line with their agendas – is reflected in the case of ARC and CCA-RAI through a high level of alignment with national targets and meeting the benchmark. Only the IIF risk finance intervention is not designed to align with partner agendas, due to its private sector approach. Depending on the individual investee, the intervention is barely relevant as its activities are separate from those of the partner country. Hence it is unable to meet this benchmark. Furthermore, the IIF can only influence the benchmark of alignment with the needs of the final beneficiaries indirectly, because it finances private sector actors. Depending on the objectives of the individual investee, the instrument is thus only partially relevant to the final beneficiaries. Third-party risk finance is complemented by elements of capacity development in all three case studies. These play a key role in making the finance more relevant by improving knowledge on residual climate risks, CRI, contingency planning or administrative processes.

The objectives of the **risk pooling** cases considered in the SAGA, RFPI III, ARC, PrAda and IIF case studies meet the benchmark of alignment with relevant international agendas. The benchmark of alignment with national strategies of partner countries is also largely met, although risk pooling through climate risk insurance is not always the top priority instrument for partner country actors. Alignment with the development needs of the target groups varies widely; the rating here ranges between met and not met. This is due to the different contextual conditions surrounding the case studies, and the heterogeneity of the target groups. Some of the risk pooling instruments considered target actors in selected value chains such as agriculture (PrAda). Others do not focus on any specific sector, but on MSMEs in the respective region (SAGA and RFPI III) or on the poorest households and those at risk (RFPI III).

Through various investees, the IIF is able to support the promotion of CRI for very different target groups, such as small and medium-sized enterprises or agricultural borrowers. In the case of ARC, CRI is offered at the macro level for countries (regional risk pool) together with Technical Assistance (TA) for disaster preparedness and disaster risk management. These context-specific approaches can meet the benchmark of alignment with the development needs of target groups. At the same time, this benchmark could only be fully met in one case (RFPI III). Here, the target groups also rated risk pooling through CRI as their preferred instrument for managing residual climate risks. In other case studies, other instruments were seen as priorities. Many target groups prefer instruments such as risk preparedness or third-party risk finance, but also risk reduction instruments. In order to reach these target groups through risk pooling, complementary instruments are required such as incentives for risk reduction interventions, premium subsidies or other third-party risk finance interventions. Coverage by social security systems would be a further option.

All in all, German development cooperation thus has a broad repertoire of instruments at its disposal for achieving a high degree of context-specific relevance through risk pooling. However, the case studies examined show that the relevance of the instruments is often rated as low by the target groups. Hence the benchmark of alignment with the development needs of the target groups is only partially met.

The four **risk preparedness** instruments considered in the CCA-RAI, SAGA, ARC and PrAda case studies meet the benchmark of alignment with international agendas in support of the 2030 Agenda and the UNFCCC. In the case of CCA-RAI, PrAda and ARC, explicit relevant contributions are made to SDG 13 (Climate Action), particularly in terms of capacity building for climate change-related disasters. Furthermore, CCA-RAI and PrAda make relevant contributions in line with the Nationally Determined Contributions (NDCs) arising from the Paris Agreement. ARC is particularly relevant to Article 8 of the Paris Agreement (on loss and damage) and the WIM. One example of this is the support of early warning systems based on risk modelling using Africa RiskView software. Risk preparedness achieved through CCA-RAI and ARC meets the benchmark of alignment with the relevant priorities of partner countries. The risk preparedness instruments considered largely meet the benchmark of alignment with the development needs of the target groups. CCA-RAI largely meets the needs of stakeholders in terms of capacity development, planning and coordination for risk preparedness. As neither civil society nor the private sector were sufficiently involved in the piloting and implementation of risk preparedness instruments, the development needs of the target groups in this regard are only partially met. The need to replicate and scale up the implemented pilots more effectively is not met. In the CCA-RAI, PrAda and ARC case studies, the needs of the target groups in the field of action 'data and analyses' are partially met. In the CCA-RAI case study, for example, there are gaps in the target group-oriented preparation and communication of climate risk assessments for policy-makers.

The two considered **transformative risk management** instruments for managing human mobility in the context of climate change (UMIMCC and HMCCC) meet the benchmark of alignment with international agendas, and partner country strategies, priorities and agendas. Mobility issues play an important role in these. The benchmark of alignment with the development needs of the target groups, as part of the 'relevance' criterion, is largely met, but at different levels. For example, the intervention to improve living conditions in Bangladesh (UMIMCC) is largely relevant to climate migrants, while in the case of the intervention to increase knowledge in the Philippines (HMCCC) this applies largely to government organisations. Climate migrants in the Philippines benefit indirectly from government organisations being better able to manage climate mobility. The benchmark of relevance to local civil society is partially met by the interventions, as civil society is only partially involved in planning and implementing them. Both interventions (UMIMCC and HMCCC) meet the benchmark of alignment with Germany's strategies and agendas.

Overall, the **findings on the instrument groups for evaluation question 1** show that the ratings of the instruments' relevance vary widely. The instrument groups meet the benchmark of alignment with global agendas and Germany's strategies and agendas. While the benchmark of relevance to partner countries is met for the instruments of risk preparedness and transformative risk management, this also applies largely to risk pooling, even though risk pooling is often not a top-priority instrument. For the instruments of third-party risk finance, the findings are mixed. While the benchmark of alignment with partner country priorities is met for ARC, it is barely met for IIF due to the private-sector-based approach. The ratings for relevance to target groups vary widely: With risk preparedness and transformative risk management, the benchmark is largely met. For third-party risk finance, however, it is only partially met, and in the case of risk pooling ratings fall between achieved and not achieved.

The four instrument groups thus largely meet the benchmark of relevance. Challenges do exist in some cases, however. This is so particularly as regards alignment with the priorities of the partner countries and the needs and capacities of the target groups. This results firstly from the early commitment to climate risk insurance (risk pooling). The second reason is the sometimes insufficient combination with other instruments, especially those of risk preparedness and risk finance. One consequence can be the neglect of target-group-specific needs and local contextual factors. In the case of third-party risk finance, the challenge of aligning with the needs of the final beneficiaries and – in the case of investment funds – also partner-country priorities, became particularly apparent. These findings underline the importance of comprehensive risk management approaches. Relevance thus also depends heavily on the combined implementation of other instruments.

The investigation shows that climate risk assessments are not always carried out, and when they are, they are not always performed systematically. In some cases, they remain incomplete or have little effect on instrument use and implementation. However, climate risk assessments are an important basis for selecting relevant instruments to manage residual climate risks. This is because they provide basic information on climate risks (hazards, exposure and vulnerability) in the partner country concerned. In three case studies, the relevance of the applied risk pooling instrument was called into question. Coordination of the analyses with partners and other development cooperation actors was only partial. Furthermore, the results of climate risk assessments were not always prepared in a way that was appropriate for the target group, nor were they made available to local stakeholders and policy-makers. Moreover, the findings show that there is still little systematic discussion of the limits to adaptation in the interventions considered.

Based on the findings for evaluation question 1, the evaluation module makes the following recommendations:

Recommendation 1

The BMZ should work to ensure that GIZ and KfW align the use of instruments more systematically with climate risks (hazards, exposure and vulnerability), taking the limits to adaptation into account.

Implementation guidance for recommendation 1:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Carry out climate risk assessments in all cases and in a coordinated manner, with the participation of partners, local stakeholders and other development cooperation actors; also integrate their results into programming and implementation to a greater extent. (BMZ, GIZ, KfW)
- In future programming and portfolio management, take into account the limits to adaptation in needs-based climate risk assessments, so that these have a stronger effect on the choice and combination of instruments for residual climate risk management. (BMZ)

Recommendation 2

The GIZ and KfW should align risk finance instruments (risk pooling and third-party risk finance) more closely with the priorities of the partner countries, and the needs of target groups that are relevant for achieving development objectives.

Implementation guidance for recommendation 2:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Design and introduce climate risk insurance in a more target group-oriented and context-specific manner. (GIZ, KfW)
- When a new investment fund is set up, place greater emphasis on the target group's development needs, and coordination with the partner's climate risk management approaches. This applies to both the selection of investees, and the products offered. (KfW)
- When designing and proposing interventions, give greater consideration to (i) possible regional approaches to risk finance instruments (third-party risk finance and risk pooling), and (ii) managing the instrument through the partners (e.g. through NDCs and NAPs) in order to better integrate it into country-specific risk management approaches. (GIZ, KfW)

Relevance and effectiveness for comprehensive residual climate risk management (EQ2)

The benchmarks for assessing the relevance and effectiveness of the considered instruments and instrument groups for comprehensive residual climate risk management were derived from the guiding questions. They are defined as follows:

- The interventions are relevant to comprehensive residual climate risk management (including coverage of relevant residual climate risks, conduct of climate risk assessments and comprehensive coverage of climate risks).
- The interventions are effective for comprehensive residual climate risk management (including integration into overall climate risk management, and combination with other interventions).

The considered instruments for **third-party risk finance** (ARC, IIF and CCA-RAI) partially meet the benchmark of relevance for comprehensive residual climate risk management. In some cases, aspects of risk preparedness are not sufficiently integrated, only few climate risks are covered or climate risk assessments are not used comprehensively. Two case studies (IIF and ARC) show that risk finance instruments can be well combined with risk pooling instruments. In the case of ARC, this link is provided by international equity participation (as financing for the insurance company) and the regional risk pool it supports (for payouts in case of claims). In the case of the IIF, this link is created by providing funding for risk pooling instruments, including premium subsidies. In one case study (CCA-RAI), project proposals in (residual) climate risk management are supported through the State Action Plans on Climate Change (SAPCCs), and thus the NDCs. This enables access to national and international funds. The three risk financing instruments considered (case studies ARC, IIF, CCA-RAI) meet the benchmark for effectively covering relevant climate risks of the target groups and final beneficiaries (with the limitations mentioned). Overall, the IIF and ARC play an important role in the interplay of global approaches to comprehensive residual climate risk management. However, coordination of third-party risk finance instruments with other actors in the regional, national or local setting takes place only to a limited extent in the case studies considered. This mainly concerns coherence and coordination with other donors. Overall, it is clear that all the risk finance instruments considered can be improved with regard to comprehensive risk management.

The **risk pooling** instruments in the SAGA, RFPI III, ARC, PrAda and IIF case studies are partially relevant for comprehensive residual climate risk management. For a conclusive assessment of relevance, in some cases (e.g. SAGA and RFPI III) the figures for insurance coverage and level are still unavailable at present. In some cases, the focus of insurance providers has led to relevant weather and climate risks being only partially

covered. For example, drought risk was not included in RFPI III. Coordination with the climate risk management activities of partners and other donors can be considered partially met. Overall, both within an intervention and in coordination with other actors (partner countries, donors), more comprehensive approaches to climate risk management are not included to a sufficient extent in some cases.

Concerning **risk preparedness** two instruments (CCA-RAI and ARC case studies) are largely relevant and effective for comprehensive residual climate risk management. This is mainly achieved by combining several impact pathways of the instrument group.[4] While CCA-RAI supports all impact pathways of risk preparedness, ARC addresses three. In the case of CCA-RAI, however, the instrument's relevance to comprehensive residual climate risk management for the different impact pathways needs to be assessed in a differentiated manner. While planning is already comprehensive, empirical findings indicate that the piloted implementation would first need to be scaled up and replicated in order to sufficiently cover relevant residual climate risks. CCA-RAI risk preparedness is also combined with risk finance, which contributes to comprehensive management of residual climate risks. ARC also combines risk preparedness with risk pooling and risk finance. This too contributes to comprehensive residual climate risk management, because more target groups can be reached and relevant climate risks can be covered. Moreover, losses and damages can be reduced.

The considered **transformative risk management** instruments for managing human mobility in the context of climate change (UMIMCC and HMCCC case studies) cover two of five relevant fields of action (climatic factors and vulnerabilities at the place of origin, migration process, improvements at the destination, links between place of origin and destination, context). The activities in the HMCCC case to generate applied knowledge on 'human mobility in the context of climate change' are largely confined to field of action 5 ('context'). By contrast, the UMIMCC case largely relates to field of action 3 ('improvements at the destination'). The way the relevant fields of action are conceptualised, neither instrument is comprehensive and neither constitutes an integrated approach. If the fields of action for climate mobility were to be conceptualised more comprehensively and integrated, human mobility in the context of climate change could be better managed and expanded as a transformative approach. Synergies from combination with other groups of instruments for residual climate risk management, and combination with risk reduction interventions, could support the development of sustainable approaches to transformative risk management and human mobility in the context of climate change. Lessons learned from development cooperation interventions addressing migration more generally may be helpful here. However, their suitability for the specific case of human mobility in the context of climate change would need to be examined, and the lessons learned adapted. As interest in transformative approaches is growing among partner countries as well as bilateral and multilateral donors, options are emerging for a coordinated and coherent approach, and corresponding interventions.

Overall, the **findings for evaluation question 2** show that the instrument groups partially meet the benchmark for comprehensive residual climate risk management. The breadth (coverage of relevant target groups), the level (reduction of losses and damages/impacts of climate risks, or of management/ compensation of losses and damages) and the depth (coverage of relevant climate risks) are examined. In this respect, the instrument group 'third-party risk finance' is partially effective: While relevant climate risks are effectively covered (with some limitations), there is room for improvement regarding coordination with other actors and combination with the instrument groups 'risk pooling' and 'risk preparedness', with a view to more comprehensive residual climate risk management. For the most part, the risk preparedness instruments are largely relevant and effective for comprehensive residual climate risk management. Scaling up implementation could also increase effectiveness. Risk preparedness benefits from a combination of instruments, including with instruments from other instrument groups. With risk pooling, there is still potential for expansion in terms of the coverage of relevant climate risks and the relevant target groups. In terms of comprehensive risk management, risk pooling is therefore only partially effective. Transformative risk management instruments currently only partially meet the benchmark for comprehensive climate risk management, as they do not yet constitute integrated approaches. This means that the potential of all

[4] The impact pathways for the instrument group 'risk preparedness' are 'capacity development', 'piloting and implementation', 'planning and coordination' and 'data and analyses'.

instrument groups is not yet being used exhaustively. Therefore, the relevance and effectiveness of the instruments for comprehensive risk management can be further increased.

The findings also clearly demonstrate that the strength of the approaches results primarily from the combination and interlinking of groups of instruments. They also show that these opportunities are not yet being used exhaustively in order to achieve comprehensive risk management. German development cooperation's approach to comprehensive risk management can also be enhanced in this respect. Above all, in the case of risk pooling instruments at the micro level, opportunities to freely choose instruments or combine them with third-party risk finance and risk preparedness instruments are not yet being used exhaustively. Furthermore, the findings show that there is some scope for further risk-reducing interventions in risk pooling instruments. Incentives for further investment in risk reduction interventions implemented by target groups or stakeholders could play a greater role.

The German development cooperation instruments for transformative risk management examined in the module do address relevant areas. However, they could be focused more on integrated and sustainable long-term solutions for human mobility in the context of climate change. German development cooperation's long-standing experience in the field of 'migration' is to some extent transferable to the climate context. This can be helpful in developing sustainable approaches to human mobility in the context of climate change.

Based on the findings for evaluation question 2, the evaluation module makes the following recommendations:

Recommendation 3

The BMZ should further develop its existing approach to comprehensive risk management in order to achieve a stronger results orientation in the selection and combination of instruments. Building on this, the GIZ and KfW should operationalise this approach in the design and implementation of interventions.

Implementation guidance for recommendation 3:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Create a strategic guiding framework for the selection and combination of the instrument groups 'risk pooling', 'third-party risk finance', 'risk preparedness' and 'transformative risk management' for programming and implementation. (BMZ)
- In risk finance interventions (risk pooling and third-party risk finance), increase incentives for actors and target groups to invest further in risk reduction through adaptation. (GIZ, KfW)
- Intensify cooperation and coordination of interventions with partner countries and other development cooperation actors, in order to achieve comprehensive risk management. (BMZ)

Recommendation 4

The BMZ should expand its portfolio for managing human mobility in the context of climate change as an important component of transformative risk management. It should also harness possible synergies with its migration portfolio. In light of current forecasts for climate risks, approaches to human mobility in the context of climate change that are sustainable in the long term should be (further) developed. To this end, approaches from migration interventions with a specific focus on climate change as a cause of mobility and migration can be used and further developed.

Effectiveness and impact of the instruments (EQ3)

The benchmarks for assessing the effectiveness and impact of the considered instruments and the instrument groups as a whole (which are derived from the guiding questions) are:

- The interventions achieve their objectives at outcome level.
- The intervention makes a clear contribution towards the achievement of objectives at outcome level.
- Wider impacts of the interventions can be identified and/or foreseen.
- The intervention makes a clear contribution towards the identifiable/foreseeable impacts.

The three **third-party risk finance instruments** considered in the ARC, IIF and CCA-RAI case studies do show positive results at the output level, but only partially meet the benchmark of achieving the objective at the outcome level. For example, the IIF's finance reaches a large number of actors who are further expanding the CRI sector in developing and emerging countries. It also raises the profile of climate risk insurance at the international level, and can thus promote its funding, implementation and further development. The ARC is also already able to achieve some outcomes thanks to a growing number of participating countries and an active process of further development. As well as having undergone the capacity development process and participating in the risk pool, nine countries have also been able to benefit from ARC payments totalling 64 million US dollars. As of September 2020, the IIF has been able to use its funding to support 21 investees in developing or scaling up CRI, reaching 25 million beneficiaries with the products. However, it falls short of its original target of 104 million beneficiaries receiving an improved product or coverage. Due to lack of prioritisation of the topic by the Indian federal states, and by the funds, only a few interventions involving residual climate risk management are funded under CCA-RAI. The benchmark of effectiveness at outcome level is thus partially met.

With regard to the general objectives, all third-party risk finance interventions overall have to some extent developed more slowly than expected. Thus outcomes have occurred, but not yet to the extent planned. Information on the impact of the finance at the level of the final beneficiaries is not yet available in the form of rigorous evidence, and can only be outlined qualitatively. The current estimate of direct and indirect beneficiaries reached by the IIF is of limited value in assessing the actual effectiveness and impact of the instrument. Investee reporting requirements do not extend to the impact for final beneficiaries. No impact evaluations are available for ARC yet either. Thus, although there is the potential to achieve impacts such as safeguarding the population against drought risks, there is not yet sufficient evidence for a conclusive evaluation.

Due to their early implementation status, the **risk pooling** instruments in the SAGA, RFPI III, PrAda and IIF case studies can be examined mainly for *potential* outcomes and impacts. Differences arise due to the heterogeneous target groups. For example, insured parties with higher incomes seem to be better reached by CRI. The interventions considered show that various factors can inhibit the effectiveness of CRI, such as lack of acceptance of the insurance by potential policyholders. It is important that risks are covered which are relevant to the target groups. Policyholders also need to know what triggers payments and what consumer protection measures are in place. The target groups' ability to pay is also an important factor in their decision to sign up with an insurance company. In some contexts, a lack of insurance culture makes it very difficult to reach target groups. For example, if the population is unfamiliar with the principle of insurance, where a fixed premium is paid but no payout is made without an insurance trigger, potential policyholders will not join the insurance scheme or will join only for an imminent event. Risk transfer for the poorest, poor and vulnerable target groups is barely possible without premium subsidies, and therefore without the involvement of third-party risk finance.

The anticipated impact of CRI for financial protection against climate risks therefore depends heavily on the context, and on its successful combination with other instruments. Interventions to raise target-group awareness meet the benchmark of achieving objectives if and when they are designed in a target-group-appropriate way. The promotion of regulatory and legal frameworks for CRI, the networking of private and public actors (especially at national level), and the building of capacities for using meteorological data and services, make an important contribution towards reducing relevant barriers to investment in CRI and private adaptation finance.

The four **risk preparedness** instruments considered in the CCA-RAI, SAGA, ARC and PrAda case studies meet the benchmark for effectiveness to varying degrees. At the national level, the capacity development objectives of two instruments (ARC and CCA-RAI) were largely achieved. In the case of CCA-RAI, capacity development at the subnational level was largely effective, but was insufficient for policy-makers. At the local level, capacity development in both the SAGA and PrAda case studies was also largely effective in contributing to risk preparedness. In other words, the perception of climate risks was effectively strengthened through awareness-raising measures.

In the case of CCA-RAI, German development cooperation has initiated the piloting and implementation of activities for residual climate risk management, and has partially met the benchmark for effectiveness in relation to these activities. However, empirical findings show that a developed strategy for scaling up implementation is lacking. They also indicate that piloting and implementation would need to be scaled up and replicated in order to increase effectiveness. Civil society and the private sector were insufficiently involved in the piloting. State and national planning and coordination for residual climate risk management were largely effectively improved in three case studies considered (CCA-RAI, ARC and SAGA). For example, support for national and international coordination processes was effective. Further improvements are needed, particularly in sectoral coordination and coordination between different donors.

The benchmark for effectiveness concerning the use of data and analyses for risk preparedness was largely met in all case studies (CCA-RAI, PrAda, SAGA and ARC). In some cases, however, the processed data and findings of the analyses did not reach all target groups. As a result, the private sector for instance is not yet better able to respond to early warnings. Risks exist with regard to the achievement of impact. This is due to the fact that partner responsibilities for continuing capacity development after the end of the intervention are not defined, or there are gaps in the transition from planning to implementation.

In the 'risk preparedness' instrument group, the lack of integration of lessons learned by other donors and the lack of coordination between the various development cooperation actors jeopardise the achievement of impact. Nonetheless, the benchmarks of relevance for partner countries and target groups, and of effectiveness at outcome level, were met. Consequently, the instruments considered can be expected to generate impact.

With regard to their effectiveness, it is foreseeable that the two investigated instruments of **transformative risk management** (UMIMCC and HMCCC case studies) will achieve their primary objectives at outcome level and thus meet the benchmark for achievement of objectives: The expansion of knowledge on human mobility in the context of climate change (HMCCC) and the improvement of the living conditions of climate migrants (UMIMCC) are foreseeable. In both cases, the instruments used largely meet the effectiveness benchmark in terms of capacity building, awareness raising and sensitisation. The benchmark for effectiveness in strengthening the institutional framework for human mobility in the context of climate change was largely met in the case of HMCCC, but barely so in the case of UMIMCC. However, local partners are increasingly addressing the issue of 'climate migration' (UMIMCC). Further capacity building is needed in order to strengthen administrative structures. This also includes enabling staff and management personnel to deal with human mobility in the context of climate change, for example by providing counselling and advisory services for climate migrants. It is still barely possible to assess the impact here – also due to the early implementation status. Risks that could jeopardise outcomes and impacts include the continuity of donor funding, and partner-country ownership and willingness to continue the activities. In the UMIMCC and HMCCC interventions, the instruments examined each address essentially just one field of action. Both integrated interventions that combine several fields of action, and coordination at the level of the instrument

group with the broader development cooperation portfolio, could enable synergies and thus contribute to impact.

In summary, third-party risk finance instruments are thus successful at output level, but only partially meet the benchmark for achieving the objectives at outcome level. There is potential for impact, but the methodology for estimating the number of beneficiaries is not sufficiently robust. The various components of the risk pooling instruments in some cases meet the benchmark for effectiveness, and in some cases are partially effective. In the case of risk pooling, both the effectiveness and the expected impact depend strongly on the context and on combination with other instruments. Impact measurement shows the same weaknesses as in the case of third-party risk finance. The benchmark for effectiveness of risk preparedness instruments is in some cases met and in some cases partially so, although this differs between the fields of action. Impact can be expected, but depends on the relevance of the interventions to partner countries and target groups. The benchmark for the effectiveness of the examined transformative risk management instruments is met to varying degrees, ranging from barely met to largely met for specific fields of action. Since implementation remains ongoing, it is not yet possible to assess the impact of the examined instruments of transformative risk management at this point in time.

Overall, the **findings on the instrument groups for evaluation question 3** show that German development cooperation already has broad experience with implementing the four groups of residual climate risk management instruments examined in this evaluation module. In designing and implementing its development cooperation, Germany relies extensively on risk pooling. It also already has a broad array of risk preparedness instruments. The third-party risk finance instruments are innovative. However, so far German development cooperation has only partially exploited the opportunities offered by this group of instruments. There is major potential for further expanding these instruments and applying them more broadly.

Regarding coverage for residual climate risks, for example, there are gaps in the protection of high-risk groups and low-income groups, and coverage for uninsurable risks and high-cost events. Transformative risk management instruments are promising and innovative, but can only be sustainable in the long term if they are conceptually elaborated and scaled up for implementation. Overall, German development cooperation already has experience in designing, piloting and implementing residual climate risk instruments. The findings show that these instruments, which are already in use, have the potential to serve as models and to be scaled up for German development cooperation.

The evaluation module has shown that the instruments of third-party finance and risk pooling should focus more on impact among the target groups and final beneficiaries. There is a great deal of pressure to reach the InsuResilience Global Partnership's target of 500 million (directly or indirectly) insured persons by 2025. Given the strong focus on expanding the number of insured persons, there is a risk that the much more complex tasks of reaching disadvantaged and marginalised groups, and building effective risk transfer for relevant climate risks, will take a back seat. The case study of the IIF investment fund clearly shows that global risk transfer instruments still face major challenges. Capacity development plays a pivotal and significant role in all instruments considered. The module shows that capacities were strengthened at national, subnational and local level.

Based on the findings for evaluation question 3, the evaluation module makes the following recommendations:

Recommendation 5

The BMZ should expand the portfolio of German development cooperation in the area of residual climate risks in terms of financial resources, the number of interventions and the instruments used. In cooperation with partner countries and other development cooperation actors, the BMZ should ensure that reliable findings on the effectiveness and impact of various instruments are generated and that the instruments used are selected on the basis of these findings.

Implementation guidance for recommendation 5:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Consider how greater use can be made of risk preparedness options in order to reduce losses and damages. (BMZ)
- In cooperation with partner countries and other development cooperation actors, perform an inventory of proven residual climate risk management instruments. Then use these broadly, but context-specifically. Where there has been little experience with implementation to date, pilot the instruments strategically. (BMZ)
- Further enable German development cooperation's residual climate risk management instruments to serve as a model. To do so, use accompanying rigorous impact evaluations to generate reliable findings on the impacts of the interventions and processes. (BMZ)

Recommendation 6

In order to take better account of the 2030 Agenda principle of 'leaving no one behind', the BMZ should issue directives to ensure a stronger focus on impact among target groups and final beneficiaries, especially vulnerable and marginalised groups. The GIZ and KfW should align their interventions for residual climate risk management accordingly.

Implementation guidance for recommendation 6:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Revise the focus on the number of insured persons or the number of persons reached as the main indicator, as this could undermine the relevance and impact. Focus on indicators such as effective financial protection against residual climate risks. (BMZ)
- When designing interventions, place stronger emphasis on achieving impacts for disadvantaged and marginalised groups. This can be achieved for instance by using third-party risk finance instruments to integrate these groups into risk pooling instruments. (GIZ, KfW)
- In the case of capacity development approaches, focus on the outcomes and impacts, on enabling participants sustainably and on integrating these approaches into the partner institutions. (GIZ, KfW)

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ABBREVIATIONS AND ACRONYMS

ACRI+	Advancing Climate Risk Insurance +
ADRiFi	Africa Disaster Risk Financing Programme
AFD	*Agence française de développement* (French Development Agency)
AfDB	African Development Bank
AOSIS	Alliance of Small Island States
ARC	African Risk Capacity
ARV	Africa RiskView
AU	African Union
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BMZ	German Federal Ministry for Economic Cooperation and Development
Cat DDO	Catastrophe Deferred Drawdown Option
CCA-RAI	Climate Change Adaptation in Rural Areas of India
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CLA	Climate Change Adaptation Marker
CM	Climate Migration
COP	Conference of the Parties
CRA	Climate Risk Assessment
CRI	Climate Risk Insurance
CRM	Climate Risk Management
CRAIC	Climate Risk Adaptation and Insurance in the Caribbean
CRS	Common Reporting Standard
DAC	Development Assistance Committee
DCE	Discrete Choice Experiment
DEval	German Institute for Development Evaluation
DFIs	Development Finance Institutions
DFID	Department for International Development (United Kingdom)
EQ	Evaluation question
EU	European Union
FC	Financial Cooperation
G20	Group of 20 most advanced economies and emerging market economies
GCF	Green Climate Fund
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GriF	Global Risk Financing Facility
HBV	Hydrologiska Byrans Vattenbalansavdelning
HMCCC	Human Mobility in the Context of Climate Change
ICI	International Climate Initiative
IFAD	International Fund for Agricultural Development
IGEP-RA	Indo-German Environment Programme in Rural Areas
IGP	InsuResilience Global Partnership

IIF	InsuResilience Investment Fund
IOM	International Organization for Migration
IPCC	The Intergovernmental Panel on Climate Change
KfW	KfW Development Bank
L&D	Losses and Damages
LGU	Local Government Unit
M&E	Monitoring & Evaluation
MCII	Munich Climate Insurance Initiative
MFIs	Microfinance institutions
MoEFCC	Indian Ministry of Environment, Forest and Climate Change
MSMEs	Micro, Small and Medium-sized Enterprises
NAFCC	National Adaptation Fund for Climate Change
NAP	National Action Plan
NDCs	Nationally Determined Contributions
NDF	Natural Disaster Fund
NEM	New Economics of Migration
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
OPM	Oxford Policy Management
PrAda	*Projet Adaptation des chaînes de valeur agricoles au changement climatique* (Adaptation of Agricultural Value Chains to Climate Change in Madagascar)
PSACC	Private Sector Adaptation to Climate Change
RFPI	Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia
SAGA	Strategic Alliance GIZ and Allianz
SAPCCs	State Action Plans on Climate Change
SDGs	Sustainable Development Goals
SMEs	Small and Medium-sized Enterprises
TA	Technical Assistance
ToC	Theory of Change
ToT	Training of Trainers
TC	Technical Cooperation
UMIMCC	Urban Management of Internal Migration due to Climate Change
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
V20	Vulnerable 20 Group
UN	United Nations
WFP	World Food Programme
WIM	Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts

1. INTRODUCTION

1.1 Background

Natural disasters exacerbated by climate change are causing major losses and damages worldwide. This is particularly true for developing countries. Despite climate change mitigation and adaptation, economic losses resulting from weather and climate-related events have increased in recent decades. Measured in relation to relevant well-being indicators, the losses are highest in developing countries (IPCC, 2018b). Between 1998 and 2017, 91 per cent of all disasters were caused by floods, storms, droughts, heat waves and other extreme weather events (UNISDR, 2018). The monetary losses resulting from climate-related disasters during this period amounted to 2.2 trillion USD. This represented an increase of 68 per cent compared to the period 1978 to 1997. Annual economic losses since 1980 are estimated to be as high as 200 billion USD (IPCC, 2018b). According to estimates, 26 million people fall below the extreme poverty line in any given year as a result of weather- and climate-related disasters (Hallegatte et al., 2017).

Even after climate risks have been reduced through adaptation and mitigation, some risks remain. These risks – termed 'residual climate risks' – are the focus of this evaluation module. Various factors mean that residual climate risks remain and cannot be entirely prevented. One example of these factors is trade-offs. These can arise where limited resources coincide with a large number of societal goals. Or they can arise due to financial, technical or other restrictions (see discussion in Chapter 2). These residual climate risks threaten development results, especially in the poorest and most vulnerable countries such as small island states (BMZ, 2019; UNISDR, 2018). It is therefore urgent that interventions be implemented by the affected countries, as well as through international development cooperation.

The policy debate on dealing with Loss and Damage (L&D) is shaped by the different perspectives of developed and developing countries[5]. This includes different understandings, responsibilities, negotiating positions, demands and priorities for action (see Box 1 for a more in-depth account of the political debate). According to Calliari (2018), one main point of discussion is the treatment of climate change Loss and Damage as a separate issue rather than as part of adaptation. Developing countries in particular are in favour of separating the two. According to Boyd et al. (2017), focusing the debate on these very general definitional aspects is slowing down consensus building on more specific aspects, such as the role of climate change or questions concerning the limits to adaptation and transformation in adaptation. Consequently, Loss and Damage therefore continue to be conceptualised and operationalised differently, even after several years of climate negotiations. The term 'Loss and Damage' is therefore used below in the context of the international climate policy debate on managing residual climate risks (see Box 1).

Box 1 The debate on Loss and Damage (L&D)

The term 'Loss and Damage (L&D) is often used with reference to the policy debate on L&D conducted in recent decades in conjunction with the United Nations Framework Convention on Climate Change (UNFCC) and the Paris Agreement. This ties in with the original call by the Alliance of Small Island States (AOSIS) for an insurance and compensation pool in the context of rising sea levels (Vanhala and Hestbaek, 2016) – a position held by some developing countries. Developed countries, on the other hand, tend to postulate a stronger focus on promoting residual risk management, especially through insurance solutions for extreme events (Boyd et al., 2017; Mechler et al., 2019). Having said that, German development cooperation advocates a comprehensive risk management approach that addresses several aspects (BMZ, 2019).

According to Calliari (2018), the various perspectives can be broken down as follows: In the negotiating positions of the Global South, the L&D debate is related to impacts and risks in the context of anthropogenic climate change that are beyond adaptation and cannot simply be mitigated by adaptation interventions. So, from this perspective, additional instruments are required. According to Calliari (2018), in the negotiating positions of the developed countries, managing L&D is generally understood as part of adaptation. Seen from this perspective, according to which L&D are part of adaptation, negative impacts can be mitigated ex post and ex ante. Other authors identify a range of typologised understandings, which are each associated with different priorities for action. These authors thus argue against a binary division

[5] Defined as either Annex or Non-Annex Parties to the Framework Convention on Climate Change (UNFCCC, 1992).

and polarisation of the Global North against the Global South (Boyd et al., 2017; Vanhala and Hestbaek, 2016; Mechler et al., 2019).

By contrast, the scientific debate on managing residual climate risks is evolving dynamically. Following conceptual discussions and developments, a great deal of attention is currently being focused on identifying possible limits to adaptation. Furthermore, current scientific discussions are also focussing on analysis of the political debate, the attribution of individual (negative) impacts to anthropogenic climate change, the potential of climate risk insurance (CRI) and other (mainly financial) instruments, and human mobility in the context of climate change (HM)[6]. Here, scientific analyses can deliver conceptual approaches and evidence in order to develop and improve interventions for managing residual climate risk. Compared to the scientific discussion, the L&D policy debate is moving more slowly. Increasingly, however, it is taking up scientific findings, especially on climate risk transfer. Currently, various topics are the subject of political controversy, such as the attribution of climate risks to climate change. There is also growing debate on how to deal with non-economic losses, human mobility in the context of climate change, and legal consequences and issues of financial market-based risk transfer.

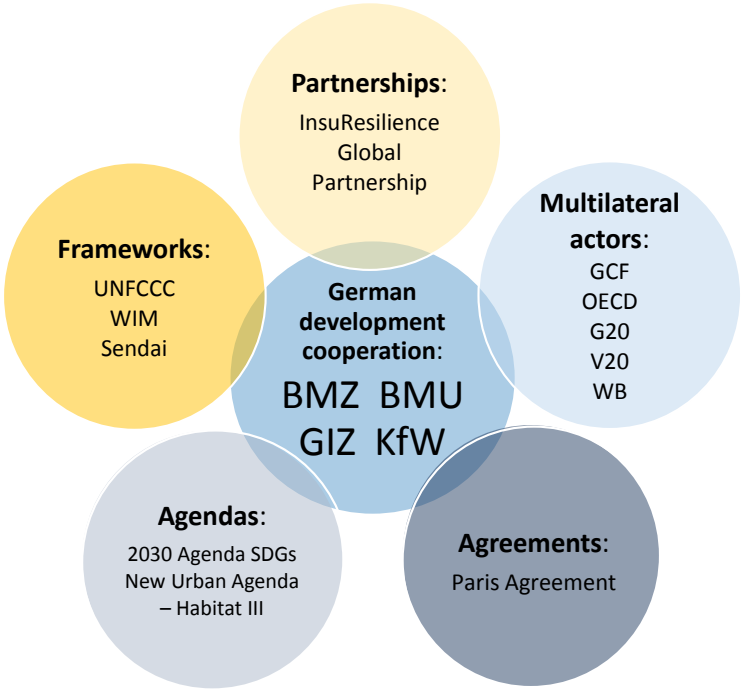
The topic of 'loss and damage' – and in this context the topic of 'residual climate risks' – is also reflected in international agreements, frameworks and agendas. An L&D Article (Article 8) was included in the 2015 Paris Agreement, for instance. This identifies the following areas of action for international development cooperation (UNFCCC, 2015a):

- early warning systems
- emergency preparedness
- slow onset events
- events that may involve irreversible and permanent loss and damage
- comprehensive risk assessment and management
- risk insurance facilities
- climate risk pooling and other insurance solutions
- non-economic losses
- resilience of communities, livelihoods and ecosystems

The Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM) was established through the United Nations Framework Convention on Climate Change (UNFCCC) in 2013 (UNFCCC, 2014). Moreover, climate risks are mentioned explicitly or implicitly in many of the Sustainable Development Goals (SDGs) contained in the 2030 Agenda for Sustainable Development adopted by the United Nations. The SDGs and the Sendai Framework for Disaster Risk Reduction 2015-2030 have indicators related to climate-related impacts and risks (UN, 2015; UNDRR, 2015). Interventions for managing residual climate risks, including international development cooperation interventions, are designed within the context of these agreements, frameworks and agendas (see Figure 1).

[6] This evaluation uses the term 'human mobility in the context of climate change' to include displacement, migration and planned resettlement. The term is also being used increasingly in the context of the UN Framework Convention on Climate Change (see Section 4.4).

Figure 1 Selected actors involved in managing 'residual climate risks'



Source: DEval, authors' own graphic

These agreements, frameworks and agendas also point the way forward for German development cooperation and its strategies, concepts and interventions for managing residual climate risks. The international frameworks form the basis for orienting the portfolio of instruments for managing residual climate risk discussed here. The German Federal Ministry for Economic Cooperation and Development (BMZ) recognises the need for coherent implementation of the aforementioned agendas (BMZ, 2019).

The BMZ's climate policy priorities currently remain embedded in a large number of sectoral and regional strategies. DEval's portfolio and allocation analysis clearly showed that German development cooperation still lacks a comprehensive strategy for climate change and adaptation (Noltze and Rauschenbach, 2019). As part of the 'BMZ 2030' reform process, which aims to make German development cooperation more effective and efficient, the BMZ has now defined climate and energy as a core area. The core area strategy 'Responsibility for our Planet – Climate and Energy' is currently being prepared. It will also encompass the area of adaptation to climate change.

To address disaster and climate risks, German development cooperation advocates a comprehensive risk management approach. This also includes managing residual climate risks and non-climate-change-related hazards. The approach includes instruments from the fields of disaster risk management, mitigation and adaptation, social protection and transitional development assistance (BMZ, 2019). In this context, the BMZ understands residual climate risk management as part of adaptation, or integrates it into the comprehensive risk management approach that encompasses climate change-related, geophysical and other risks, as well as disaster risks. The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) takes a similar line. This is also reflected in interventions financed through the International Climate Initiative (ICI), which pursue the comprehensive climate risk management approach. Comprehensive risk management aims to interlink instruments and, among other things, support the management of residual risks in such a way that improved risk understanding also promotes risk reduction. With this BMZ approach, German development cooperation is supposed to support the implementation of international agendas and, by including disaster risks, go beyond an approach that focuses exclusively on climate change (BMZ, 2019).

Since the topic became more prominent at the international level from 2007 onwards, the German portfolio for managing residual climate risks has also been developing steadily. As well as stand-alone interventions, since around 2013 there has been a greater emphasis on residual climate risks (see Section 3.2). The focus here has been on interventions for capacity development, risk transfer – especially through CRI – and, to a lesser extent, human mobility in the context of climate change. Global partnerships and cooperation with the private sector are being advanced, particularly in relation to CRI. Since 2013 German development cooperation has also been implementing the Global Programme on Risk Assessment and Management for Adaptation to Climate Change (Loss and Damage). This project aims to support the WIM and the development policy discourse on loss and damage, and to pilot appropriate interventions in partner countries.

A new thematic area requires comprehensive, practical evaluations and studies, in order to close evidence gaps and to review and strengthen the relevance and effectiveness of development cooperation in the area concerned. So far, the growing importance of this thematic area at international level and in German development cooperation is only just beginning to be reflected in existing evidence on the evaluation of these interventions. The number of interventions linked to residual climate risks is not very large, and there have not been any comprehensive evaluations of them. Also, due to major methodological challenges, few scientific studies on the effectiveness of interventions are available so far (Bours et al., 2014; Noltze et al., 2021). Challenges in this area include:

- attributing an event or risk as an impact of anthropogenic climate change
- complex interactions and difficulties in weighting drivers, such as drivers of human mobility or species loss
- lack of or insufficient data on economic and non-economic losses in natural and social systems, including predictions for relevant time horizons
- integrating the thematic area at the interface between research on 'climate change', and research on natural hazards and disaster risks, as well as risks in general, each with their different conceptual frameworks, theories and information requirements.

Nevertheless, scientific debate on residual climate risks is increasing. This concerns both findings on climate-related impacts and limits to adaptation, and possible policy interventions.

Some adaptation interventions already include interventions to manage residual climate risks. In development practice, adaptation instruments, processes and institutions do include interventions to deal with residual climate risks. However, in order to take sufficient account of these risks, the instruments need to be adapted, supplemented and combined. Initial implementations require and make use of new institutional frameworks and new constellations of actors, for instance by involving private actors in financial market-based risk transfers. There is an evaluation gap regarding the effectiveness of these modified or new instruments. Closing this gap is of considerable strategic relevance for the design of German development cooperation when dealing with residual climate risks, and for the global political L&D debate.

The first available evaluations, particularly on insurance, help to better understand the impacts of the interventions and how these interventions work, as well as to improve their practical implementation. The impact evaluations of the Munich Climate Insurance Initiative (MCII) commissioned by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH provide initial evidence on the instrument of insurance. However, these evaluations focus on individual, short-term aspects. They provide little scope for extrapolation to other sectors or CRI (Fernandez and Schäfer, 2018). Two positive examples that stand out are a long-term evaluation and a cost-benefit analysis of the regional African Risk Capacity (ARC) (Kramer et al., 2020). For decision-makers, rigorous empirical evidence on disaster risk finance instruments at the micro and macro levels is important (Cissé and Mombauer, 2020). More comprehensive, rigorous evaluations that would support further evolution of the policy field are not available, however. At the project level, it is mainly insurance solutions beyond the climate context that have been evaluated so far.

Further initiatives may provide additional evidence to further develop the field in the future. The Impact Working Group established in the InsuResilience Global Partnership (IGP) to address the evidence gaps

suggests that further evaluations conducted by development cooperation can be expected in the future. In this working group, an initial evidence roadmap was developed together with MCII and experts (Cissé, 2020; GIZ, 2020a). A working paper by the Organisation for Economic Co-operation and Development (OECD) is also planned. This will compile policy analysis and evidence from current and possible future approaches to loss and damage.

In summary, it is clear that the topic of 'residual climate risks' is still relatively new to development cooperation. It is also clear that only limited evidence is available on interventions which can be broadly used. As the interventions implemented to date have only sporadically benefited from comprehensive evaluations, it is important to generate more evidence on relevant instruments. This evaluation module aims to fill the evaluation gap on the relevance and effectiveness of the instruments applied so far to manage residual climate risks. It also aims to contribute to evidence-based decision-making and further strategic development of the German portfolio.

1.2 Purpose of the evaluation and of this module

The purpose of the 'Evaluation of climate change adaptation interventions' as a whole is to support the further strategic development of the climate change adaptation portfolio, as this is one of the future challenges for German and international development cooperation. Given the wide range of information requirements and the breadth of Germany's adaptation portfolio, the evaluation is divided into three modules plus a synthesis report. Each of the individual evaluation modules concludes with a separate evaluation report.

Due to the major importance of residual climate risks in the current international debate, this module – module 3 – was brought forward in DEval's overall evaluation on climate change adaptation, and completed before module 2.

Modular structure of DEval's evaluation on adaptation to climate change

- **Module 1:** A portfolio and allocation analysis has already been published (Noltze and Rauschenbach, 2019). This addresses issues of the relevance and coherence of the adaptation portfolio at the overarching, strategic level. Issues of complementarity were also included when analysing relevance.
- **Module 2:** This evaluation module focuses on the effectiveness, impact and sustainability of adaptation interventions for risk reduction. It aims to support processes and structures in key sectors of German development cooperation that are relevant to adaptation.
- **Module 3:** The present module examines the relevance and effectiveness as well as the (potential) impact of instruments for managing residual climate risk.
- **Synthesis:** To conclude, a synthesis report will synthesise the findings, conclusions and recommendations of modules 1 to 3, and identify overarching conclusions and recommendations.

Purpose of this module

The overarching aim of this evaluation module is to evaluate the instruments of German development cooperation used to manage residual climate risks. The module has been prepared primarily for the benefit of the BMZ, and the implementing organisations GIZ and KfW (KfW Development Bank). A further addressee is the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU), in its capacity as a further key ministry in this policy field. The analysis focuses on the evaluation criteria 'relevance', 'effectiveness' and (potential) 'impact', as defined by the OECD Development Assistance Committee (DAC) (BMZ, 2006).[7]

[7] The revised version of the OECD-DAC criteria (OECD-DAC, 2019) was published after conceptualisation of the evaluation module. The data analysis relates to key questions that are already based on the new OECD-DAC criteria.

Specifically, the module examines:

- the **relevance** to partner countries and target groups of the instruments deployed to manage residual climate risks. The criterion 'relevance' encompasses what OECD-DAC refers to as the *beneficiaries'* or *users' requirements and needs*. It also includes the alignment of the interventions with the policies and priorities of the development partners and the German Federal Government. The module also covers a further aspect at the point where relevance and effectiveness meet: the suitability of Germany's development cooperation instruments for managing residual climate risks and climate-related damages expediently and comprehensively. It also includes aspects of the criterion 'coherence', which has since been included in OECD-DAC's list of criteria.
- the **effectiveness and potential impact** of the instruments. The evaluation's theory-based approach also enables the evaluation module to assess the potential impact of the residual risk management instruments even in interventions not yet completed. The module thus makes a contribution towards evidence-based decision-making and strategic orientation of the portfolio with respect to residual risks.

All aspects of the evaluation serve to support the accountability of German development cooperation. The focus of this module, however, is on the learning role of evaluations. This is because the field of residual climate risks and climate-related losses and damages as an area for managing the impacts of climate change is relatively new, and is still unfolding dynamically. As a result, the instruments vary in terms of their level of sophistication and how they are implemented. This evaluation therefore focuses on how they work, and on assessing their (potential) impact in the fields of third-party risk finance, risk pooling, risk preparedness and transformative risk management. Given the relatively little scientific evidence available on the relevance and (potential) impact of the instruments used, it aims to support the evidenced-based evolution of German development cooperation's programming and portfolio for managing residual climate risk.

1.3 Object of the module and evaluation questions

The object of this module is instruments for managing residual climate risks in German development cooperation that can be assigned to specific instrument groups. The module covers those interventions for which Germany's key federal ministries in this policy field are responsible, and that are implemented by the official implementing organisations.

The overarching evaluation question (EQ) of the module is:

How, and to what extent, do Germany's development cooperation instruments contribute to managing the impacts of residual climate risks?

The module then goes on to examine the following three specific questions:

EQ1	To what extent are German development cooperation's instruments for managing residual climate risk relevant to partner countries and target groups?
EQ2	To what extent do German development cooperation's instruments manage residual climate risks comprehensively?
EQ3	How, and to what extent, are instruments for managing residual climate risks effective (in terms of their outcomes) and impactful?

Table 1 indicates for each specific question the OECD-DAC criteria on which it elicits information.

Table 1 The specific questions and the OECD-DAC evaluation criteria on which they provide information

Specific questions that elaborate on the overarching evaluation question	Relevance	Effectiveness	Impact
1. Question EQ1	X		
2. Question EQ2	X	X	
3. Question EQ3		X	X

Source: DEval, authors' own graphic

The evaluation questions encompass various dimensions of the OECD-DAC criteria examined, and here we need to make some conceptual distinctions:

- **Question EQ1 examines the relevance** of the implemented instruments for partner countries and target groups. This involves looking at the beneficiaries' or users' development requirements and needs, as well as the partner governments' and Germany's policies and priorities. Furthermore, the interventions are cross-referenced with the stated priorities for managing residual climate risks and risk exposure. Question EQ1 does not have any causal focus.
- **Question EQ2 examines the comprehensive management of residual climate risks by German development cooperation. This means looking at aspects of both relevance and effectiveness.** First of all, EQ2 enquires how suitable Germany's development cooperation instruments are – when combined – for comprehensively addressing residual climate risks (relevance). This also involves looking at aspects of coherence and coordination between different development cooperation actors. Secondly, EQ2 examines the extent to which residual climate risks are managed comprehensively (effectiveness). EQ2 does have a causal focus, and is both theory building and theory testing.
- **Question EQ3 looks at the effectiveness and the (potential) impact of the instruments.** EQ3 has a causal focus and is theory testing.

Each individual module of the 'Evaluation of climate change adaptation interventions' focuses on selected OECD-DAC evaluation criteria, in accordance with the object and the information needs of the reference group. Some of the instruments for residual climate risk management looked at were at early stages of implementation. In these cases it is only possible to assess their potential impact. This is also the reason why the evaluation module decided not to look at the criterion 'sustainability' separately.

The module evaluates development cooperation instruments that each possess very different features. This means that their strengths for comprehensively managing residual climate risks come to the fore particularly when they are deployed in combination. Given this combination and the complementary analysis of different groups of instruments, the efficiency of individual instruments or groups of instruments was not of particular interest. This module therefore did not investigate the criterion 'efficiency'.

Annex 7.5 specifies these evaluation questions in further detail in an evaluation matrix showing detailed dimensions of analysis.

1.4 Structure of the report

The report is structured as follows: Following the introduction, Chapter 2 describes the conceptual framework of the evaluation. In particular, this chapter elaborates key concepts and terms in residual climate risk management, such as 'limits to adaptation'. It describes development cooperation instruments that are suitable for managing residual climate risks, and narrows this down to the context of German development cooperation. Chapter 3 then describes the methodological approach. It also includes an overview of the interventions of German development cooperation that manage residual climate risks, the selection of case studies, the collection of data and the analysis.

Chapter 4 systematically analyses the findings. The evidence from the case studies is systematically analysed and aggregated for each of the four instrument groups. In each case the chapter identifies impact pathways and risks for the achievement of objectives within the framework of the Theories of Change (ToCs). As the empirical evidence is presented, this gradually leads to the evaluation questions being answered, and to each of the instrument groups being assessed. Chapter 4.5 discusses observations on the interplay between the instrument groups, and their advantages and drawbacks. Finally, Chapter 5 draws conclusions and practical recommendations from the analysis for the benefit of Germany's development cooperation actors.

2. CONCEPTUAL FRAMEWORK

To enable the systematic analysis of interventions for managing residual climate risks, this chapter conceptualises, defines and demarcates the object of evaluation. The chapter provides definitions of key terms, such as 'residual climate risks' and the 'limits to adaptation' (Section 2.1). This is followed by a categorisation of instruments for managing residual climate risks (Section 2.2).

2.1 Residual climate risks and limits to adaptation

Climate risks are reduced by mitigation and adaptation interventions (IPCC, 2014). Here, mitigation and adaptation should be understood as complementary. While the mitigation of greenhouse gas emissions significantly reduces hazards resulting from anthropogenic climate change, adaptation aims to moderate harm or exploit beneficial opportunities (IPCC, 2018a). Residual climate risks are defined as those climate risks that remain after risks have been reduced through mitigation and adaptation (IPCC, 2019). Interventions to address residual climate risks aim to manage their impacts.

The transition between adaptation interventions to reduce climate risks, and interventions to manage residual climate risks, is gradual, and depends on several factors. Together, the two are both part of managing the current and future impacts of climate change, and are thus integral components of adaptation. Financial, technical and other restrictions mean that complete adaptation, i.e. reduction and coverage of (climate) risk, is either not possible, or is not socially or politically desirable (see discussion below on the limits to adaptation).

This module uses the following definitions (Box 2):

Box 2 Definitions of key terms

Adaptation to climate change

The term 'adaptation to climate change' refers to the process of adjusting to the actual or expected climate and its effects. In human systems, adaptation aims to moderate harm or exploit beneficial opportunities (IPCC, 2018a).

Climate risks

The risk of climate-related impacts (climate risks) is defined as the potential for negative impacts of a climate-related hazard. Risk results from the interaction between vulnerability (of the affected system), its exposure over time (to the hazard), the (climate-related) hazard and the likelihood of its occurrence (IPCC, 2018a).

Residual climate risks

'Residual climate risks' are defined as those climate risks that remain after risks have been reduced through mitigation and adaptation (IPCC, 2019).

Comprehensive management of residual climate risks

Managing residual climate risks comprehensively means covering them to the maximum extent possible in terms of breadth, depth and scope. The depth of cover refers to the inclusion of all relevant climate risks, while the breadth of cover refers to the inclusion of all relevant target groups. The level (scope) of coverage refers either to a comprehensive reduction of the size of losses and damages/the impacts of climate risks, or the coverage/compensation of losses and damages. The comprehensive management of residual climate risks can be achieved by using and combining instruments of German development cooperation in collaboration with other actors.

Limits to adaptation

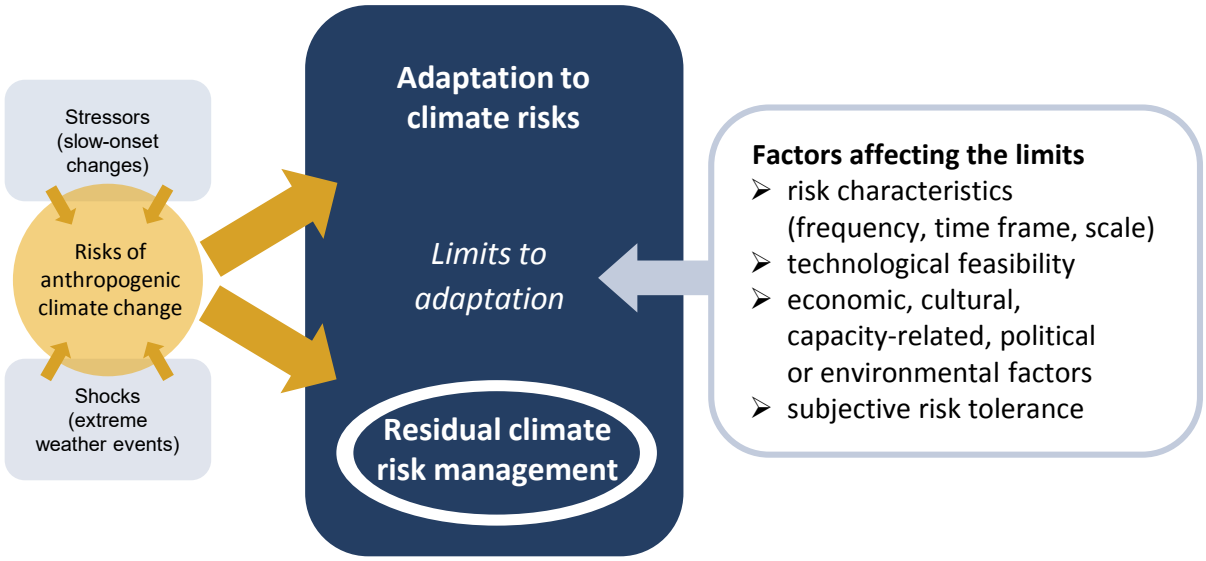
Where a system cannot avoid intolerable risks, limits to adaptation limits are reached. Hard limits exist when no further adaptation options are available. Soft limits occur when options exist, but are not currently available to the affected system (IPCC, 2019). The limits to adaptation are influenced by:

1. Risk characteristics (frequency, time frame, magnitude) and risk impacts
2. Social, cultural, economic and technological trade-offs and constraints (IPCC, 2018a; Mechler et al., 2019; Warner and van der Geest, 2013).

After risks are reduced, residual climate risks remain. These lead to losses and damages. Losses and damages can be economic in nature and measurable in monetary terms, as is the case with crop failures. Yet losses and damages are often difficult to quantify in monetary terms. This applies, for example, to the loss of biodiversity, ecosystems or cultural assets. In combination with other factors, such as unsustainable land and resource use, climate change is increasingly exacerbating residual climate risks, in terms of both the likelihood that losses will occur, and their scale.

Adaptation to climate risks transitions into the management of residual climate risks when it comes up against the limits to adaptation. The transition is a gradual one, as it is influenced by several factors. Figure 2 shows the transition between adaptation to climate risks and the management of residual climate risks, with the latter forming an integral component of adaptation interventions. Biophysical and technological factors, constraints and trade-offs with other decisions cause residual climate risks to remain in affected systems. The limits to adaptation are dynamic, context-specific and linked to the subjective tolerance of risk by the system in question (Preston et al., 2015). The focus of this evaluation module on the aforementioned limits to adaptation is based on the current scientific debate (Lal et al., 2012; Preston et al., 2013; Warner and van der Geest, 2013; Klein et al., 2014; Filho and Nalau, 2017; IPCC, 2018a; Mechler et al., 2019).

Figure 2 Managing the impacts of climate change, and contours of the module



Source: DEval, authors' own graphic

Constraints are dynamic. They are also context-specific, as they are determined by capacity-related, financial, cognitive, behavioural, social, political and cultural factors. Limits and constraints vary widely by sector and region. The relative isolation of small island states can entail limits. It may for instance make it more difficult to transfer adaptation technologies, and require international cooperation in order to manage residual risks (IPCC, 2018b). Given this multitude of factors, two neighbouring regions may have different tolerance assessments and different limits for the same risk. The level of residual climate risks and the existence of limits therefore depend on a variety of factors, some of which are dynamic and interact with each other. However, they also depend on how much is or can be invested in risk reduction interventions.

The limits to adaptation are reached when thresholds are exceeded to an intolerable degree. As climate change advances and its impacts increase, adaptation should ensure that threshold values are not reached. At these thresholds, the social or natural system in question faces intolerable risks; there is then a threat that the system will tip over and fail to maintain or restore its functions (Preston et al., 2013). Such a tipping point is reached, for example, when the sea level rises to dike level. Adaptation (such as raising the height of the dike) can mitigate the risk of climate change-related losses and damages (Filho and Nalau, 2017). As climate change advances, however, not all systems can adapt as quickly or as widely as desired. This is especially true for natural systems. The Intergovernmental Panel on Climate Change (IPCC) concluded as early as 2007 that there are limits to adaptation (IPCC, 2007). Since then, when referring to natural, large-scale systems in the context of the global climate, the literature has termed these limits 'thresholds', 'tipping points' or 'planetary boundaries'. For social systems, terms such as 'vulnerabilities', 'barriers' or 'constraints' have been used.

In the scientific debate, an increasingly uniform understanding of the term 'limits to adaptation' and its definition is emerging (Klein et al., 2014). Limits to adaptation were conceptualised in the Fifth Assessment Report of the IPCC (2014), and the IPCC Special Report on Global Warming of 1.5°C (IPCC, 2018b) for the first time describes evidence of hard and soft limits. Limits to adaptation will probably also play an important role in the Sixth Assessment Report of the IPCC (to be published in 2021). See Box 2 concerning the terms used in this evaluation module.

Limits to adaptation can be 'soft' or 'hard'. Limits to adaptation are considered to be 'soft' when intolerable risks and limits can be shifted by further developments, such as technologies or capacity development. For example, raising a dike can reduce climate-related losses and damages resulting from a rise in sea level. Conversely, when intolerable climate risks cannot be reduced through further adaptation options, 'hard' limits to adaptation are reached. Returning to the example of the dike: New technologies can ensure that the dike is higher and safer. However, once the sea level has risen beyond a certain point, or once storm surges have reached a certain level of intensity, even if the dike is higher it will no longer be able to prevent flooding. When other flood management options also fail, and land becomes uninhabitable as a result of climate change, then a hard limit to adaptation is reached.

In other words, 'hard' limits to adaptation exist where those affected are unable to avert intolerable risks either now or in the future, using options available today or others yet to emerge. In the aforementioned example, raising a dike may be subject to technological limits, and thus become a 'hard' limit to adaptation. Typically, hard limits arise in natural systems. One example is the threat of extinction of coral reefs at a mean temperature increase of over 1.5°C (IPCC, 2018b). Yet social systems are also increasingly affected. For example, it is predicted that temperature tolerance in urban areas will be exceeded if severe warming continues (Mechler et al., 2019). Initial studies on limits to adaptation and case studies from Asia, the Pacific region, Africa and Europe are provided by Filho and Nalau (2017) and the IPCC Special Report 1.5°C (2018b).

The existence of constraints to adaptation and trade-offs that can result in the limits to adaptation being reached is relevant to development cooperation actors. Knowing that these obstacles and trade-offs exist enables these actors to analyse climate risks in more detail. The fact that they exist also provides a compelling rationale for further mitigating greenhouse gases. Ignoring these limits and constraints to adaptation would undermine this motivation and instead lead to actors thinking about the costs and benefits of adaptation, and issues of justice (Dow et al., 2013). However, as development cooperation has limited resources at its disposal and trade-offs do exist, it makes sense for actors to pay more attention to limits, trade-offs and constraints to adaptation. For development cooperation interventions, it is important to know whether further options for risk reduction exist or whether the limits of adaptation have been reached. If the latter is the case, special instruments can improve the management of residual climate risks.

Taking the limits to adaptation into account helps to make climate change adaptation interventions more relevant and effective. Knowledge of limits can be integrated into planning. It can also support the identification of development cooperation instruments and their alignment with needs. When residual climate risks and limits are taken into account, interventions can be made more relevant and effective.

2.2 Instruments for managing residual climate risks

Instruments and interventions for managing residual climate risks are geared to extreme events (shocks) or gradual changes (stressors). Shocks represent extreme events such as floods or tropical storms. Stressors are understood as gradual changes resulting from anthropogenic climate change. Stressors include gradual temperature increases, soil salinisation, and long-term changes in precipitation patterns or sea-level rise. Both shocks and stressors can lead to disasters. With shocks, losses and damages occur only with a certain probability. With stressors, on the other hand, a deterioration is foreseeable, even if it is not certain that a disaster will result.

The conceptual categories used by UNFCCC and IPCC place the relevant instruments for managing residual climate risks at the level of the limits to adaptation (IPCC, 2012; WIM Excom, 2016). The IPCC defines these as interventions for managing current and projected climate risks (Lal et al., 2012). The instruments can also be categorised. First, there are instruments that reduce climate risk, for instance in terms of vulnerability, exposure, and climate-related hazards. Then come the limits to adaptation, defined by Lal et al. (2012) as the risk acceptance threshold. Beyond this area, further instruments can be used These include first of all interventions for risk sharing, risk transfer and risk pooling. These are followed by risk preparedness interventions, which include capacity development and disaster preparedness (e.g. contingency planning). This categorisation shows the smooth transition between interventions for reducing risks, and interventions for managing residual climate risks. Both contribute to the overall goal of adaptation to climate change.

The categories 'pooling', 'transfer' and 'sharing' described in Lal et al. (2012) do not, however, cover comprehensively the financing interventions for managing residual climate risks. While the UNFCCC (2019) generally speaks of financial resources or financial mechanisms, other publications use the term 'risk finance' (Hirsch and Hampel, 2020). Alternatively, they use the term 'disaster risk finance and insurance', which is not specific to climate risks. The present report adopts the term 'risk finance' to cover the whole area of finance, and is defined as 'investments to address or compensate for residual losses and damages that could not be prevented' (after Hirsch and Hampel, 2020). Here, this evaluation module focuses solely on ex ante risk finance, which is defined as finance provided before climate risk events occur. These mechanisms, formalised before events materialise, are designed to coordinate financing so as to increase the amount of funding available, and provide actors with greater certainty and better terms. By contrast, other financing approaches such as humanitarian aid delivered through emergency loans or contingency credits, or financing by private networks, are not formalised upfront. This means they involve greater uncertainty.

Risk finance instruments can be divided into the subcategories 'third-party risk finance', 'risk pooling' and 'risk retention'. Risk transfer instruments – including risk pooling – are often treated separately in the literature (Burton et al., 2012; GIZ, 2019a; Hirsch and Hampel, 2020). As the term suggests, risk transfer involves transferring the risk to the risk pool (comprising all insured units that are exposed to the risk). At the same time, the categories used in the literature to further subdivide risk finance instruments vary widely. The category 'financial resilience building' used in Hirsch and Hampel (2020)) can be classified as third-party risk finance.[8] This encompasses risk finance provided by international and national actors that are not directly affected by the risk. In the field of climate and disaster risk finance, the categorisation of instruments in GIZ (2019a) includes the further subcategory of 'risk retention'. This includes for instance public reserve funds in the context of residual climate risks. Risk retention is not a focus of this evaluation module. It is covered, however, in the context of third-party risk finance in cases where the finance is provided by a higher-level unit (such as the nation state).

[8] Third-party risk finance instruments are also found in the GIZ's classification system for climate and disaster risk finance under the heading 'risk reduction'. Specific forms of most of the instruments included there (such as loans, credits, grants, bonds) are also relevant to residual climate risks, and are used accordingly. Generally speaking, instruments designed to reduce climate-related hazards and risk exposure (i.e. to reduce risks) are of lesser importance in this module with regard to residual risk management, as these risks are managed through instruments for climate change mitigation and adaptation.

The term 'third-party risk finance' is used below to refer to financing by higher-level (e.g. international) actors that are not affected by the risk. These can be donors, private actors or national governments. Third-party risk finance is used to finance (i) institutions, interventions and projects for residual climate risk management, or (ii) climate risk assumption/transfer. Often, this also includes indirect interventions to manage residual risks (as with the Green Climate Fund [GCF], or the Global Environment Facility [GEF]), or direct loss coverage (as with the World Bank's Catastrophe Deferred Drawdown Option [Cat-DDO]). The instruments of third-party risk finance include loans, bonds, equity and grants.

The classification system of Lal et al. (2012) still paid relatively little attention to transformative approaches[9] to managing residual climate risks. Transformative risk management includes human mobility in the context of climate change: migration by, or the resettlement of, individuals or groups – whether induced or autonomous – reduces or completely eliminates their respective exposure to climate risks. Strategies for fundamental socio-economic reorientation or livelihood transformation are another example. So far, German development cooperation has implemented transformative risk management only sporadically. As the evidence of existential and irreversible climate impacts has increased, transformative risk management has become more of a focus for the scientific and development communities. Transformative risk management involves systemic change. This distinguishes it from incremental adaptation designed to preserve systems. One example would be abandoning livelihoods and building new ones (i.e. transforming a system) versus continuing to farm in the face of rising heat and drought (i.e. preserving a system) (IPCC, 2018b).

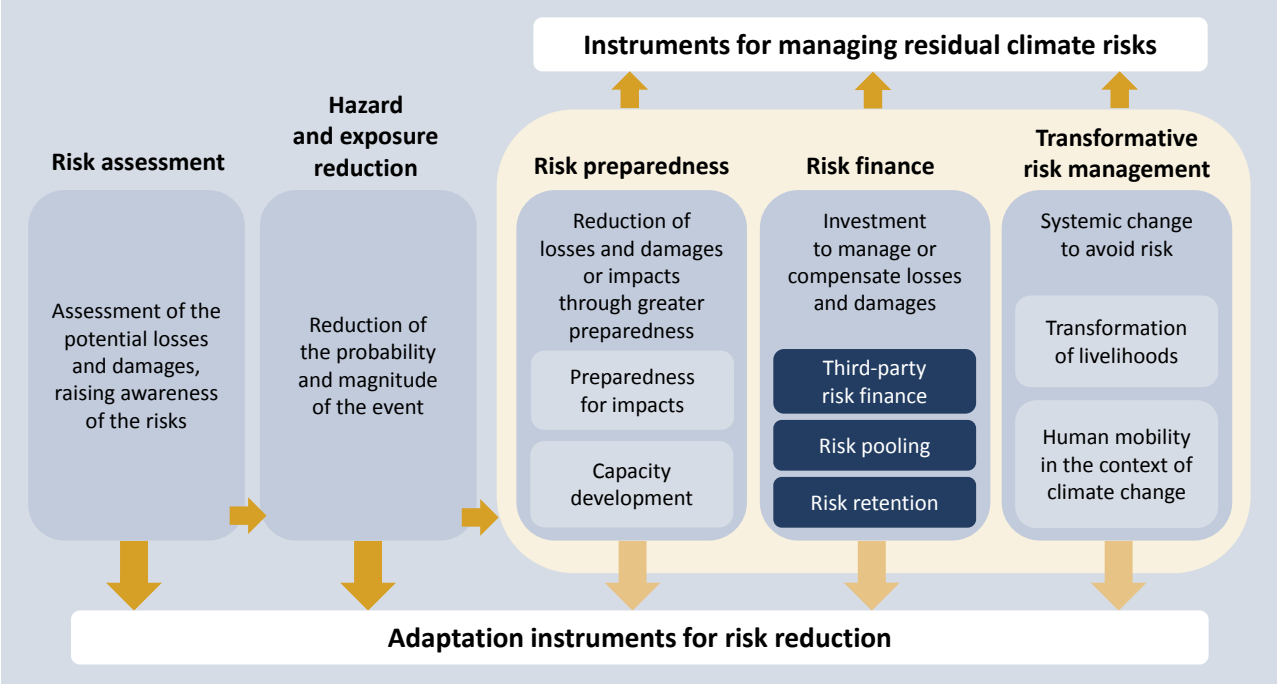
[9] This evaluation module analyses transformative risk management only in relation to residual climate risks, as opposed to transformative adaptation in general. Transformative adaptation refers to a change in the fundamental attributes of a system, and also addresses non-residual climate risks (IPCC, 2018a).

This evaluation module classifies the instruments for managing residual climate risks based on the categories used by Lal et al. (2012), but also extends these conceptually. The module breaks down the management of climate change impacts into five basic conceptual areas:

1. Risk analysis, for instance to assess potential losses and damages
2. Reduction of climate-related hazards and risk exposure, for instance through mitigation and adaptation
3. Risk preparedness, for instance through capacity development, early warning systems and contingency planning
4. Risk financing through risk pooling (for instance CRI) and third-party risk finance (for instance through loans, bonds, equity and grants)
5. Transformative risk management, for instance through human mobility in the context of climate change

This continuum in the management of residual climate risks, which includes possible limits to adaptation, is shown in Figure 3.

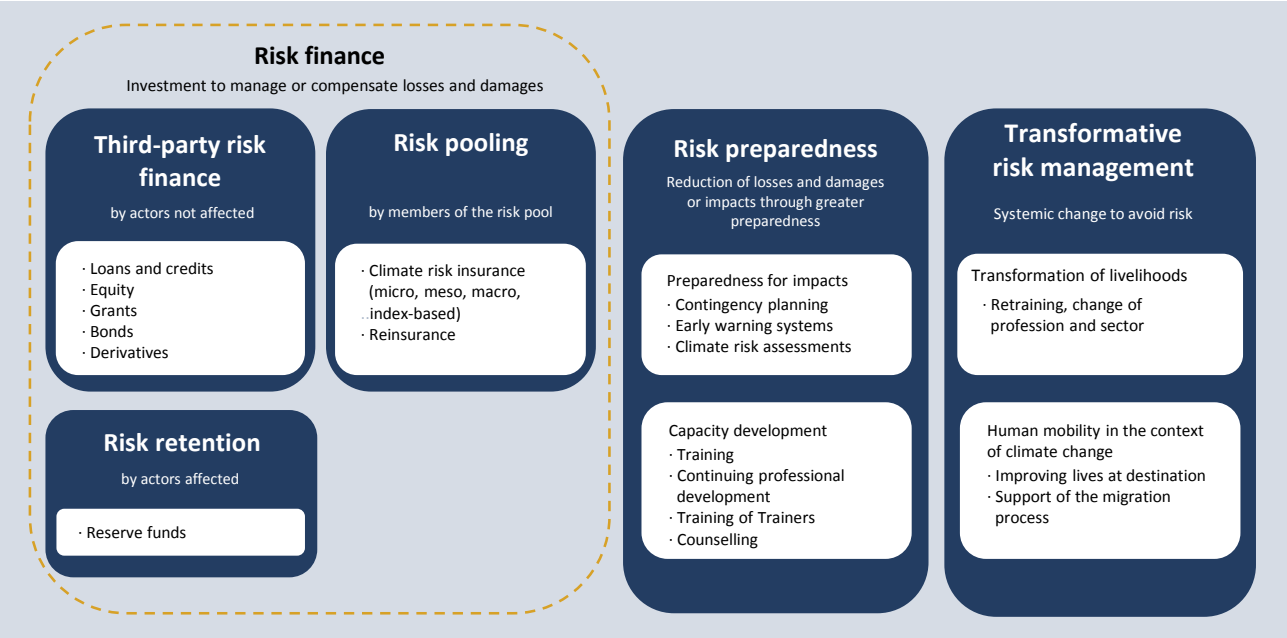
Figure 3 Groups of instruments for managing the impacts of climate change



Source: DEval, authors' own graphic, based on Lal et al. (2012)

In line with the categories shown above (see right of graphic), we can assign the following examples of instruments to the relevant groups of instruments for managing residual climate risks in the context of development cooperation (Figure 4).

Figure 4 Development cooperation instruments for managing residual climate risks



Source: DEval, authors' own graphic, based on Lal et al. (2012)

Based on the evaluation portfolio described in Section 3.2, German development cooperation's instruments to support partner countries in managing residual climate risks are assigned to the following groups. These are then made the focus of this evaluation module:

- **Third-party risk finance:** This group includes instruments for emergency financing and financing of losses and damages such as loans, grants and equity (in some cases through funds) and bonds. Third-party risk finance enables third parties to compensate and finance losses and damages. It also supports them in accessing and providing financing instruments for residual climate risk management.
- **Risk pooling:** This group includes climate risk insurance, and its reinsurance. Risk pooling aims to transfer risk through international, regional or national risk pools. The insured units are located at the national, local or individual level. In risk pooling, the units of the risk pool (usually all the insured parties) transfer the climate risks to the joint risk pool. The units of the risk pool – such as poor and vulnerable households and farmers – are usually exposed to the risk themselves.
- **Risk preparedness:** This encompasses strategies for proactive and reactive response to climate-related natural disasters. Examples include contingency planning, early warning systems, evacuation, reconstruction, improved understanding of non-economic losses – plus capacity development for managing residual risks as well as losses and damages.
- **Transformative risk management:** This group involves instruments designed to remove target groups from risk through systemic change. These include instruments for managing human mobility in the context of climate change, and for livelihood transformation.

Each of the four groups of instruments possesses its own strengths and limitations. Consequently, to manage climate risks and impacts effectively, in development cooperation they are usually used in a mix rather than separately. They serve as a basis for further analysis of the German portfolio as a whole, and analysis within case studies. The portfolio and the selection of case studies based on it are presented in the next chapter – 3 – on the methodology of the evaluation module.

3. METHODOLOGY

This Chapter presents and discusses the methodology of the evaluation module. Section 3.1 explains method integration and the theory-based approach, which form the analytical framework of the evaluation module. Germany's development cooperation interventions for managing residual climate risks are presented in Section 3.2.1, while Section 3.2.2 presents the case study selection process and criteria. Section 3.2.3 details the case studies selected for the evaluation. Section 3.3 presents the data collection and data analysis methods, and Section 3.4 the data collection undertaken. Section 3.5 reflects on and discusses limitations of the methodological approach.

3.1 Method integration and theory-based approach

The methodological approach of this evaluation module was selected on the basis of various parameters. As described above the thematic area is relatively new, and – partly due to the early implementation status of the interventions – the module focuses on the learning function of evaluations. As a result, this evaluation module has a formative focus, but also includes summative elements, for instance in the assessment of (potential) outcomes and impacts. With this approach, the module aims to make a contribution towards the ongoing process of developing interventions for managing residual climate risks in German development cooperation.

The evaluation module pursues a theory-based approach (see Figure 5): A theory is derived from scientific literature, project documents and empirically gathered data (theory building). In the course of the evaluation, this theory is tested using further data gathered in the field (theory testing). This approach generates verified Theories of Change (ToCs) of the instruments for managing residual climate risks. The theory-based approach helps identify detailed impact pathways that enable the instruments to be analysed with respect to their relevance, effectiveness and impact. The analysis can then help generate conclusions and recommendations that are transferable to similar instruments in the same area, or beyond it.

This evaluation module also uses a method integration approach. In other words, a selection of different methods are used (such as qualitative and quantitative data collection), which are combined with each other and integrated.[10] This enables the evaluation module to

- address multi-dimensional evaluation questions
- build and test theories
- systematically assess causal relationships, and
- strengthen the evidence by triangulating data from various sources.

The module uses method integration to ensure that the methods applied are integrated, and enhance each other by supplying information. For example, information from qualitative interviews was used to design a quantitative standardised survey. The findings from this survey were triangulated with findings from the interviews, in order to obtain a final assessment. Carefully applying, analysing and integrating different methods in this way enables the evaluation module to generate precise and multidimensional findings. As a result, the conclusions and recommendations become more reliable, more precise and more relevant.

The distinction between theory building and theory testing, also with respect to causality, enables the content of this evaluation module to be assigned to the three focal areas 'Reconstruction of the Theories of Change', 'Analysis of relevance' and 'Analysis of effectiveness and impact' (see Box 3 and Figure 5).

[10] The approach is based on two strands of method integration: the mixed-method approach (Creswell and Plano Clark, 2011; Greene, 2007; Kuckartz, 2014; Mertens, 2017), and the multi-method approach (Goertz, 2017; Goertz and Mahoney, 2012).

Box 3 The focal areas of theory building and theory testing

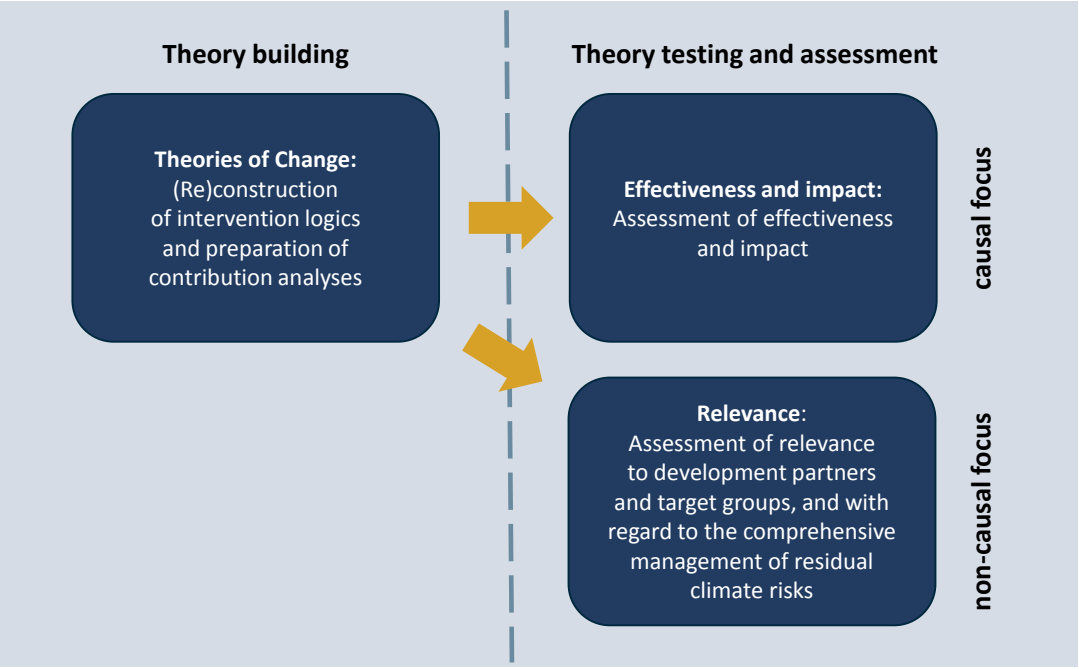
One focus of the evaluation module is theory building:

- The focal area 'Theories of change' aims to generate an overarching Theory of Change for each group of instruments. These overarching ToCs are based on the reconstructed ToCs for the individual case studies, which are tested for plausibility. They present the findings on an aggregated basis.

Two focal areas primarily involve theory testing:

- As the term suggests, the focal area 'relevance' covers the OECD-DAC criterion 'relevance' in relation to the evaluation questions EQ1 and EQ2. In this focal area, the module examines whether the objectives formulated in the ToCs match the problems and relevant solutions found in practice.
- The focal area 'effectiveness and impact' is devoted to theory testing. This involves examining the potential effectiveness and impact of the groups of instruments based on the collected data and the Theories of Change. Through a contribution analysis, it is possible to draw sufficiently robust conclusions concerning the causal contribution of the interventions to the outcomes and impacts (see Section 3.1 on contribution analysis). The component thus includes aspects of effectiveness arising from EQ2 and EQ3.

Figure 5 The method integration approach and its components



Source: DEval, authors' own graphic

These methodological approaches support the process of answering the evaluation questions in relation to the OECD-DAC evaluation criteria specified in Section 1.3. The questions, criteria and data collection methods are presented in more systematic detail in Annex 7.5.

3.2 Portfolio and selection of case studies

3.2.1 Overview of the German development cooperation portfolio

Chiefly over the last decade, development cooperation has stepped up its engagement with residual climate risks, and the area as a whole has gained importance (see Chapters 1 and 2). Interventions to manage residual climate risks are classified as climate change adaptation interventions. In this context, Germany's contributions to disaster risk management and adaptation to climate change overlap; interventions are often located where the two areas meet. The aforementioned comprehensive risk management approach thus also encompasses climate change mitigation and adaptation interventions, plus the management of residual climate risks (BMZ, 2019). The approach also includes interventions to manage non-climate-related risks . At the same time, DEval's portfolio and allocation analysis clearly showed that German development cooperation still lacks a comprehensive strategy for climate change and adaptation. The BMZ's climate policy priorities currently remain embedded in a large number of sectoral and regional strategies (Noltze and Rauschenbach, 2019). The core area strategy 'Responsibility for our Planet – Climate and Energy' is currently being prepared. It will also encompass the area of adaptation to climate change.

Although at the strategic level an explicit link to the management of residual climate risks is still emerging, German development cooperation is already deploying corresponding instruments. This encompasses interventions for disaster preparedness, capacity development chiefly at the individual and institutional levels, and risk transfer (insurance, risk funds and social protection systems). The BMZ also considers preventive reconstruction and support to partner countries in connection with climate mobility to be relevant instruments (BMZ, 2019). 'Instruments for risk management – innovative insurance solutions for insuring against weather risks' is one of the three key funding areas for climate change adaptation provided by the BMUV's International Climate Initiative. German development cooperation's interventions for climate change adaptation are increasingly positioned in the area where adaptation transitions smoothly into residual climate risk management. Overall, German development cooperation – as was clearly shown in DEval's portfolio and allocation analysis – is increasingly relying on the introduction and expansion of climate risk insurance as an important instrument in the adaptation portfolio (Noltze and Rauschenbach, 2019). Between 2011 and 2017, funding commitments for climate risk insurance amounted to some 623 million euros (Noltze and Rauschenbach, 2019). Compared to insurance-based approaches, instruments for managing human mobility in the context of climate change have so far been implemented only sporadically (GIZ, 2017). At the same time, synergies do exist with the BMZ's wider prioritisation of displacement and migration. Moreover, fragility is increasing in partner countries. This can affect mobility patterns and the vulnerability of migrants.

German development cooperation's focus on climate risk insurance is also reflected in its involvement in the InsuResilience Global Partnership. Alongside the Group of 20 major industrialised and emerging economies (G20), the Vulnerable 20 (V20) Group, international organisations, the private sector, non-governmental organisations (NGOs) and research institutions, German development cooperation is part of the IGP, and is a driving force behind it. The IGP is based on the G7 InsuResilience Initiative, which was launched in 2015 (IGP, 2019). It adopted the latter's goal of insuring 400 million poor and vulnerable people directly or indirectly against climate risks by 2020 (GIZ, 2019b). Germany provided the InsuResilience initiative with around half its implementing funds – just under 350 million USD (BMZ, 2019). The IGP subsequently raised its target to 500 million insured people by 2025. Its vision includes further targets, such as covering 10 per cent of average annual climate and disaster losses in V20 and other vulnerable countries. It aspires to achieve this through pre-arranged risk finance and insurance mechanisms, and by drawing up comprehensive disaster risk finance strategies for 80 countries by 2025 (IGP, 2019). Furthermore, this partnership aims to boost the resilience of countries overall, and increase the supply of new climate risk finance and insurance approaches, inter alia through the InsuResilience Solutions Fund (BMZ, 2019). Through this global partnership, German development cooperation is for instance increasing the visibility of CRI promotion (Noltze and Rauschenbach, 2019).

Identifying the interventions that use German development cooperation's instruments for managing residual climate risks was a particular challenge, both for the reference group and for the evaluation team:

- Due to the lack of information gathering and reporting on residual climate risks, and for conceptual reasons, it is not possible to isolate and distinguish Germany`s portfolio of interventions to manage residual climate risks. The marker 'CLA', a Rio marker for climate change adaptation of the OECD Common Reporting Standard (CRS), classifies interventions that address climate risks as a 'principal objective' (CLA-2) or 'significant objective' (CLA-1), but does not distinguish between residual and non-residual climate risks. There is no separate OECD CRS marker for residual climate risks. There is also currently no separate reporting to the UNFCCC. Consequently, it was not possible using the portfolio and allocation analysis of this evaluation (evaluation module 1) to clearly isolate the instruments for managing residual climate risks. This also means that the instrument groups 'third-party risk finance', 'risk pooling', 'risk preparedness' and 'transformative risk management' are neither recorded nor identifiable using CRS data.
- The descriptions of interventions provided by Germany's federal ministries and implementing organisations usually do not indicate precisely whether or not the respective interventions include elements of residual climate risk management. Which of the defined instrument groups is used, however, is usually made clear in the respective descriptions. However, it is not always possible to draw a clear distinction between the two, as the transition between adaptation and residual climate risk management is seamless.

Since the instruments of German development cooperation are used across the board for adaptation, and thus for managing residual climate risks too, and since they are often embedded in non-climate-related interventions, it is not possible to provide an exhaustive list of instruments for residual climate risks. The discussion below can only be an approximation.

This evaluation module examines instruments for managing residual climate risks that result from climate change. These instruments are used as part of a development cooperation measure or a package of interventions. In this context, an 'instrument' is a generalisable approach in development cooperation interventions, such as equity participation, CRI or training. Interventions may comprise several instruments for managing residual climate risks, and often include components that are not the object of this evaluation module. Instruments to manage residual climate risks can be categorised into the four groups identified above. For example, the African Risk Capacity case study includes instruments for both third-party risk finance (equity participation) and risk preparedness (capacity building for contingency planning), as well as risk pooling (insurance through ARC Ltd.). Here, German development cooperation has commissioned several interventions, such as fiduciary holding, funding of technical assistance or funding of ARC premium subsidies (COVID-19).

To present the portfolio of instruments used to manage residual climate risks in German development cooperation, the evaluation module pursued a multi-level approach. The overview was prepared on the basis of available data, in consultation with members of the reference group. Both publicly available and internal data were used, and the information was systematically processed. Information was sourced from the publicly available information in the GIZ, BMU-ICI and KfW project databases. Other sources included requested internal project lists, plus project and programme descriptions of the implementing organisations KfW and GIZ for interventions involving German adaptation financing (CLA-1, CLA-2). The federal ministries and the implementing organisations were also consulted directly. To narrow down the thematic area and support selection of the case studies, they were asked to submit interventions that were both typical of the area, and suitable for investigating how the specified instruments work. Providing lists of suitable interventions for managing residual climate risks proved challenging. This is because for the most part, such lists are not kept separately in the integrated reporting data collection system. It was therefore difficult to isolate the interventions ex post. Given the incomplete data, extensive consultations were then held with members of the reference group in order to assess the relevance of possible interventions. Exploratory talks on potentially suitable case studies were also held with actors from German development cooperation and independent experts. This process generated a rough overview of the instruments used by German

development cooperation to manage residual climate risks. For the reasons mentioned above, however, this was not a conclusive list.

The search for suitable residual climate risk instruments and the selection of case studies took place in the first half of 2019. Interventions that began after February 2019 could not be included in the analysis performed in this evaluation module.

The study identified a total of 46 German development cooperation interventions that implement instruments for managing residual climate risks. These interventions display the following characteristics:

- The BMZ commissioned 33 interventions, the BMUV 11, and both federal ministries were involved in 2 interventions.
- 25 interventions were implemented by the GIZ, 11 by the KfW and 10 by other organisations.
- 38 interventions are classified as CLA-2 and 8 interventions as CLA-1.
- Some of the interventions have implemented several instruments for managing residual climate risks. These break down among the instrument groups as follows:
    - 11 instruments belong to the instrument group 'third-party risk finance'.
    - 32 instruments belong to the instrument group 'risk pooling'.
    - 27 instruments belong to the instrument group 'risk preparedness'.
    - 7 instruments belong to the instrument group 'transformative risk management'.

Table 2 shows an overview of the instruments implemented by German development cooperation to manage residual climate risks.

Table 2 Overview of the instruments used to manage residual climate risks

Instrument group	Instruments (total)	Federal ministry			Implementing organisation		
		BMZ	BMU	BMZ/BMU	GIZ	KfW	Other
Third-party risk finance	11	9	1	1	1	8	2
Risk pooling	32	22	8	2	20	7	5
Risk preparedness	27	18	8	1	16	5	6
Transformative risk management	7	6	1	0	5	1	1

Source: DEval, authors' own graphic

3.2.2 Criteria-based selection of case studies

For empirical analysis of the various instrument groups, several case studies were selected for each group. The studies were selected systematically according to defined criteria and on the basis of the portfolio overview in Section 3.2.1. In the process, internal project documents (project and programme commissions, interim and final reports, other internal documents) were reviewed as additional data sources. To clarify various points, discussions were also held with the federal ministries and implementing organisations, and with individuals responsible for interventions. The selection process and the selection criteria are shown below:

1. The project and programme descriptions publicly available on the Internet and submitted on request were systematised according to (i) the instrument groups listed in Section 2.2, (ii) the volume of ODA provided by the respective ministries and (iii) the form of cooperation (financial/technical).

2. In a first step of the selection process, four main criteria were established:

    - **Main criterion 1 'ODA':** The intervention has received contributions from German Official Development Assistance (ODA), for which the federal ministries BMZ or BMU are responsible.
    - **Main criterion 2 'CLA marker':** According to official reporting, the intervention is assigned the OECD CRS marker CLA-1 or CLA-2, indicating that it falls under German development cooperation's funding of adaptation. In other words, it is classified as a intervention that addresses climate risks as a principal or significant objective.[11]
    - **Main criterion 3 'residual climate risks':** Managing residual climate risks is a relevant aspect of the intervention.
    - **Main criterion 4 'implementing organisation':** To further narrow down the case studies, interventions were included through which the official implementing organisations GIZ and KfW implemented a major share of German adaptation funding.

3. In a final step of the case study selection process, various factors were taken into account in order to achieve as balanced a coverage as possible of Germany's development cooperation instruments for managing residual climate risks:

    - an assessment by DEval of **evaluability and evaluation gaps**, learning effects and strategic relevance for development of the portfolio as well as innovative elements in implementation;
    - a **spread of the selected case studies**, i.e. a case selection plan that ensured coverage of different geographical regions, target groups and commissioning parties, both Financial Cooperation (FC) and Technical Cooperation (TC), the implementation status, plus the interplay between bilateral and global interventions;
    - a **balanced coverage of the instrument groups**, in which instrument group 3 ('risk preparedness') was selected for a cross-sectional analysis rather than a case study.

These factors were triangulated with the importance of individual countries and sectors according to funding volumes in the OECD CRS data.

The case study selection aimed to include those instruments that address residual climate risks. However, a detailed review of the eligible interventions revealed that these thematically relevant interventions did not exclusively cover residual climate risks as defined in Section 2.1. Rather, some of the selected case studies overlap with adaptation. Given its focus of interest, this module looked at these case studies with respect to the management of residual climate risks.

When selecting the case studies it was possible to both cover the instrument groups, and take into account the selection criteria and evaluation questions drawn up in advance. Once again, it became clear that managing residual climate risks is still a fairly young area of activity in German development cooperation. It was also evident that the implementation status of many of the interventions is not yet very advanced. Hence the case studies can provide information in particular on relevance and potential effectiveness (relevance, effectiveness and impact). Only a few case studies, such as the InsuResilience Investment Fund (IIF) or the ARC, could be examined for initial effectiveness. The analysis of potential outcomes and impact involved verifying the Theory of Change (i.e. checking its plausibility), but without performing any further empirical verification. This would only have been possible at a later stage.

[11] It should be noted that although interventions with no CLA marker do not have a declared link to adaptation, there are interventions that pursue similar objectives (for example, in disaster risk management or migration projects). Similarly, there are interventions with a CLA marker that have only a weak direct link to adaptation. This has been demonstrated for many OECD donors. For example, the findings of Weikmans et al. (2017) for Germany suggest considerable overreporting of CLA projects with both principal and significant objectives in the OECD CRS data in 2012.

3.2.3 Case studies of the evaluation module

From the identified instruments for managing residual climate risks, eight case studies were selected for data collection and analysis. As described above, several instruments for managing residual climate risks may be implemented in a single case study. Consequently, the case studies can each be explicitly assigned to more than one instrument group. Table 3 provides a first overview of the selected case studies and the respective assignment of their instruments to the instrument groups.

Table 3 Contribution of the case studies to the instrument groups

Abbreviation		Title of case study	Instruments looked at in the instrument groups			
			Third-party risk finance	Risk pooling	Risk preparedness	Transformative risk management
SAGA	SAGA	Strategic Alliance GIZ and Allianz		CRI for SMEs[12] in industrial areas	Capacity development Private sector and park management	
	ACRI+	Advancing Climate Risk Insurance +				
	PSACC	Private Sector Adaptation to Climate Change				
RFPI III		Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III		CRI for extremely poor, poor and at-risk households and MSMEs[13]		
ARC		African Risk Capacity	Equity investment in ARC Ltd.	Regional risk pool	Capacities, early warning systems, contingency planning	
PrAda		Projet Adaptation des chaînes de valeur agricoles au changement climatique		CRI for agricultural value chains	Regulatory framework CRI	
IIF		InsuResilience Investment Fund	Lending and equity via investment funds to institutions in CRV value chains	CRI of an IIF investee		
CCA-RAI		Climate Change Adaptation in Rural Areas of India	Access to climate funds that provide grants and loans		Capacities, planning, piloting, data	
UMIMCC		Urban Management of Internal Migration due to Climate Change				Human mobility in the context of climate change
HMCCC		Human Mobility in the Context of Climate Change				

Source: DEval, authors' own graphic

[12] Small and medium-sized enterprises (SMEs)
[13] Micro, small and medium-sized enterprises (MSMEs)

The selected case studies make a specific contribution to the analysis of the respective instrument groups:

- For instrument group 1 ('third-party risk finance') instruments were selected from the field of action Climate Change Adaptation in Rural Areas of India (CCA-RAI), the IIF including two sub-case studies of investees and the ARC.
- Instrument group 2 ('risk pooling') was evaluated on the basis of the insurance instruments of the project Adaptation of agricultural value chains to climate change in Madagascar (Projet Adaptation des chaînes de valeur agricoles au changement climatique, PrAda), the Strategic Alliance GIZ and Allianz (SAGA, including predecessor projects) in Morocco, the regional programme Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III (RFPI III) in the Philippines and the ARC regional risk pool. The IIF case study is included here via the sub-case study of a funded insurance provider and the insurance it offers.
- For instrument group 3 ('risk preparedness'), instruments in PrAda in Madagascar, SAGA (including predecessor projects) in Morocco and CCA-RAI in India as well as the ARC were included.
- The global project Human Mobility in the Context of Climate Change (HMCCC) in the Philippines and the project Urban Management of Internal Migration due to Climate Change (UMIMCC) in Bangladesh were selected as examples of instruments in instrument group 4 ('transformative risk management').

A case study overview showing the key data is presented below in Table 4. For further data and more extensive descriptions of the case studies, please refer to Annex 7.1.

Table 4 Overview of the case studies

Abbreviation		Title of case study	Term	Volume (in EUR million)	Commissioning party	IO	FC/TC	Scale	Location of case study considered
SAGA	SAGA	Strategic Alliance GIZ and Allianz	11/2015 to 06/2019	5.3	BMZ	GIZ	TC	global	Morocco, Ait-Melloul industrial zone
	ACRI+	Advancing Climate Risk Insurance +			BMU-ICI	GIZ	TC	global	
	PSACC	Private Sector Adaptation to Climate Change			BMZ	GIZ	TC	global	
RFPI III		Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III	01/2019 to 12/2022	2.0	BMZ	GIZ	TC	regional	Philippines
ARC		African Risk Capacity	03/2014 to 03/2034	92.2	BMZ	KfW	FC	regional	multi-country
PrAda		Projet Adaptation des chaînes de valeur agricoles au changement climatique	03/2017 to 02/2022	17.5	BMZ	GIZ	TC	bilateral	Madagascar
IIF		InsuResilience Investment Fund	12/2013 to 06/2029*	74.8	BMZ	KfW	FC	global	multi-country, 2 investees
CCA-RAI		Climate Change Adaptation in Rural Areas of India (this case study is part of the Indo-German Environment Programme in Rural Areas – IGEP-RA)	01/2015 to 12/2019	17.6 (IGEP-RA)	BMZ	GIZ	TC	bilateral	India + Tamil Nadu
UMIMCC		Urban Management of Internal Migration due to Climate Change	01/2015 to 12/2022	20.0	BMZ	GIZ	TC	bilateral	Bangladesh
HMCCC		Human Mobility in the Context of Climate Change	11/2017 to 04/2020	4.0	BMZ	GIZ	TC	global	Philippines

*Note: The data reflect the status during the data collection period September 2019 to April 2020. Any changes which may have occurred since then are shown in the more extensive case study descriptions (see Annex 7.1). These are not the object of this evaluation module, however. * until 2017 as climate insurance fund.*
Source: DEval, authors' own graphic

3.3 Data collection and analysis methods

The four methodological components described in Section 3.1 formed the starting point for selecting the data collection methods. Based on the various objectives, evaluation questions and instruments, as well as the respective contributing case studies, the following data collection methods were identified:

The cornerstone for the analysis was the conceptualisation of the object of evaluation and important terms. The conceptual framework of this evaluation module, described in Chapter 2, was developed on the basis of scientific literature and documents from German and international development cooperation. In dialogue with the members of the reference group, concepts, instruments and the evaluation interest were discussed and further elaborated. In addition to discussions and interviews with the federal ministries and the implementing organisations, interviews were also conducted with academics and civil society actors. This distinguished amongst other things the object of the present evaluation module from that of Module 2 ('Climate change adaptation').

The first focus of the analysis was the Theories of Change for the case studies and the instrument groups, which were reconstructed comprehensively. In order to construct their essential elements – from activities/inputs, through outputs of the intervention and on to its outcomes and impacts – secondary data such as available programme documentation as well as academic literature were first of all consulted. The reconstructed ToCs were verified in the case studies. With the data collected, the relationships between the different elements of the ToCs were examined in depth. To this end, ToC workshops, qualitative interviews and focus group discussions were held. The approach enabled the evaluation module to bring to light gaps and inconsistencies in the ToCs, and discuss questions concerning causal mechanisms, assumptions and risks for each causal relationship. The case study ToCs were the starting point for generating aggregated, overarching ToCs for each instrument group. The instrument group ToCs mapped, summarised and discussed impact pathways of the key components from the case studies that are crucial for each particular instrument group.

The relevance of instruments for managing residual climate risks was analysed on the basis of secondary data and qualitative surveys. To determine the relevance of the instruments and their consistency with the formulated objectives and priorities of the partner countries, the evaluation team used secondary data. The team obtained these from national strategies, international agendas and programme documents. A further comparison was made in the context of the case studies using qualitative survey methods. These enabled the evaluation team to record in detail the perceptions of, and information held by, a large number of different groups of actors.

For some instrument groups, in addition to qualitative surveys and document analyses, further studies were conducted to analyse relevance. One such analysis was carried out to determine the relevance of the instrument group 'risk pooling' for the target groups and the final beneficiaries. This involved collecting baseline data in the case study RFPI III in the Philippines, as part of a longitudinal study. Combined with the qualitative, more anecdotal data, quantitative data can increase the robustness of findings on relevance because they involve a high number of standardised respondents. The decision-based Discrete Choice Experiment (DCE) method, which was conducted here as a master's thesis, also allowed the evaluation module to systematically measure microentrepreneurs' preferences for different residual climate risk management instruments (see Box 9). Furthermore, the 'risk pooling' instrument group in the SAGA case study included a flood risk assessment based on flood modelling. This made it possible to measure the coverage of relevant climate risks by climate risk insurance, even over a long period of time. The measurements were based on quantitative weather data, flood data and topographical information.

In the instrument group 'transformative risk management', a desk study on human mobility in the context of climate change and development cooperation was also produced. This study analyses human mobility in the context of climate change by incorporating climate-related factors into existing theoretical frameworks. It examined the extent to which migration theories can be applied, whether there is evidence on drivers of human mobility in this context, and which development cooperation instruments are used. It also ascertained what findings exist at the global level on relevant protection against residual climate risks in this context.

The second focal area analysed the (potential) effectiveness and impact of the instruments for managing residual climate risks. For this purpose, the evaluation module applied the theory-based method of contribution analysis (see Beach and Pedersen, 2013; Mayne, 2011, 2012; Noltze et al., 2014). This method enables a systematic analysis of assumed causal relationships, and the extent to which they plausibly lead or have led to observable effects under certain conditions (Mayne, 2012). In a first step, comprehensive Theories of Change for the residual climate risk management instruments were reconstructed and verified (see Section 3.1 on theory building). For the verification, ToC workshops were held in order to systematically determine and assess the plausibility of the impact pathways, as well as the assumptions and risks for results to be achieved. The findings from the ToC workshops were triangulated through numerous qualitative interviews. The contribution analysis thus enables analysis of the causality of interventions (Mayne, 2019). For the Theories of Change, robust conclusions can then be drawn concerning (potential) outcomes and impacts, based on the inputs and outputs of the instruments. This leads to sufficiently robust conclusions on the contribution of the interventions to the causal relationships, and thus to the analysis of effectiveness (Mayne, 2008).

The measurement of effectiveness revolves around the outcomes of an instrument. According to the OECD, outcomes are defined as 'the likely or achieved short-term and medium-term effects of an intervention's outputs' (OECD, 2009, p. 28). In other words, they are defined as products, capital goods and services that result directly from a development intervention. Unlike outputs, however, outcomes can be understood as results or interim results. They can be influenced by the development intervention only indirectly, and often depend on changes in behaviour. Outcomes are not under the direct control of the development cooperation actors. They are under the responsibility/control of the partners or other actors.

The impact is measured at the impact level. Impacts are defined as 'positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended' (OECD, 2009, p. 24). They are triggered by the intervention, but in most cases cannot be directly influenced by development interventions, such as poverty reduction or behavioural change. Intended impacts should coincide with desired development-policy goals.

The evaluation module set out to answer the evaluation questions systematically via the three analytical components 'Theories of Change', 'relevance' and 'effectiveness'. Table 5 summarises the analytical components, the main methods used, and how they relate to the evaluation questions and criteria.

Table 5 Methodological components of Module 3

Component	Methods	Focus	Evaluation questions	OECD-DAC evaluation criteria
Theories of Change	Literature review Secondary data (e.g. programme documents) ToC workshops Allocation study (link to evaluation module 1)	Theory formation – reconstruction and elaboration of the Theories of Change	EQ1 EQ2 EQ3	Effectiveness, impact
Relevance	Secondary data (e.g. strategies) ToC workshops Qualitative Interviews Baseline study (RFPI III) DCE (RFPI III) Flood modelling (SAGA) Literature review of human mobility in the context of climate change	Assessment of relevance for development partners and target groups, and with regard to the comprehensive management of residual climate risks	EQ1 EQ2	Relevance
Effectiveness	ToC workshops Qualitative Interviews Literature review of human mobility in the context of climate change Secondary data (e.g. impact assessments)	Assessment of effectiveness and impact	EQ2 EQ3	Effectiveness, impact

Source: DEval, authors' own graphic

The data analysis and assessment of the evidence were performed systematically using a synthesis grid developed from the evaluation matrix. Based on the evaluation questions and the DEval guidelines on the OECD-DAC evaluation criteria, an evaluation matrix was developed (Annex 7.5). This formed the basis for a synthesis grid that supported the analysis and synthesis of findings from the case studies in three analytical stages. Findings were first synthesised for individual data sources, then for different groups of actors (government staff, implementers, experts, etc.), and finally for each case study as a whole (see Annex 7.6 for details). Finally, the findings were further aggregated and considered across the case studies, which provided findings for each instrument group. The analysis of qualitative data was carried out using MAXQDA and tables. Quantitative data were analysed using the statistical programmes R and Stata. Data privacy requirements were complied with in all cases.

For each specific question elaborating on the more general evaluation questions, benchmarks were identified. These show the conditions under which the evaluation team consider a development intervention to be appropriate and successful. The benchmarks for the three evaluation questions are:

Box 4 Benchmarks for the evaluation questions

Evaluation question 1:

- The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.
- The objectives of the interventions align with the needs of the target groups and the objectives of the partners.

Evaluation question 2:

- The interventions are relevant to the comprehensive management of residual climate risks (including coverage of relevant residual climate risks, conduct of climate risk assessments, comprehensive coverage of climate risks).
- The interventions are effective for comprehensively managing residual climate risks (including integrating them into comprehensive climate risk management, dovetailing with other interventions).

Evaluation question 3:

- The interventions achieve their objectives at outcome level.
- The intervention makes a clear contribution towards the achievement of objectives at outcome level.
- Wider impacts of the interventions can be identified and/or foreseen.
- The intervention makes a clear contribution towards the identifiable/foreseeable impacts.

These benchmarks are then applied to the content of the synthesis, and the evidence for the instrument groups is rated using a defined DEval rating scale (see Table 6 and Annex 7.7). This evaluation module performs its ratings along a six-point scale ('over achieved', 'achieved', 'largely achieved', 'partly achieved', 'barely achieved' and 'not achieved'):

Table 6 DEval's rating scale for evaluations

Category	Meaning
Over achieved	The intervention clearly exceeds the benchmark for the evaluation criterion applied. Findings demonstrate a result well above the benchmark.
Achieved	The intervention meets the benchmark for the evaluation criterion applied. Findings demonstrate that the benchmark has been met.
Largely achieved	The intervention largely meets the benchmark for the evaluation criterion applied. Findings predominate which demonstrate that the benchmark has been met.
Partly achieved	The intervention partly meets the benchmark for the evaluation criterion applied. The numbers of findings demonstrating that the benchmark has been met, and those demonstrating it has not, are (more or less) equal.
Barely achieved	The intervention barely meets the benchmark for the evaluation criterion applied. Findings predominate which demonstrate that the benchmark has not been met.
Not achieved	The intervention does not meet the benchmark for the evaluation criterion applied. Findings demonstrate that the benchmark has not been met.

Source: DEval, authors' own table

3.4 Data collection

To collect qualitative data, ToC workshops and qualitative interviews were held. These were complemented by a desk study. In the eight case studies, a total of seven ToC workshops and 138 qualitative interviews were conducted between September 2019 and April 2020. This was carried out in collaboration with the lead evaluator of the consultancy firm Oxford Policy Management (OPM), as OPM had already performed a comprehensive evaluation for the ARC case study in 2017. For this evaluation module, the findings and the questions focused on German development cooperation and the instrument groups 'risk pooling', 'third-party risk finance' and 'risk preparedness'. They were enriched by further qualitative interviews. The evaluation module decide to conduct the UMIMCC case study in Bangladesh as a desk study with qualitative interviews, as the intervention was between two implementation phases, and how the instrument works was of particular interest.

Table 7 provides an overview of the data collection methods used in each case study. The evaluation matrix in Annex 7.5 provides additional detailed information on which methods contributed to which question, and which groups of actors were interviewed.

Table 7 Data collection methods for each case study

Case studies / Methods	PrAda	PSACC, ACRI+, SAGA	RFPI III	ARC	IIF	CCA-RAI	HMCCC	UMIMCC
	Madagascar	Morocco	Philippines	regional	global	India	Philippines	Bangladesh
ToC workshop	1*	1*	2		1	1	1	
Qualitative interviews	32	28	1	8	26	30	10	2
Quantitative survey			N=1,300					
Project/ programme documents	x	x	x		x	x	x	x
Additional component		Flood modelling	DCE				Literature review	Literature review
Special feature				External study				Desk study

*Note: * ToC workshop with two focus groups in each case. Source: DEval, authors' own graphic*

To quantitatively measure relevance for target groups and final beneficiaries, and triangulate this with qualitative data, a longitudinal study was designed for the RFPI III case study in the Philippines. Baseline data were then collected. This quantitative baseline study was conducted among households and micro, small and medium-sized enterprises (MSMEs) and at the meso level. A total of 1,300 interviews were held. The survey included aspects of perceived climate risks, risk management strategies implemented at multiple levels, and the use of insurance and perceptions thereof. As the evaluation module aimed to provide timely input for ongoing policy processes for residual climate risk management, it was only possible to work with cross-sectional data until the writing of the module report. To capture the effectiveness of the intervention over time, an endline data survey is envisaged. As part of a master's thesis and integrated into the baseline study, a discrete choice experiment was conducted to measure the preferences of microentrepreneurs.

All the surveys described above were conducted in accordance with scientific standards. Respondents were informed about the study and their participation, and their consent for use of the data was obtained. The qualitative data were transcribed and translated into German, English, French or Spanish. All qualitative data were pseudonymised, and personal data were separated. The quantitative data were anonymised for analysis in order to protect the respondents. In the report, the quantitative findings are cited with reference to the respective study. For the qualitative findings, the relevant interview or focus group discussion is cited with a pseudonymised code, which indicates the actor group [14].

3.5 Limitations

Reconstructing Germany's development cooperation portfolio for residual climate risk management was a challenge, and made selecting the case studies more difficult. Given the current coding and non-existent information collection and reporting on residual climate risk management, it is barely possible to accurately determine the German portfolio in this area. There is no separate OECD CRS marker or any separate reporting to the UNFCCC. Furthermore, it is not always possible to clearly distinguish between residual climate risks and other disaster risks. Nor is it possible to distinguish between adaptation interventions for risk reduction, and those for managing residual climate risks. For these reasons, all actors found it difficult to provide an overview of interventions for residual climate risk management – the object of the evaluation. Such lists are not kept separately for conceptual reasons, or in integrated reporting. They had to be extracted, mainly in dialogue with the actors. However, based on the suggestions of the reference group and their own selection of interventions, suitable case studies could be found for all instrument groups. This enabled the evaluation module to gain an overall picture of the functioning and the (potential) effectiveness of each instrument group. However, it must be remembered that a bias in the selection of case studies is possible in principle. This is because not all interventions for managing residual climate risks could be fully identified, and the overview was largely based on suggestions made by the reference group.

Due to the early implementation stage of many of the instruments considered, it was only possible to examine their potential effectiveness in some cases. Since many of the case studies or the instruments examined in them were at the beginning of implementation, the formative aspects outweigh the summative aspects in this evaluation module. The chosen methodology of qualitative plausibility testing and verification of reconstructed Theories of Change is suitable for making plausible the mode of action and effects (including potential effects). For the case studies RFPI III, PrAda, SAGA, HMCCC (in each case the instruments under review), implementation of the instruments remains ongoing. It is therefore possible to estimate the potential effectiveness (outcomes and impact) within evaluation questions EQ2 and EQ3. In other case studies (for example ARC, IIF and UMIMCC [1st phase]), initial effects can already be examined.

The (potential) outcomes and impacts are estimated with the theory-based method of contribution analysis, using mainly qualitative data. For verification of the Theories of Change in the contribution analysis, only qualitative evidence was used. This was not triangulated with quantitative data. The selected method is able to identify the Theory of Change of the instruments, to assess the contribution of German development cooperation and to estimate (potential) outcomes and impacts.

The quantitative data collected can be used for follow-up studies for rigorous impact evaluation. Since a lack of baseline surveys (including vulnerability and climate risk assessments [CRAs] datasets) often limits the scope for impact assessment, a baseline study was conducted on the RFPI III case study. In the context of the present evaluation module, this helps to assess relevance only. However, it can be used to assess effectiveness in follow-up studies.

The COVID-19 pandemic limited possible follow-up data collection, and is hampering considerably the further development of the interventions under consideration. Data collection for this evaluation module was mostly complete at the start of the COVID-19 pandemic. From March 2020 onward, however, the associated travel restrictions meant that planned follow-up data collection was not possible. Moreover, the pandemic resulted in persistent delays in implementation of the interventions. For example, it is unclear

[14] Respondents were assigned to actor groups as described in Annex 7.8.

whether the implementation of climate risk insurance in the Philippines will be advanced far enough during the evaluation period to permit an endline survey for the baseline study conducted under this evaluation module.

Despite the aforementioned limitations, the data collected did enable the evaluation module to provide comprehensive answers to the evaluation questions. Given the predominantly qualitative database, the findings can be generalised to a limited extent across all case studies – as well as in relation to German development cooperation as a whole. The theory-based approach, involving the analysis of assumptions and risks of impact pathways, supports this. At appropriate points, the report indicates which context-specific causal relationships were considered.

4. FINDINGS

This Chapter systematically processes, presents and discusses the empirical findings on the instrument groups. Section 4.1 covers the instrument group 'third-party risk finance', Section 4.2 covers risk pooling, Section 4.3 risk preparedness and Section 4.4 transformative risk management. The findings chapter concludes with a discussion of the interaction of the various instrument groups (Section 4.5).

The approach is identical for each instrument group, and is shown here using the instrument group 'third-party risk finance' as an example. In a first Section (4.1) the instrument group is defined and described. This is followed by an explanation of the Theory of Change (ToC) for the instrument group, which analyses how and under what conditions the instrument group contributes to the management of residual climate risks (Section 4.1.2). The three subsequent sections (4.1.3 to 4.1.5) address each of the three evaluation questions in turn. In each case the empirical findings from the case studies are first synthesised, and the questions are then answered for the instrument group. Finally, the instrument group is assessed according to DEval's rating scale for evaluations.

4.1 The instrument group 'third-party risk finance'

4.1.1 Introduction and contribution to residual climate risk management

Third-party risk finance is an instrument through which third parties make investments in order to remedy or compensate losses and damages (Hirsch and Hampel, 2020). This is carried out by national and international actors, because the actors exposed to the risk cannot provide the financing themselves. Financing actors can be national or local governments, individual country donors, multilateral or regional institutions, or private actors (Burton et al., 2012). Third-party risk finance instruments can be distinguished from risk pooling instruments in that they do not apply insurance principles. However, they can finance risk pooling or risk preparedness instruments, for example through fund structures.

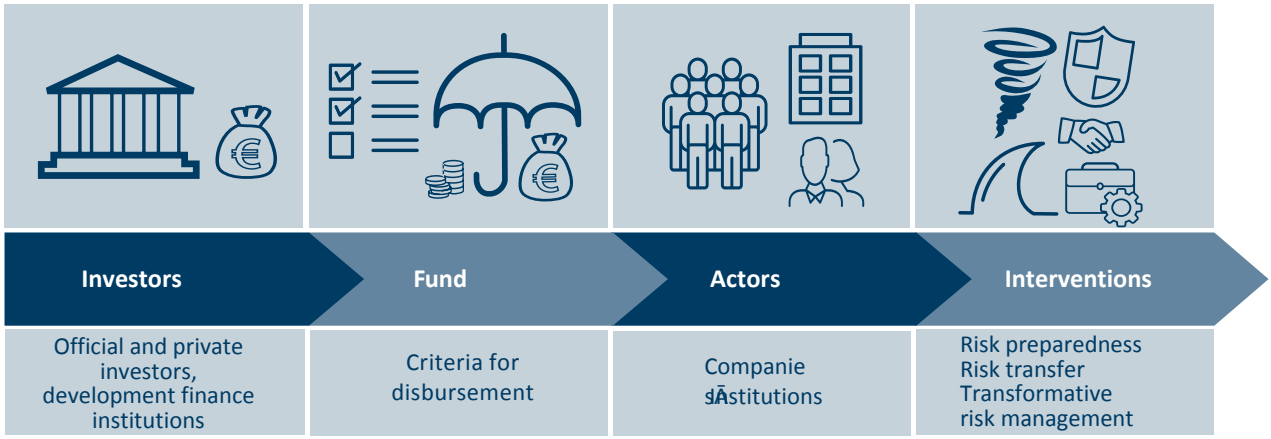
Third-party risk financing instruments include loans, credits, grants, equity and bonds (especially cat bonds), as well as weather derivatives.[15]The financing can be provided directly to actors in the form of loans or grants. Alternatively, it can be channelled into various types of funds (structured funds or trust funds), where it is allocated according to defined criteria (WIM Excom, 2016). Financing can be provided for different points in the residual climate risk management process. It can be used either to reduce the impacts of extreme weather events (such as risk preparedness with a focus on residual climate risks), or to directly compensate for damages (such as the financing of insurance or emergency loans) (Hirsch et al., 2019).[16]

Funds are a much-used instrument within third-party risk finance for collecting and allocating financial resources (Figure 6)**.** They replace one-on-one negotiations between two actors. This reduces the coordination effort required of donors and recipients. Funds are also designed to encourage more investment through collaborative action and guaranteed processes, such as the criteria applied (Lázaro Rüther and Jara, 2015). A distinction can be drawn between mainly donor-financed trust funds, and structured funds involving blended finance, which is designed to mobilise private capital. Structured funds have a tiered risk structure. Depending on the tranche in which money is invested, investment risks are spread differently among investors. Funds can finance activities or institutions in predefined thematic areas, and serve target groups in the private and/or public sector. They may provide credits, equity or grants. Investment funds and – in their particular form – structured funds finance the development or expansion of a financial institution's or a company's business by granting credits or equity. Here, a fund's investment guidelines specify a focus on specific sectors and activities. For example, financing in the InsuResilience Investment Fund (DOC-07) is only provided for the development and expansion of climate risk insurance in partner countries.

[15] As mentioned above in the conceptual framework chapter, financing instruments deployed by countries themselves, such as reserve funds, are not a focus of this evaluation module. This is because these instruments are defined as belonging to the 'risk retention' group.

[16] Once again, as mentioned in the conceptual chapter this evaluation module focuses solely on ex ante risk finance, which is defined as finance provided before climate risk events occur.

Figure 6 Structure of a fund



Source: DEval, authors' own graphic

Some funds focus solely on residual climate risks. Examples include: the Natural Disaster Fund (NDF), which insures institutions against the impacts of extreme weather events; the Global Risk Financing Facility (GRiF), which supports the establishment or expansion of financing instruments for climate risks; and the InsuResilience Solutions Fund (ISF), which finances technical support for the development of CRI (including climate risk assessments). Thematically broader funds such as the multilateral Green Climate Fund, the Global Environment Facility, the UN Adaptation Fund or – at the local level – the National Adaptation Fund for Climate Change (NAFCC) in India or the People's Survival Fund in the Philippines, enable countries or institutions to obtain funding for adaptation (including residual climate risks) by submitting a project proposal.

As described in the overview of German interventions (Section 3.2.1), German development cooperation is involved in supporting some financing instruments, such as ARC, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), GRiF, IIF and NDF. This takes place through the implementing organisations KfW and GIZ, and through the BMZ and BMU, including the embedded ICI Initiative. German development cooperation also supports financing instruments such as the People's Survival Fund, or access to them through capacity development interventions. Within the NDF, the instrument of weather derivatives, which is similar to insurance, is used for hedging.

Instruments studied

This group of instruments focuses on three instruments (Table 8): the financing of the InsuResilience Investment Fund and African Risk Capacity[17], and the support of financing access to the NAFCC, or to international funds such as the GCF within the 'CCA-RAI' field of action in the Indo-German Environment Programme in Rural Areas (IGEP-RA).

[17] The implementation of risk pooling by a studied investment recipient of the IIF and ARC Ltd. is covered in detail in Section 4.2 on 'risk pooling'.

Table 8 Case studies on third-party risk finance

Abbreviation	Title of case study	Instruments considered	Target groups
IIF	InsuResilience Investment Fund	Award of credits and equity through investment funds to institutions in CRI value chains	Private actors along the CRI value chains
CCA-RAI	Climate Change Adaptation in Rural Areas of India	Access to climate funds	Federal state institutions
ARC	African Risk Capacity	Financing of the insurance company for the regional risk pool	AU countries

Source: DEval, authors' own graphic

The KfW's **InsuResilience Investment Fund (IIF)** aims to reduce the vulnerability of MSMEs and low-income households to extreme weather events in developing and emerging countries. This is to be achieved by financing institutions that offer CRI schemes or support their development. To this end, the two sub-funds for debt and equity were supplied with public and private capital, as well as capital from Development Finance Institutions (DFIs)[18], which is then invested in enterprises along the CRI value chains. Here, the IIF is considered a structured fund in which risks are shared differently among investors. Technical Assistance (TA) and premium reduction interventions complement the IIF, and are financed separately by the BMZ through grants. The risk financing mechanism consists of several investors placing higher-risk investments in companies along the CRI value chain (for further details, see the IIF case study description in Annex 7.1.5).

African Risk Capacity (ARC) is a regional institution for the management of extreme weather events and natural disasters. It is divided into two entities, and receives funding from donors on different levels: from the African Risk Capacity Agency as a specialised institution of the African Union (AU), and from African Risk Capacity Limited (Ltd.). The latter is a private, member-owned insurance company that provides a regional risk pool. As well as general governance, the African Risk Capacity Agency focuses on disaster risk management, early warning systems, contingency planning and capacity development. Before AU members can participate in the ARC Ltd. risk pool, they must undergo capacity development for contingency planning. The ARC Ltd. insurance company provides insurance against natural disasters (currently drought) to participating governments, so that they can support their vulnerable populations following a disaster. The ARC Agency is funded by various donors. ARC Ltd. receives its capital from the premiums of the member states. It also receives ODA through the KfW (in the form of a repayable fiduciary holding) and from the UK Department for International Development (DFID). In this section on third-party finance, the entire ARC (including ARC Ltd.) is presented with the financing component of Germany and other donors. Under the instrument group 'risk pooling' (Section 4.2), there is a stronger focus on the functioning of the risk pool within ARC Ltd. (for further details, see the ARC case study description in Annex 7.1.3).

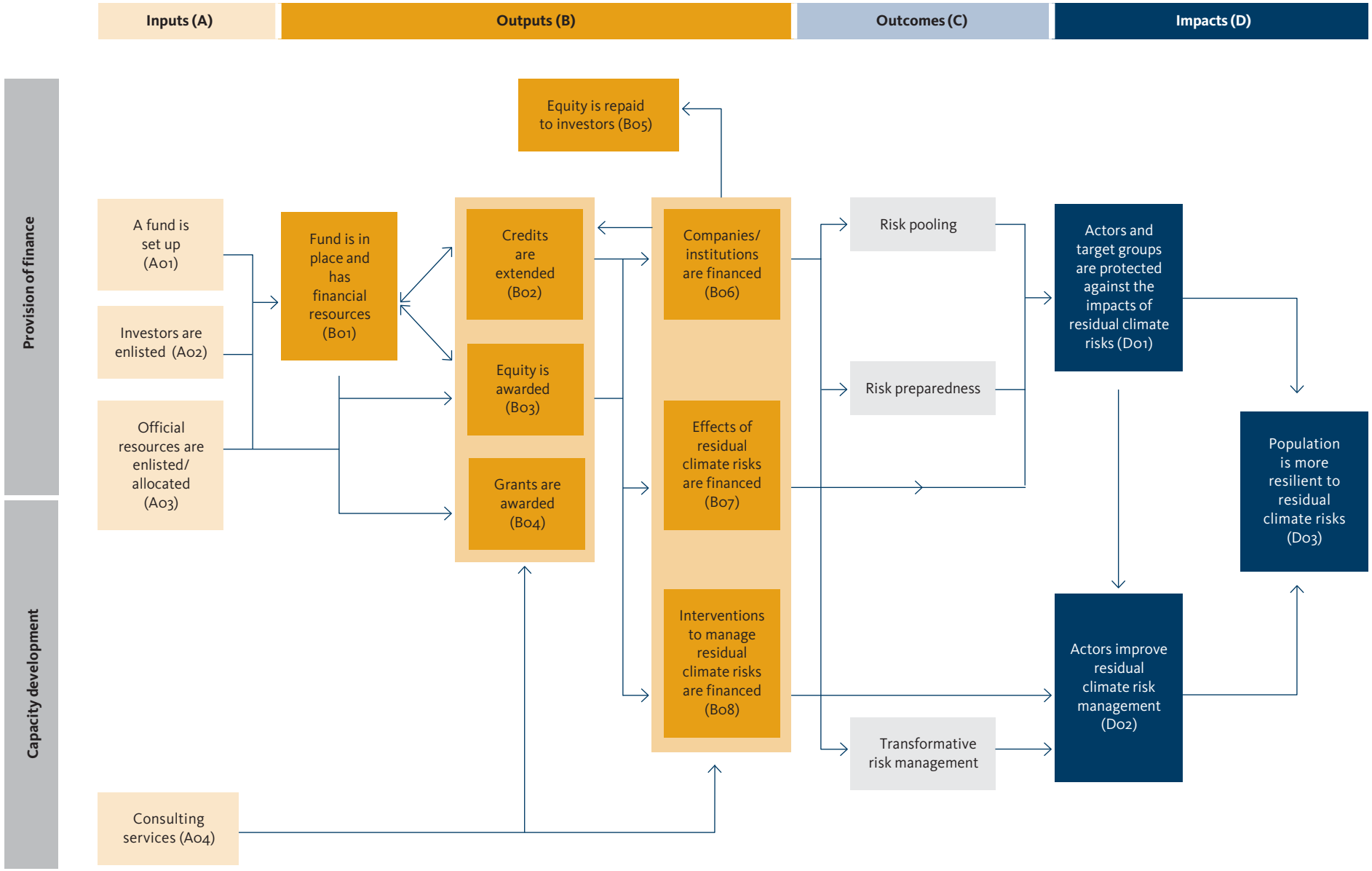
A third case study that is a focus of the investigation is one field of action of the Indo-German Environment Programme in Rural Areas (IGEP-RA) – **Climate Change Adaptation in Rural Areas of India (CCA-RAI)**. Other fields of action of the intervention do not deal with climate risks to any significant extent, and are not included here. German development cooperation supports this component through capacity development for project proposals. This is designed to give federal states better access to the NAFCC or to international climate funds – such as the GCF. The risk financing mechanism takes place through the funds that finance climate risk interventions in different federal states, and are financed by the national government or international donors (for further details, see the CCA-RAI case study description in Annex 7.1.6).

[18] Here the fund might also be supplemented with the financing institution's (in this case the KfW's) own resources. This is not the case with the IIF, however.

4.1.2 Theory of Change for the instrument group 'third-party risk finance'

Primary and secondary data were used to develop the ToC on third-party risk finance. This was based on the basic documents of the three mechanisms under review, such as strategic frameworks or project proposals; for ARC, an evaluation that includes a ToC was also consulted (DOC-07; DOC-16) (ARC, 2016; OPM, 2017; Scott et al., 2017). In the case of the IIF and CCA-RAI, findings from workshops were also used to reconstruct and discuss the ToC. Finally, interviews were held with implementing organisations, partner organisations, experts, beneficiaries and the government. Figure 7 shows the reconstructed ToC for the instrument group 'third-party risk finance'.

Figure 7 Theory of Change for the instrument group 'third-party risk finance'



Source: DEval, authors' own graphic

The ToC for third-party risk finance revolves around the provision of finance (credits, grants and equity). These resources can be used to finance interventions such as developing and offering of insurance products, or further activities to manage residual climate risks. A distinction can be drawn here between the direct allocation of financing (such as the equity participation in ARC by German development cooperation) and the allocation of financing within a fund (A01). When the fund is set up, a decision must be taken on its legal form and its regulations[19]. The negotiated fund investment guidelines[20] are the key to its further use. The inputs used to replenish the funds are first of all the official capital made available (A03), and secondly activities through which further investors are to be reached for the interventions (A02). Both official (governmental or multilateral) and private investments can be targeted.

As outputs, the resources made available can be contributed directly or via funds for various purposes (B02, B03, B04), or channelled into a company (B06). In the case of funds, the financial resources can more or less directly cover the consequences of residual climate risks (B07; one example of this is the CAT-DDO), or finance interventions to manage residual climate risks (B08). This can take the form of loans, grants or equity (for example the GCF or NAFCC). Furthermore, resources can be provided in the form of loans and credits to actors such as insurance companies, microfinance institutions (MFIs) or technology companies that operate in the area of residual climate risks (B06). In the case studies considered here, this involves financing actors in the field of climate risk insurance (such as insurance companies or microfinance institutions). For an investment fund, this involves the revolving use of capital for debt payments (loans) (illustrated in Figure 7 by an arrow pointing in both directions). This means that once capital is paid in, it flows back into the fund when the loans are repaid and can be used again. Proceeds from the sale of the equity participation go to the investors (B05).

The allocation of resources is associated with certain assumptions, but also risks. For example, it may be that investment recipients have to file for insolvency and are therefore unable to repay loans (B02), or that equity investments experience a loss in value (B05). One underlying assumption is that investors see this area as relevant and consider it not too risky to provide resources for the fund (A02 -> B01). Investment recipients such as microfinance institutions that can pass on CRI to clients must see this issue as relevant to their clients, and be positive about insurance (especially CRI) (B06 -> risk pooling). Institutions whose mandate is to plan interventions on losses and damages must see this topic as relevant to their population, and be knowledgeable about the topic (B01 -> B04). Only then will they develop applications for financing through a fund.

At outcome level, third-party risk finance then finances instruments in other instrument groups. It is thus used to strengthen and implement risk preparedness and risk pooling instruments. Details on this can be found in the ToCs of the other instrument groups. At the impact level, these instruments aim to ensure that actors and target groups are protected against the consequences of residual climate risks (D01) and that actors can improve their management of residual climate risks (D02). Finally, climate risk finance instruments aim to protect the poor and vulnerable population financially from the consequences of residual climate risks and prevent them from falling into poverty (D03).

Particularly with investment funds, general risks do result from the uncertainty of economic developments. In the case of CRI, companies often have to enter new markets – in some cases with innovative or riskier products and a higher financial risk. Possible challenges include not only the companies' own management, but also global and regional developments. The COVID-19 pandemic, for example, marks a turning point for the economy in many countries, which can put private-sector players in particular under acute pressure.

Capacity development complements the finance offered by the instruments, and also makes a major contribution to preparedness for residual climate risks. It can address specific elements – such as CRI product development at the IIF, contingency planning for countries before joining the ARC risk pool, or

[19] Since Germany, like many other countries, does not support all legal forms, the search for the appropriate legal form may also mean locating the fund in another country, as in the case of structured funds based in Luxembourg.

[20] These are based for instance on the issue document in the case of investment funds, the implementation guidelines for the NAFCC (Government of India, no date) and the investment framework for the GCF (GCF, 2014).

proposing projects for CCA-RAI. It allows companies to offer more suitable products and countries to make better use of existing contingency plans, or makes it easier for institutions to access resources. As a result, financing actors is less risky and financial resources are used more effectively and efficiently. One assumption here is that there is a lack of knowledge on how to implement interventions effectively. At the same time, there is a risk that actors do not (or cannot) implement the knowledge gained, despite capacity development, due to further barriers such as lack of financial resources or limited longevity of knowledge in institutions.

4.1.3 Relevance to partners, agendas and target groups (EQ1)

Box 5 Benchmarks for assessing EQ1

- The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.
- The objectives of the interventions align with the needs of the target groups and the objectives of the partners.

There are financing gaps in the area of residual climate risks. National actors often face financial bottlenecks when taking steps to adapt to climate change and manage residual climate risks (Lal et al., 2012). In some cases, the actors in question cannot afford the finance (at this time). Financing at a higher level can share the risk regionally or globally. Actors such as countries, institutions, entrepreneurs or households then do not have to cover their risk alone (Burton et al., 2012).

The relevance of all three instruments – IIF, ARC and CCA-RAI – is primarily due to large financing gaps that exist with respect to covering the effects of climate risks. While CCA-RAI aims to provide Indian states with improved access to national and international climate funds, the ARC focuses on contingency planning and finance for African countries. The IIF supports institutions with capital needs and limited knowledge of CRI in developing insurance against climate and natural disaster risks. The relevance of CCA-RAI is mainly due to the fact that financing activities in National Action Plans (NAPs) within the State Action Plans on Climate Change (SAPCCs) is challenging. Support for project proposals for national and international funds is designed to improve access to finance for activities from the SAPCCs, as there is a large financing gap in the area of adaptation and managing residual climate risks (EXP-10; EXP-17; EXP-21). All three risk finance instruments studied were developed to cover the effects of climate risks because of an existing finance shortfall. They are therefore highly relevant to climate risk finance.

Risk finance instruments can be broad-based and thus achieve wide reach (Burton et al., 2012; Lal et al., 2012). The IIF's primary focus is to reach large numbers of people globally with its support and to open up new markets for CRI or expand markets for existing products (DEV-16). The ARC and IIF are embedded in the InsuResilience Global Partnership, which aims to reach 500 million people by 2025 (IGP, 2019). The IIF itself aims to reach 95 to 145 million people (IIF, 2020), and the ARC cites 150 million people as a target (ARC, 2016). Through their volume and global or regional set-up, investment funds, including structured funds, trust funds, or regional risk finance interventions, have the objective and the potential to combine forces and financial volumes. In so doing, they can reach large numbers of people. Given this potential for reaching final beneficiaries, the two initiatives ARC and IIF are of very major relevance to residual climate risk management.

The IIF is also highly relevant due to the involvement of private investors. Blended finance offers the opportunity to complement governmental or multilateral resources with private capital, and is seen as an important source of finance for achieving the Sustainable Development Goals and the Paris Agreement targets (OECD, 2018). In the IIF, this involves not only attracting private sector investors, but also investing in the private sector and placing emphasis on creating marketable insurance and fostering innovation. The fund invests along the entire value chain of climate risk insurance (DEV-24; EXP-27). It thus combines the economic with the social perspective (EXP-27).

The provisions in the structure of the IIF to reduce and balance risk make it more attractive for private investors. Typically**,** investors see investments in developing and emerging countries as less attractive because the investments carry a higher risk of default or non-repayment of loans (Orth et al., 2020). Compared to the free market, the IIF encourages investments by screening potential investment recipients on a variety of economic criteria (DEV-15). It does this in order to minimise the risk of default. Moreover, this structured fund also has a so-called waterfall structure[21], and includes tranches and disbursements of varying risk for official and private capital (DEV-16; DOC-16). The fund has also been split between debt and equity investments. The debt fund involves less risky investments with loans repayable on fixed terms, while the equity fund undertakes more risky investments in start-ups or restructurings that are made for the entire fund period. The associated higher risk is reflected in a somewhat lower attractiveness for investors, despite higher potential returns (DEV-16). Overall, the above characteristics make IIF risk finance in CRI more relevant to investors.

In terms of investment recipients, the IIF also has the potential to meet the capital needs of private actors. In particular, private actors need capital to pursue activities to develop and scale up CRI. Institutions in partner countries relevant to climate risk insurance generally do not have sufficient access to suitable long-term capital or equity (DEV-30; DOC-16). They are also unable to expand the market to the extent desired. In this context, the fund's division into debt and equity funds makes it relevant to companies along the CRI value chain. Loans delivered through the IIF debt fund are primarily targeted at established MFIs with capital needs (DDP-15; DEV-30; DEV-33). Equity in the other sub-fund is for innovative or market-relevant insurance and technology firms. It is designed to fill gaps with respect to data or innovative modelling approaches for CRI in developing and emerging countries (DEV-16). The fund is also described as relevant to investment recipients (in this case MFIs). This is due to the relatively quick availability of amounts geared to the needs of companies (DDP-15; DEV-33) and the possible combination with TA (DEV-33). The importance of private actors in the insurance market in particular is also highlighted by Lal et al. (2012). With their help, risks in public-private partnerships can if necessary be better modelled and robust insurance policies can be developed.

While the fund is becoming highly significant for the CRI companies, this focus is not always seen in a positive light. One point of criticism mentioned in interviews is that the IIF's strong focus on insurance does not align with the priorities of the V20 group of countries (EXP-19). Having said that, it is seen in interaction with other instruments used in the IGP and its specific role is acknowledged. The private sector-based approach also makes it difficult to link it to country strategies: When a fund is set up, there are no negotiations with individual countries. Unlike bilateral cooperation, regional or global projects do not require intergovernmental negotiations; these would also be impractical for global instruments. Negotiations with individual countries, however, ensure a needs analysis and alignment with existing or planned activities, which makes the interventions more appropriate and relevant. If this is omitted, there is a risk of achieving only limited impact due to a lack of relevance to partners and final target groups.[22] The close cooperation between the BMZ and KfW in the development and establishment of the fund ensures alignment with international agendas.

[21] The fund is structured in different tranches, with capital in the so-called first-loss tranche assuming greater risk and receiving fewer profits than the subsequent tranches. In the event of repayment problems on the part of the investment recipients, this tranche first assumes all losses until resources in the other tranches have to be written off as losses. In the IIF, the first-loss tranche is reserved for official capital, while the other tranches are reserved for private capital (DOC-07).

[22] Alignment with national strategies is one of the main aspects of the Paris Declaration on Aid Effectiveness, which highlighted in particular the lack of alignment with partners as an obstacle to achieving development results (OECD DAC, 2005). This importance is reflected in the OECD-DAC evaluation criterion 'relevance'.

The IIF's investment decisions also lack criteria to ensure coordination with the partner's climate risk management, and thus a bespoke solution for development. Once the fund has been set up, individual investment decisions are made on the basis of predefined criteria. These are reviewed by the fund management and the investment committee, and in the case of the IIF the KfW is also involved. Economic and reach criteria are pivotal in the decision-making process (DEV-33; DOC-16). In the various investment decisions, there is close dialogue with private sector actors in order to meet their needs in terms of the level and use of TA (DEV-33). However, neither alignment with national strategies nor coordination with country activities plays any particular role (DEV-15). Some see it as an advantage that funding can be provided quickly without prior government negotiations (DEV-30). The example of the debt investment recipient studied showed that regional and national agendas for climate risk insurance were not given specific consideration. However, work on agricultural insurance has been ongoing with German Technical Cooperation for many years (EXP-03; GOV-18), and a regional strategy also includes the objective of promoting insurance to protect against climate risks in productive sectors (Gobierno Regional Piura, 2013).

Compared to the IIF, the ARC is a regional financing approach, with African Union governance. This makes it highly relevant to the countries concerned. The continent of Africa is particularly hard hit by natural disasters (UNISDR, 2016). This results in reduced economic growth and budget shifts. Progress is undermined, resilience deteriorates and the risk of political instability increases. Thus, the ARC's mission to increase the resilience of African countries to natural disasters is fundamental for responding to climate change-related challenges and disaster risk. Here the ARC seeks to provide a comprehensive approach to combating losses and damages arising from climate risks. This macro-level insurance leaves countries to decide how to manage the disbursements made. At the same time it spreads the risk more broadly, as individual countries do not take on a very high level of risk (Lal et al., 2012). The regional institution can thus provide finance that would not be available at the level of a single country.

The core element of the ARC approach is that it is an African initiative which aims to address the challenges of climate and disaster risks through ownership by African countries (ARC, 2016, 2020a; OPM, 2017). ARC thus aims to become less dependent on humanitarian aid from abroad, and to establish a firm safeguard mechanism. Resources from humanitarian appeals or concessional loans have drawbacks such as poor coordination, delays in the flow of resources (van Aalst et al., 2013) or the limited ability of governments to negotiate low interest rates on loans. ARC gives countries greater power to act, which includes planning for disasters. It thus occupies a special role, and can become a flagship for governance of relevant mechanisms by the affected countries themselves. The ARC came into being due to the African countries' strong need for such a mechanism. Its advantage is that the countries actively participate in the institution's development and priority-setting, thus ensuring its relevance.

The third approach examined here – GIZ support for implementation of the SAPCCs – begins at the national and local level. When revising the SAPCCs as part of CCA-RAI, particular attention was paid to their alignment with the Nationally Determined Contributions (NDCs) developed under the Paris Agreement and the SDGs (DEV-08; EXP-26). The interventions are thus derived directly from the international agendas. By integrating residual climate risks, the revision of the SAPCCs followed national priorities (GOV-09; GOV-15). Interviewees saw this as highly relevant (DEV-20; DEV-27; see Section 4.3 for further details). Given high-quality NDCs, the approach of linking activities with them via the SAPCCs ensures close alignment with national and international objectives. This could be a guiding principle for other risk finance instruments.

The high relevance of this instrument also stems from the fact that other funding opportunities for climate risk management activities are not available in the country. In India there is no budget earmarked for financing in this thematic area at the national level (EXP-14). The SAPCCs play an important role in accessing national and international climate finance (DEV-27; EXP-22; GOV-10). However, due to the small size of the NAFCC, its lengthy processes (DEV-20; EXP-12; EXP-14; GOV-05; GOV-10; GOV-13), and very limited access to the GCF, this is not sufficient to close the existing finance gap (EXP-15; EXP-24). Rather than treating climate finance separately, interviewees also suggest mainstreaming finance in India's national and subnational budgets (EXP-10; EXP-17; EXP-21).

The analysis of the alignment of the three instruments considered with the development needs of the target group has shown that too narrow a focus (as in the IIF) can limit the relevance of the implemented activities for the final beneficiaries. Funds can be thematically broad or have a specific focus. The IIF has specified in its criteria that the focus of the investment recipients must be on poor and vulnerable groups (which are, by definition: people living on less than 15 US dollars purchasing power parity per day) and small and medium-sized enterprises (SMEs). Overall, they are thus clearly aligned with development-policy objectives. The IIF's specification of CRI in the investment guidelines (DEV-33; DOC-07) may limit their relevance to the final target groups, as insurance instruments do not necessarily meet the needs of the population and are not a sustainable solution for extremely poor and vulnerable groups (DDP-8; EXP-19). In the IIF debt fund, the question at the outset of an investment decision is whether or not to support an investment recipient in developing or scaling up insurance. However, marketable insurance need not be the tool of choice from a development perspective. The international literature also highlights the fact that insurance at the micro level is only one of various possible tools for managing residual climate risks, and its use needs to be weighed on a situation-specific basis (Lal et al., 2012; Schäfer et al., 2016). Macro- or meso-level insurance solutions can also lead to the goal of better coverage of losses and damages (DDP-07) (Schäfer et al., 2016). Such solutions are also partly supported indirectly through participations in equity funds that focus on weather data and risk modelling in developing and emerging countries (DDP-01; DDP-08; DDP-09; DEV-15; DEV-24). However, they are generally not among the top priorities for financing by the fund.

In the IIF, adapting the respective CRI solution of a supported investment recipient to the development needs of the final beneficiaries also involves challenges. In the case of the IIF, target-group needs are elicited and examined when taking investment decisions and when developing CRI products, (DEV-16; DEV-33). However, the primary aim here is to promote marketable insurance that is profitable. It is easier to realise such insurance solutions through a mass-produced product and in combination with other products, which comes at the expense of scope for adaptation to local needs (DEV-33; STG-01). This is also confirmed by final beneficiaries, who stated that they would not always have sought an insurance solution on their own (BEN-4; BEN-15; BEN-18), but would expect, for example, better protection against climate risks from the local government (BEN-15; BEN-18; BEN-19; BEN-21). From a private-sector perspective, the approach is correct. Marketability often turns out to be a long-term problem with climate risk insurance. However, development-policy objectives can then end up taking a back seat.

It is not possible to assess conclusively the local relevance of the SAPCCs – an instrument that is relatively local in orientation. The same applies to the ARC. For the revision of the SAPCCs, community surveys were conducted in order to better understand residual climate risks, and incorporate bespoke instruments as well as risk management and adaptation options (DEV-20; DEV-27; EXP-10; EXP-11, EXP-26). However, the review was often carried out by external consultants who were not familiar with the precise context (EXP-15; EXP-22; GOV-05). It is therefore not clear to what extent the activities derived from the SAPCCs are relevant to the final target groups. With ARC, on the other hand, countries are responsible for ensuring solutions that are tailored to the needs of final beneficiaries.

TA for investment recipients makes investment funds in developing and emerging countries more relevant to investors. One special feature of the IIF is to offer finance in conjunction with advisory services and training measures. Many respondents emphasised their relevance to investment recipients, as well as to final beneficiaries (DDP-03; DEV-10; DEV-16; EXP-19; EXP-27). Here, advisory measures are important for reducing risk for investors (Orth et al., 2020), and for making investment in countries with small markets and poor target groups more attractive for them (DEV-24). Investment recipients emphasise this possible combination of finance and TA as a positive (DEV-33).

Capacity development is also a relevant complementary component in ARC and for CCA-RAI. ARC provides a combination of insurance, capacity development and contingency plan development. This means that in a process lasting up to one year, countries are closely guided through a series of activities encompassing the use of an early warning system, contingency planning and the application of risk transfer instruments (ARC, 2016). In this context, the risk pool is also pivotal for ARC. This was the main objective in the founding phase. At the same time, experience with other mechanisms that only offer a pool, such as CCRIF and the Pacific Catastrophe Insurance Facility (PCRIC), has shown that interventions going beyond this can support the effectiveness of the pool and climate risk management. In African countries in particular, knowledge on contingency planning was seen as very important in making regional risk pools more effective. For CCA-RAI, lack of knowledge on residual climate risks, SAPCCs and the elaboration of project proposals (DEV-18; EXP-10; EXP-13; EXP-22; EXP-26; GOV-09; GOV-10; GOV-15) are a key point for relevance. Capacity development in both substantive and administrative areas is a focus in CCA-RAI activities.

The three instruments considered reflect three distinct approaches to providing third-party risk finance. Hence they are rated differently in terms of their relevance. ARC and the IIF stand out in particular for their high relevance in closing financing gaps and in their global or regional reach. The approach of implementation by countries – based on their agendas – helps ensure very high relevance and alignment with national objectives for ARC and CCA-RAI. The IIF faces some challenges here due to the financing at private-sector level. Challenges also arise here regarding alignment with the needs of the final beneficiaries. With all three instruments, capacity development components play a key role in making the finance more relevant.

4.1.4 Relevance and effectiveness for comprehensive residual climate risk management (EQ2)

This section will first examine the extent to which the instrument group is relevant to comprehensive residual climate risk management. Secondly, it will look at its effectiveness with regard to comprehensive residual climate risk management.

Box 6 Benchmarks for assessing EQ2

- The interventions are relevant to comprehensive residual climate risk management (including coverage of relevant residual climate risks, conduct of climate risk assessments and comprehensive coverage of climate risks).
- The interventions are effective for comprehensive residual climate risk management (including integration into overall climate risk management, and combination with other interventions).

The global and regional risk finance instruments examined are relevant to covering residual climate risks. They also often cover other risks relevant to the target groups. For example, the IIF and ARC also include residual climate risks in their guidelines and frameworks. Furthermore, the IIF also includes earthquakes and volcanic eruptions (DOC-07), and ARC is developing instruments to deal with pandemics as well as products for droughts, floods and storms (ARC, 2016). With the IIF, many products supported through the investment recipients include other natural disasters such as earthquakes and, as so-called multi-risk products, a range of other risks such as lightning and fire (DDP-02; DDP-15). When developing insurance policies, trade-offs are often made between climate risks covered and price. For poor and vulnerable people, however, it is very important that all relevant risks are covered (Schäfer et al., 2016). Consequently, a broad coverage of risks and non-exclusivity of the climate risk finance approach merit a positive rating.

National risk finance instruments often miss out on potential in the financing of activities for residual climate risk management. This is due to a lack of knowledge, and insufficient inclusion of relevant target-group risks. CCA-RAI also has the potential to support activities for residual climate risk management by funding the implementation of the SAPCCs in the NAFCC. To date, however, there have been few activities directly related to this. This is because the guidelines and project approval procedures are heavily biased towards adaptation activities for risk reduction, and resources are limited (EXP-11; EXP-14; EXP-26). This is compounded by the insufficient capacity of states and their institutions to manage residual climate risks. They plan and propose few activities in this area. Moreover, the project proposal process is lengthy, making it impossible to finance acute damage caused by a climate risk event. The potential of the NAFCC can therefore currently be used only to a limited extent for residual climate risk management. In order to better incorporate residual climate risks, the guidelines and criteria of the NAFCC would need to be updated (DEV-18; DEV-27).

Global risk finance instruments can – if insurable – finance locally relevant climate risks. The IIF conducts needs assessments and feasibility studies as part of TA when new insurance products are being introduced or existing ones revised. This ensures that the risks covered by the products are relevant (DEV-16). Climate risks that are irrelevant to target groups would not lead to marketable insurance, so this review also increases the relevance of the climate risks covered. However, no systematic climate risk assessments are performed for each of the products supported. Furthermore, there is no detailed analysis of whether the product of the supported investment recipient is already on the market.

Responses by interviewees underline the lack of relevant analyses. For example, the borrower considered had a product on the market that was only looked at during the investment decision analysis. As mentioned earlier, it is clear from the policyholders' comments that while they do welcome insurance, they would expect protection from the state to prevent losses and damages (BEN-15; BEN-18; BEN-19; BEN-21). A climate risk assessment would provide important insights in this regard. It could reveal that the limits to adaptation have not yet been reached, and that insurance is not the preferred or sole instrument to be used. At the same time, flood risk coverage is highly relevant to policyholders, as this climate risk event occurs regularly (BEN-04; BEN-07; BEN-15; BEN-18; BEN-19; BEN-21). Overall, the covered risks are plausible sources of losses and damages for micro-entrepreneurs in the region. In the case of the equity investment recipient studied, a detailed analysis of the specific local situation is being carried out in collaboration with the clients before an instrument is developed. The relevance of the specific instrument will thus be examined in more detail (DDP-02). At the same time, it became evident that insurance-based approaches are generally not suitable for covering slow-onset changes and the losses and damages they entail (EXP-27).

Climate risk assessments increase the relevance of the climate action plans associated with the NDCs. One positive example of this is CCA-RAI. Here, studies were conducted to revise the SAPCCs as part of the German development cooperation intervention. This was done in order to better understand communities' perceptions of their capacities for residual climate risks, and identify appropriate tools for risk management and adaptation options (DEV-20; DEV-27; EXP-10; EXP-11; EXP-26). This has improved the quality of the SAPCCs (DEV-02; DEV-08; DEV-14; EXP-10; EXP-11; EXP-26; GOV-05). It has also made them more specific and relevant (EXP-26). The funded interventions can thus also benefit from the analyses and use tools that are relevant to the communities.

Regional risk finance instruments with defined products for all members of the risk pool may cover climate risks that are less relevant to some actors than local approaches. In the country-driven ARC, the countries decide on the focus together with the capital providers, and can thus influence the coverage of relevant climate risks. However, for individual ARC member states, the focus may not be appropriate, for instance because they are not affected by droughts, which are one of the risks currently insured in the ARC Ltd. While ARC does focus strongly on the regional risk pool, overall it does take a holistic approach. Supported by an intensive capacity development process, this is designed to develop country-specific contingency plans. These are geared primarily to drought. Insurance for tropical cyclones was integrated in 2020, and insurance for floods has been in the pilot phase since 2017. By contrast, project proposals developed under CCA-RAI align with the individual SAPCCs. In principle, in the case of financing through national or international funds, this has great potential to include relevant climate risks. At the same time, it is not entirely clear how well the SAPCCs fit local circumstances (see Section 4.1.3). This comparison illustrates the advantages and disadvantages of local and regional approaches.

The approaches of the various investment recipients in a fund can vary greatly. Relevance can be influenced above all when the taking the decision on investment recipients. At the same time, the KfW's climate mainstreaming strategy makes one thing clear: In the case of indirect finance, such as funds, or regional or global interventions, climate risk assessments (including the analysis of suitable countermeasures) cannot be carried out in advance for all fund participants or included interventions (DOC-41; DOC-42; DOC-43). In this case, pre-defined implementation modalities such as minimum standards or agreements on the selection, appraisal and monitoring of interventions are used to complement the general information as best as possible (DOC-42).

In combination with other instruments, third-party risk finance can enable comprehensive residual climate risk management. Here, the focus must be on this combination when setting up the instrument. The ARC's approach of combining the development and enhancement of early warning systems with contingency planning, and natural disaster response through capacity development and financing mechanisms (ARC, 2016) was cited by all interviewees as the most important benefit delivered by ARC (DEV-34; DEV-35; DEV-36; DEV-37; DEV-38; DEV-39; EXP-28; MSG-07; MSG-08). At the same time, no single financial instrument can cover all risks. Ideally, actors and governments should combine different instruments in order to protect against events of varying frequency and severity (so-called risk layering) (Ghesquiere and Mahul, 2010; Schäfer et al., 2016). The role of ARC as part of this comprehensive approach was acknowledged by a large number of interviewees (DEV-34; DEV-36; DEV-37; DEV-38; EXP-28; MSG-07; MSG-08).

Funds can support comprehensive risk management through an open thematic focus and sufficient financial volume. Overall, CCA-RAI promotes financing through thematically broad funds. Activities derived from the SAPCCs also promote comprehensive management of residual climate risks (EXP-11). At the same time, the financing funds are still heavily focused on risk reduction interventions. The IIF, with its special focus on CRI, is also only one component of the comprehensive approach to residual climate risks. One positive aspect is the breadth of financing along the entire CRI value chain, which means that other areas such as risk preparedness can also benefit from improved weather data. At the investment recipient level, however, there is no embedding in comprehensive risk management in the IIF. The product offered by the borrower studied does not incentivise further climate risk management. However, one investment decision criterion does make reference to 'the insurance product's incentives to adapt to climate change' (DOC-03). Giving this criterion low priority limits the likelihood of achieving comprehensive climate risk management. Moreover, as described below, effectiveness as well as impacts and their sustainability may also suffer.

The following section examines whether the group of instruments is effective in comprehensively managing residual climate risks, and to what extent it contributes to comprehensive protection – including when the instruments interact.

The findings on the various financing instruments indicate that target groups and final beneficiaries are better protected against relevant climate risks. Since the inception of the ARC risk pool, for example, there have been several disbursements as a result of droughts (ARC, 2020b). This indicates that a relevant climate risk has been effectively covered. While it is very clear that other climate risks are also important for members, experts advised that the introduction of further insurance products should be handled with care in order to first consolidate the institution and its processes (MSG-07).

How effectively relevant climate risks were covered cannot be answered for the entirety of the IIF, as all actors offer their own particular products whose effectiveness depends on the specific context. With regard to the borrower studied, the supported CRI effectively covers highly relevant climate risks that occur regularly and affect the region covered in particular (BEN-04; BEN-07; BEN-15; BEN-18; BEN-19; BEN-21). However, only a small number of beneficiaries selected by the investment recipient were spoken to, so again no conclusive assessment can be made. For CCA-RAI, no evidence is available on this point, as few interventions for residual climate risk management have been proposed so far.

The IIF, through the combination of the two sub-funds with TA and premium support (DDP-02; DOC-16), and through interaction with other initiatives, is well embedded in the environment of the various risk transfer initiatives. It can thus contribute to the comprehensive management of climate risks. For example, under the IGP, it represents the focus on microinsurance in the private sector. Furthermore, one IIF investment recipient with global operations also focuses on mesoinsurance. By contrast, the KfW's InsuResilience Solution Fund, which is also supported by Germany, includes a focus on advisory services, while ARC pursues the macro approach of insurance for countries (DEV-10; DEV-15; DEV-16; DOC-03; DOC-16). Operationally, however, the linkage with the IGP is relatively limited, and the initiatives are linked primarily through the common target figures for insured persons (DEV-16; DEV-24; EXP-19). In practice, therefore, the instruments are not yet combined such as to enable comprehensive risk management.

The global private-sector approach with no link to partner strategies makes it difficult to manage climate risks comprehensively at the respective financing location. As described in Section 4.1.3, it is difficult to link a global Financial Cooperation intervention to promote the private sector with partner strategies. This also makes coordination with local risk management more difficult. At the investment recipient level, each proposal explains which other products are already available in the given context in order to prevent duplication (DEV-30). However, there is no further integration with other interventions in the country concerned (DEV-33; EXP-03). In the IIF, there was one case of technical assistance funding directly linked to a country or region. This was provided through the Caucasus country window, which supports Financial Cooperation activities in Armenia (DOC-03). In general, as also confirmed by the case of the studied borrower, interventions in countries are not coordinated with activities of the government or other donors. This leaves a question mark hanging over comprehensive climate risk management. The lack of use by the BMZ of possible synergies from the activities of a fund that and the respective country portfolio was also highlighted in a DEval evaluation of structured funds (Orth et al., 2020).

CCA-RAI is well embedded in the national framework, but coordinates less with other donors (DDP-14; DEV-02; DEV-08; DEV-21; GOV-13) (see Section 4.3 for details). It has the potential to achieve comprehensive residual climate risk management, as the revised SAPCCs combine the actions and priorities of several ministries, and the support is aimed at improved access to finance for these interventions. However, the focus of the proposed interventions is not on residual climate risk management, and the national fund is characterised by lengthy approval processes and low overall funding (EXP-11; EXP-14). Consequently, it has not been possible thus far to achieve comprehensive residual climate risk management with this instrument.

ARC is more likely to achieve national alignment, because it works with governments. There is also more work on embedding and alignment at the regional level. According to OPM (2017), ARC has engaged with a wide range of actors to promote the use of ARC products and services. While dialogue was limited at the outset, ARC and the African Development Bank (AfDB) signed a Memorandum of Understanding in 2017 to strengthen cooperation. This gave birth to the AfDB's Africa Disaster Risk Financing Programme (ADRiFi) in October 2018 (AfDB, 2017, 2018). The cooperation specifically aims to plan, develop and implement interventions to build climate change resilience. It aims to support member countries on policies such as the drought risk pool and other disaster risk interventions. The cooperation can further complement ARC's already relatively comprehensive approach, and further strengthen its important role in risk financing and risk pooling.

In summary, it is possible to say that the IIF and ARC in particular play an important role in the interplay of global approaches to comprehensive residual climate risk management. At the same time, in this context, embedding third-party risk finance instruments in the regional, national or local environment is a challenge. Gaps exist in particular in coherence and coordination with other actors, and within German development cooperation.

4.1.5 Effectiveness and impact (EQ3)

Box 7 Benchmarks for assessing EQ3

- The interventions achieve their objectives at outcome level.
- The intervention makes a clear contribution towards the achievement of objectives at outcome level.
- Wider impacts of the interventions can be identified and/or foreseen.
- The intervention makes a clear contribution towards the identifiable/foreseeable impacts.

The IIF has already been able to acquire substantial funds, but its size falls short of expectations. With a capital of 64 million US dollars paid in, the KfW was initially the only shareholder in the fund. At the output level, the objective in the programme proposal to the BMZ was to attract private investors for a total fund volume of 300 million US dollars (DOC-16). The debt fund was supposed to reach a size of 200 million US dollars and the equity fund a size of 100 million US dollars (DOC-16). However, attracting investors for risk financing went slower than expected. That said, this was also not a focus initially. Later on it was accorded higher priority as a fund management activity (DEV-16; DOC-03). In total, by 2020 the Fund was able to attract an additional 100 million US dollars in private resources plus 20 million US dollars from commercial development finance institutions (DFIs) on top of the 64 million US dollars in official capital already in place (IIF, 2020). The debt fund stands at 105 million US dollars[23] (entirely from private resources), thus falling short of its target.[24] The equity fund was closed to further investors in July 2020 at a total size of 79 million US dollars, until it expires in 2027 (DEV-15) (BlueOrchard, 2020; IIF, 2020).

[23] According to the InsuResilience Investment Fund (IIF, 2020), a further 50 million US dollars of inflowing investment funds in the debt fund were approaching closure, and were expected to close by the end of 2020.

[24] Compared to the funds examined in the DEval 'Structured Funds' evaluation, the overall size of the IIF is rather large. Only a few of the funds considered in the 'Structured Funds' evaluation are larger than 100 million US dollars (Orth et al., 2020).

The fact that development was slower than expected, or that targets have not yet been achieved, is due to various reasons. First of all, the investment portfolio was not yet fixed at the beginning, so investors did not know what exactly they were investing in (DEV-16). Secondly, investors generally assess risks more highly than the fund management. Besides risk aversion, another obstacle is a low level of interest in CRI in general on the part of investment providers (DEV-33). This aspect was also highlighted as a risk in the ToC. The split between debt and equity funds introduced in 2017 is seen as being responsible for positive momentum as it accommodates the different preferences of investors, such as greater security of repayment and stability in the debt fund (DEV-16; DEV-33).

The IIF's risk financing target was met in 2020. By September 2020, a total of 133 million US dollars had been provided to 21 investment recipients to develop and scale up CRI (IIF, 2020). In 2020, there were 14 debt financing investments, mainly in Latin America and Asia. Once exception was the VisionFund network, which operates globally and primarily in Africa. IIF-issued loans tend to be small, with an average size of 4.9 million US dollars (as of 2019 reporting) (DOC-03).[25] Of the six equity investments, mostly focused on weather data and risk modelling, two companies are active in Africa and two in Asia. The other two supported actors operate globally. As such, a wide range of investees have benefited from IIF funding and numerous activities on CRI have been supported. In the history of the IIF, as of 2020 only one of the investment recipients had filed for bankruptcy, with only a small loss in value for the IIF due to currency movements (DOC-03). Since 2018, the debt fund has generated sufficient income to fund all ongoing costs (DOC-03). Subsequent sales proceeds from the equity investments are expected to cover the costs of the equity fund and offset potential further losses (DOC-03). Thus overall, developments are slower than expected and the number of investors and investments is not yet in line with targets. A final assessment will only be possible after the sale of the equity investments.

Even if the restrictions or slower processes in achieving the objectives at the output level make the overall evaluation of the outcomes difficult, **the investment recipients studied do see positive effects from the financing by the IIF.** Here, the two examples considered in the IIF's equity and debt funds reflect the principle of risk financing very well: Firstly of all, capital is provided to an established microfinance institution to expand an existing product that already works; secondly, support is provided to a newly founded enterprise whose ultimate success still remains uncertain. The capital paid in can lead to the following effects, which were also confirmed by the borrower examined (DDP-15):

1. Maintenance of the statutory balance between deposits, equity and investments
2. Increase in lending
3. Good economic profitability, without losing independence through capital from third parties (as with equity investments)
4. Maintenance of liquidity in the event of a climate risk event, and use thereof for activities to reactivate borrowers

The equity borrower studied also sees independence from private funding as a positive effect of IIF financing. In particular, the borrower can contribute to the public availability of weather data, and model innovative products for customers in developing and emerging countries (DDP-01).

[25] This classification is based on the categories applied by DEval's 'Structured Funds' evaluation, in which average loan sizes of less than USD 9 million are considered rather small; however, these can be awarded in a fund structure to cover costs (Orth et al., 2020).

The IIF can reach numerous households and companies through its financing, but has not yet achieved its very ambitious goals. Despite the challenges of convincing investors and investment recipients, the fund managers believe that the goal of expanding risk pooling instruments is mostly achieved when the investment is made, especially in the debt fund (DEV-33). At 104 million beneficiaries by 2020, the fund had set itself very high targets and a tight time frame. However, since (as described above) at the output level both the acquisition of capital and the acquisition of investment recipients are slower than expected, according to current figures only 25 million beneficiaries[26] were reached by September 2020 (IIF, 2020). The time frame for achieving the target was subsequently shifted to 2025 ((DEV-15; DOC-03); (IIF, 2020)), and the target was put at between 90 and 145 million beneficiaries in the current outreach report (IIF, 2020). Slow scaling processes in the respective institutions were highlighted as another reason for the low numbers (DEV-15). If financial and insurance markets are not sufficiently well developed to facilitate product development or ensure scalability (DEV-33; EXP-27), this leads to a lack of any regulatory framework and of knowledge on CRI. Contributing to regulatory developments is not envisaged as part of the IIF's activities. Nor would it fit in with the rapid implementation approach of the financing, due to the long processes involved.

The IIF contributes to results at the outcome level. When financing a newly established company – as in the case of the equity recipient studied – the individual successes can be relatively plausibly traced back to the IIF financing, such as weather data for modelling and products developed with it. In other words, the IIF can make a clear and attributable contribution to improving insurance products here. In the case of the borrower studied, it is less clearly demonstrable what contribution the financing by the fund has made to the achievement of objectives. The borrower lacked the equity capital to expand their lending business, and the insurance business directly associated with it. The development of the financial institution's lending business has been positive in recent years (DDP-15; DOC-30). And for the time being it has also developed positively since the IIF financing, with a slight reduction in the amount of lending to microenterprises at the end of 2019.[27] Since climate risk insurance in conjunction with the loan is mandatory, the number of insurance policies changes directly along with the number of loans for MSMEs, and has therefore also grown.

The calculation of insured persons and the inclusion of indirect beneficiaries allow only limited conclusions to be drawn on impacts. The number of insured persons is used as a decisive criterion for strategic decisions; however, it is only determined by simple descriptive procedures. Given that the number of indirect clients is extrapolated (DDP-05; DDP-07) and other household members are systematically included, the number of beneficiaries is very likely to be overestimated. Although the IIF is likely to be one contributory factor here, the numbers of insured persons may not be directly caused by IIF funding (DEV-10; DEV-24; EXP-27). The causal chain from the fund's activity to the final beneficiaries is very long,[28] and external factors influence whether individuals choose insurance. There is therefore an attribution problem. Moreover, the product of the debt fund studied is primarily a credit protection product that protects the MFI from default and keeps the beneficiaries solvent. It is very likely that household members included in the calculation do benefit. However, only impact evaluations for indirect beneficiaries would permit reliable conclusions concerning the link to the financed intervention (Holzapfel, 2014).

After a less-than-successful start, ARC is making progress towards its 2016 targets. It had set itself the goal to 'Indirectly insure 150 million people in Africa against the impact of natural disasters, with 1.5 billion US dollars in coverage across 30 countries and channel a further US$ 500 million in climate adaptation financing by 2020' (ARC, 2016). Equity of 78.2 million euros was provided by German development cooperation through the KfW (KfW, 2020), and supplemented with further resources from DFID. The KfW and DFID amounts are repayable in 2034 after 20 years without interest (PricewaterhouseCoopers Ltd., 2020). As a

[26] In a first step, direct and indirect beneficiaries are counted who have received climate risk insurance or other risk transfer products through a supported company. This number is multiplied by six, based on the estimated average household size. Indirect clients are mostly the result of equity investments, through which technology companies are funded to help insurers or MFIs model their products using for instance appropriate weather data or the like (IIF, 2020).

[27] Downloaded from https://datacatalog.worldbank.org/dataset/mix-market. Microfinance institutions provide business data there (accessed on 29/11/2020).

[28] For example, users of products developed by an investment recipient for an MFI are included (1. IIF supports technology company -> 2. technology company develops CRI product for MFIs not supported by IIF -> 3. clients of MFI use product and are counted as indirect beneficiaries).

result of the initial lack of comprehensive success, the equity contribution was reduced by 43 million euros and transferred back to Germany's federal budget. In 2020, 34 African Union countries were members of the ARC. Of these, 15 countries have successfully undergone the capacity development process and received the Certificate of Good Standing (DFID, 2020). Twelve countries are actively using the early warning software provided (DFID, 2020), and a varying number of countries join the risk pool each year (ARC, 2020c), with 11 countries in 2019/2020 being the most so far (ARC, 2020c).[29] In total, as of 2020 there have been nine disbursements totalling 64 million US dollars (ARC, 2020c).

The ARC faces several challenges that negatively affect country satisfaction and participation in the risk pool. For example, the effectiveness and efficiency of the governance bodies have been considered limited. They are also seen as involving political and procedural barriers that hinder a timely and effective response (DFID, 2019; OPM, 2017). On the positive side, the funding mechanism was highlighted as providing faster financial support than other sources (Clarke, 2017).

By addressing various criticisms, ARC can strengthen its role as an important instrument for climate risk finance. Since one of the challenges for ARC is the payment of premiums by members, it offers an additional risk financing mechanism. This will enable premium support from 2019 to 2023 through the Africa Disaster Risk Financing Programme and the Global Risk Financing Facility. To date, the AfDB has agreed premium support with The Gambia, Madagascar and Zimbabwe for the period 2020-2022. It is also in negotiation with other countries. Furthermore, the early warning software and contingency planning processes have been revised to improve the ARC financing tool and add modelling of additional risks. However, concerns remain about the effectiveness of the modelling software used in the very different contexts (OPM, 2017). The entire institution of ARC is also currently being restructured: The ARC Agency and ARC Ltd. will merge into one institution in order to streamline processes (ARC, 2020a; DFID, 2020). Overall, from the perspective of the target group, these interventions appear to have addressed some of the challenges successfully, or at least promisingly. One indicator of this is the higher number of countries in last year's risk pool (ARC, 2020c).

German support can make an important contribution to improving access to national financing funds. Although the NAFCC has supported important risk reduction interventions, hardly any residual climate risk management interventions have been funded so far. Only partial aspects within adaptation or resilience building interventions have been financed (EXP-21; EXP-24; EXP-26; GOV-10). Within CCA-RAI, GIZ supported the development of interventions and submission of project proposals to the NAFCC (DEV-18; DEV-27; DOC-26). It also made innovative proposals for accessing climate finance from the GCF (DOC-26). The project proposals submitted to the NAFCC with German support were approved (GOV-05; GOV-13; GOV-15). However, access to international climate finance from the GCF was barely improved (GOV-09).

Capacity development is a key contributor to achieving the risk financing objective in all three instruments. In all three instruments, TA is designed for the direct target groups, i.e. investment recipients in the case of the IIF, governments with the ARC and state institutions with CCA-RAI. In ARC, capacity development processes have taken place in 15 countries, and can thus contribute to the stability of ARC *in toto* as a risk finance instrument. The component of the CCA-RAI project examined here focuses on capacity development in the writing of project proposals. And as described in the paragraph above, it reports positive feedback on all project proposals thus supported, and therefore success in accessing risk finance. All three case studies examined show the importance of capacity development in the context of risk financing, or as a prerequisite for it.

[29] The number of countries in the risk pool fluctuated widely, with six in 2016/2017, five in 2017/2018, three in 2018/2019 and then eleven in 2019/2020.

The fund management sees IIF TA as a key component for building CRI capacity in the institutions and for developing adapted and marketable products (DEV-16). The focus of support is on marketing and distribution of insurance products (DEV-16), but also on assessing whether a product is suitable for the market (DEV-15). The advice is highly tailored to specific cases and clients (DEV-30). It is considered very important by this investment recipient, who received TA because the company could not have handled the tasks taken on by the consultants with its own human resources (DDP-01; DDP-07).

The three instruments have set themselves ambitious goals at an overarching level. At this stage, however, these can only be evaluated on the basis of qualitative evidence and the potential to be derived from that. As the instruments have a relatively indirect effect, it is difficult to infer impact. This is due to the combination of a very long causal chain up to the final beneficiaries ((DEV-16); (Orth et al., 2020)) and relatively short-term interventions: The IIF emerged from the Climate Insurance Fund (since 2015) and the ARC has existed since 2012 ((DEV-30; DOC-16); (ARC, 2016)). At the same time, however, in the case of the IIF it is also clear that the focus of the actors is on the number of persons reached (especially insured persons). Little information has been collected on broader impacts such as resilience building, adaptation to climate change or usefulness of the insurance (DDP-02; DDP-15; DEV-15; DEV-16; DEV-33; DOC-16). In the future, to obtain further information the fund management plans to survey the insured persons on a standardised basis following a payout (DEV-16). An impact evaluation of ARC, which was expected to provide findings during 2020, has not yet been published. It is not possible to draw any conclusions concerning the impact of CCA-RAI due to the small number of residual climate risk management interventions.

The IIF and ARC help to raise awareness of climate disaster insurance and preparedness at the global, regional and local levels. The size of the IIF and the IGP as a whole gives the issue a lot of weight at the international level (DEV-24). Both the IIF and the investment recipients help to make climate risk insurance better known and more readily accepted in countries with a lack of insurance culture. For example, the various actors of the debt investment recipient studied highlight the fact that following a climate risk event, there is greater awareness of insurance when an insurer has paid out (BEN-07; BEN-15; DDP-15; STG-01). With ARC too, most interviewees point to increased awareness and a shift by African governments towards greater engagement with climate risk events. For example, 30 countries participated in the ARC Conference of Parties held in Kigali in December 2019, in order to discuss risk management (DEV-34; DEV-38; MSG-08).

The IIF has great potential to help transfer risk through the instruments it finances. This is due to the large number of investment recipients it supports. However, at this point in time there is no systematic evidence of risk transfer among the final beneficiaries. In the case of the two investment recipients studied, a different potential for risk transfer is evident. The priority of the company in the equity fund studied is to support risk transfer products, which means that – as some examples have illustrated – outcomes and impacts seem plausible (DDP-08; DDP-09). In the case of the studied microfinance institution in the debt fund, risk transfer occurs only partially. By combining the insurance with a loan, the risk transfer is complete to the extent of the loan taken out. This is because following an extreme weather event, borrowers are often unable to continue servicing their loans. For further losses and damages, however, this only applies to the extent that the money does not flow into the loan to be paid off (DDP-15). Thus, for most policyholders, the risk transfer for the effects of climate risks occurs partially, and in the case of a newly taken out loan not at all. If a new loan is granted, it is then possible to borrow further money to pay claims or to restart the business (BEN-04; BEN-07; BEN-15; BEN-18, BEN-21; DDP-15). This means that borrowers can be kept financially solvent, and some of the economic losses and damages can be reduced if necessary (VisionFund, 2019). At the same time, taking out more loans can place companies in a more difficult economic situation due to over-indebtedness (Bylander et al., 2019; Schicks and Rosenberg, 2011).

It is not possible to clearly demonstrate that ARC member states are better able to anticipate weather-related disasters in a timely manner, and plan and fund the response more effectively than non-member states (OPM, 2017). There is as yet no detailed research on the effectiveness of ARC's risk transfer, particularly at the population level. ARC documentation suggests that several countries have received payouts. It also suggests that they have been able to finance interventions to cover the impacts of drought as part of their plan of operations (which they designed in the capacity development process) and the final implementation plan (ARC, 2020c, 2020b). Thus, risk transfer at country level for payouts in case of drought is very likely, but cannot yet be accurately assessed. Some countries criticised the fact that the insurance did not trigger despite drought (Hillier, 2018); accordingly, no risk transfer could occur here.

Box 8 Assessment of the instrument group 'third-party risk finance'

Evaluation question 1: The three third-party risk finance instruments considered reflect three approaches to risk financing, and are therefore rated differently in terms of their relevance. Overall**,** the three considered instruments – or contributions to the use of risk finance – meet the benchmark of relevance; they finance activities to manage residual climate risks in a global context, and help to close the financing gap in this area. The ARC and IIF in particular meet the benchmark of relevance to relevant strategies and agendas by increasing financing, and through their global or regional reach. The IIF meets the benchmark in particular by mobilising private capital and promoting the private sector.

With ARC and CCA-RAI, the approach of implementation by countries – based on their agendas – helps meet the benchmark of alignment with national objectives. For the IIF, challenges arise here due to the private sector approach and its global reach. Alignment with the development needs of the final beneficiaries is also a challenge for the IIF, due to the financing at private sector level.

Concerning the principle of alignment with partner countries and with the needs of final beneficiaries, the instruments are partially relevant (subject to the aforementioned differences). With all three instruments, capacity development components play a key role in making the finance more relevant.

Evaluation question 2: In the interplay of the global approaches, the IIF and ARC meet the requirement of a comprehensive approach to residual climate risks, and represent unique and innovative instruments for managing them. However, embedding risk financing instruments in the regional, national or local context for comprehensive residual climate risk management is challenging. Overall, it is clear that all the financing instruments considered can be improved with regard to comprehensive risk management. Gaps exist in particular in coherence and coordination with other actors. Risk preparedness is in some cases poorly integrated. Moreover, only few climate risks have been covered so far, and climate risk assessments are barely used. The risk financing instruments considered therefore partially meet the benchmark of comprehensive residual climate risk management.

The IIF and ARC case studies show that risk financing instruments can be well combined with risk pooling instruments. In the case of ARC, this link is provided by international equity participation (as financing for the insurance company) and the regional risk pool it supports (for allowances in case of claims). For IIF, the link is through the provision of finance for risk pooling instruments, including premium subsidies provided through national governments. With CCA-RAI, project proposals for (residual) climate risk management are supported through the SAPCCs and thus the NDCs, which provide access to national and international funds. With regard to comprehensive climate risk management, the three risk financing instruments **meet** the benchmark of effectively covering relevant climate risks of the target groups and the final beneficiaries (with the limitations mentioned).

Evaluation question 3: All risk financing instruments can demonstrate successes at the output level, some of which are already translating into outcomes. For example, the IIF's finance reaches a large number of actors who are further expanding the climate risk insurance sector in developing and emerging countries. Moreover, this weighty initiative makes the issue of CRI visible at the international level. ARC is also already achieving results through the large number of participating countries and an active further development process. Some countries have already benefited from ARC disbursements in addition to the capacity development process and participation in the risk pool. Overall, with regard to the general objectives of

risk financing, all instruments have developed more slowly than expected to some extent. As a result**,** they have shown effectiveness at the outcome level, though not yet to the extent planned. The benchmark of achieving the objectives and of a contribution by the interventions is thus partially met**.**

So far, information on outcomes and impacts of financing at final beneficiary level can only be outlined qualitatively. The current method of estimating the number of direct and indirect beneficiaries reached by the IIF is not sufficiently robust to assess the actual effectiveness and impact of the instrument. Consequently, at the impact level there is potential to achieve impacts, but there is insufficient robust evidence on this to date.

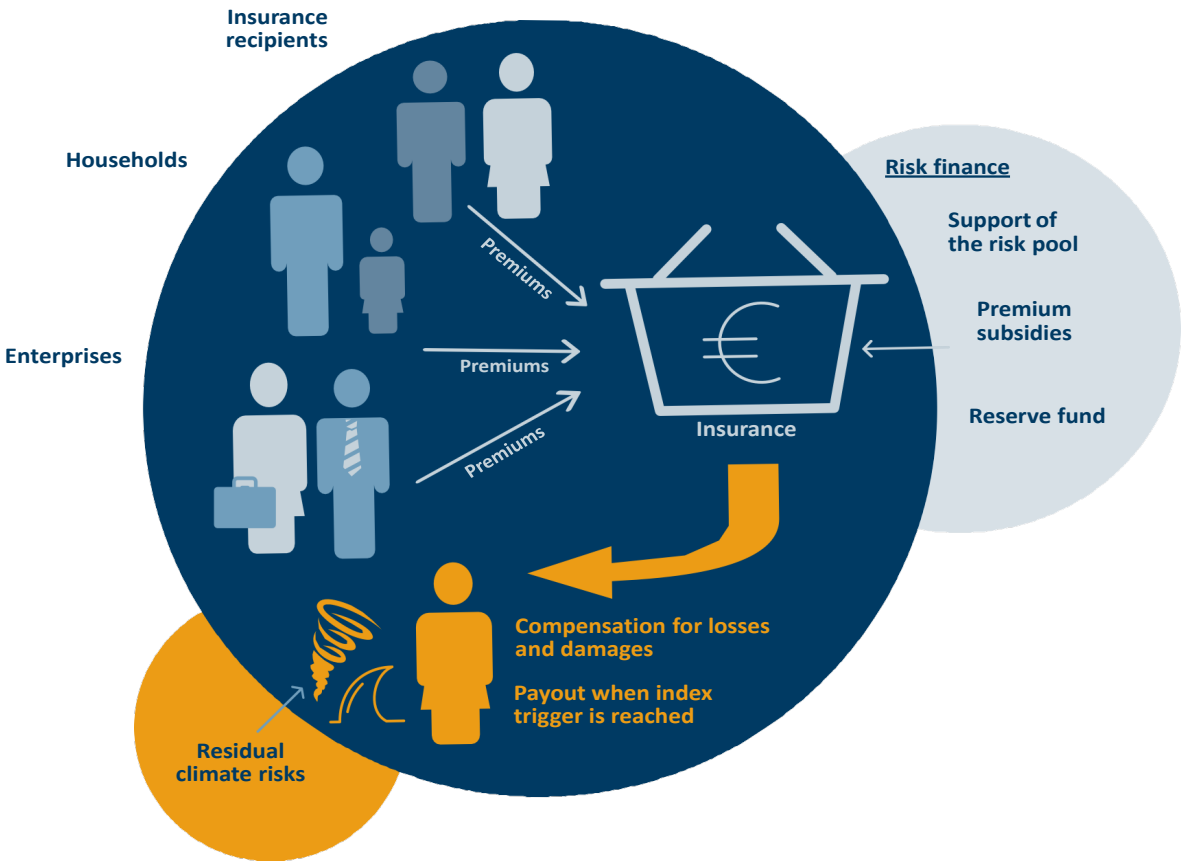
4.2 The 'risk pooling' instrument group

4.2.1 Introduction and contribution to residual climate risk management

Risk pooling as part of risk financing is a risk transfer instrument. In weather- and disaster-related risk pooling, risks are transferred between the members of the risk pool, who are spatially distributed and exposed to different risks. The risks are thereby transferred to the risk pool (and thus, as a rule, to all insured persons).

In both adaptation-related and disaster-related development cooperation, risk pooling is carried out through climate risk insurance and its reinsurance. Here, predefined risks are transferred to a pool through the payment of an insurance premium. The size of the insurance premium depends on the risk characteristics of the insured event and the insured entity/entities of the pool. Risk coverage is provided through the common resources of the pool. Risk pools can be set up on an international, regional, national or local level. The insured entities are usually at the national, local or individual level, and can be e.g. countries, states, provinces, cities, individuals, MFIs or NGOs. The insurance covers for instance the risk of crop failures, infrastructure damage or losses of business activities due to weather-related extreme events. First of all, (potential) losses and damages are covered, and compensated. Secondly, consequential damage can often be prevented through swift payouts. Risk pooling is relevant to financial protection against weather-related extreme events that occur infrequently and involve a relatively high risk of losses and damages. It is crucial for the economic viability of the CRI that the risk spread of pool participants is sufficiently large. Other instruments are more suitable for homogeneous pools, intangible residual losses and damages, gradual environmental changes or frequently occurring extreme events. Figure 8 illustrates the simplified structure of a CRI solution.

Figure 8 Structure of climate risk insurance



Source: DEval, authors' own graphic

In the event of a claim, affected pool participants receive the payout defined in advance in the insurance policies. With damage-based insurance, payments are made depending on the assessment of actual losses and damages. By contrast, with so-called parametric or index-based insurance, payments are triggered automatically and relatively quickly when a certain measured value – often a meteorological one – is reached. These measured values capture, for example, wind speed, precipitation per unit of time or the duration of a precipitation-free period. The payout is thus triggered regardless of the losses and damages, or an assessment thereof. Conversely, this means that a loss can remain uncovered if a predefined measured value is not reached.

In practice, index-based insurance is preferred, especially in countries with less highly developed insurance markets. The reasons why insurance companies and development cooperation prefer them to claims-based insurance are as follows (IFAD, 2011; Skees, 2008):

- comparatively low transaction costs
- less potential for moral hazard (riskier practices by policyholders once the contract has been signed)
- lower data requirements
- greater transparency and faster payouts.

Claims-based insurance is hardly ever used for microinsurance in the area of climate risks. This is partly due to the higher costs and the more complex (and therefore longer) payout processes. Relevant for the implementation of parametric (index-based) insurance are (i) identification of a suitable measured value, (ii) establishment of a diverse risk pool and (iii) definition of the principles governing who contributes to the CRI (Schäfer et al., 2016; Linnerooth-Bayer et al., 2019).

To ensure economic efficiency and avoid negative incentives for pool participants and insurers, CRI is usually combined with other instruments. This enables broader risk coverage, especially for risks with expected high losses and damages, or those with a low but frequently occurring risk of losses and damages. Integrated applications exist, e.g. with instruments for risk reduction, risk preparedness (to minimise losses and damages) and risk financing, which is particularly suitable for actuarially or economically uninsurable risks. For example, pool participants could be incentivised to upgrade their infrastructure against extreme weather events such as storms and floods, thereby minimising losses and damages. Furthermore, risk prevention interventions such as capacity development can lead to better financial literacy and improved risk awareness, thus promoting a culture of risk prevention and reduction. This combination with other instruments is fundamental to the efficiency, effectiveness and impact of risk pooling. Risk reduction through adaptation and risk preparedness is implemented alongside risk pooling until further reduction or preparedness is no longer economically justifiable or limits to adaptation are reached.

In addition to the microinsurance under consideration, some macroinsurance solutions also exist in the form of regional risk pools for countries. Insurance at meso level for institutions is still a relatively new area of climate risk insurance. At the individual, local and value chain level, climate risk insurance often builds on development cooperation interventions for microfinance and value chain development in the agricultural sector. Relatively new areas of insurance include natural resource insurance in the Caribbean (Beck et al., 2019), for example through the tourism sector.

There are examples of microinsurance being implemented globally and in German development cooperation in a large number of development-related sectors and at several levels. Although many interventions have a focus on a higher level or are openly designed, there is a clear focus on microinsurance. In German development cooperation, a large number of interventions are based on developing and establishing microinsurance, particularly in agriculture. Occasionally meso approaches are supported such as the Natural Disaster Fund, through which institutions can insure themselves, or the equity investment recipient capitalised by the IIF. German development cooperation is more strongly involved at the macro level. Here it supports climate-related regional risk pools such as CCRIF, PCRAFI (Pacific Climate Risk Assessment and Financing Initiative) or ARC. Furthermore, the levels are linked, inter alia through the BMU-funded CRAIC intervention (Climate Risk Adaptation and Insurance in the Caribbean) under the International Climate Initiative. They are also linked via the general promotion of insurance-based approaches through the activities within the IGP.

To evaluate the instrument, implementation examples were selected on the basis of criteria. These cover various sectors, geographical and institutional contexts, partner institutions and actor constellations. The present evaluation module examined five interventions of German development cooperation involving CRI activities, as part of a case study (see Table 9). All of the interventions examined are considered in this section, particularly with regard to their risk pooling instrument. In some cases they contain further components that are considered in other sections, or are not part of the study. However, their existence is taken into account in the final assessment, especially for the area of comprehensive climate risk management.

Table 9 Case studies on risk pooling

Abbreviation		Title of case study	Risk pooling instruments considered	Target groups
PrAda		Projet Adaptation des chaînes de valeur au changement climatique	CRI for value chains	Actors of selected agricultural value chains
SAGA	SAGA	Strategic Alliance GIZ and Allianz	CRI for industrial areas	SMEs, actors of the industrial area
	ACRI+	Advancing Climate Risk Insurance +		
	PSACC	Private Sector Adaptation to Climate Change		
RFPI III		Regulatory Framework Promotion on Pro-Poor Insurance Markets in Asia III	CRI for extremely poor, poor and at-risk households and MSMEs	Extremely poor, poor and at-risk households and MSMEs
ARC		African Risk Capacity	Regional risk pool	Countries of the AU, as final beneficiaries the poor and vulnerable population
IIF		InsuResilience Investment Fund	Financing of investment recipients along the CRI value chain	Private actors along the CRI value chain, poor and vulnerable population

Source: DEval, authors' own graphic

Four of the risk pooling instruments considered are at the micro level. The initiation of CRI for industrial areas in Ait Melloul, Morocco, with approximately 300 SMEs and around 25,000 employees, in the interventions SAGA, PSACC (Private Sector Adaptation to Climate Change – a global programme) and ACRI+ (GIZ, no date a), is innovative. Within PrAda, CRI is being introduced in Madagascar, which aims to protect actors in agricultural value chains against climate- and weather-related events (DOC-20).[30] RFPI III aims to develop CRI for the poorest, poor and at-risk population groups in the Philippines, among other countries (GIZ, no date b). From the IIF analysis, findings on an IIF-financed insurer are also included in the context of risk pooling: A microfinance institution supported by the debt fund offers a CRI solution for borrowing microenterprises, and was considered in a case study.

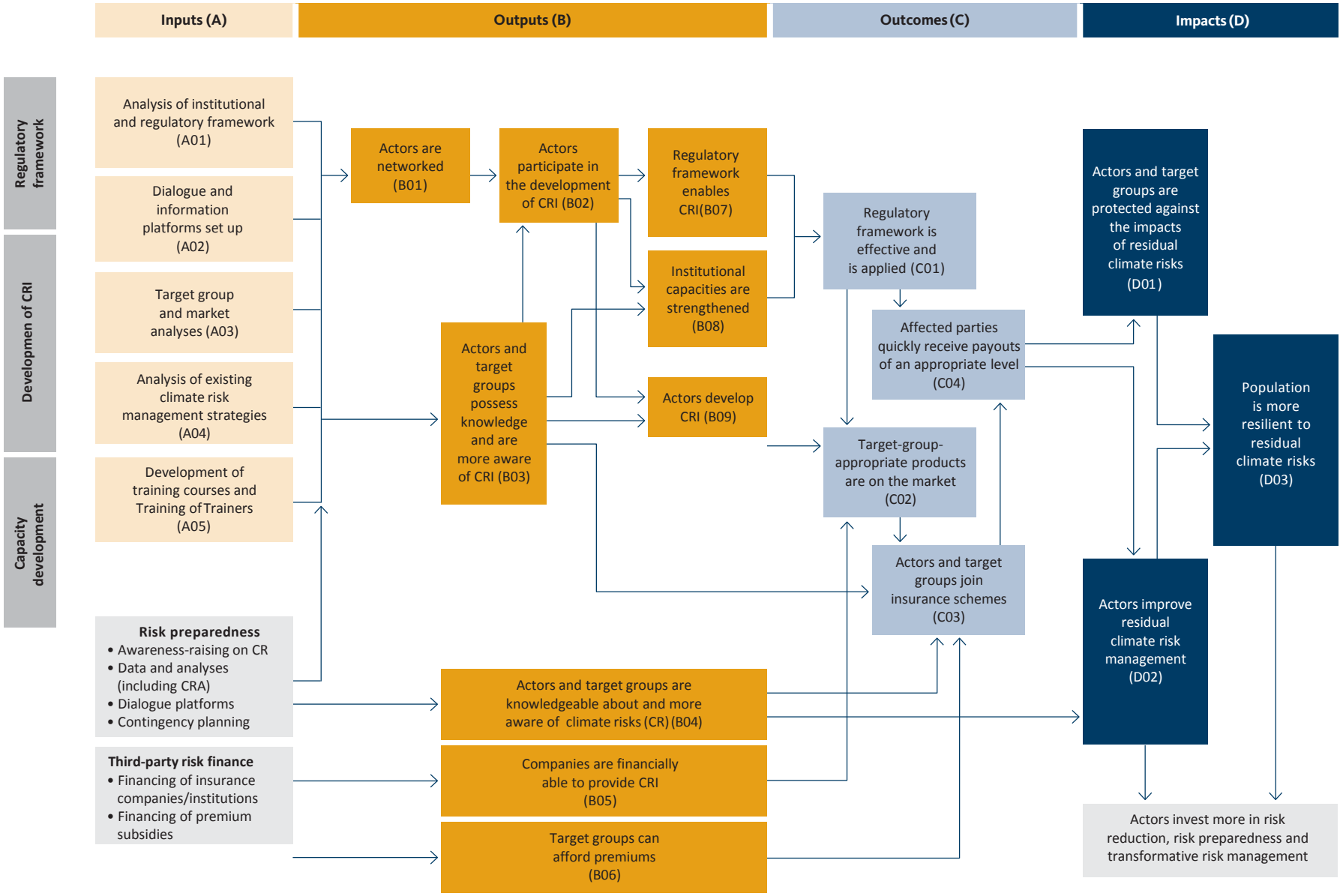
ARC was selected as an example of regional risk pooling due to its evaluability, the existing evaluation gap and the relevance of the German contribution. The ARC is the first risk pool established for low-income countries, and is open to a total of 34 AU member states (ARC, 2020a). The ARC is divided into two entities. This section focuses on the risk pooling element in ARC Ltd. The ARC as a whole, i.e. including the ARC Agency, was considered in the previous section. ARC Ltd. is a private, member-owned insurance company. It develops insurance solutions against natural disasters. It is funded by premiums from member states as well as ODA contributions, which are currently being provided by Germany and the UK (KfW and DFID).

[30] PrAda comprises three fields of action. Field of action 3 deals with access to insurance products for protection against climate and weather-related events, and further activities within the intervention complement this field of action. The object of this evaluation module is the risk pooling instrument in field of action 3, plus the activities on the regulatory framework, which are dealt with in the instrument group 'risk preparedness'.

4.2.2 Theory of Change for the instrument group 'risk pooling'

A Theory of Change on risk pooling (especially micro and macro CRI) was reconstructed on the basis of five interactive workshops on four case studies (SAGA, PrAda, IIF and RFPI III) and the study on ARC. Furthermore, interviews conducted in the context of the case studies as well as project documentation and scientific literature were also used for this purpose. As shown in Figure 9, the ToC is subdivided into three impact pathways that interact: 'regulatory framework' 'development of CRI' and 'capacity development'. It is closely linked to the instrument groups 'third-party risk finance' and 'risk preparedness'. The targeted impact is to make the population more resilient to residual climate risks.

Figure 9 Theory of Change for the instrument group 'risk pooling'



Source: DEval, authors' own graphic

The establishment or adaptation of the regulatory and institutional framework is necessary especially for the introduction and continuation of micro and meso CRI (impact pathway 1). In implementation contexts of German development cooperation, index-based insurance solutions are usually novel. Introducing them therefore entails analyses and advisory inputs on the regulations governing insurance, on their taxation, on the institutional framework, and on mandates and responsibilities (A01). Another important component of the regulatory framework is to create targeted dialogue and information platforms for insurers, regulators, experts and other actors in order to improve coordination (A02). Through these activities (A01, A02), the regulatory framework for the introduction and application of the respective risk pooling products is prepared at the output (B07) level by involving various actors (B02). Furthermore, institutional capacities are strengthened (B08) and an important contribution is made to developing the instruments (B09).

At the outcome level of impact pathway 1, in the short and medium term these outputs (B01, B02) enable the effective application of the regulatory framework (C01) and lead to strengthened institutional capacities (C02). An overarching study commissioned by GIZ identifies the legal and regulatory framework as the main impediment to engaging private actors (Carpenter, 2018). Development cooperation and insurance actors discussed the lack of data availability, as well as insufficient data sharing and networking between private and public actors, as further inhibiting factors (Cissé and Mombauer, 2020). For the regulatory framework, it is also important to include index-based insurance in the regulations and to strengthen consumer protection. This will enable policyholders to trust and accept the product even when climate risk insurance is first introduced, and to be sure that they will actually receive an insurance benefit in case of an insured event.

The second impact pathway describes the development, distribution and use of CRI. Activities for this impact pathway encompass analyses of target group needs (A03), including the needs of marginalised groups, as well as market analyses to identify relevant channels and actors for the distribution of CRI. This also ascertains the target group's willingness to pay. This is important for ensuring that the product is actually in demand. Furthermore, analyses should be carried out of risk management strategies already used by the target groups, as well as by partner institutions and other relevant actors (A04).

Impact pathway 3 shows capacity development in direct relation to risk pooling. For example, training courses and Trainings of Trainers (ToT) are developed and implemented (A05) so that target groups can subsequently participate in these, expand their knowledge (B03) and be trained as trainers.

For risk pooling to be effective and generate impacts, it also needs to be integrated with other groups of instruments. These can include, for example, long-term subsidies for premiums, and the financing of insurance institutions through third-party risk finance. Aspects of loss and damage reduction, contingency planning and other information and awareness-raising measures are also included. Linnerooth-Bayer et al. (2019) broadly expect that the loss and damage reduction and compensation targets set out in the WIM will be missed unless significant changes are made to the design of CRI (such as subsidies for the poor) and their implementation.

General risk preparedness can help ensure that target groups become more aware of climate risks and are kept continuously well-informed about them (B04). This awareness-raising, as well as knowledge about contingency planning as conveyed within ARC, make an important contribution to (i) actors and target groups joining the insurance schemes (C03), (ii) the instruments working effectively, and (iii) where relevant, premiums being reduced through a reduction in the losses and damages that occur. With regard to third-party risk finance, the capitalisation or financing of insurance institutions, as with ARC and IIF, is an important complementary approach to promote institutions and their investment in insurance. Furthermore, for target groups such as low-income households, micro-enterprises, farmers or low-income countries, it is crucial to provide premium support to enable their participation in the risk pool.

Through the interplay of the three impact pathways, and the combination with other instrument groups, needs-based CRI solutions emerge on the market (C02) that actually cover residual risks and potentially strengthen the resilience of the target groups to extreme events. Actors and target groups actually join the insurance schemes (C03) – made possible, among other things, by premium subsidies – and quickly receive compensation in relevant amounts (C04). The impacts are a safeguarding of actors and target groups (D01),

and improved residual climate risk management by actors (D02). Here it is important that insurance products incentivise target groups to minimise climate risks, practice preparedness and share risks efficiently through appropriate mechanisms. To ensure impacts, insurance products are generally used in combination with the other three instrument groups for residual climate risk management. Overall, the population is more resilient as a result (D03).

One assumption regarding the ToC for market-based microinsurance is that insurance companies and other actors involved in distribution are interested in creating an insurance product that is relevant and sustainable for residual climate risks. Linked to this is also the assumption that actors are willing to work together in a relatively innovative area. In the case of market-based products, it is also assumed that a largely functioning market exists in which actors compete and offer different products according to demand. Specifically, this means that the insurance market should be economically sustainable, so that insurance companies invest in the development of insurance products and offer them on the market in the long term. Another assumption is that adjustments to the regulatory framework will be made, including for instance tax adjustments or the approval of actors and innovative products by the relevant authorities.

One risk is that the CRI solutions introduced on the market do not meet demand. Specifically, this could involve climate risks that are relevant to the target groups but are not considered profitable by the insurance companies. Such a case would arise, for example, if weather-related extreme events were to occur with increasing frequency. In such a constellation, there would be a risk that losses and damages would not be adequately compensated. A strong dependence of the target group on humanitarian aid and a corresponding recipient mentality may also pose a risk.

Box 9 MSMEs in the Philippines – What factors influence their climate risk management and the relevance of CRI?

This evaluation module conducted **quantitative standardised surveys** in the Philippines to ascertain the relevance of CRI in the RFPI III prior to its introduction. Future policyholders, i.e. households and MSMEs, were asked about their experiences and perceptions of climate risk events and risk management. Similarly, other actors such as local governments, business associations, cooperatives and insurance companies were interviewed. A total of **625 households, 625 MSMEs and 50 actors of named institutions were surveyed in** the **five municipalities** of Las Nieves, Cabadbaran (both Agusan del Norte), Catarman (Northern Samar), Malungon (Sarangani) and Irosin (Sorsogon).

The survey of MSMEs revealed that they are exposed to significant climate risks. Ninety-one per cent of MSMEs had experienced a climate risk event since 2017. Seventy-four per cent of these reported experiencing moderate to major effects. Only about 40 per cent of MSMEs with moderate to major effects received compensation for losses and damages.

Enterprises prepare for climate risk events with individual climate risk management (CRM) solutions. They pay particular attention to climate risks in their planning (85 per cent). In addition, some (25 per cent) diversify their supply. Few MSMEs (5 to 10 per cent) change or diversify their inputs, work structure and or work processes. Many (69 per cent) cooperate with other enterprises in managing climate risks, or set aside reserves in case of a climate risk event (79 per cent). Only few (6 per cent) enterprises invest in protective structural and infrastructural interventions.

In a regression analysis, **determinants for CRM** were measured using an index of the various risk management activities. The following significant determinants were found (see column 1 of Table 10):

- the frequency of climatic risk events (exposure)
- the magnitude of the effects of past climate risk events (impact)
- the awareness of climate risks and participation in training on climate risks.

The higher the experienced effects of climate risk events, the more precautions were taken. However, if enterprises were affected more frequently, they took fewer precautions for CRM. Greater awareness and participation in training increase CRM activities.

Table 10 Regression analysis on determinants of CRM and relevance of insurance

	(1)		(2)	
	Climate risk management (index, 0-1)		Insurance as a relevant instrument (categories 1-4)	
Exposure	**–0.00744****	(0.0036)	0.0164	(0.0108)
Impact	**0.00275*****	(0.0005)	**0.00360****	(0.0015)
Compensation	0.0234*	(0.0139)	**-0.135*****	(0.0415)
Training courses	**0.0936*****	(0.0121)	**-0.0835****	(0.0361)
	0.0362***	(0.0084)	**0,138*****	(0.0253)
LN (net income)	0.00681	(0.0050)	-0.00483	(0.0150)
LN (assets)	0.0110*	(0,0056)	**0.0543*****	(0.0168)
LN (age of enterprise)	**-0.0154*****	(0.0056)	0.00351	(0.0166)
Urban location	0.0228*	(0.0128)	**0.129*****	(0.0385)
Constant	-0.0562	(0.0707)	2.029***	(0.2117)
N	599		599	
R^2 within municipalities	0.147		0.0808	
R^2 between municipalities	0.848		0.975	
R^2 total	0.227		0.155	

*Note: Standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. Multilevel OLS regressions. Additional controls were included for education, age, and gender, and variance between the five municipalities was removed. It is this that explains a major part of the differences, as can be seen from the R^2 value between municipalities. This represents a number of variables for which no controls were included here. See further information and findings in Appendix 7.4. LN stands for the logarithmic transformation of the three variables to approximate a normal distribution of the variable.*

Insurance is seen as a relevant instrument for covering climate risks by almost all MSMEs surveyed (98 per cent). The majority of them (> 85 per cent) state that they would consider CRI for their own strongest risks (especially for storms, floods and drought). To date, however, enterprises rarely use CRI (2 per cent) to cover climate risks.

The findings of the regression (column 2 of Table 10) show that especially those MSMEs that are well informed about climate risks are open to insurance. MSMEs see insurance as particularly relevant if they have experienced strong effects from extreme weather events or did not receive compensation. Higher asset value also leads to a more positive assessment of insurance as a relevant instrument. If enterprises are well informed about climate risks, this has a positive effect on their perception of insurance as a relevant instrument. Training, on the other hand, tends to have a negative effect on perceptions. It is possible that training currently focuses little on CRI, due to its limited availability on the market.

The analysis thus shows the **important role that information and training** play in enabling companies to better protect themselves against residual climate risks, and to see insurance as a relevant CRM instrument. However, an MSME's attitude and activities with regard to CRM and insurance are also influenced by (i) the frequency of losses and damages from severe weather events, (ii) the effects of those losses and damages, (iii) the compensation received and (iv) the enterprise's assets.

4.2.3 Relevance to partners, agendas and target groups (EQ1)

Box 10 Benchmarks for assessing EQ1

- The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.
- The objectives of the interventions align with the needs of the target groups and the objectives of the partners.

Support for CRI aligns with the objectives of both German development cooperation and the international frameworks. For example, CRI can help achieve the Sustainable Development Goals set out in the 2030 Agenda as well as the targets of the Paris Agreement and the Sendai Framework. CRI aligns with the vision of the InsuResilience Global Partnership funded by German development cooperation. It is also consistent with the focus of the BMU's International Climate Initiative on supporting risk transfer in the adaptation sector (BMU-ICI, no date; IGP, 2019). Support for CRI is also found in the sectoral priority areas of German development cooperation. This is already reflected in the respective project and programme offers of the implementing organisations (BMZ, 2016a, 2017).

The risk pooling instruments considered align with global strategies and agendas. At an abstract aggregate level, it is possible to link each risk pooling instrument to most SDGs, as managing risk is relevant to all development sectors. According to documentation on the RFPI III, promoting insurance against climate risks supports financial inclusion and risk protection – premises that are inherent in the SDGs (DOC-17). A contribution to several SDGs is also seen for PrAda (DOC-39; DOC-40). IIF stakeholders, including investment recipients, see IIF-funded CRI as relevant to the SDGs, as it can increase the climate resilience of particularly disadvantaged groups, thus increasing the likelihood of achieving the SDGs (DEV-24; DOC-16).

The PrAda case study shows that the objectives align with national strategies and agendas. One example cited is a consistency with Madagascar's government objective, defined in the National Development Plan (2015-2019) (Ministère de l'Economie et de la Planification Madagascar, 2015). This involves strengthening food security and modernisation of the agricultural sector, as well as expanding microinsurance for low-income populations in line with the five-year plan adopted by the Ministry of Economy (DOC-20; GOV-26; GOV-31). Overall, the risk pooling instrument aligns with Malagasy partners. Its focus on adaptation and the agricultural sector, for instance, is reflected in various Malagasy strategies. That said, CRI is not mentioned explicitly in these ((EXP-05); (République de Madagascar, 2015)). Other strategies and action plans on financial inclusion, rural development, and climate and disaster risks confirm a general alignment with partner priorities. The country's entry into the 2019/2020 African Risk Capacity risk pool reflects the growing interest in CRI (ARC, 2020c). In the minds of many decision-makers and other actors, however, CRI is still barely present.

Various national strategies in the Philippines highlight the fact that CRI is a partner priority. The RFPI III case study shows a high degree of alignment with the national Disaster Risk Financing and Insurance Strategy (DRFI) (Laureano, 2015). The latter has the explicit objective of reducing the impact of natural disasters on the poorest and the vulnerable, and supporting these households and MSMEs in rapidly restore their livelihoods following a disaster (DEV-28; GOV-06). The National Disaster Risk Reduction and Management Plan 2011-2028, (NDRRMP) (Government of the Philippines, 2020) and the Philippine Development Plan 2017-2022 (PDP) (NEDA, 2017) explicitly target increased and effective access to natural disaster risk financing instruments, which include CRI ((DOC-01); (GIZ, 2019c, 2019d)).

In the other case studies (SAGA, ARC and IIF), the assessments vary widely. In the SAGA case study, adaptation is generally seen as a relatively new topic for the partner countries (DEV-23). According to the assessment of development cooperation actors, residual climate risks are not a priority (DEV-26). Awareness of this topic increased, for example, as a result of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change held in Marrakesh in 2016, and the awareness-raising measures of German development cooperation (DEV-23; DEV-26). It is not possible to draw any conclusions regarding the ARC on the basis of the information collected. Alignment with partner priorities seems foreseeable, given the national capacity building process for the preparation of partner-owned contingency plans with corresponding priorities. Overall, alignment with national strategies of the partner countries is seen largely as a given. Given its status as a private-sector instrument with no explicit partner orientation, the IIF is a special case (see Section4.1 on risk financing).

For the PrAda component on CRI, overall a low level of alignment with the development needs of the target groups is found (DEV-06; DEV-11; DEV-19; DEV-22; EXP-05, EXP-20; GOV-12; GOV-17; GOV-21; GOV-25; GOV-26; GOV-29; GOV-30; GOV-31). Here, the findings show that CRI tends to be appropriate for enterprises, and especially those who are more technologically sophisticated. For poor and vulnerable agricultural producers, on the other hand, engineered solutions or infrastructure interventions are more appropriate. It was also noted that the target group's understanding of CRI and insurance in general is low, and that cultural barriers exist. Due to the major effort required to establish CRI, a focus on risk reduction and risk preparedness interventions seems effective and proportionate (EXP-05; EXP-20; STG-04). The target group itself also prefers interventions such as training on improved agricultural techniques, better material resources, and information and awareness-raising interventions on climate risks (BEN-06; BEN-11; BEN-16; BEN-17). Training, awareness raising and risk reduction interventions are also part of PrAda, and thus represent one approach to dealing with these challenges (GOV-12). Government staff also point to the low solvency of the target group, who often engage in subsistence farming and have barely any financial resources for insurance premiums (GOV-12).

High climate risks combined with low solvency thus pose a challenge to the financial sustainability of CRI. Other government staff take a critical view of the continued dependence on humanitarian aid and welcome any alternative, including CRI (GOV-21). Overall, there is a desire for openness in the choice of instruments, flexibility in cooperation with partner institutions at the start of interventions or project commissioning, and greater responsiveness to local realities (BEN-16; EXP-27).

The SAGA case study in Morocco also shows only a limited relevance of CRI. This is due to a lack of risk and insurance culture, and a low preference for insurance. In some cases, a match between the objectives of the insurance company of the intervention and the development needs of the target group (SMEs) is seen. SMEs increasingly see climate risks as relevant, partly due to the contribution of German development cooperation (DEV-23). However, stakeholders prefer infrastructure interventions, capacity building and additional evacuation plans for goods and people. They criticise the lack of openness in the choice of German development cooperation instruments (MSG-03). According to development cooperation actors, the target group prefers risk financing (funds) and risk preparedness, however there is a lack of integration of CRI in risk preparedness interventions (DEV-29). According to the development actors, CRI also does not match the Moroccan risk culture. SMEs prefer to plan in the short term. Consequently, implementing CRI would require considerable awareness-raising efforts (DEV-29). According to target group interviews, experience with existing insurance policies (such as fire insurance) demonstrates that only legally compulsory insurance creates demand (BEN-03; BEN-11); the willingness of SMEs to pay is low (DEV-23).

In the RFPI III regional project, insurance is generally regarded as a relevant instrument against climate risks and for compensation. The insurance product planned through RFPI III is designed for the extremely poor, poor and at-risk segments of the population that are particularly affected by climate and disaster risks. Large segments of the population do not receive compensation for the corresponding losses and damages ((DOC-17); (Annex 7.3.1)). Partially subsidised CRI is to be developed for at-risk smallholders and MSMEs (DOC-17). A discrete choice experiment, supported by further regression analyses, was conducted as part of this evaluation module (see Box 9 and Box 11). It found that for surveyed MSMEs, climate risk insurance is the preferred instrument, followed by infrastructure and improved information sharing for early warning. In the baseline study (Annex 7.3.1), the primary target groups interviewed ranked storms and floods as the most relevant climate risks. These are also to be covered through CRI (GIZ, 2020b). Currently, only a few insurers offer CRI in the Philippines (GIZ, 2019e, 2019f). Insurance is also not common among the target groups, according to the baseline study (Annex 7.3.1). One reason for this may be that there is limited awareness and understanding of insurance in general and CRI in particular ((Annex 7.3.1); (GIZ, 2019g)). RFPI III addresses these compensation gaps. In order to reach the poorest and small insurers, it seeks to combine a risk pooling instrument with a government premium subsidy and a publicly accessible platform containing premium calculation data (DEV-28; DOC-17). CRI subsidies could be highly relevant to local government units (LGUs) in persuading larger insurance companies to see CRI as commercially viable and to enter the market (MSG-04).

In the case of ARC, it is not yet possible to assess the relevance to the population. Besides the strong focus on the national level of partner countries, the OPM evaluation criticised the low level of dialogue with the final target groups and the inadequate eliciting of information from them (OPM, 2017). As a result, while ARC certainly tailors its services to the needs of countries, it does not necessarily tailor them to those of the population. Future developments and analyses will need to show how and to what extent ARC meets the needs of target groups.

The analysis of the limits to adaptation has shown potential for interventions to reduce climate-related hazards and risk exposure; however, some limits to adaptation have already been reached. For example, case study data on SAGA and PrAda, as well as information from the IIF's investment recipient (as described above), indicate that there is a need for further interventions to reduce climate-related hazards and risk exposure, such as flood barriers, water drainage systems and sewers. At the same time, the PrAda case study argues that (i) irrigation systems have become scarce in some places, (ii) drainage systems are pumping brine rather than fresh water due to seawater intrusion, and (iii) alluvial soils have also been eroded due to increased wind erosion and flooding. Interviewees saw a link between reaching the limits to adaptation, and the social conflicts and sometimes violent clashes in Madagascar. They suggested that the ecological crisis was exacerbating social crises, and could aggravate ongoing conflicts in southern Madagascar, for instance (EXP-20). PrAda is pursuing both risk reduction interventions in the selected value chains, and the introduction of a risk pooling instrument. It may also be able to address any needs. In the RFPI III case study, the focus on the risk pooling instrument seems appropriate, as limits to adaptation seem to have been reached.

In summary, at the target group level, risk reduction through adaptation interventions and risk preparedness are the predominantly preferred approaches. CRI is among the priorities in only one case study (RFPI III) – along with infrastructure interventions and information systems. Focusing on CRI carries the risk of failing to meet the usually much broader development needs of the target groups. Overarching risk reduction through adaptation interventions and risk preparedness seem to reflect the needs of the target group; CRI tends to be seen as the last of several possible elements in risk management. It also emerged that insurance and CRI are not understood – sometimes even after awareness-raising measures – or that the target groups do not feel sufficiently well-informed about them. Moreover, with some insurance instruments the question arises as to when the limits of adaptation are reached. To increase effectiveness and impact, it would make sense to implement complementary or, where appropriate, priority risk reduction interventions in the specific context.

Box 11 *Discrete choice experiment* – climate risk management in the Philippines

As one aspect of the criterion 'relevance', the preferences of the target group can be measured with greater methodical precision by conducting a discrete choice experiment (DCE) rather than a direct survey of interviewees. In a DCE, participants are placed in simple decision-making situations in which they have to weigh up alternatives and make compromises. In each decision-making situation, two hypothetical options with bundles of interventions are placed alongside each other. Participants can then choose between the two. Furthermore, there is also a status quo option if neither of the proposed alternatives can be considered under the given conditions. Compared to other methods such as surveys or rankings, a DCE makes it easy for respondents to evaluate complex bundles of interventions. They also provide a more realistic representation of real decisions made by individuals.

In a more in-depth analysis, the preferences of microenterprises in the Philippines for different climate risk management interventions were measured using such a DCE. These were used to calculate willingness to pay (WTP) and to assess compensating variations (CV) for different interventions and combinations of interventions.

Microenterprises are a significant part of the Philippine economy, and are badly affected by extreme weather events such as tropical cyclones. The following questions were examined for this target group:

- How do microentrepreneurs in the Philippines rate different interventions for managing climate risks and coping with shocks from extreme weather events?
- What enterprise characteristics influence the preferences of microentrepreneurs in the Philippines for different climate risk management interventions?
- What are the preferences of microentrepreneurs in the Philippines for integrated climate risk management interventions?

Based on a literature review and qualitative interviews, the preferences of entrepreneurs for the following interventions for residual climate risk management were measured: a) improvements in information sharing for early warning, b) development of climate protection infrastructure, and c) climate risk insurance.

The findings of this study show that microentrepreneurs have recognised the importance of climate risk management, and have strong preferences for the proposed risk management interventions. The strongest preference identified was for climate risk insurance, followed by

infrastructure interventions and information interventions. However, there were large differences in the preferences of the respondents.

For example, it was found that participation in climate risk training and investments made by the enterprise in the past twelve months significantly increased respondents' preferences for the risk management interventions presented. Another factor associated with the differences in preferences is the gender of the respondents, with male respondents showing a higher willingness to pay for the proposed climate risk management interventions. Enterprises in urban areas also showed a higher preference for climate risk insurance than those in rural areas. The findings for the compensating variations showed that microenterprises rated climate risk insurance approximately twice as highly as infrastructure and information interventions respectively. Integrated interventions, in which several of the given climate risk management interventions are implemented together, were rated the highest.

The study found that rigorous measurement of target group preferences for climate risk management interventions using a DCE is feasible. It can provide essential insights into the preferences of the target group and the final beneficiaries. This enables the collection of reliable information on willingness to pay, and implementation of evidence-based target-group-oriented interventions.

Read more: Ann-Kristin Becker (2021), *Eliciting entrepreneurs' preferences on climate risk management. A discrete choice experiment with micro-sized enterprises in the Philippines*.

4.2.4 Relevance and effectiveness for comprehensive residual climate risk management (EQ2)

This section analyses the comprehensive management of residual climate risks using the risk pooling instruments considered. The focus is on the questions of (i) whether residual climate risks are covered by risk pooling, (ii) how relevant the instruments used are, and (iii) how they are incorporated into other instruments of the respective intervention and into further interventions of the partner countries or other donors.

Box 12 Benchmarks for assessing EQ2

- The interventions are relevant to comprehensive residual climate risk management (including coverage of relevant residual climate risks, conduct of climate risk assessments and comprehensive coverage of climate risks).
- The interventions are effective for comprehensive residual climate risk management (including integration into overall climate risk management, and combination with other interventions).

The case studies show that very different approaches are taken to identifying relevant climate risks. PrAda, for instance, does not have a systematic procedure for conducting climate risk assessments and thus ensuring that relevant climate risks are covered. However, at the time of the study, neither the residual climate risks to be covered, nor the value chains that would ultimately benefit, nor the criteria for further narrowing down the selection, had been determined. Respondents expressed differing views on the relevance of particular climate risks. Depending on the value chain, the prioritised risks also varied widely. For example, local development cooperation actors, local government officials and experts emphasised that droughts were a priority (DEV-11; EXP-17; GOV-09; STG-20).

With SAGA, the climate risk assessments show findings that are partly contradictory. The flood modelling carried out by DEval (see Box 13) does not provide a rationale for covering flood risks in Ait Melloul (Morocco). It thus contrasts with previous findings. For example, climate risk assessments in the previous intervention (PSACC), which aimed to build private-sector capacity for adapting to climate change, had highlighted the relatively high vulnerability of Ait Melloul to heat waves, flooding, heavy rainfall and droughts. This is consistent with the SMEs interviewed, which mention flooding from heavy rainfall in addition to heat waves, droughts and water scarcity (BEN-01; BEN-02; BEN-03; BEN-08, BEN-13; BEN-20; DDP-11; DDP-12; DDP-13; DEV-23; EXP-04; GOV-08; GOV-14; GOV-23; MSG-03). Implementing organisations see a need for further analysis (DEV-26; EXP-04). The General Confederation of Moroccan Enterprises (Confédération Générale des Entreprises du Maroc) identifies drought as one of the general risks of climate change (La Confédération Générale des Entreprises du Maroc, no date). SMEs sometimes themselves implement risk reduction interventions using physical infrastructure. For example, they build high warehouses and elevated installations or air-conditioning systems. Municipal risk management interventions, especially the construction and maintenance of appropriate infrastructure, have so far been lacking. This means that risk preparedness interventions, as well as CRI for flooding of infrastructure, can cover gaps (GOV-14).

RFPI III has conducted climate risk assessments, some of which confirm the relevance of the instrument in the pilot regions in the Philippines. The CRI of RFPI III is relevant to residual climate risk management, and initially targeted three risks to be insured (storm, flood and drought). In the course of implementation, one climate risk to be insured – drought – was replaced by earthquake (as of March 2020). This is because more data is available for earthquakes, and the insurance industry has more experience with earthquake insurance (GIZ, 2020b).

The ARC covers drought, and more recently began covering tropical storms. With the planned coverage of other climate risks, it can potentially become more relevant to all member states. In its first strategic framework, ARC highlights droughts as the greatest risk to Africa's population (ARC, 2016). In response to the increasing climate risks and needs of its members, ARC Ltd. is developing new products for other climate risks. These include floods, wind, storm surges and ocean waves (ARC, 2016). However, there is debate as to whether – despite the relevance of the instruments for further climate risks – ARC should not prioritise solving existing challenges with drought insurance before covering further climate risks ((MSG-07; MSG-08); (Martinez-Diaz et al., 2019)).

With the IIF, the coverage of relevant climate risks is in the hands of the respective supported institution. The institution does not necessarily conduct a climate risk assessment before developing or expanding the product. The CRI solution considered, which is financed by the IIF debt fund, covers climate and natural disaster risks that are relevant to final beneficiaries. These include heavy rain, lightning, floods, landslides, volcanic eruptions, seaquakes, hurricanes and earthquakes. The payout case involving El Niño examined in this example shows that flood coverage is highly relevant, as this climate phenomenon regularly causes flooding in the region (BEN-15; BEN-21; DDP-15; DEV-33). Overall, the coverage of relevant climate risks depends on implementation of the respective intervention by the investment recipients, and is only assessed through needs analyses (DEV-33). Through the equity fund the IIF supports technology companies that help provide (better) weather data for modelling. This data can be used for all residual climate risk management instruments to make them a better fit. Risk pooling instruments can thus also benefit: To cover relevant climate risks they can develop insurance models based on actual exposure (DDP-01; DDP-02). In this way, the IIF can have cross-cutting effects on activities in the area of residual climate risks.

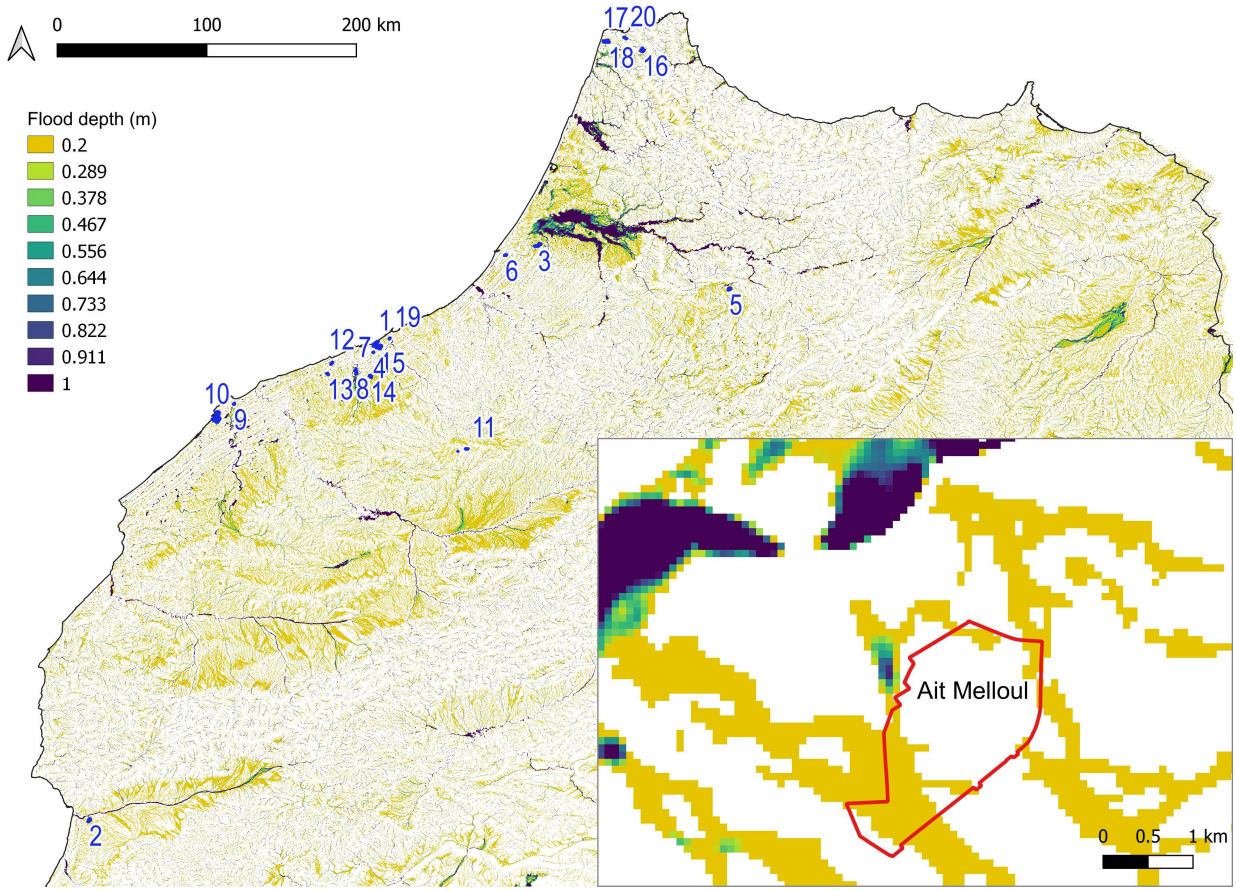
Box 13 Why Ait Melloul?

Comparing the flood risk in 20 industrial zones in Morocco

The industrial zone of Ait Melloul was selected by German development cooperation as a site for implementing the TC interventions PSACC, ACRI+ and SAGA, which build on each other. The selection was based inter alia on the risk analyses of the PSACC intervention. This evaluation module reviews the selection of this site by examining the extent to which the flood risk in Ait Melloul is higher than in 19 comparable industrial zones (> 100 active small to medium-sized enterprises; moderate to high flood risk). In cooperation with the Luxembourg company RSS-Hydro, DEval carried out comprehensive flood modelling for this purpose (Annex 7.2.1 describes the study in detail).

Quantitative flood risk data provide important information for calculating flood risks. They can thus help in the selection of relevant intervention sites for climate risk insurance with a strong flood component. For modelling purposes, the extent of all industrial zones was mapped, and individual grid cell values for flood depth were then extracted for a one-hundred-year flood event. Regression models allowed statistical comparison of the inundation depth between Ait Melloul and 19 other industrial zones. The calculations showed that for a one-hundred-year flood event, the average flood depth in Ait Melloul is approximately two centimetres. This value is significantly lower than the average value of approximately six centimetres for the 19 industrial zones of comparison. However, this difference is not statistically significant. The prioritisation of Ait Melloul as the only implementation site for a flood risk insurance component cannot therefore be justified statistically. In this case, a stronger weighting of other factors for site selection would seem to be appropriate.

Figure 10 Flood depth in a one-hundred-year flooding scenario



Source: DEval, authors' own graphic. The box shows an enlargement of the Ait Melloul industrial zone in the Souss-Massa region.

The conduct of climate risk assessments (CRAs) also varies considerably from case study to case study. With SAGA, the CRA was conducted on a project basis, but was neither coordinated with other actors nor embedded in a climate risk management strategy (DEV-11; EXP-20). With ACRI+, the CRA was developed and implemented on a project basis as the foundation for the German development cooperation intervention. Here, too, there does not appear to have been any coordination with other development cooperation actors. In PrAda, partner capacities for climate information and services were strengthened. Nevertheless, weather stations, data and capacities to use them, as well as climate risk assessment, are patchy, and are spread across different institutions and actors (DEV-06; EXP-05). In the RFPI III case study, the selection of pilot regions was based systematically on CRAs. Data from the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) were used for this purpose (DEV-28).

Climate risk assessments should also support the decision to choose the appropriate instrument. In the case of SAGA, however, it emerges that during implementation there is no openness regarding the selection of suitable instruments. The background to this is that the intervention is designed as a public-private partnership which is implemented together with the insurance company Allianz SE. In the case of ACRI+, there was also a donor-driven focus on CRI after commissioning. RFPI III and PrAda also have a clear focus on the design and roll-out of CRI. With IIF, the support for MFIs also clearly focuses on CRI. The choice is either for or against CRI, but not for any other approach. Residual risks could be analysed more systematically, and methods and findings provided more systematically.

Some interventions link different instruments and coordinate their activities well with partners and other donors. In the case of PrAda, risk pooling is embedded in other German development cooperation activities, such as risk preparedness and other risk reduction interventions. Combination of the instruments can therefore be expected (GOV-25). The activities are also well coordinated with those of other actors. The approach of the Malagasy partners appears to be coordinated, coherent and consistent. The partners are thus supporting the efficient and developmentally effective allocation of funds in the face of strong pressure to implement resources and short project durations (GOV-12). The ARC also embraces a comprehensive approach that includes risk preparedness and protection for countries, as well as a risk pool. It is also open to the instruments applied at country level, such as reserve funds or insurance.

RFPI III stands out among the case studies because of the integration of the insurance component into comprehensive risk management. This integration into comprehensive disaster risk management (DRM) is in line with the five phases of the 2017 MCII/GIZ model: prevention, preparedness, residual risk transfer, response and recovery (DEV-28; DOC-44; DOC-45). The CRI solution is designed to cover the area of residual risk transfer (DOC-44), and is only one important aspect of risk management (GOV-06). BMU-ICI-funded interventions also take a more comprehensive approach. Here, GIZ is working with MCII to develop and apply the integrated climate risk management approach for several partner countries, such as Morocco (MCII and GIZ, 2019).

In other case studies, however, gaps are evident. For example, the combination of CRI with other instruments for residual climate risk management was not promoted in ACRI+ at the target group level (DEV-23), and no coordination with partners and donors is evident. Also, as in the example of the investment recipient studied, the supported CRI solutions of the IIF are not systematically integrated into comprehensive risk management. Nor are they combined with interventions of partners or other donors, even in cases where this would be possible in principle. It is thus clear that some instruments are already pursuing the comprehensive risk management approach more strongly than others.

In summary, the respondents confirm the relevance of the instruments used for residual climate risk management. There are sporadic indications in case studies that relevant residual climate risks are not defined or covered. In particular, systematic analysis through CRAs does not take place in all case studies.

4.2.5 Effectiveness and impact (EQ3)

The effectiveness and impact of CRI depend to a large extent on its acceptance by, and the solvency of, the target group. They also depend on how well the CRI product fits. Below, the rating of impact is disaggregated by target group. Furthermore – due to the implementation stages - these ratings represent a projection.

Box 14 Benchmarks for assessing EQ3

- The interventions achieve their objectives at outcome level.
- The intervention makes a clear contribution towards the achievement of objectives at outcome level.
- Wider impacts of the interventions can be identified and/or foreseen.
- The intervention makes a clear contribution towards the identifiable/foreseeable impacts.

The promotion of regulatory frameworks and the networking of actors (impact pathway 1) can be positively rated in three case studies. Although the PrAda interviewees consider the achievement of objectives as not yet foreseeable, the expert input on the draft law and the distribution channels which it included were rated positively (GOV-25; GOV-28). In the SAGA case study, German development cooperation can probably make an effective contribution to mobilising the development of CRI solutions that might be attractive as a product for larger companies. It could do so through the Moroccan insurance supervisory authority ACAPS (L'Autorité de Contrôle des Assurances et de la Prévoyance Sociale) and insurance companies (DDP-13). The MEFIN network for cross-country knowledge sharing in the RFPI III case study has also helped raise awareness of CRI among insurance actors and governments. This has encouraged the establishment of regulatory frameworks and supervisory systems for inclusive insurance (DEV-28; DOC-17). It is expected that the recommendations from the CRI concept paper prepared with the support of German development cooperation will be taken up by the national government (DEV-28). In this context, the project's regional approach will help draw on the lessons learned by other countries through established exchange platforms (DOC-17). Initial partnerships with government ministries and private insurance companies have already been established (DOC-01). The IIF focuses less on developing the regulatory framework. It tends to look for investment recipients in countries where insurance markets already exist. It works with regulatory institutions only in some cases. In the example considered, the regulatory framework required in order to sell the products was already in place (DEV-33). Overall, however, it appears that the impact pathway to promote the regulatory framework is effective and potentially sustainable.

Regarding the co-design of CRI development by insurance providers (impact pathway 2), the findings for PrAda show that insurance actors are generally interested in product development (DEV-19; DEV-22). Due to the interventions of German development cooperation, insurance actors recognise the opportunities of CRI, understand how it works, and see it as relevant or even a priority (DDP-03; DEV-06). According to development actors, CRI can be integrated as an effective and impactful instrument in value chains involving production for the world market (DEV-06). This is consistent with initial evidence from Fernández and Schäfer (2018) that index-based insurance in the livestock sector can boost commercialisation if tailored appropriately. Better-off actors thus had the required long-term solvency and displayed higher acceptance towards innovative products (DEV-12). PrAda's target group comprises actors in selected agricultural value chains. However, for a part of this target group – the poor and vulnerable population, and women in general – interviewees question the effectiveness and impact of CRI (STG-03). According to the interviewees, these target groups tend to work individually and are extremely difficult to reach as potential policyholders, even through associations such as cooperatives (EXP-20; EXP-25). This is a challenge for the intervention, as it had to select comparatively well-organised target groups for CRI. It therefore had to invest in the promotion of cooperatives, among other things. One unintended effect of the interventions may be increasing inequality for marginalised groups. These groups have little scope for repaying loans to microfinance institutions (EXP-20) and would risk losing their goods, as well as any land they might own. At the same time, depending on further implementation, context-specific and needs-based CRI can effectively fill a gap in climate risk management and contribute to impacts (GOV-21). The effectiveness and impact of those CRI instruments that existed before the intervention began were insufficient. In some cases, they continued to have an

unintended effect, i.e. dependence on humanitarian aid and the promotion of a recipient mentality among the target group (GOV-21).

Regarding the SAGA case study, at the time of the survey it remained an open question whether the industrial park administration or individual companies in Ait Melloul would become policyholders. Expectations diverge in this regard: In the view of insurance companies and German development cooperation, the municipal industrial park administration could become a potential policyholder, as this would allow for full coverage of all companies and thus a large risk pool (MCII and GIZ, 2019). However, the feasibility of this is questioned (DDP-11). What is challenging from the perspective of insurance companies is obtaining disclosure of SMEs' actual willingness to pay and entrepreneurial risks, given existing risk characteristics (DDP-13). SAGA capacity building (specifically through its predecessor PSACC) has contributed to the inclusion of climate risks in the local development plan (EXP-09), and increased SME awareness of general climate risks even after the end of the intervention (GOV-08; GOV-21; MSG-29). It is evident that larger companies are in principle interested in innovative products and show a basic willingness to pay and invest in CRI. However, the many small projects with short durations on complex topics such as CRI are already causing fatigue among partner institutions and the target group (DEV-25).

Through its continuous efforts to make the instrument more attractive, ARC is able to report the largest risk pool since its inception for the 2019/2020 agricultural season. Currently, it faces the challenge of encouraging participation by countries/approval by their parliaments to join the ARC Ltd. regional risk pool – and thus pay contributions. In the 2019/2020 agricultural season, the number of countries participating in the risk pool increased to 11, allowing the ARC to have a stronger impact. The fluctuations in pool size in previous years came from a lack of confidence: As a result of the droughts that occurred, the pre-determined value that would trigger a payout was not reached. This was compounded by budget constraints. As a result, governments questioned the functioning and effectiveness of ARC (DFID, 2020; OPM, 2017).

In order to reach the target groups, premium subsidies are important for ARC as well as for other interventions. In order to encourage more countries to participate in the risk pool and receive capital in the long term, premium subsidies were made available through the ADRiFi (Martinez-Diaz et al., 2019). This seems to be one of the reasons for the increased number of countries in the risk pool. With PrAda, respondents also note that risk financing instruments such as (premium) subsidies need to be used for CRI to be effective and impactful (DEV-06; EXP-20; GOV-25). Premium subsidies can increase breadth and increase the number of people taking out insurance. In the case of RFPI III, it was noted that insurance providers may only have an interest in offering CRI to the poorest and poor groups as long as government agencies cover premium payments (DOC-17).

The IIF is more in favour of market-based insurance. This should also function without premium subsidies. However, the latter are also available, but are only used very selectively to kick-start the CRI solution and to cover development costs. The insurance scheme examined in the IIF sub-case study is successful in principle, and has many participants in the pool. In this case, insurance is only ever provided in conjunction with a compulsory loan (DDP-15). In other words, the insurance cover is tied to the loan and is valid as long as a loan exists. This linkage makes the premium relatively low. However, access for the poor and vulnerable may be limited by their lack of creditworthiness. They would barely be able to finance an insurance premium without a loan or subsidy (EXP-06). TA is used in the IIF to build the capacity of supported financial institutions or technology companies, and in particular to ensure that CRI products are a good fit. This assistance is rated as very important. Although the automatic linking of a financial service with CRI does not yet constitute a culture of insurance, it can contribute to this in the long term.

Raising awareness of CRI solutions is an important aspect of making them marketable and generating demand. In two of the case studies considered, interventions to raise awareness of climate risks and to support climate services and information were implemented. Within PrAda, they are rated as effective (EXP-20) and highly relevant (EXP-05; EXP-18). Awareness raising was performed through an online game. It reached many participants (DEV-06), and the target group rated it as effective (BEN-16). However, such interventions should be more inclusive of local languages and contexts (GOV-26). German development cooperation has thus helped to improve understanding of climate risks and residual climate risks at target group level. With SAGA awareness was raised to a limited extent, as effective CRI awareness raising for the target group was carried out only in some cases. The previous PSACC intervention implemented awareness-raising activities for SMEs on climate risks. These are consistently rated as relevant and effective (EXP-09; MSG-03). In Ait Melloul, CRI awareness-raising activities for SMEs were not accepted. This was manifested by the fact that German development cooperation workshops on climate risk insurance were not attended, for example. The ACRI+ intervention in particular was criticised by government representatives. The reason they gave was the length of time required for the conceptual meetings, which were difficult to understand and had no discernible link to implementation (GOV-14). The concept of CRI was thus unable to achieve relevance (DDP-11; DDP-25).

Challenges presented by the above findings of the relevance analysis also have a negative effect on effectiveness and impact. The reasons for limited relevance identified in the SAGA case study, such as the donor-driven focus on CRI, a lack of target-group orientation and the lack of responsiveness to the local context, are currently limiting the potential of the instrument to achieve effectiveness and impact (DEV-23; GOV-21).

As yet there is no evidence available to substantiate the effects of ARC at the household level. The current impact evaluation by OPM is intended to provide evidence in this regard, but it had not yet been published at the time of the study. At the target-group level, an analysis of the estimated costs of regional risk pooling indicates that an investment of one US dollar delivers a benefit of 1.9 US dollars for the target group. This revises downward the value from a previous cost-benefit analysis (Clarke and Hill, 2013). One reason for this could be high premiums (Kramer et al., 2020). Evidence at impact level is also not yet available for RFPI III or PrAda. In the case of one IIF investment recipient, only a few people selected by the insurance provider could be interviewed. These individuals reported how they were able to use the insurance money meaningfully to rebuild their business or home (BEN-04; BEN-07; BEN-15; BEN-18; BEN-19; BEN-21). The potential of the IIF to achieve impacts is high. However, systematic studies of impacts beyond the purchase of insurance have not yet been designed.

Box 15 Assessment of the instrument group 'risk pooling'

Evaluation question 1: The German development cooperation risk pooling instruments considered meet the benchmark of alignment with relevant global agendas. The benchmark of alignment with partner-country national strategies is largely met, although risk pooling is not a top-priority instrument. Awareness-raising interventions are therefore of great importance.

Regarding the benchmark of alignment with the development needs of target groups, major differences between the case studies mean that the ratings fall between met and not met. This depends strongly on the context. Only in one case study (RFPI III) did the target groups see risk pooling unreservedly as the preferred instrument for residual climate risk management. By contrast, many target groups tend to prefer instruments of risk reduction, risk preparedness or third-party risk finance.

Evaluation question 2: It currently appears that relevant weather and climate risks are partially covered; in some cases the insurance cover and amount have yet to be determined. As the case studies show, the priorities set by insurance providers only partially lead to relevant weather and climate risks being covered. Integration into comprehensive climate risk management in coordination with partners and donors is partially achieved. Overall, both within an intervention and in coordination with other actors such as partner countries or donors, more comprehensive approaches to climate risk management are not always

sufficiently considered. Thus overall, the benchmark for comprehensive management of residual climate risks is only partially met for the risk pooling instruments considered.

Evaluation question 3: In terms of effectiveness**,** the various components of the risk pooling instruments partially or fully meet the benchmarks for achieving the objectives and the contribution by the interventions. As far as can currently be foreseen, the promotion of regulatory and legal frameworks, the networking of private and public actors (especially at national level), and the capacity building for meteorological data and services are effective. Interventions to raise target-group awareness achieve their objective if and when they are prepared appropriately. The rollout of CRI itself was only partially effective**.** The case studies considered show that several factors constrain the effectiveness of risk pooling instruments. These are: the target groups' poor accessibility and lack of solvency; the lack of insurance culture and consumer protection; risks that are not relevant and not insurable; triggers that are difficult to understand, and a lack of willingness on the part of insurance providers to offer products for managing relevant climate risks.

At the current stage of implementation, the extent to which CRI meets the benchmark for (potential) impact can only be predicted to a limited extent. The impact may vary widely depending on the target group, and due to the above-mentioned constraints at the level of effectiveness. The anticipated impact of CRI for financial protection against climate risks therefore depends heavily on the context, and on its combination with other instruments.

4.3 The instrument group 'risk preparedness'

4.3.1 Introduction and contribution to residual climate risk management

One cross-cutting issue for residual climate risks is risk preparedness interventions. The 'risk preparedness' instrument group encompasses capacity development and disaster risk management for proactive and reactive residual climate risk management (Warner et al., 2009; Lal et al., 2012). The main objective of risk preparedness is to reduce the scope of losses and damages when an extreme weather event occurs, or mitigate its effects, through preparedness (Tanner et al., 2015). At the same time, risk preparedness can improve the ability to respond to negative effects of events (IPCC, 2012). The instrument group 'risk preparedness' therefore includes both (i) building capacity to manage residual climate risks, as well as losses and damages, and (ii) strategies to manage climate-related natural disasters, such as contingency planning, evacuation structures and recovery planning. Risk preparedness can therefore contribute to risk reduction as well as to residual climate risk management. The target groups of risk preparedness interventions are public-sector, civil-society and private-sector actors, as well as the entire population.

The 2030 Agenda, the Framework Convention on Climate Change and the Sendai Framework differ in terms of their relevance to risk preparedness. Target 13.3 of the Sustainable Development Goals revolves around specific aspects of risk preparedness: 'Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning' (UN, 2015). The Sendai Framework for Disaster Risk Reduction has a similar kind of focus on disaster preparedness (UNDRR, 2015). By contrast, the Warsaw International Mechanism for Loss and Damage has a broader relevance: '[...] implementation of approaches to address loss and damage associated with the adverse effects of climate change in a comprehensive, integrated and coherent manner' (UNFCCC, 2014). The Paris Agreement also identifies broad areas of risk preparedness. These encompass inclusive early warning systems, disaster preparedness, comprehensive risk assessment and comprehensive risk management (UNFCCC, 2015a).

Table 11 Case studies on risk preparedness

Abbreviation		Title of case study	Risk preparedness instruments considered	Target groups
CCA-RAI		Climate Change Adaptation in Rural Areas of India	Capacities, planning, piloting, data	State institutions
ARC		African Risk Capacity	Capacities, early warning systems, contingency planning	AU countries
SAGA	SAGA	Strategic Alliance GIZ and Allianz	Capacity development Private sector	SMEs, industrial area actors
	ACRI+	Advancing Climate Risk Insurance +		
	PSACC	Private Sector Adaptation to Climate Change		
PrAda		Projet Adaptation des chaînes de valeur agricoles au changement climatique	Regulatory framework for CRI	Actors of selected agricultural value chains

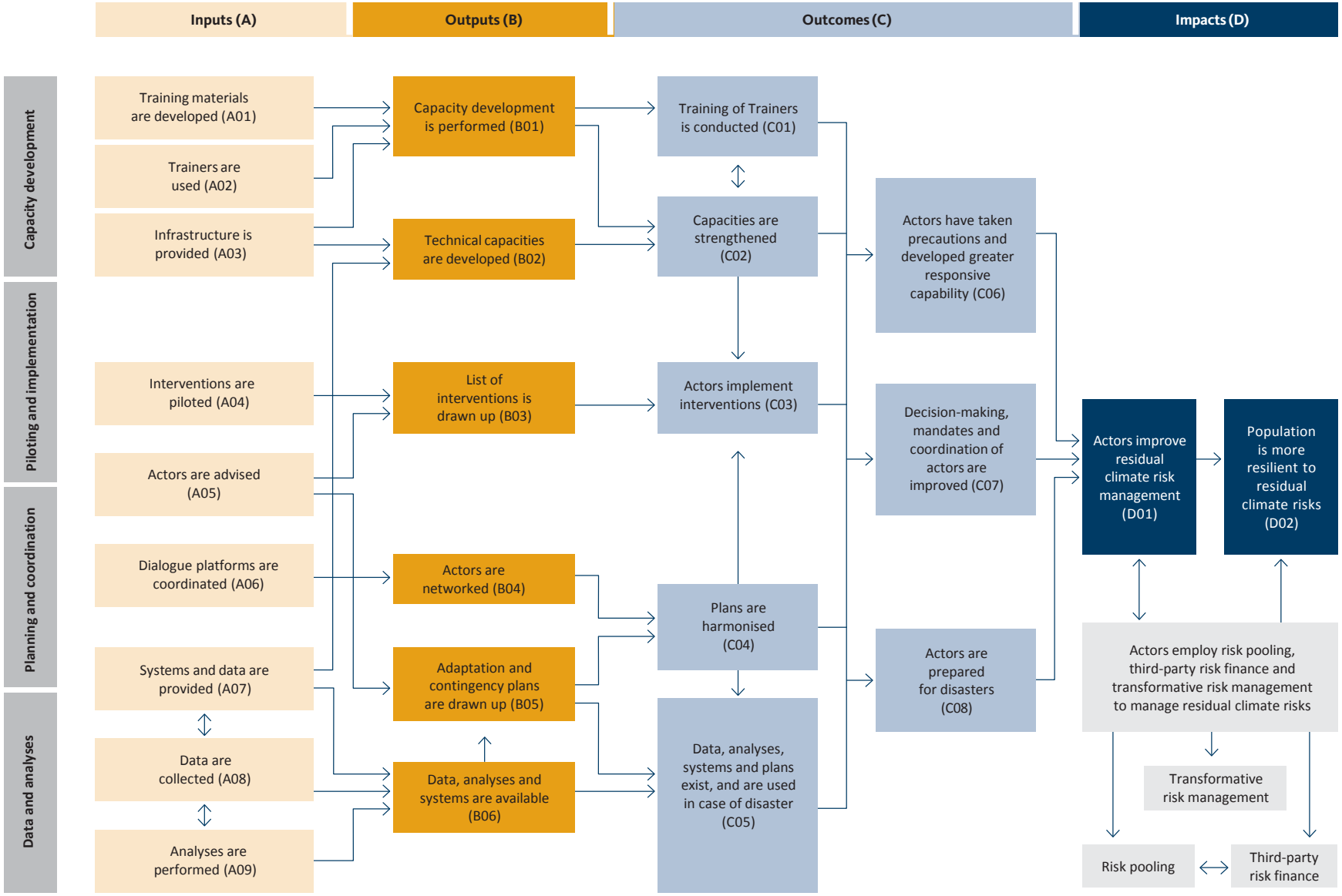
Source: DEval, authors' own graphic

The analysis of this instrument group is based on risk preparedness instruments from four case studies considered in this evaluation module. Risk preparedness is often a component of German development cooperation interventions for residual climate risk management, but it is not usually their main focus. Due to its special focus on risk preparedness, IGEP-RA's field of action Climate Change Adaptation in Rural Areas of India provides the main contribution to the analysis of this instrument group. CCA-RAI includes risk preparedness through capacity building for the management of residual risks as well as losses and damages, and the integration of residual risks into climate action plans (DOC-25). African Risk Capacity contributes to risk preparedness through comprehensive capacity development on early warning systems, risk modelling, contingency planning, and disaster risk management and financing (ARC, 2016). The development cooperation intervention on Adaptation of Agricultural Value Chains to Climate Change in Madagascar (PrAda) supports risk preparedness through the establishment of a new regulatory framework for climate risk insurance (DOC-20). This law is also relevant beyond risk pooling, particularly for risk assessment, risk analysis and the institutional framework for residual risk management. The development cooperation intervention on Private Sector Adaptation to Climate Change (PSACC) also incorporated aspects of risk preparedness. This included building private-sector capacity for climate risks (DOC-19). This is the fourth case study forming part of this analysis.

4.3.2 Theory of Change for the instrument group 'risk preparedness''

This ToC was developed on the basis of the four case studies. In a first step, project documents and scientific literature were consulted. The reconstructed ToC was then discussed and verified in the context of the CCA-RAI case study in a ToC workshop held in Tamil Nadu. Participants included actors from civil society, academia, Indian partner institutions and German development cooperation. In a next step, aspects relating to risk preparedness from other case studies (ARC, PrAda and PSACC) were integrated into the ToC. This enabled the construction of a generalised theory of change for the instrument group 'risk preparedness'. The theory describes inputs, outputs, outcomes and impacts necessary for risk preparedness, as well as the underlying assumptions and risks. In elaborating the ToC for this instrument group, four distinct impact pathways emerge: 'capacity development', 'piloting and implementation', 'planning and coordination', and 'data and analyses' (see Figure 11). In the description below, inputs are labelled A, outputs are labelled B, outcomes are labelled C and impacts are labelled D.

Figure 11 Theory of Change for the instrument group 'risk preparedness''



Source: DEval, authors' own graphic

Impact pathway 1 encompasses capacity development for residual climate risk management. This is necessary to effectively address the causes and effects of climate change (UNFCCC, 2020). First of all, strengthened capacities thus lead to better climate risk management (Denton et al., 2014). Secondly, capacities include the ability of systems, institutions and individuals to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC, 2018a). In this regard, capacities for adaptation to climate change are dynamic and are influenced by available socio-economic and environmental resources, institutions and technologies (Adger et al., 2007). Building technical and institutional capacities is therefore a core component of risk preparedness.

This capacity development can be achieved with different inputs. These include developing training materials (A01), employing trainers (A02) and providing technical and spatial infrastructure (A03). These inputs are used for capacity development (B01), and technical capacity can be expanded (B02). The resulting training of trainers (C01) and strengthened capacities (C02) increase response capability and enable actors to take precautions for residual climate risks (C06), make better decisions (C07), and prepare for disasters (C08). Overall, actors are empowered to better manage residual climate risks (D01), and ultimately the population become more resilient to these risks (D02). One assumption of this impact pathway is that capacity development also reaches political decision-makers and influences their decision-making (C02 -> C07). One risk is that capacity development is only short-term, insufficient and generalised. This would mean that capacities are not strengthened in the long term, and that the political decision-making level is not influenced.

Impact pathway 2, which is shown in Figure 11, involves piloting and implementing interventions to manage residual climate risks. Scarce resources, institutional limitations and limited capacity mean that implementation remains a challenge for partner countries (Mimura et al., 2014). While there is ample evidence for the creation of adaptation policies, strategies and plans, there is an evidence gap for the implementation of interventions (Mimura et al., 2014). Currently, interventions to protect against extreme weather events are mainly used in a reactive, event-driven, and localised manner. Interventions in the context of risk preparedness therefore aim to implement adaptation plans and thus support the policy process and actors involved in managing residual climate risks.

The interventions start at the input level by piloting interventions (A04) and advising actors (A05), so that lists of interventions can be drawn up (B03) and implemented (C03). These lists identify suitable courses of action that can be implemented in the partner countries to improve risk preparedness. The precautions taken as a result give actors greater capacity to respond (C06) and improved coordination (C07). This in turn enables them to better manage residual climate risks (D01), and ultimately increases the resilience of the population to residual climate risks (D02). This impact pathway follows the assumption that local public and civil society actors and final beneficiaries participate in the process from piloting to implementation (A04 -> C03). If the subnational and national governments of the partner countries prefer a top-down approach, there is a risk that the aforementioned actors will not be involved to a sufficient extent.

Impact pathway 3 encompasses institutional planning and coordination for residual climate risk management. Climate adaptation support is provided at the phase where awareness and promotion transition to the construction of adaptation plans, strategies, legislation and projects at national, subnational and local levels (Mimura et al., 2014). Appropriate institutional planning can reduce the scope of losses and damages damage and the effects of extreme weather events or slow-onset changes. Here, inter-institutional coordination at multiple political and administrative levels is not only an essential mechanism to support adaptation planning, but also a priority need for partner countries (Noble et al., 2014). Institutional dimensions play a key role in the transition from adaptation planning to adaptation implementation (Mimura et al., 2014). Planning residual climate risk management in the context of risk preparedness includes strategies such as contingency, adaptation, evacuation, and recovery planning. Coordination in the context of risk preparedness includes sharing and revising mandates of agencies and ministries, in order to better manage residual climate risks and disaster response.

Exchange and dialogue are a pivotal part of the inputs for institutional planning and coordination. Advising actors (A05) leads to the preparation of plans (B04). The coordination of dialogue platforms (A06) creates

better networking among actors (B04), resulting in coordinated planning (C04). This leads to increased actor responsiveness (C06) and better decision-making by mandated and coordinated actors (C07) at the outcome level. This is designed to improve the actors' residual climate risk management (D01), and increase the resilience of the population to residual climate risks (D02).

One assumption of this impact pathway is that plans are proactively created which are coordinated between and within the local, regional and national levels through the networking of actors (B04, B05 -> C04). This requires decentralised planning and coordination approaches that involve actors at the local level. This local level is often the first level to respond to residual climate risks. In the event of a crisis it is especially important to be able to act quickly and apply plans. The assumption is that all actors are aware of the plans and have the capacity needed to apply them. One risk is that the plans will not be implemented.

Impact pathway 4 encompasses data and analyses for residual climate risk management. Effective planning, implementation and capacity development depend on the availability and use of the necessary data and analyses. However, gaps exist in both developing and developed countries, and better data and analysis are needed for adequate risk preparedness (Noble et al., 2014). Data generation, use and analysis take into account technical and information needs that go beyond risk preparedness. Risk pooling instruments require weather data and models to calculate risks and, in the case of index-based insurance, to make payouts. Similarly, risk financing instruments build on data and analyses in order to quantify the risks to be transferred as well as their frequency and intensity. The planning and implementation of transformative risk management approaches, some of which are of a long-term nature, also draw on the database and the analyses it supports.

Implementing organisations can contribute to the 'data and analysis' impact pathway with various inputs. By providing systems and data (A07), collecting data (A08) and conducting analyses (A09), data, analysis and systems can be used as outputs (B06) for planning (B05), and subsequently in disaster response (C05). This supports the systematic preparation of actors for disasters (C08), improved decision making (C07) and possible preparedness and response capacity of actors (C06). At the impact level, through this impact pathway actors can improve their residual climate risk management (D01). They can also apply risk preparedness in combination with risk pooling, risk financing and transformative risk management. This helps to make the population more resilient to residual climate risks (D02).

It is necessary to communicate available data, analyses and systems as needed, so that these can be taken into account in planning and used in case of a disaster (B05 -> B04, C05). There should be a fundamental interest on the part of institutions to use data and analyses so that appropriately trained personnel, technical resources and data are made available. Frequent staff changes in partner institutions, which prevent communication and long-term use of data and analyses for residual climate risk management, pose a risk.

4.3.3 Relevance to partners, agendas and target groups (EQ1)

In this section, the risk preparedness interventions examined are analysed in terms of their relevance to the partner countries, alignment with national and international strategies and relevance to the target groups.

Box 16 Benchmarks for assessing EQ1

- The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.
- The objectives of the interventions align with the needs of the target groups and the objectives of the partners.

Concerning international agendas, all interventions examined (CCA-RAI, PrAda, SAGA, ARC) make relevant contributions to risk preparedness. These include support for the 2030 Agenda and the achievement of several SDGs. In particular, the interventions considered make relevant contributions to SDG 13 (climate action). These contributions are made e.g. through support to subnational planning (CCA-RAI), capacity development for data use (PrAda), development of climate risk software and contingency plans in conjunction with capacity development (ARC), and private-sector capacity building for climate risks (SAGA) ((DOC-19; DOC-20; DOC-25); (ARC, 2016)). With CCA-RAI, it is evident that India's State Action Plans on Climate Change (SAPCCs), revised by German development cooperation, take into account and integrate the SDGs, especially SDG 13 (DDP-14; GOV-05; GOV-10; GOV-14). Thus, according to Jogesh and Paul (2020), the revised SAPCCs can be expected to align more closely with the 2030 Agenda. Pahuja et al. (2020) also estimate that they will incorporate the subnational and national climate policies.

Three of the interventions considered (ARC, CCA-RAI and PrAda) also align with the objectives of the United Nations Framework Convention on Climate Change (UNFCCC). They explicitly mention that they make contributions to the Paris Agreement, mainly by supporting the formulation and tracking of the nationally determined contributions ((DOC-20; DOC-25); (UNFCCC, 2015b)). ARC is particularly relevant to Article 8 of the Paris Agreement (on loss and damage) and the Warsaw International Mechanism for Loss and Damage. One example of this is the support of early warning systems based on risk modelling using Africa RiskView software (ARC, 2016). German development cooperation supported relevant consultation processes with national partners for the formulation of the NDCs (CCA-RAI, PrAda) (DEV-08; DOC-20; EXP-17; EXP-26).

Two risk preparedness interventions (ARC and CCA-RAI) align with the corresponding national priorities of the partner countries. For example, CCA-RAI supports state-level adaptation planning. This is largely in line with the National Action Plan on Climate Change and follows national priorities in India (Government of Tamil Nadu, 2018). These priorities include doing more to manage residual climate risks and applying proactive approaches to risk preparedness ((DEV-08; DEV-20; DEV-27; EXP-12; GOV-09; GOV-15); (ARC, 2020a)).

As a result of governance through the African Union and its members, ARC coordination, technical and contingency planning align with the relevant priorities within and among the African partner countries (ARC, 2020a). The development and enhancement of early warning systems support relevant contingency planning (ARC, 2016). When a disaster occurs, many national governments in Africa are neither sufficiently climate resilient nor do they possess response capacity (van Aalst et al., 2013). ARC's systematic and comprehensive approach to risk preparedness for partner countries is relevant because it targets long-term and sustainable development and enables ownership by African countries (DEV-34; DEV-36; DEV-37; MSG-07; MSG-08). This enhances their disaster preparedness (Clarke and Dercon, 2016; van Aalst et al., 2013).

Three interventions (ARC, CCA-RAI and SAGA) differ in their degree of relevance to the capacity needs and capacity development of actors. At the national level, capacity development (ARC) largely covers national needs for early warning, risk modelling, software training and contingency planning (ARC, 2020a). Capacity development activities at the subnational and local levels under CCA-RAI and SAGA largely meet the adaptation planning needs of public and private actors (DEV-14; EXP-10; EXP-12; EXP-13; EXP-22; EXP-26; GOV-09; GOV-10; GOV-15; MSG-03).

Some capacity needs of target groups at subnational level were not met (PrAda, CCA-RAI and ARC). In this context the needs-orientation and sustainability of the capacity development are called into question ((DDP-14; DEV-06; DEV-11; DEV-14; DEV-19; DEV-21; DEV-22; EXP-11; EXP-17; EXP-26; GOV-10; GOV-13); (OPM, 2017)). In the case of CCA-RAI, for instance, one of the criticisms was that the capacity development does not reach the relevant political decision-makers, and therefore does not lead to better institutional decisions. From the perspective of one implementing organisation, another unmet need in this case study is the development of private-sector capacity for climate risk assessment and intervention options for improved climate risk management (DEV-21). This is relevant, because the private sector is increasingly addressing the theme of adaptation (EXP-26). There is also a greater need for targeted capacity development for disadvantaged groups (GOV-10; GOV-13). For example, in one intervention (PrAda), the final beneficiaries would have preferred training on improved agricultural techniques, as well as access to material resources plus information and awareness raising on climate risks, rather than access to CRI (BEN-06; BEN-11; BEN-16;

BEN-17). In this case, the scope for adaptation interventions was therefore not used exhaustively. ARC interventions were criticised for not reaching the final beneficiaries with their capacity development (OPM, 2017).

Piloting and implementation (impact pathway 2) in CCA-RAI vary in terms of their relevance to the target groups. The need to influence the policy process for residual climate risk management and to strengthen cooperation among state governments was met through the pilot implementation of the SAPCCs (EXP-17; GOV-09). There is also a need to replicate and scale up the implemented pilots (EXP-11; EXP-12; EXP-21; EXP-22; GOV-13; GOV-15). Although civil society and the private sector should have hold roles in developing and implementing pilot interventions, they were not sufficiently involved in them (DEV-20; EXP-11; EXP-12; EXP-17; EXP-22; EXP-26; GOV-13).

Planning and coordination (impact pathway 3) in CCA-RAI largely meet the development needs of the target groups. According to the interviewees, the needs of national and subnational actors for the implementation of planning and coordination processes were met (DEV-18; DOC-27). This includes, among other things, advisory services to India's national Ministry of Environment, Forest and Climate Change (MoEFCC), plus support to develop its decision-making capacities and processes (DOC-27). The intervention also supports national planning by including residual climate risks to a greater extent (EXP-11; EXP-13). In subnational planning, a relevant contribution was made to gender equality in the Tamil Nadu State Action Plan on Climate Change ((DEV-08; EXP-22); (Government of Tamil Nadu, 2020)).

The coordination processes supported by German development cooperation, such as dialogue and exchange platforms (impact pathway 3), are largely relevant (CCA-RAI). These processes meet the need to bring national and international actors together in a community of practice, in order to continue working on residual climate risk management through workshops (DEV-27). However, it was noted that public- and private-sector actors needed to do more to take up approaches for residual climate risk management (EXP-12; GOV-20). The private sector in particular still plays a minor role in planning residual climate risk management (EXP-12).

The data and analyses (impact pathway 4) of the interventions (CCA-RAI, PrAda and ARC) partially meet the development needs of the target groups. With CCA-RAI, climate risk assessments were used to support the revision of State Action Plans on Climate Change and identify risk management and adaptation options (DEV-02; DEV-08; DEV-14; DEV-20; DEV-27; EXP-10, EXP-11, EXP-26; GOV-05). It was noted that the information supplied by the climate risk assessments was not sufficiently well prepared and communicated. Had it been presented in a target group-oriented and comprehensible manner, it could have provided better support to political decision-makers in their decision-making (GOV-15). In the case of risk preparedness interventions as part of PrAda, it was noted that there was still a need to improve meteorological data, modelling and the quantity and networking of weather stations. Also noted was a need to provide the capacities for processing and interpretation by national experts independently of international expertise. Specifically, data would need to be made available to the relatively heterogeneous target group of producers in a wide range of agricultural value chains in a way that meets their needs (EXP-20). Furthermore, the transfer of information via mobile phones is limited. This is because poor and vulnerable target group segments in particular have only limited access to these devices (MSG-03). With ARC's regional approach it was evident that the intervention met data and analysis needs. Both an inventory of existing programmes and platforms for climate risk management, and risk modelling using the Africa RiskView software (which is a key element of ARC), are taking place. Governments and their technical experts use this information to develop the most appropriate solutions (ARC, 2016).

In summary, the four impact pathways of the 'risk preparedness' instrument group vary in terms of their relevance. Capacity development (impact pathway 1) is relevant at all levels, but some of the capacity needs of the target groups have not been met at the subnational level. Piloting and implementation (impact pathway 2) are relevant to meeting the need for pilot interventions that can be scaled up and replicated. Planning and coordination (impact path 3) largely meet the development needs of the target groups; this is only partly the case for data and analysis (impact pathway 4).

4.3.4 Relevance and effectiveness for comprehensive residual climate risk management (EQ2)

Box 17 Benchmarks for assessing EQ2

- The interventions are relevant to comprehensive residual climate risk management (including coverage of relevant residual climate risks, conduct of climate risk assessments and comprehensive coverage of climate risks).
- The interventions are effective for comprehensive residual climate risk management (including integration into overall climate risk management, and combination with other interventions).

This section deals with comprehensive residual climate risk management through the risk preparedness interventions. The findings show that the combination of the impact pathways in the instrument group 'risk preparedness' was implemented in two interventions (CCA-RAI and ARC). This is relevant to comprehensive residual climate risk management. The revised SAPCCs do include residual climate risks (CCA-RAI) (DEV-14; GOV-05; GOV-13). According to interviewees, however, piloting and implementation would need to be scaled up and replicated in order to manage relevant residual climate risks adequately (EXP-11; EXP-12; EXP-15; EXP-21; EXP-22; GOV-09; GOV-13; GOV-15).

While CCA-RAI supports all impact pathways of risk preparedness, ARC addresses three. This is achieved through the development and improvement of early warning systems and modelling (impact pathway 'data and analyses'), contingency planning (planning and coordination) and software training (capacity development). ARC is the only platform that provides systematic and comprehensive support to African countries for managing natural disasters (DEV-34; DEV-36; DEV-37; MSG-07; MSG-08). It is therefore likely that ARC contributes to improvements in the field of natural disaster management in the participating countries. However, no impact evaluations are yet available to substantiate this.

In addition to the comprehensive approach within the instrument of risk preparedness, the integration of components from other instrument groups can increase the relevance of an intervention. Combining instrument groups simplifies a comprehensive approach to residual climate risks. Such a combination was found in two case studies (CCA-RAI and ARC). The CCA-RAI intervention combines risk preparedness with risk financing by supporting the submission of project proposals to national and international climate funds, and the corresponding capacity development. This strengthens the implementation of planning (DOC-27). However, it was noted that the existing risk finance instruments do not yet comprehensively cover residual climate risks, for example due to a limited volume of the national fund and lengthy procedures (EXP-12; EXP-15). Furthermore, it was reported that risk financing is not yet included in planning to a sufficient extent. One result of this is that compensation for residual climate risks is not yet part of the SAPCCs, for instance (GOV-20). The ARC also combines risk pooling with risk preparedness and risk financing. This enables more comprehensive residual climate risk management. An even closer integration of impact pathways – within risk preparedness and with other instrument groups – would contribute to more relevant and more effective comprehensive climate risk management (DDP-14; DEV-21; EXP-11; GOV-25). Thus, two German development cooperation interventions clearly demonstrate the benefits of combining instruments in ways that offer further potential for the future (CCA-RAI, ARC).

4.3.5 Effectiveness and impact (EQ3)

This section analyses the objectives set for the risk preparedness interventions and the extent to which these objectives have been achieved.

Box 18 Benchmarks for assessing EQ3

- The interventions achieve their objectives at outcome level.
- The intervention makes a clear contribution towards the achievement of objectives at outcome level.
- Wider impacts of the interventions can be identified and/or foreseen.
- The intervention makes a clear contribution towards the identifiable/foreseeable impacts.

Capacities (impact pathway 1) were strengthened with varying degrees of success at national, subnational and local levels (ARC, CCA-RAI, SAGA and PrAda). Effects at the outcome level can therefore only be expected in part. At the national level, the capacity development processes within ARC have now taken place in 15 out of 34 countries. However, they often took longer than planned and were not considered very innovative or well prepared in the 2017 evaluation (DFID, 2020; OPM, 2017). Nevertheless, increased awareness and a shift by African governments towards greater engagement in the area of climate risk events were noted as positives. For example, in December 2019 30 countries attended the ARC Conference of the Parties in Kigali and actively discussed how to manage risks (DEV-34; DEV-38; MSG-08).

A look at the national and subnational levels for CCA-RAI shows that the capacity of stakeholders to mobilise funding, implement and monitor has been strengthened (EXP-26; GOV-09). However, it was noted that the capacity building was insufficient because not enough people participated (GOV-10). Furthermore, there is a lack of capacity among political decision-makers for submitting project proposals to national and international climate funds without donor support (EXP-14; EXP-21). The key factor for integrating capacity into the institutional system is therefore not in place (GOV-10). A risk for this impact pathway has thus occurred in the case of CCA-RAI: Capacity building has not reached the political decision-makers to a sufficient extent. In other words, these decision-makers are not able permanently to use enhanced capacities for improved decision-making on residual climate risk management. It is therefore questionable whether the development impacts of capacity building and sustainable risk preparedness in the partner country will be achieved.

At the local level, capacity building (impact pathway 1) supported by German development cooperation made an effective contribution to risk preparedness (SAGA, PrAda and CCA-RAI). Among other things, the perception of climate risks was effectively strengthened through awareness-raising interventions, and aspects of climate change were integrated into local development planning (SAGA, PrAda) (DEV-23; EXP-09; EXP-20; MSG-03). In PrAda, an online game was used to effectively reach many participants (BEN-16; DEV-06) – subject to the caveat that activities need to be more inclusive of local languages and contexts (GOV-26). Furthermore, participants do not receive any follow-up after the training in order to institutionalise the capacities and knowledge (CCA-RAI) (DEV-21; DEV-27; GOV-10). In the case of CCA-RAI and SAGA, although there are plans to continue the training after completion of the interventions, a lack of clarity regarding funding and partner responsibilities might become a problem (DDP-14; GOV-05; GOV-14).

In the case of CCA-RAI, with the support of German development cooperation a start was made on piloting and implementing risk preparedness interventions for residual climate risk management (impact pathway 2). Residual climate risks were placed on the agenda by German development cooperation, and piloted and implemented in parts (DEV-21; EXP-10; GOV-15). Scaling up pilot interventions to implement the SAPCCs and replicating them could help make residual climate risk management more effective (EXP-11; EXP-12; EXP-21; EXP-22; GOV-09; GOV-13; GOV-15). Although there are a large number of pilot interventions, no strategy has been developed to scale up implementation of the SAPCCs (DEV-20; DEV-21; EXP-12; EXP-17; EXP-21). As civil society and the private sector are insufficiently involved (DEV-20; EXP-11; EXP-12; EXP-17; EXP-22; EXP-26; GOV-13), the key assumption of the ToC that final beneficiaries will participate continuously in the pilot interventions is partly not met. Therefore, the corresponding risk addressed in the ToC has occurred in this case. This results in gaps between planning and implementation. In turn, this can undermine the partner

country's achievement of the development impacts of piloting and implementation and sustainable risk preparedness (DEV-21).

Planning and coordination (impact pathway 3) of risk preparedness for residual climate risk management were improved at subnational and local levels (SAGA and CCA-RAI). In this context, residual and non-residual climate risks have been integrated into subnational planning in CCA-RAI and into local planning in SAGA (DEV-20; DEV-21; DEV-27; EXP-09; EXP-12; EXP-22; GOV-05; GOV-14; GOV-15). By comparison, there is evidence at national level that ARC member states are little better at anticipating, planning for, funding or responding to weather-related disasters in a timely and effective manner (OPM, 2017). Furthermore, interviews on CCA-RAI indicated that the subnational SAPCCs contain improved information on residual climate risks as a result of activities within the intervention. This makes them an important mainstreaming document in the states' planning process (DEV-08; DEV-18; DEV-20; DEV-21; GOV-20). The SAPCC of the state of Tamil Nadu, which was supported by development cooperation, has been described as the most successful of all Indian SAPCCs (DEV-14). This is the case even though, like other SAPCCs, it was prepared by external consultants and criticised for its sometimes limited inclusion of the local contexts (EXP-15; EXP-22; GOV-05). The SAGA case study indicated that climate risks at the local level were effectively integrated into the local development plan (EXP-09; GOV-14). Furthermore, at the end of the project, a clear roadmap was established and a handover was carried out so that activities could be continued by the target group and partners (GOV-14). This is a basis for achieving and sustaining development impacts.

Coordination processes (impact pathway 3) for residual climate risk management have been supported by German development cooperation, but need to be further improved (ARC and CCA-RAI). In the case of ARC, improvements in coordination between donors have been seen over time at the regional level (AfDB, 2017, 2018; OPM, 2017). With CCA-RAI, it was noted that sector coordination at the national and subnational levels was insufficient, and that planning tools needed to be regularly updated to achieve outcomes and impacts (EXP-12; EXP-17). The various donors did not integrate the lessons learned into a development process, thus missing the opportunity to secure outcomes and impacts in the long term (GOV-09).

The objectives for the use of data and analyses (impact pathway 4) for risk preparedness were only partially achieved. Across all interventions considered (PrAda, CCA-RAI, SAGA and ARC), the German contribution was able to improve use, but the target groups (private sector, civil society and households) were not reached in some cases. In the case of PrAda**,** the support for data processing and access to agrometeorological models was helpful. This was also a prerequisite for transmitting meteorological data to farmers by mobile phone, for instance (EXP-18; EXP-20). With CCA-RAI, climate risk assessments were carried out and made available. This has improved public, civil society and private actors' understanding of climate risks in general and residual climate risks in particular (DEV-20; DEV-27; EXP-11; EXP-26). Actors were also able to identify current climate risks, as well as future risk management strategies and planning activities outside the contexts of the interventions (CCA-RAI and ARC) (DEV-27; DEV-34; DEV-38; GOV-09; MSG-08). Through activities in this impact pathway, private-sector actors in the SAGA case study were able to analyse their individual climate risk as a basis for further risk preparedness (GOV-08; GOV-14).

In addition to the positive outcomes and impacts mentioned above, several case studies also revealed limitations. It was noted, for example, that in SAGA the private sector does not yet have any improved capacity to respond to early warnings (via fax, Internet) from municipalities (MSG-03). It was also noted that small enterprises sometimes did not understand the risks and thus did not take any steps to prepare for them (EXP-04). In the PrAda case study, it emerged that climate risk assessments were incomplete and not available to all actors (DEV-06; EXP-05). It was also noted that climate risk assessments were only carried out sporadically and not systematically enough by German and international development cooperation (DEV-11; EXP-20). CCA-RAI also failed to prepare the information from climate risk assessments in a simplified form for political decision-makers (GOV-15).

Box 19 Assessment of the instrument group 'risk preparedness'

Risk preparedness is often a component of German development cooperation interventions for residual climate risk management. CCA-RAI in particular makes a major contribution to risk preparedness; this also applies to some aspects of the three other interventions examined (ARC, PrAda and SAGA).

Evaluation question 1: The German development cooperation risk preparedness instruments considered largely meet the benchmark of alignment with relevant strategies and agendas. For example, they support the 2030 Agenda and the Framework Convention on Climate Change. Three interventions (CCA-RAI, PrAda and ARC) explicitly support the achievement of SDG 13 (climate action). Two interventions (CCA-RAI, and PrAda) make relevant contributions in line with the NDCs. One intervention (ARC) is particularly relevant to Article 8 of the Paris Agreement and to the Warsaw International Mechanism for Loss and Damage.

The benchmark of the objectives of the risk preparedness instruments aligning with the partner-country objectives and the target-group needs is essentially met. The risk preparedness components of two interventions under consideration (CCA-RAI and ARC) is in line with the corresponding priorities of the partner countries. The capacity needs of the stakeholders are met by all interventions (CCA-RAI, ARC, SAGA and PrAda), albeit with differences. For example, one intervention (CCA-RAI) partially meets the development needs of the target groups for piloting and implementation, and largely meets their needs for planning and coordination. The data and analyses (impact pathway 4) of the interventions (CCA-RAI, PrAda and ARC) partially meet the development needs of the target groups.

Evaluation question 2: The benchmark of relevance and effectiveness for comprehensive residual climate risk management is largely met for two of the risk preparedness interventions considered (CCA-RAI and ARC). This is achieved by combining several impact pathways of the instrument group. While CCA-RAI supports all impact pathways of risk preparedness, ARC addresses three. However, the relevance of one intervention (CCA-RAI) to comprehensive residual climate risk management differs for the different impact pathways. While planning is already comprehensive, piloting and implementation would need to be scaled up and replicated in order to sufficiently address the relevant residual climate risks. The risk preparedness component of the CCA-RAI instrument considered is combined with the instrument of risk finance. This ensures that residual climate risks are managed in a largely effective, comprehensive manner. The risk preparedness component of ARC is combined with the instruments of risk pooling and risk finance. This enables comprehensive residual climate risk management.

Evaluation question 3: The German development cooperation interventions for risk preparedness made different contributions to effectiveness. Achievement of the benchmarks ranges from partially met to met. At the national level, the capacity development objectives of two instruments considered (ARC and CCA-RAI) were largely achieved. At the subnational level, capacity strengthening in one measure (CCA-RAI) was mostly effective but insufficient. At the local level, capacity development in two of the interventions considered (SAGA and PrAda) was also largely effective in contributing to risk preparedness. In one intervention (CCA-RAI), German development cooperation initiated and to some extent effectively supported piloting and implementation for residual climate risks. Planning and coordination were largely effectively improved in three of the interventions considered (CCA-RAI, ARC and SAGA). National and international coordination processes were effectively supported; however, improvements are needed. The use of data and analyses for risk preparedness was largely improved by all German development cooperation interventions, although the target groups were not reached in some cases (CCA-RAI, PrAda, SAGA and ARC).

At the time of the analysis, it was not yet possible to assess conclusively the extent to which the benchmark for (potential) impact had been reached. Risks to the achievement of impact include a lack of partner responsibilities for continuing capacity development after the end of the intervention, gaps between planning and implementation, a lack of integration of lessons learned and a lack of coordination among the various donors. Although these risks can undermine impact, the relevance of the interventions to partner countries and target groups as well as positive effects at the outcome level point to the possible achievement of impact.

4.4 The instrument group 'transformative risk management'

4.4.1 Introduction and contribution to residual climate risk management

Human mobility in the context of climate change is of major socio-political relevance. Recent statistical modelling assumes, in the most pessimistic case, that in 2050 there will be 143 million internal migrants as a result of slow-onset climate-related events and changes in three world regions (sub-Saharan Africa, South Asia and Latin America) (Rigaud et al., 2018). Inhabitants of coastal regions, and island and atoll states, will be particularly hard hit (Locke, 2009). Overall, internal migration is more likely than international migration (Mueller et al., 2014). Paradoxically, climate migrants often resettle in risk areas (de Sherbinin et al., 2012), for example due to low housing prices in flood-prone river deltas. Consequently, this section of the population remains exposed to climate risks (de Sherbinin et al., 2007).

Climate migration (CM) is a transformative approach to residual climate risk management. The core of transformative risk management is systemic change in order to escape risk (Kates et al., 2012). This systemic change is possible both *in situ* (at the same location) and *ex situ* (elsewhere) (Silvestrini et al., 2015). In an ex-situ transformation, rural inhabitants may move to the nearest major city to take up employment in industrial production or the service industry (ex-situ livelihood transformation). Ex-situ livelihood changes involve a change of location (migration). The aim is to minimise or even eliminate the climate risk in question for the changed local livelihood. The focus of this evaluation module is on ex-situ transformation.[31]

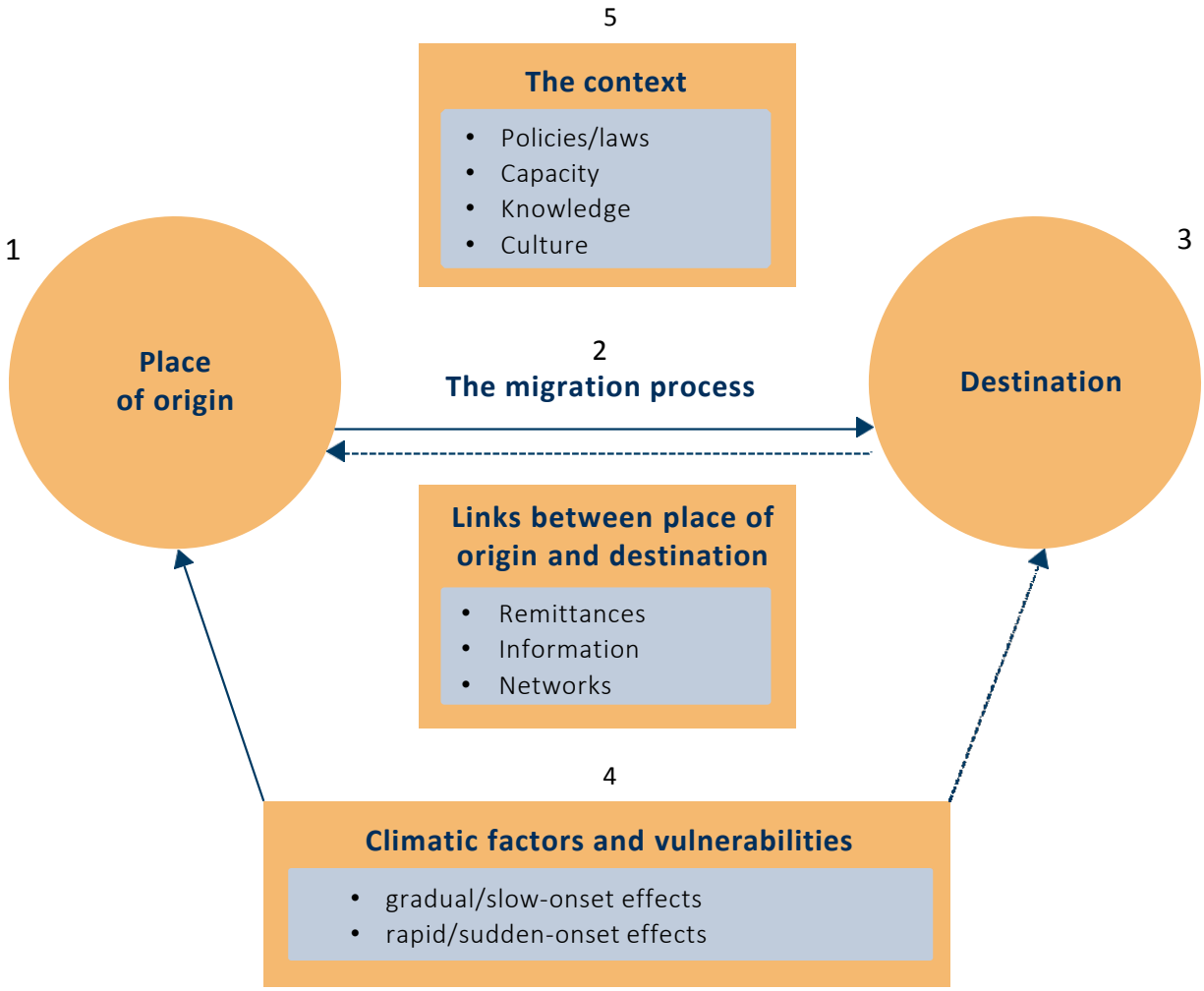
The conceptual framework and fields of action for CM are based on relevant theories of migration as well as a growing body of academic literature.[32]The British Foresight Report (Foresight, 2011) has produced a framework that combines elements of the different theories to explain CM as comprehensively as possible. It makes the case that climate change has a direct effect on the environment and socio-economic conditions, which in turn affects the decision to migrate (Foresight, 2011). Figure 12 presents the conceptual framework for CM. Box 20 elaborates on the areas of action shown in the diagram.

[31] An in-situ transformation would involve livelihood transformation) at the same location. For example, following drought-induced crop failures, rural residents might decide to switch from agriculture to the services sector while remaining in the same place. In-situ transformation is not the focus of this evaluation module.

[32] The conceptual framework was developed on the basis of an unpublished literature review. The literature review *Climate migration and development cooperation* was conducted by researchers from Mendel University (Czech Republic) and Columbia University (USA). An abridged version is available in Annex 7.3.3.

The effects of climatic factors on population movements (migration) are often indirect and multidimensional (Black et al., 2011a). To understand how environmental factors and climate change affect migration decisions, the specialist literature often uses the New Economics of Migration (NEM) (Hunter et al., 2013; Nawrotzki et al., 2013; Nawrotzki and Bakhtsiyarava, 2017). The NEM understands migration as performing a self-insurance function at household level (Stark and Bloom, 1985). Here, one member of the household is sent to another location in order to diversify income flows (van der Land et al., 2018). If at the place of origin the effects of climate change lead to lost revenue, the household can rely on receiving remittances from its member living away from home. This self-insurance function is most effective when climatic conditions at the destination differ significantly from those at the place of origin (Massey et al., 1993). However, the decision to migrate is ultimately made by the individual. Personal goals, wishes, expectations and abilities (education, experience and financial resources) play an important role here (de Haas, 2011).

Figure 12 Conceptual framework for human mobility in the context of climate change



Note: The five fields of action are numbered in the diagram. This numbering corresponds to the fields of action 1-5 in the description contained in Box 20.
Source: DEval, authors' own graphic

Box 20 Fields of action for human mobility in the context of climate change (CM)

To be able to respond appropriately to the phenomenon of CM and prepare for it, it is necessary to consider various fields of action (Figure 12).

Field of action 1: Climatic factors and vulnerabilities at the place of origin

Negative changes induced by climate change (sea level rise, prolonged droughts, etc.) at the place of origin often influence migration decisions (Chen and Mueller, 2018; McAdam, 2010). Households that lose their livelihoods due to such negative changes may decide to migrate in order to find employment in another region or another economic sector (Nawrotzki and Bakhtsiyarava, 2017). A comprehensive CM portfolio should therefore pay particular attention to the place of origin.

First of all, hotspots of climate migration should be identified (de Sherbinin, 2014; Thomas and Benjamin, 2018). Furthermore, the needs of potential climate migrants should be analysed in order to adapt the interventions to the regional situation. Ideally, the vulnerability of relevant economic sectors will also be identified. By improving lives and increasing resilience at the place of origin, causes of displacement could be minimised and regular, safe, orderly migration (often internal migration) could be promoted as an adaptation strategy (BMZ, 2016b).

Various factors influence the decision to migrate in the context of climate change. At the place of origin, these are firstly the negative push factors that motivate a person or a household to leave home. Push factors are often classified as either slow-onset or sudden-onset. Fast-acting natural disasters such as storms or floods require different interventions than changes which develop gradually over years or decades, such as desertification. Push factors are often region-specific. In coastal regions, for example, sea-level rise can cause problems through resulting flooding and soil salinisation (Wrathall et al., 2019). In rural agricultural areas, push factors can include droughts (Nawrotzki and Bakhtsiyarava, 2017), and in urban areas, problems with drinking water supplies and increased temperatures (heat island effect) (Nawrotzki et al., 2015a). However, push factors need not necessarily have a direct climatic origin. They can also be socio-political in nature. For example, a government may legally mandate the relocation of households from high-risk areas (McNamara and Des Combes, 2015). It should be emphasised that targeted resettlement should only be an option when priority risk reduction interventions (such as climate, forest, coastal and marine protection, and sustainable agriculture) have been exhausted.

Field of action 2: The migration process

Several factors influence the migration process. For example, the timing of migration is a function of the resilience of the population and the availability of risk reduction interventions (Nawrotzki and DeWaard, 2016). As the place of origin and the destination of migrants and displaced persons can be fragile, transitional development assistance can support population resilience. Moreover, the destination of migration is often determined by existing migration routes and networks (Nawrotzki et al., 2015b). Knowledge of the migration process helps supports the active management of CM. Here it is necessary to take into account the intake capacity of the destinations (Naser, 2015). In order to guarantee a safe change of location, especially for vulnerable populations such as women and children, support for the migration process is needed (Thomas and Benjamin, 2018). With policy interventions that entail resettlement (expansion of protected areas for sustainable drinking water supply, designation of danger zones), the migration process should also be taken into account and supported accordingly. This is also important for the protection of vulnerable groups and for the upholding of human rights.

Field of action 3: Livelihoods at the destination

Positive pull factors have an effect at the potential destination. They make a place more attractive. Examples include a better labour market, food and nutrition security, access to natural resources such as water, or more favourable climatic conditions (van der Geest, 2011). Social aspects can also be positive pull factors. Existing social networks at the destination through acquaintances and relatives, for example, reduce costs and make it easier to gain a foothold there (Flavell et al., 2020b). Perceptions and the image of the destination also act as crucial pull factors. These factors can be reinforced by access to information

and communication technologies, and information sharing within family and social networks (Foresight, 2011).

Field of action 4: Links between the place of origin and the destination

Migrants often stay connected with their place of origin. They actively share information and transfer money to their relatives – also referred to as remittances (Nawrotzki et al., 2015b). Money and information can be used to actively adapt to climate change at the place of origin. Generally speaking, for many partner countries remittances make an important contribution to economic development (Aggarwal et al., 2011; Giuliano and Ruiz-Arranz, 2009). However, they are often costly and uncertain, especially when made across national borders (de Haas, 2006; Freund and Spatafora, 2008). A comprehensive CM management portfolio can therefore also provide channels for the safe transfer of remittances (Scheffran et al., 2012). It can also provide rewards when these funds are used for climate change adaptation back home (Musah-Surugu et al., 2018; Webber and Barnett, 2010).

Field of action 5: The context

Contextual factors can enable or constrain migration flows (Massey et al., 1993). These factors can be political, economic, social or cultural. National policies on rural development and climate change adaptation, for example, can influence human mobility by supporting rural livelihoods, land-use planning and in-situ transformation (Flavell et al., 2020a). Policy-based contextual factors include the existence of legal migration opportunities, as well as laws and rights. Potential for conflict at the local level – such as the exacerbation of existing political crises or distribution conflicts – can also influence human mobility. Economic contextual factors include the socio-economic situation of the population groups concerned, but also the economic situation at the place of origin and the destination. The adaptive capacities and knowledge of migrants affect human mobility too, but also affect their vulnerability. Cultural factors include educational status, as this affects access to important information and resources relating to mobility (Flavell et al., 2020a).

Transformative approaches are part of individual, societal and political risk management. This needs to be governed by policy. Given the forecasts for climate change-induced migration, development policy needs the foresight to continue developing approaches to transformative risk management that are viable and sustainable. Only in this way can transformation be operationalised as an option for political decision-making and action. Conceptualising and integrating the fields of action for CM can improve the management of human mobility in the context of climate change as a transformative approach.

Given the scale and the effects of climate mobility, the strategies of many partner countries include objectives and interventions for CM. For example, strategic documents of the governments of Bangladesh (GED, 2015) and Peru (MINAM, 2015) clearly highlight the issue of CM. That said, they do not propose concrete interventions to manage it. Fiji addresses CM in its National Adaptation Plan (Government of Fiji, 2018). In collaboration with German development cooperation, it has already produced guidelines on resettlement in the context of climate change (Hirsch et al., 2015; Ministry of Economy, Republic of Fiji, 2018). A knowledge generation activity on CM was requested by the Fijian Government under the HMCCC Global Project. This was in order to revise and finalise the national guidelines on planned resettlement with technical expertise (DOC-31).

'CM' is a topic hat has also been increasingly discussed in the media recently. The discourse often focuses on moral and political issues of international CM. For example, it raises the question of whether a populist isolationist policy, under which rich industrialised countries deny entry to poor climate migrants from the Global South, can be ethically justifiable (Lustgarten, 2020). The lack of legal protection for climate migrants is also discussed (Hierro and Silva, 2019). A further issue discussed is entitlement to asylum as a result of the life-threatening impacts of climate change (Knox, 2020). The discourse here is caught between the fear of migration movements possibly having a destabilising effect, and an awareness of the need for climate migration as an adaptive process (Bennett, 2020; Schraven, 2019). For example, one recommendation is to drastically reduce greenhouse gas emissions in order to address the root causes of CM (White, 2019). Steps should also be taken to prepare for CM, in order to better manage and regulate migration flows proactively (Lustgarten, 2020).

While the discourse in the media predominantly addresses international migration, the thematic field of 'CM' in development cooperation has so far largely been concerned with internal and regional migration International migration in the context of climate change is treated less prominently. One reason for this may be the considerable resources required for international migration (Flavell et al., 2020a).

Despite its major social relevance, 'human mobility in the context of climate change' is a relatively new topic in German development cooperation. Furthermore, only a few international donors are implementing interventions on this topic (DOC-31). Consequently, this evaluation of the instrument group 'transformative risk management' is of a formative nature. The aim is to illustrate how the instrument works, to assess its relevance and to discuss possible impact in the future. Case studies on two interventions of German development cooperation dealing with CM form the basis for this: First of all, instruments of the Philippine component of the HMCCC global programme[33] are analysed. This deals with the generation of applied knowledge on climate migration – or 'CM'. Secondly, instruments of the UMIMCC intervention are considered. This focuses on improving the lives of climate migrants in urban slums in Bangladesh (for details on these interventions, see the case study descriptions in Annex 7.1.7 and 7.1.8).

Table 12 Case studies on transformative risk management

Abbreviation	Title of case study	Transformative risk management instruments considered	Target groups
UMIMCC	Urban Management of Internal Migration due to Climate Change	Human mobility in the context of climate change	Poor urban population in selected hotspots, climate migrants
HMCCC	Human Mobility in the Context of Climate Change		Climate migrants, host communities, BMZ, GIZ, representatives and staff of regional organisations and partner countries, and international development professionals

Source: DEval, authors' own graphic

Synergies exist between the interventions on CM and the wider German development cooperation portfolio. Due to the multidimensional nature of human mobility in the context of climate change, many areas of German development cooperation activity are interlinked with the climate change-migration nexus. These include climate protection, risk reduction interventions, food security and agriculture, biodiversity and environmental protection, disaster risk management, peace and security, migration and displacement contexts, and human rights.

[33] The data reflect the status during the data collection period from September 2019 to April 2020. Changes that have occurred since then, where known, are presented in the case study descriptions (see Appendix 7.1). They are not, however, covered by this evaluation module.

The wider German development cooperation portfolio on migration includes interventions that support several fields of action for managing human mobility in the context of climate change. In the field of action on climatic factors and vulnerabilities at the place of origin (field of action 1, see Box 20), German development cooperation interventions for risk reduction also play a role. These focus on improving people's lives, for instance in the areas of food security and agriculture (e.g. in Chad, under the One World – No Hunger special initiative (SEWOH)). They also focus on creating employment and income prospects for refugees, returnees and the local population (e.g. in Senegal). As these are mainly risk reduction interventions and aim to build long-term resilience, they are not dealt with in this evaluation module, which looks at residual climate risk management. Interventions in field of action 1 can also support policy-makers and authorities in integrating climate risk information and in disaster risk management (e.g. in Bangladesh). Both these areas are instruments of risk preparedness.

The field of action on livelihoods at the destination (field of action 3, see Box 20) is also supported by interventions in the contiguous wider German development cooperation portfolio on migration. These interventions, most of which are not marked as adaptation interventions (by the OECD CRS marker 'CLA'), aim to improve the living conditions, economic opportunities, infrastructure and capacities of migrants, returnees, the local population and host communities (e.g. in the Horn of Africa). This includes economic development interventions as well as those that improve access to drinking water and sanitation (e.g. in Ethiopia) and water availability. Furthermore, interventions at the destination can strengthen local conflict management structures (e.g. in Chad). Interventions at the destination that support migrants can also support migrants in the context of climate change.

4.4.2 Theory of Change for the instrument group 'transformative risk management'

The ToC for the instrument group 'transformative risk management' is presented below. This was reconstructed based on project documents, academic literature and qualitative interviews. It was also discussed and verified with stakeholders during a workshop in Manila in October 2019 as part of the HMCCC case study. Based on the case studies, the ToC has two impact pathways (see Figure 13): applied knowledge on CM (impact pathway 1), and improving the life situation of climate migrants at the destination (impact pathway 2). These two impact pathways correspond to fields of action 5 (the context) and 3 (livelihoods at the destination) in Box 20.

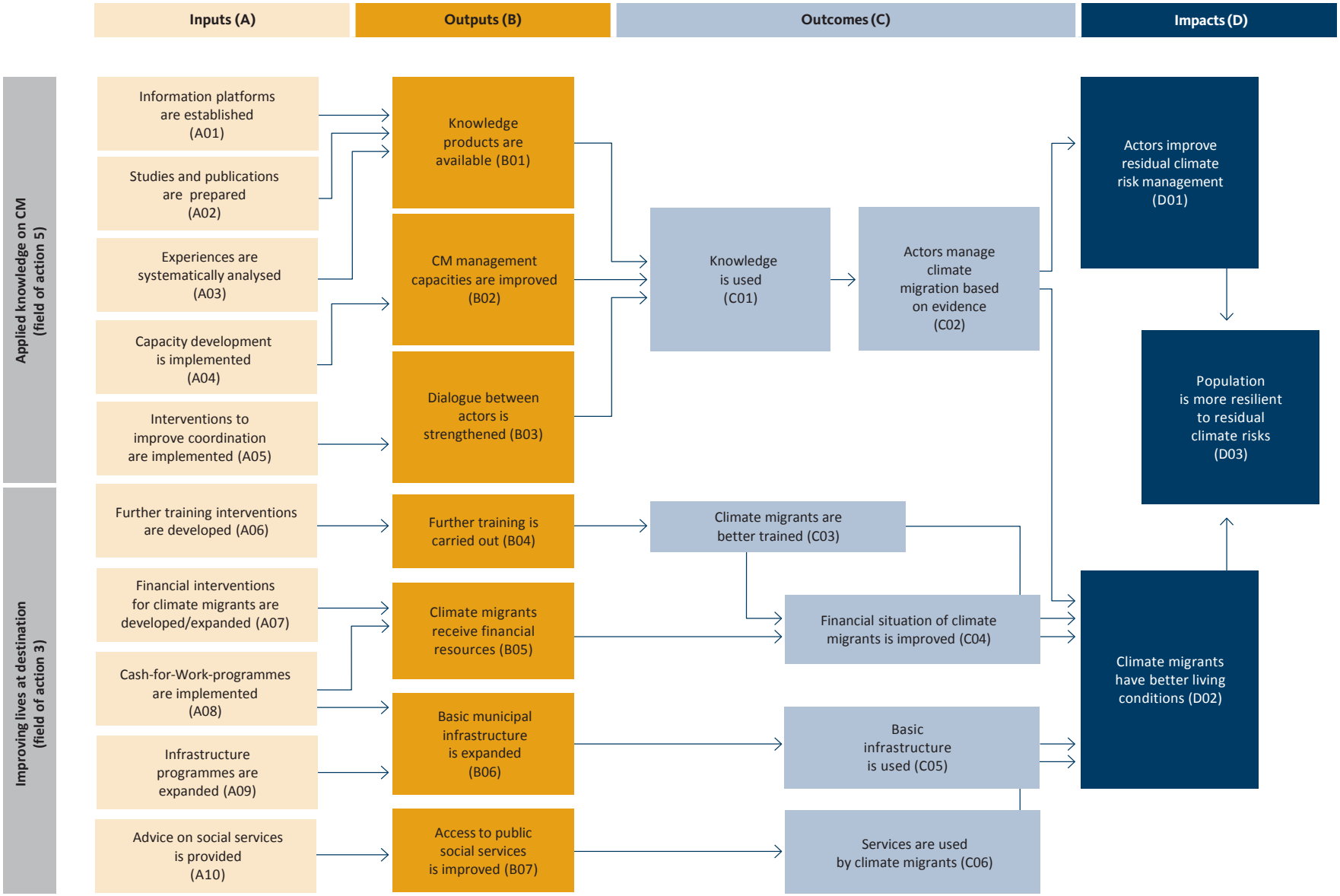
Impact pathway 1 (field of action 5): The primary objective at impact level is improved residual climate risk management (D01). This will make the population more resilient to residual climate risks (D03). Knowledge products are created (B01) and used (C01) by developing information platforms (A01) and through studies and publications (A02). Assuming that these products are innovative and relevant, the knowledge base on 'CM' is thus expanded. By processing lessons learned on CM and developing recommendations, advisory content is made available to decision-makers. In the case of the HMCCC Global Project, this includes revising and finalising the national guidelines on planned resettlement using technical expertise. Capacities for managing CM are improved in the partner country, and dialogue on the topic between different actors is supported. Taken together, these activities will ensure that actors manage CM based on evidence (C02). In order to ensure the usefulness of the data, certain risks must be taken into account. For example, data on 'CM' are only used (B01, B02, B03 -> C01) if there is general political interest in CM, the data are easily accessible and the existence of the data products is known to the target groups. Moreover, generated knowledge is only used when the actors in question have a clear mandate to use it (for example, for purposes of instruction and to describe activities).

Impact pathway 2 (field of action 3): The primary goal at impact level is to improve the life situation of climate migrants (D02). This will make the population more resilient to residual climate risks (D03). First of all, local economic structures and training needs are analysed. Based on this, training interventions are designed (A06) and implemented (B04). Assuming that climate migrants gain relevant skills through the intervention, they should be able to obtain better jobs (C03) and thus significantly improve their standard of living (D02). One assumption is that the socio-economic situation and mental state of climate migrants will allow them to complete their training and take up employment. However, the individual debt of climate migrant households may be so large (DEV-31) that better training and higher income do not noticeably improve their life situation (C04 -> D02). This is because they might use additional income to repay debts. Poverty reduction interventions are therefore an important supplement (A07, A08). These supplementary interventions can involve support in the form of transfer payments (B05). The provision of breeding animals also enables climate migrants to improve their livelihoods and diversify their sources of income (DOC-28). Furthermore, financial services provided by microfinance institutions can improve the financial situation of climate migrants (C04).

Access to (B07) and use of (C06) public social services can also improve the living situation of climate migrants (D02). Climate migrants often lack knowledge about the availability of social services and their own rights in this regard. Counselling (A10) improves access to these services. Ideally, counselling centres should be established locally and staffed for this purpose. These centres act as an interface with local authorities. One risk to be considered is that climate migrants may need active support (coaching) in order to be able to use the counselling services (B07 -> C06).

The life situation of climate migrants is often shaped by the quality of the basic infrastructure in the area where they settle. Labour-intensive interventions (A08, A09) that involve climate migrants not only improve local infrastructure (e.g. paved roads, electricity supply, access to drinking water) (B06). They also create income-generating opportunities for migrants in the medium term (B05). The support of local governments in proposing and implementing infrastructure programmes also guarantees that the life situation of climate migrants will improve in the long term (D02). It is assumed that climate migrants actually use the improved basic infrastructure (C05). One risk is that improved basic infrastructure leads to higher rents (C05 -> D02), and that climate migrants may not be able to pay them. In this case, they would be forced to move, which would be contrary to the programme objectives.

Figure 13 Theory of Change for the instrument group 'transformative risk management'



Source: DEval, authors' own graphic

4.4.3 Relevance to partners, agendas and target groups (EQ1)

Box 21 Benchmarks for assessing EQ1

- The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.
- The objectives of the interventions align with the needs of the target groups and the objectives of the partners.

The overall objectives of the interventions align with the objectives of relevant global strategies. Both the HMCCC and the UMIMCC projects make relevant contributions to the SDGs, especially through adaptation to climate change (DEV-31; DOC-37). They also align with the 2015 Paris Agreement (DOC-32). 'CM' is also addressed by the Task Force on Displacement under the Warsaw International Mechanism for Loss and Damage (DOC-30; DOC-31). The theme is discussed in both the UN Global Compact for Safe, Orderly and Regular Migration and the Sendai Framework for Disaster Risk Reduction (UNDRR, 2015) (DOC-30; DOC-31). In this regard, the WIM Task Force on Displacement clearly recommended improving data on CM, and this recommendation was adopted by the 24th Conference of the Parties (COP 24) (DOC-31) (Wright et al., 2020).

The alignment of the interventions' objectives with the partner-country strategies, priorities and agendas needs to be assessed on a case-by-case basis. For example, 'CM' is discussed in the relevant strategy document of Bangladesh (DOC-34), but not in that of the Philippines (GOV-28; MSG-02). The Philippines lacks proposals for concrete actions to address CM issues (DOC-30). However, the existence of relevant governmental organisations (such as the Climate Change Commission in the Philippines), and ministerial support for interventions (DEV-31) in both countries, show that the effects of global climate change are indeed taken seriously (EXP-01; GOV-04). High-ranking politicians in Bangladesh (such as the prime minister) discuss the issue publicly (DEV-31). By comparison, climate change is of secondary importance for the Philippine government, according to the interviewees (EXP-01; GOV-28). Only in the context of natural disasters (such as tropical storms) do politicians in the Philippines give broad consideration to climate change (GOV-02).

The objectives of the interventions align with the relevant strategies and agendas of Germany and the BMZ. In general, the German Government has a strong political interest in the topic of 'displacement and migration' (DEV-01). The causes that force people to flee are to be tackled, and refugees and host communities supported. The focus here is increasingly on international migration, and only to a limited extent on internal migration (Crage, 2016; Müller et al., 2012). The BMZ's Special Initiative on Displacement was also established with the aim of reducing the causes of displacement and supporting refugees and host regions (DEV-31; DOC-30). Interventions of the special initiative work on cross-cutting issues that are relevant to human mobility in the context of climate change. The relevance of CM is also reflected in the strategy for migration and development, the strategy for transitional development assistance and the BMZ strategy papers 'Climate Change - Time to Act' and 'Comprehensive Risk Management' (DOC-30). Furthermore, the UMIMCC intervention takes account of relevant country and regional strategies (such as the BMZ's new Asia policy) (DOC-32).

Besides alignment with the objectives of German development cooperation, coordination with other German federal ministries and other donors is also an important aspect of relevance. The interventions in this instrument group are commissioned exclusively by the BMZ (DOC-30; DOC-33). However, the topic is also of interest to the BMU, and there are various agreements between the two ministries (DOC-31). This interest is also reflected by several studies by the German Environment Agency, which were produced as part of the BMU's departmental research plan (Flavell et al., 2020a, 2020b; Wright et al., 2020). According to interviews, the interventions were at least partially coordinated with other donors (DEV-31; DOC-28; MSG-02). For example, representatives of the International Organization for Migration (IOM) attended various planning meetings for the HMCCC intervention (MSG-02). The UMIMCC intervention is also working with the IOM in the second phase to locate migrants (DEV-31; DOC-28). Due to the co-financing by Germany and the EU, there is increased coordination with the EU in the second phase of UMIMCC. However, this has been

fraught with difficulties due to differences in perspective between Germany and the EU (DEV-01). In general, the opportunities for coordination are limited, as so far relatively few international donors are implementing interventions on CM(DOC-31).

The instruments considered are of limited relevance to local civil society in addressing CM. Both interventions in the instrument group have involved local civil society to a limited extent in the planning and implementation of interventions (DOC-13; DOC-18; DOC-30). Representatives of local civil society see the relevance of the intervention in the possibility of bringing together different stakeholder groups (convening power) (EXP-01) and shaping the discourse at conferences and meetings (GOV-02). If CM-related problems affecting local civil society (e.g. resource scarcity or distribution conflicts) were also to be directly addressed, the intervention could become more relevant in the future.

The interventions are relevant to different target group segments. On the one hand, this is due to the fact that they are designed for different levels of target groups. The UMIMCC project pursues activities that are primarily relevant to climate migrants (DEV-31). However, particularly vulnerable slum dwellers can also participate in this inclusive approach (DEV-31). The needs and expectations of climate migrants were identified in a participatory process involving studies and workshops, and the interventions were aligned accordingly (DOC-13; DOC-37). According to interviewees, climate migrants rated various interventions (e.g. educational interventions) as particularly relevant. This was taken into account in the design of follow-up projects (DEV-01). With its knowledge products and capacity-building interventions, the HMCCC project is aimed primarily at governmental organisations (GOV-28). However, climate migrants in the Philippines can benefit indirectly from the interventions through improved handling of CM by governmental organisations.

Both interventions focus on specifically disadvantaged groups. UMIMCC in Bangladesh focuses on the poor population in slums. It thus directly targets a socio-economically disadvantaged group (DOC-30). Furthermore, both interventions aim to include a special focus on women as a disadvantaged group. Although the HMCCC project in the Philippines is undertaking gender-specific research, one interviewee noted that a gender focus was not yet evident in the programme components (GOV-28). However, other interviews have shown that many interventions in the UMIMCC project are recognisably tailored to women (DEV-01; DEV-31). Furthermore, efforts are made to make participation attractive for women by providing meals and childcare (DOC-30).

Climate risk assessments can also make activities in transformative risk management instruments more relevant by specifying the place of origin and the destination. In the UMIMCC project, a survey was conducted to determine the proportion of climate migrants in the implementation regions (slums) (DOC-18). This demonstrated the relevance of location selection. Furthermore, climate risk assessments have shown that 40 out of 64 districts in Bangladesh are vulnerable to the impacts of climate change (DOC-30). UMIMCC focuses on urban centres as a destination for climate migrants (DOC-30). Researchers assume that the strongest CM flows will be towards metropolitan regions (Nawrotzki et al., 2017).

In summary, the instruments considered in the instrument group 'transformative risk management' can be classified as relevant for the most part. They do align with the development needs of the target groups, albeit at different levels.

4.4.4 Relevance and effectiveness for comprehensive residual climate risk management (EQ2)

The relevance and effectiveness of transformative risk management for comprehensive residual climate risk management can be assessed by relating it to a detailed comprehensive conceptual framework for CM. This conceptual framework was developed in Section 4.4.1 (Figure 12) and serves as the basis for the discussion below.

Box 22 Benchmarks for assessing EQ2

- The interventions are relevant to comprehensive residual climate risk management (including coverage of relevant residual climate risks, conduct of climate risk assessments and comprehensive coverage of climate risks).
- The interventions are effective for comprehensive residual climate risk management (including integration into overall climate risk management, and combination with other interventions).

The two interventions considered represent different fields of action for CM. The primary objective of the HMCCC Global Project is to generate applied knowledge on 'CM', and to support relevant actors in using this knowledge. This aspect corresponds to field of action 5 ('the context') in the conceptual framework (Figure 12). A comprehensive knowledge base provides the foundation for the various fields of action. The UMIMCC project aims to improve the lives of climate migrants at their destination. It thus covers field of action 3 in the conceptual framework. However, it is not designed exclusively for climate migrants. Local slum-dwellers can also access the interventions (DEV-01).

Against the background of the conceptual framework, the interventions are not comprehensive. The following fields of action are not included in the projects: 1 ('climatic factors and vulnerabilities at the place of origin'), 2 ('the migration process') and 4 ('links between the place of origin and the destination'). However, the wider German development cooperation portfolio does encompass interventions that support several fields of action for CM management. This also includes interventions in the context of climate change (mostly without the CLA marker; see Section 4.4.1). There are synergies between the considered interventions and the wider German development cooperation portfolio.

Global climate change is manifested in different phenomena that can generate different migration dynamics. The phenomena caused by climate change can be divided into gradual/slow-onset climate effects (e.g. sea-level rise, desertification), and rapid/sudden-onset effects (e.g. storms, droughts, heat waves) (IPCC, 2007). Gradual climate effects often lead to permanent migration (DOC-30). Sudden-onset climate effects, on the other hand, can imply either temporary displacement (Kälin, 2010; McLeman and Hunter, 2010), or permanent and multiple displacement in certain contexts (Peters and Lovell, 2020). A comprehensive CM portfolio should include both phenomena. The Philippine component of the HMCCC project focuses on gradual climate effects (DOC-30). However, decision-makers in the country rate the sudden effects (especially storms) as significantly more relevant (EXP-01; GOV-02). This reduces the developmental relevance of the intervention. In the long term, it would therefore be advisable to better integrate the intervention into disaster risk management strategies and interventions.

4.4.5 Effectiveness and impacts (EQ3)

Box 23 Benchmarks for assessing EQ3

- The interventions achieve their objectives at outcome level.
- The intervention makes a clear contribution towards the achievement of objectives at outcome level.
- Wider impacts of the interventions can be identified and/or foreseen.
- The intervention makes a clear contribution towards the identifiable/foreseeable impacts.

Overall, the effectiveness of UMIMCC is rated positively at this point in time. The first phase of the intervention in Bangladesh has already been completed. The second phase is still being implemented (DEV-31). In the first phase, all objective indicators were achieved (DOC-13), and a project evaluation confirms the effectiveness of the intervention (DOC-37). The lives of climate migrants were demonstrably improved through the development of basic infrastructure, cash-for-work programmes and educational opportunities. According to one interview, the target group rated the development of basic infrastructure as not very helpful, but found the educational offerings very useful (DEV-01). These activities were able to significantly increase the income of climate migrants (DEV-01). One reason for the high effectiveness of UMIMCC is seen in its flexible design. The activities were adapted to the needs of the target group in a participatory process (DEV-01).

The HMCCC project still falls somewhat short of this result, as its implementation phase is still in its infancy. The goal of generating applied knowledge on the topic of 'CM' has so far only been achieved to a limited extent (GOV-22; GOV-28). However, interviews also revealed that initial scenario workshops have already been held to generate knowledge. Relevant knowledge has also already been fed into international processes, and the BMZ has been supplied with information through numerous contributions on the subject (GOV-04). Furthermore, various products such as regional studies, fact sheets and videos have been produced (GIZ, no date c). A certain degree of effectiveness is thus already emerging.

Both interventions achieve their goal of raising awareness of climate migration among relevant ministries, political decision-makers and the public. For example, the HMCCC project has helped to raise awareness of the existence of climate migrants, and their treatment, through the visit of a group of Filipino decision-makers to Germany (GOV-19; GOV-24). UMIMCC has succeeded in disseminating its knowledge nationwide by speaking at national conferences. According to interviews, the relevant research has also contributed internationally to generating awareness on the topic of 'CM' (DEV-01). In general, both instruments have shaped the political discourse (DEV-31) and raised awareness of the topic within relevant ministries (MSG-05).

Capacities to address the CM within partner organisations have been built by both interventions. However, needs have not yet been fully met. Capacity-building interventions include workshops, training, consultancy services and cooperation (DEV-01; DOC-13; DOC-18; DOC-30; DOC-31; GOV-02; GOV-19; GOV-32). The aim of these capacity-building interventions was to strengthen administrative structures and enable staff and management personnel to address CM (DOC-32). However, capacity building is not yet complete and further needs were noted in interviews (GOV-02).

The long-term objective of helping to shape the institutional framework in the partner countries was largely achieved in the HMCCC project, and barely at all in the UMIMCC project (DEV-01; EXP-23). Influenced by the HMCCC project, CM issues in the Philippines have already been included on the agendas of inter-ministerial committees, which are actively shaping the institutional framework (GOV-04). There are also plans to mainstream CM in the new version of the Philippine National Climate Change Action Plan (NCCAP) (MSG-05) and the Executive Legislative Agenda (ELA) (GOV-24). Comparable plans to further mainstream the topic within the institutional framework also exist in Bangladesh. So far, however, these have had little effect on the institutional framework (DEV-01).

Both interventions are currently still in the implementation phase, and various factors can negatively influence the achievement of objectives. Although most risk factors are specific to a country or an intervention, certain commonalities can be identified as regards factors affecting the achievement of objectives. These are: a significant loss of political attention paid to CM as a result of extreme events (such as the pandemic) (DOC-30; DOC-31); a deterioration in the political situation (DOC-24; DOC-30; DOC-31; DOC-32); a lack of ownership within partner institutions (DOC-24; DOC-30; DOC-32); security risks for implementing personnel due to crime (DOC-18; DOC-30), and sharply declining donor funding for displacement and migration (DOC-31). The projects actively monitor the socio-political situation so that they can respond to negative developments (DOC-30). They also take various risk-reducing steps, such as close cooperation with partner ministries (DOC-32).

Since implementation remains ongoing, it is not yet possible to assess the impact of the two projects at this point in time. A long-term improvement in life circumstances depends on many factors, many of which are beyond the control of the projects. For example, better training (UMIMCC) does not necessarily lead to a better life situation. The local labour market must be structured such as to enable employment or self-employment. However, the project is barely able to influence this. The extent to which the life situation of climate migrants can be guaranteed beyond the implemented interventions also depends largely on continuation by local partner institutions. Over time, however, both projects will make an active contribution towards climate change adaptation as envisaged by SDG 13 (climate action) (DOC-32). Moreover, UMIMCC contributes directly to poverty reduction among climate migrants and the vulnerable local population as envisaged by SDG 1 (No Poverty) (DOC-30).

The group of instruments under review has the potential to serve as a model and deliver results on a broad scale. According to interviews, the HMCCC project is designed such that it can be applied in other countries in Southeast Asia with minor modifications (EXP-01; EXP-23; GOV-02; GOV-11). The UMIMCC project is especially suitable for transfer to other contexts, as one of its characteristic features is the flexibility to adapt interventions to local needs (DEV-01; DEV-31). The project has already been extended from two cities (Phase 1) to five cities (Phase 2). This shows its general suitability for upscaling (DEV-01; DEV-31). Moreover, the interventions in this instrument group can be regarded as exemplary, as they are among the first to address CM within German development cooperation (DOC-30; DOC-37). The HMCCC project is also among the first to address migration induced by slow-onset/gradual climate-related changes at the place of origin. However, the interventions considered can only serve as models within their own framework, as they do not constitute integrated approaches. Since they only include individual fields of action, they cannot yet offer sustainable long-term approaches to human mobility in the context of climate change.

Box 24 Assessment of the instrument group 'transformative risk management'

Evaluation question 1: The considered German development cooperation instruments for transformative risk management meet the benchmark of alignment with global agendas, and with partner-country strategies, priorities and agendas. The requirement of alignment with the development needs of target groups is largely met, albeit at different levels. The UMIMCC project is mainly relevant to climate migrants, the HMCCC project to governmental organisations. The interventions are partially relevant to local civil society. The instruments clearly relate to Germany's strategies and agendas.

Evaluation question 2: The considered German development cooperation instruments for transformative risk management only cover a certain part of the relevant fields of action. Therefore, they only partially meet the requirement of relevance and effectiveness for comprehensive residual climate risk management. The objective of the HMCCC project, which aims to generate applied knowledge on the topic of 'CM', is largely limited to field of action 5 ('the context'). The UMIMCC project, on the other hand, primarily covers field of action 3 ('improvements at the destination'). Given the conceptual framework, the considered German development cooperation instruments for transformative risk management are therefore not comprehensive, and do not represent integrated approaches. However, there are synergies with the wider development cooperation portfolio. First of all, this contributes to more comprehensive residual climate risk management.

Secondly, it offers the opportunity to further evolve sustainable transformative risk management approaches for human mobility in the context of climate change.

Evaluation question 3: The considered instruments of German development cooperation for transformative risk management are likely to be effective. They are expected to meet the requirement of achieving the objectives, and make a contribution at outcome level. The primary objectives – to generate knowledge on human mobility in the context of climate change (the HMCCC project), and improve the lives of climate migrants (the UMIMCC project) – will probably be achieved. Both interventions are largely effective in building capacity and partly effective in terms of awareness raising and sensitisation. The HMCCC project is largely effective in influencing the institutional framework, the UMIMCC project barely so. Capacity-building interventions still need to be further expanded.

Due to the early implementation status, it is not yet possible to assess the extent to which impacts will be achieved in the HMCCC and UMIMCC projects. However, there are some risks that jeopardise medium and long-term impacts. These include uncertainty about the continuity of donor funding. Also uncertain are partner-country ownership and the willingness of partner countries to continue activities. Both the UMIMCC and the HMCCC each focus on a single field of action. An interplay brought about through integrated interventions could harness synergies with the broader development cooperation portfolio, and thus contribute to impact.

4.5 Discussion of the interplay of the instrument groups

The instrument groups for residual climate risk management (see introduction in Section 2.2) pursue different objectives and therefore have different areas of application. Many risk reduction interventions aim to reduce the probability of occurrence or the magnitude of the event in question. Residual climate risk management instruments, on the other hand, aim to deal with the effects of climate risks and to take precautions in case the occurrence of a risk can no longer be avoided or reduced.

The instrument group 'risk preparedness' aims to reduce the level of losses and damages, or the actual effects of the occurrence of a risk, through improved preparedness. For instance, functioning early warning systems for hurricanes and preparedness for evacuation processes cannot reduce the risk of losses and damages occurring, but they can limit their extent or effects.

By contrast, the instrument groups 'third-party risk finance' and 'risk pooling', both of which involve risk financing, aim primarily to manage or compensate (potential) losses and damages. With third-party risk finance, other instruments for residual climate risk management are also financed in some cases (for example, instruments from the 'risk pooling' or 'risk preparedness' groups). Risk financing instruments only have a secondary influence on the scope of losses and damages or the effects of climate risks. Firstly, they can incentivise actors to invest in risk reduction. Secondly, they can often prevent consequential losses and damages through rapid disbursement. The instrument group 'transformative risk management' represents a special case. It aims to remove the subject from risk by transforming the system.

Overall, to address residual climate risks German bilateral development cooperation has a strong focus on risk pooling through climate risk insurance. This is further consolidated by the IIF, a global fund for international development cooperation with all developing countries. The prominent support of IGP by German development cooperation illustrates the focus on the insurance-based approach. In this context, in addition to risk pooling at the micro level, IGP also pursues risk pooling at the meso level – by insuring institutions. It also does so at the macro level – by applying the insurance mechanism to countries.

For the comprehensive management of residual climate risks, three dimensions of coverage need to be considered: depth (all relevant climate risks), breadth (all relevant target groups) and level. The latter refers to a comprehensive reduction of the size of losses and damages/the effects of climate risks, or the coverage/compensation of losses and damages. An effective combination of the instrument groups, each with their different areas of application, is conducive to this. This integration can be achieved both by using and combining German development cooperation instruments, and through cooperation with partners and other development cooperation actors.

The case studies examined reveal different approaches to combining the instrument groups. Regarding comprehensive residual climate risk management, various strengths and weaknesses became apparent. The options used or not used are presented in detail in the findings for the respective instrument groups (Sections 4.1 to 4.4). Box 25 presents examples of these findings from the case studies:

Box 25 Comprehensive residual climate risk management and interplay of the instrument groups in the case studies examined

- **The ARC case study shows that a risk financing instrument can be used to comprehensively manage residual climate risks if it is combined with other instruments.** ARC combines risk preparedness instruments (e.g. early warning systems, contingency planning and capacity building) with risk pooling instruments (macro-level insurance pool via ARC Ltd.) and third-party risk finance instruments (e.g. international equity participation). In the context of risk preparedness for contingency planning, nation states are supported in using national reserve funds for self-insurance (among other things for adjustment of losses and damages).
- **The IIF structured fund uses risk financing instruments to promote the expansion of risk pooling instruments.** Beyond this, however, the fund does not pursue the approach of comprehensive residual climate risk management. It is primarily limited to financing risk pooling approaches. Financing in the equity fund, however, can indirectly support other risk financing instruments, and possibly risk preparedness instruments. This is achieved by providing weather data and supporting modelling. The debt fund only serves to expand risk pooling. It does not pursue or promote further combination with risk reduction interventions or further risk coverage through risk financing instruments.
- **The risk finance instrument considered in the CCA-RAI case study pursues a local approach to comprehensive residual climate risk management involving state actors.** Here, it is up to the Indian states to submit project proposals to national and international climate funds. They are thus responsible for integrating the projects into their own comprehensive risk management activities. In the long run, a proposal submission process of this kind will be relevant for combing instruments. So far, only a few of the projects supported by the national fund consider residual climate risks. In the SAPCCs themselves, the coverage of losses and damages resulting from residual climate risks, and risk financing instruments, have not yet been included to a sufficient extent.
- **In the PrAda case study, the risk pooling instrument is combined with risk reduction interventions through the agricultural value chain approach.** Risk preparedness instruments (e.g. provision of climatic data, information and early warning systems) are also integrated. For comprehensive residual climate risk management, however, it appears necessary to link risk pooling with instruments for third-party risk finance. For example, some risks are almost impossible to insure through the private sector. Or, poor and vulnerable agricultural producers are not financially able to join a CRI solution and need support through premium subsidies.
- **The RFPI III case study sees the risk pooling instrument as part of comprehensive disaster risk management within a national framework.** However, when not linked to other risk financing instruments, in RFPI III the risk pooling instrument is unable to cover certain relevant climate risks (such as drought). To be able to cover less solvent micro-enterprises, premium subsidies delivered through third-party risk finance are being planned.
- **The SAGA case study does not pursue integration into comprehensive risk management. However, the target groups were comprehensively made aware of the topic of 'climate risk management'.**

SAGA is designed as a pilot project for innovative, index-based insurance solutions in cooperation with the Allianz insurance company. The case study highlights a key aspect of comprehensive risk management: The choice of instrument and linkages with other instruments is a fundamental decision that can influence relevance, effectiveness and impact. There was no openness in the choice of instruments at the beginning of the intervention as the project (like its predecessor project) was already committed to CRI. However, the interviewees questioned whether risk pooling was the instrument to be applied as a priority. Premium subsidies (decreasing over time) are planned for the initial years of the product and to build up the risk pool.

The analysis of the case studies shows that many efforts are being made to combine instrument groups. However, opportunities and synergies were not used in some cases. As a result, residual climate risks were not addressed as comprehensively as would have been possible.

The conceptualisation at the beginning of the chapter and the findings of the case studies highlight the various advantages and disadvantages of each of the instrument groups:

Third-party risk finance instruments are used to finance investments for residual climate risk management. This implies a certain flexibility of the instrument. The approaches to third-party risk finance considered in this evaluation module have good potential to achieve a wide reach, and can also cover target groups with a low ability to pay. At the same time, however, the global or regional approach through intermediaries may limit the instrument's fitness for purpose at the level of final beneficiaries. Cooperation with the relevant partner governments enables coordination with regional and national strategies and activities. Public-private partnerships will seek to both create marketable insurance, and ensure coordination with partner-government activities. Risk financing instruments managed by public actors face the challenge of having to rely on how well the relevant actors, such as government agencies, are able to manage and disburse funds. At the same time, management by public actors can also deliver bespoke solutions that align with government activities.

Third-party risk finance provides funding for the instrument groups 'risk pooling', 'risk preparedness' and 'transformative risk management', among others. One example is the CCA-RAI risk finance instrument, which finances climate risk management projects at the local or state level through national and international climate funds. Projects implemented by the SAPCCs as pilot projects can thus contribute to the NDCs. In the case of the NAFCC, no residual climate risk management interventions have been financed thus far. This will therefore become relevant going forward. Another approach is the IIF as a structured fund. IIF provides financing for companies in the insurance value chain by blending official and private resources in order to leverage private capital. In the case of ARC, Germany's equity participation supports the capitalisation of ARC Ltd., which manages ARC's insurance pool.

Contributions and limits of third-party risk finance for comprehensive residual climate risk management

Contributions:

- Potential to achieve greater reach
- Coverage of target groups with insufficient ability to pay
- Coverage of non-insurable climate risks
- Provision of funding for other instrument groups

Limits:

- Instrument may not be a good fit for final beneficiaries
- Difficult to identify needy target groups
- Third party may have limited capacities or limited willingness to pay

The **risk pooling** instruments has advantages in terms of financial protection against weather-related extreme events that occur infrequently and imply a relatively high risk of losses and damages. With market-based insurance, it is also assumed that the insurance can pay for itself on the basis of premium income, and that no further financing from development cooperation is required in the long term. The strength of risk pooling lies in the transfer of risk to the pool, which is fed by the premiums from all insured parties. Consequently, insurance principles must apply to risk pooling. These include for instance a largely random occurrence of the event and a probability of occurrence that is not too high. In the case of slow-onset changes (stressors), insurance is less suitable because the criterion of randomness is not met. This is the case, for instance, when the risk of more frequent events with a high risk of losses and damages increases as expected. One example is the risk of drought in southern Madagascar. Even in the case of index-based insurance, the risk spread of the pool members must be as diverse as possible to enable the CRI solution to be financially viable. Other instruments are more suitable for homogeneous pools, intangible residual losses and damages, slow-onset changes (stressors), actuarially or economically uninsurable risks, and frequently occurring extreme events.

The financial sustainability of the CRI depends on the existence of heterogeneous and sufficiently large risk pools. It also depends on the insured parties' being sufficiently solvent. Risk transfer for poor and vulnerable target groups is barely possible without integrating other instruments such as premium subsidies. The case studies considered show that CRI is an effective and impactful instrument for residual climate risk management, but only for specific target groups, specific risks and specific contexts. Complicating matters further, the target group's understanding of CRI and insurance in their own context may be low, and cultural barriers may exist. Given the high cost of establishing CRI solutions, it may therefore be effective and proportionate in such a context to focus on risk reduction and risk preparedness interventions, or on the use of risk financing instruments. In the SAGA and PrAda case studies, target groups did not see CRI as a priority risk management strategy. Risk reduction and risk preparedness interventions seemed a better fit for their needs.

As a risk pooling instrument at the macro level, the ARC case shows that, through joint governance by the Member States, the use of risk pooling can be closely linked to national priorities. Entry into the risk pool depends, among other things, on the solvency of the state as the insured entity. The solvency of the final beneficiaries plays no role here, which is why this instrument also enables risk transfer for poorer sections of the population.

Contributions and limits of risk pooling for comprehensive residual climate risk management

Contributions:

- Coverage possible for target groups (entity to be insured) with sufficient solvency and accessibility; risk transfer and clearly defined and regular payments (premiums) help enable target groups to plan and invest
- Level of coverage (payouts) possible within the scope of the resources in the risk pool (in accordance with the insurance policy)
- Parametric insurance allows for quick settlement (no loss and damage assessment required); quick settlement often reduces consequential losses and damages
- Certain climate risks can be well covered by risk pooling (calculable, sufficiently random, no 100-per-cent probability)

Limits:

- Limit of economic insurability is reached when the risks are too high and the target groups' ability to pay is too low
- High costs/losses and damages possibly beyond the insured amount (possible deductible)
- Small and insufficiently heterogeneous risk pools reach the limits of insurability.
- Limit for uninsurable risks (probability of occurrence too high, no randomness in the case of slow-onset changes, prohibitively high premiums)

The **risk preparedness** instrument group has an important cross-cutting function, as it provides relevant services and support for the other instrument groups. Combining risk preparedness with other instrument groups is necessary for comprehensive risk management. In contrast to the instrument groups 'third-party risk finance' and 'risk pooling', the instrument group 'risk preparedness' has one particular strength: It has the potential to directly reduce the level of losses and damages, or the effects of the risk should it occur, in order to reduce the actual impacts on the target groups. This is achieved primarily through interventions in the 'planning and coordination' impact pathway, for example by drawing up contingency plans. However, an interplay of interventions between the impact pathways of the 'risk preparedness' instrument group is important, as the CCA-RAI example shows. In this case, combining planning with piloting can contribute to comprehensive risk management in the future. The provision of data and analyses, and capacity development, are essential components that are also needed for the other instrument groups to function.

Cross-cutting function of risk preparedness comprehensive residual climate risk management

Contributions:

- In case of an extreme weather event, possible reduction of the level and effects of the losses and damages
- Improved capacity to respond to the negative effects of events
- Data availability and analyses for estimating potential climate risks (costs and probabilities)
- Provision of services and support for other instrument groups

The **transformative risk management** instrument group plays an important special role among the instruments for residual climate risk management. Its relevance becomes apparent in the process of weighing up its pros and cons along with those of other instrument groups. Systemic change either 'in situ' (at the same location) or 'ex situ' (elsewhere) aims to remove the subject from the relevant climate risk. The relevant climate risks are thus minimised or even eliminated through transformative change in local livelihoods or through migration. Through human mobility, for instance, climate migrants can avoid the risk posed by drought at their place of origin. Transformative risk management strategies, and their potential societal effects such as (distribution) conflicts, are complex. Consequently, their use needs to be carefully considered in a process that strikes a balance with the use of other instruments for risk reduction and for residual climate risk management. It may be that instruments for risk preparedness, third-party risk finance and risk pooling

do not lead to the desired risk coverage, or cannot be implemented with reasonable effort. In such cases, transformative risk management then becomes especially relevant and is a risk management strategy to be considered. The German development cooperation instruments for transformative risk management that have been considered show that viable long-term approaches need to be developed. These approaches are needed in order to operationalise transformation as a policy option for decision-making and action. That said, the interventions considered can contribute to a comprehensive approach to human mobility in the context of climate change through synergies with the wider development cooperation portfolio.

Contribution and limits of transformative risk management for comprehensive residual climate risk management

Contribution:

- Once the limits to adaptation have been reached, transformative approaches can create prospects through systemic change (in situ and ex situ), and become risk management strategies worth considering. This applies in particular when other instruments do not (or no longer) lead to a desired risk coverage, or cannot be implemented with reasonable effort.

Limits:

- The acceptance of transformative risk management ex situ by host communities or the host society, and in situ by target groups and local society, may be limited.
- For development policy reasons, interventions at the destination often cannot treat climate migrants differently from the local population. Consequently, the interventions are less focused on this target group.
- The costs and benefits of transformative approaches are difficult to gauge in advance.
- With ex-situ transformative risk management, there need not necessarily be fewer climate risks at the destination.
- In-situ transformative risk management may involve exposure to similar climate risks at the place of origin.

This examination of each of the instrument groups already points to a large number of advantages to be gained from combining the instrument groups in order to comprehensively manage residual climate risks:

In the interplay of the instrument groups, third-party risk finance can in many ways be a linchpin for residual climate risk management. The IIF and ARC case studies exemplify how risk finance instruments can be well combined with risk pooling instruments in order to guarantee financing and leverage the comparative advantages of the instruments. In the case of ARC, for example, equity participation by an international donor is used to capitalise the insurance company. Through ARC's cooperation arrangements with the AfDB, additional premium support can be provided as a complementary form of risk financing. These enable the risk pool to be stabilised over the insurance periods, thus mitigating the strong fluctuations in membership that occurred previously. Nationally managed reserve funds can, in turn, cover less serious but more frequently occurring risks as a complement to the regional risk pool.

In the case of the IIF, third-party risk finance funds risk pooling instruments for product design, market development and expansion, and for services along the insurance value chain. Limited premium support is also provided in the early implementation phase of the CRI/in the process of setting up a risk pool. The core mandate of the IIF, however, is to support risk pooling interventions. Consequently, openness in the choice of instruments, for example by funding further risk finance instruments, is only possible to a limited extent within the current framework.

The **risk pooling** instrument group benefits from interaction with the 'third-party risk finance' and 'risk preparedness' instrument groups. To ensure economic efficiency and avoid negative incentives, CRI can be combined with other instruments. For example, disincentives may lead to a focus on less relevant risks or less vulnerable target groups due to limitations of the risk pooling approach. Some of the case studies already combine instruments in basic ways. Combinations with other groups of instruments exist, for example, with

- Risk reduction interventions[34]
- Risk preparedness to minimise losses and damages
- Risk finance, which is particularly suitable for actuarially or economically uninsurable risks and for high-cost events, and
- Other instruments in the 'risk pooling' instrument group, such as the use of reinsurance. However, these offer a suitable solution only for some of the instrument-related limitations of CRI, such as small risk pools.

With the risk pooling instruments examined, it is apparent that opportunities arising from openness in the choice of instruments or from combination with other instrument groups are not yet being utilised exhaustively. Uninsured residual risks, for example, have to be carried by reserves, private support or even humanitarian aid, or assumed by elements of risk finance such as premium support. Interaction with other groups of instruments might enable needs to be better met. When instrument groups are combined effectively, the range of risks and target groups that can be covered can also be expanded. In the spirit of the 2030 Agenda's principle of 'leaving no one behind', this applies, for example, to particularly vulnerable, marginalised and disadvantaged groups.

If risk pooling is supplemented purposefully with elements of third-party risk finance and risk preparedness, the actors involved can be incentivised to implement further risk reduction interventions. If used appropriately, this can also strengthen the market mechanism of CRI. The inclusion of risk financing instruments can make a substantial contribution to the financial sustainability of CRI. One example is long-term premium subsidies for poorer population groups (as in the IIF or the ARC with AfDB). Another is temporary subsidies for more solvent target groups during the risk pool's start-up phase, and to introduce target groups to the insurance product (e.g. in the case of SAGA). (Premium) subsidies can increase breadth and increase the number of policyholders. Reserve funds or equity participation can assume a reinsurance function if above-average or frequent risks or losses and damages occur in an insurance period (for example, with ARC). They can also assume uninsurable risks. If risk pooling is supplemented in line with the market, the relevance and effectiveness of risk transfer can be increased. Other incentive-compatible instruments such as externally financed high-risk pools, high-cost pools or (subsidised) risk structure compensation are rarely implemented in CRI at present. Nonetheless, they would be conceivable additions to the existing toolbox.

Table 13 shows the **benefits of combining the instrument groups** for comprehensive coverage of residual climate risks.

[34] Risk reduction interventions are not the object of this evaluation module.

Table 13 Benefits of combining the instrument groups for comprehensive coverage of residual climate risks.

Breadth (target groups)	Level (compensation)	Depth (climate risks)
RPr with RPo: Incentives for risk preparedness can enable the insurability of target groups when risks are pooled (e.g. early warning systems reduce losses for movable goods). **RPr with RPo, RF and TRM:** Climate risk assessments can help identify the relevant target groups. **RPo with RF:** Premium subsidies can increase the insurability of target groups who lack sufficient solvency or who face high risks. **RPr with RPo and RF:** Data and analyses on climate risks and wealth can identify needy target groups (e.g. needing premium subsidies). **TRM with RPr and RF:** The acceptance of ex-situ transformative approaches by host communities/society is increased (e.g. through capacity development, awareness raising, credit opportunities and planning).	**RPo with RF, RPr and TRM:** Once the limits to adaptation are reached, transformative approaches can enable more sustainable long-term climate risk management through systemic change. **RPo with RF and TRM:** When limits to insurability are reached with risk pooling, or the willingness of third parties to pay is exceeded, transformative approaches may be an option. **RPr with RPo and RF:** Incentives for risk preparedness can reduce losses and damages from climate risks and, in conjunction with risk pooling, make climate risks insurable. With risk financing, this reduces third-party financed costs. **RPo with RF:** A small or insufficiently heterogeneous risk pool can be supported by reserve funds (e.g. in case of an above-average occurrence of climate risks in a certain period). **RPo with RF:** High-cost events can be integrated into CRI through third-party risk finance. **RPr with RPo, RF and TRM:** Climate risk assessments can help estimate the level of losses and damages that can be expected.	**RPr with RPo, RF and TRM:** The provision of data and analyses on the relevant climate risks as part of risk preparedness is a prerequisite for implementing risk pooling and third party risk finance, and considering transformative risk management as an option. **RPo with RF:** Specific non-insurable risks can be integrated into CRI through third-party risk finance. **RF with RPo:** In appropriate contexts, insurable risks can often be insured more efficiently through CRI than through third-party risk finance. Parametric CRI solutions enable quick payouts. **RF with RPr:** Investment in risk preparedness can improve data availability and use in the long term. **RF with RPo** Undertakings for CRI market expansion/creation and high-risk markets/products for climate change adaptation can be funded. **RF with RPr, RPo, TRM:** Resources are allocated for interventions to manage residual climate risks.

Note: RF = third-party risk finance, RPo = risk pooling, RPr = risk preparedness, TRM = transformative risk management. Source: DEval, authors' own table

5. CONCLUSIONS AND RECOMMENDATIONS

This concluding chapter will assess the findings on the evaluation questions for the criteria 'relevance', 'effectiveness' and 'impact'. The rating system used is the one presented in Chapter 3 (see also Annexes 7.6 and 7.7). The evaluation module obtained these findings by applying DEval's rating scale to assess both the instrument groups and the evidence, in relation to the OECD-DAC criteria (Sections 4.1 to 4.4). Based on this, and in conjunction with the general chapter containing findings on the interplay between the instrument groups (Section 4.5), the team arrived at recommendations and conclusions (Chapter 5).

The evaluation module makes six recommendations. These are addressed primarily to the BMZ, and to the official implementing organisations GIZ and KfW. Each recommendation includes the relevant abbreviation(s) to indicate which organisation(s) it applies to. Furthermore, the recommendations addressed to the BMZ may also have implications for the BMU. In this regard, it is suggested that the BMU address these recommendations and examine their implications.

5.1 Assessment of relevance to partner countries and target groups (EQ1; Recommendations 1 and 2)

Economic losses and damages from weather- and climate change-related events have been increasing for years. They hit developing countries particularly hard. Intangible losses and damages such as biodiversity loss are also increasing. Development cooperation instruments for managing residual climate risks are therefore gaining considerable importance. Residual climate risks are those climate risks which, for various reasons, remain after risks have been reduced through climate change adaptation and mitigation. Managing residual climate risks is a relatively new and growing thematic area for international development cooperation, and one in which Germany has been able to position itself well in recent years. It has achieved this by engaging with the theme, networking in global initiatives such as the InsuResilience Global Partnership and working closely with national partners.

Evaluation question 1 examines the OECD-DAC evaluation criterion 'relevance': *To what extent are German development cooperation's instruments for managing residual climate risk relevant to partner countries and target groups?*

To answer this question, the evaluation analysed several aspects of relevance. First of all, it ascertained the perceptions and assessments of the target groups (final beneficiaries) and partner governments. Secondly, comprehensive data collection and analysis were used to compare development cooperation interventions with climate risk exposure and vulnerability, and partner-country priorities. Aligning these accordingly is fundamentally important for a relevant and effective use of instruments. Climate risk assessments are also an important basis for monitoring and evaluation, and for assessing the relevance, effectiveness and impact of interventions. This is because they capture the baselines on the ground prior to the development cooperation intervention.

The findings of the analyses for evaluation question 1 show that the ratings of the instruments' relevance vary widely. The instrument groups meet the benchmark of alignment with global agendas and Germany's strategies and agendas. While the benchmark of relevance to partner countries is met for the instruments of risk preparedness and transformative risk management, this also applies largely to risk pooling, even though risk pooling is often not a top-priority instrument. For the instruments of third-party risk finance, the findings are mixed. While the benchmark of alignment with partner country priorities is met for ARC, this is barely the case for IIF due to the private-sector-based approach. The ratings for relevance to target groups vary widely: With risk preparedness and transformative risk management, the benchmark is met. For third-party risk finance, however, it is only partially met, and in the case of risk pooling ratings fall between met and not met.

The case study findings show that climate risk assessments are not carried out consistently and not always systematically. They sometimes remain incomplete, take little account of the limits to adaptation, or have little effect on instrument use and implementation. This has implications for the relevance of the instruments. For example, alignment with partner country priorities and the needs and capacities of target groups is challenging, particularly for the risk pooling instrument group. By focusing on climate risk insurance (risk pooling) at an early stage and the sometimes insufficient integration with other instruments, there is a risk that target group-specific needs and the specific context will be neglected. These findings underline the importance of comprehensive risk management approaches. The relevance of the instruments thus depends strongly on integrated implementation with other instruments.

The findings of the climate risk assessments are an important prerequisite for selecting and combining relevant instruments. This was also reflected in the fact that in several cases the respondents doubted the relevance of the climate risks considered and the instruments used. German development cooperation has recognised the importance of climate risk assessments for the relevance of climate change adaptation interventions. In a study that was still ongoing at the beginning of 2021, the GIZ prepared a comprehensive overview and comparison of different climate risk assessment methods. Moreover, the BMZ and Germany's official implementing organisations are currently revising the climate mainstreaming process, with climate risk assessment forming a core component of this.

In the case studies considered, the coordination of climate risk assessments with partners, local stakeholders and other development cooperation actors was only partial. However, full coordination would be necessary in order to avoid multiple data collections and inconsistencies, and to enable inclusive implementation and effective involvement of local actors. Furthermore, the findings of the climate risk assessments were not always prepared in a way that was appropriate for the target group, nor were they made available to local stakeholders and policy-makers. Enhanced involvement and empowerment of partners, local actors and target groups would provide an opportunity to ensure the usefulness of the analyses, promote their provision and increase partner ownership.

Taking greater account of the limits to adaptation in development cooperation practice offers the potential to reduce intolerably high risks through effective interventions, or to use instruments in a more targeted manner. Where a system cannot avoid intolerable risks, limits to adaptation are reached. In the interventions considered, the limits to adaptation were not addressed very systematically. However, a close examination of these limits is fundamentally important for selecting relevant instruments and using them effectively, integrating them, and taking comprehensive account of risks along the risk continuum. Climate risk assessments can help to identify these limits, and appropriate instruments. As well as identifying the limits to adaptation, it is also important to understand the factors involved and the nature and characteristics of the risks. Knowledge of limits can be integrated into planning. It can also help identify appropriate instruments and align them with needs. Taking residual climate risks and limits to adaptation into account thus has the potential to make interventions more relevant and effective.

In the case of partner institutions, a focus on the limits to adaptation can be seen in some cases. In the PrAda case study, it was observed that – in light of climatic developments – the medium-term effectiveness and impact of the planned risk pooling instrument was questioned, as it was believed the limits to adaptation had been reached. Activities of the Indian partner governments concerning L&D and planning for transformative interventions in India and the Philippines, for example, also permit the conclusion that the partners currently believe the limits to adaptation have been reached in some cases. As interest in transformative approaches is growing among partner countries as well as bilateral and multilateral donors, options are emerging for a coordinated and coherent approach, and corresponding interventions.

Potential for interventions to reduce climate-related hazards and risk exposure, which in some cases does exist, is not yet being harnessed. For example, case study data on SAGA and PrAda, as well as information from the IIF's investee, indicate that there is a need for further interventions to reduce climate-related hazards and risk exposure, such as flood barriers, water drainage systems and sewers. Using these tools can help make residual climate risk management more relevant and effective. Risk reduction interventions to reduce climate-related hazards and risk exposure should therefore be used more exhaustively.

Against this background, the evaluation module arrives at the following recommendation. It is designed to make German development cooperation more relevant to partner countries and target groups, and more relevant to residual climate risk management:

Recommendation 1: The BMZ should work to ensure that GIZ and KfW align the use of instruments more systematically with climate risks (hazards, exposure and vulnerability), taking the limits to adaptation into account.

Implementation guidance for recommendation 1:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Carry out climate risk assessments in all cases and in a coordinated manner, with the participation of partners, local stakeholders and other development cooperation actors; also integrate their results into programming and implementation to a greater extent. (BMZ, GIZ, KfW)
- In future programming and portfolio management, take into account the limits to adaptation in needs-based climate risk assessments, so that these have a stronger effect on the choice and combination of instruments for residual climate risk management. (BMZ)

The relevance of development cooperation for achieving development objectives is also measured by the extent to which the interventions align with the partner-country priorities and target-group needs and capacities. The analysis shows that this is a challenge in the case of instruments for residual climate risk management, especially risk pooling instruments. Implementing partner orientation as a core principle of the 2030 Agenda and of German development cooperation offers further potential for achieving impact in adapting to climate change. When assessing the relevance of interventions, however, it should be noted that an area of tension may exist, depending on whether the measured climate risk exposure and vulnerability, or partner-country priorities and interests, are considered.

The findings of the evaluation show that there is room for improvement in target-group orientation. Thus, both contextual alignment and the use of instruments can be improved. The case studies also clearly demonstrate that in risk transfer interventions, an early focus on climate risk insurance (risk pooling) can lead to target group-specific needs and local contextual factors being neglected. This is particularly true if there is also insufficient integration with other instruments (especially risk preparedness and other risk finance instruments). Overall, there is a risk of a donor-driven focus on CRI.

The main challenges for making CRI more relevant involve:

- the prioritisation and acceptance of the instrument (climate risk management priorities of partner countries, possibly higher priorities for other instruments, acceptance of insurance in partner countries);
- the fit of the instrument (actual suitability of CRI as an instrument for the specific risk and context, usefulness of CRI compared to other instruments), and
- the fit of possible insurance products (coverage of relevant risks, appropriate level of coverage and premiums, payout period and distribution channels).

Furthermore, in some case studies respondents mentioned not inconsiderable constraining contextual factors, especially with regard to insurance-based approaches:

- institutional frameworks (for example, poor consumer protection and lack of trust in financial institutions or distribution channels)
- cultural factors (e.g. lack of insurance culture)
- the economic situation, and thus the financial solvency of the actual target group, for example subsistence farmers and particularly poor and vulnerable groups.

In other case studies, however, the existing context was seen as more conducive to the use of risk pooling instruments.

These findings underline the importance of comprehensive risk management approaches. The perceived relevance of CRI is related to other possible risk management strategies. It thus also depends strongly on integrated implementation with other instruments, such as risk preparedness and risk finance instruments (see Section 4.5 for a discussion of the interplay between the instrument groups). The beneficial combination of risk reduction measures (such as the rehabilitation of drainage systems or use of irrigation systems) with CRI (for instance to cover against flooding or drought) was also highlighted.

In the case of investment funds, the challenge of taking into account both the needs of the final beneficiaries and the priorities of partner countries was particularly evident. In the case of global investment funds for CRI, as in the case study of the IIF, there are limits to incorporating partner-country objectives, but there are also hitherto untapped opportunities. The case study of one existing product makes it clear that only very brief checks were performed, particularly with regard to the appropriate target group and the marketability of the product. There is no coordination with national activities or with national risk management. This lack of coordination and limited needs assessment limits the developmental relevance of German development cooperation's financing activities.

As the ARC case study shows, regional approaches to risk transfer instruments are more likely to take into account the objectives and priorities of partner countries. Macro-level risk transfer leaves the governance of the risk transfer mechanism to the countries involved. This may allow instruments to be more responsive to national priorities and more likely to meet the needs of target groups. Such regional approaches also offer the possibility of applying residual climate risk management instruments on multiple levels, as the case of the ARC shows: Third-party risk finance instruments are used in the context of donor equity participation, risk pooling among member countries, and at the country level in the form of national contingency/reserve funds and insurance. This approach can enable a level of finance and risk management that would hardly be possible at the level of a single country.

Extensive integration into country-specific risk management also makes it possible to take better account of partner countries' priorities. The CCA-RAI case study shows that basing the use of instruments in German development cooperation on NDCs can ensure that interventions align with national and international agendas. These approaches could be further strengthened in German development cooperation interventions.

Against this background, the evaluation arrives at the following recommendation for increasing relevance to partner countries and target groups:

Recommendation 2: The GIZ and KfW should align risk finance instruments (risk pooling and third-party risk finance) more closely with the priorities of the partner countries, and the needs of target groups that are relevant for achieving development objectives.

Implementation guidance for recommendation 2:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Design and introduce climate risk insurance in a more target group-oriented and context-specific manner. (GIZ, KfW)
- When a new investment fund is set up, place greater emphasis on the target group's development needs, and coordination with the partner's climate risk management approaches. This applies to both the selection of investees, and the products offered. (KfW)
- When designing and commissioning interventions, give greater consideration to (i) possible regional approaches to risk finance instruments (third-party risk finance and risk pooling), and (ii) managing the instrument through the partners (e.g. through NDCs and NAPs) in order to better integrate it into country-specific risk management approaches. (BMZ, GIZ, KfW)

5.2 Relevance and effectiveness of instruments for comprehensive residual climate risk management (EQ2; Recommendations 3 and 4)

Evaluation question 2 examines the OECD-DAC evaluation criteria 'relevance' and 'effectiveness': *To what extent do German development cooperation's instruments manage residual climate risks comprehensively?*

To answer this question, the evaluation module examined the extent to which the interplay of instruments within and between German development cooperation's instrument groups is suitable and effective for comprehensively managing residual climate risks. Another issue examined was whether there are gaps in the interplay of instruments with regard to the coverage of residual climate risks. The breadth (coverage of relevant target groups), the level (reduction of losses and damages/impacts of climate risks, or of management/compensation of losses and damages) and the depth (coverage of relevant climate risks; see Definition in Section 2.1) are examined. Aspects of coordination with different actors are also included in the analysis, as comprehensive risk management is not possible without coordination with other actors.

The **findings for evaluation question 2** show that the instrument groups partially meet the benchmark for comprehensive residual climate risk management. In this respect, the instrument group 'third-party risk finance' is partially effective: While relevant climate risks are effectively covered (with some limitations), there is room for improvement regarding coordination with other actors and combination with the instrument groups 'risk pooling' and 'risk preparedness', with a view to more comprehensive residual climate risk management. The risk preparedness instruments are largely effective in comprehensively managing residual climate risks. However, scaling up implementation could increase effectiveness. Risk preparedness benefits from a combination of instruments, including with instruments from other instrument groups. With risk pooling, there is still potential for expansion in terms of the coverage of relevant climate risks and the relevant target groups. In terms of comprehensive risk management, risk pooling is therefore only partially effective. Transformative risk management instruments currently only partially meet the benchmark for comprehensive climate risk management, as they do not yet constitute integrated approaches. This means that the potential of all instrument groups is not yet being used exhaustively. Therefore, the relevance and effectiveness of the instruments for comprehensive risk management can be further increased.

The findings also clearly demonstrate that the strength of the approaches results primarily from the combination and integration of groups of instruments. They also show that these opportunities are not yet being used exhaustively in order to achieve comprehensive risk management. German development

cooperation's approach to comprehensive risk management can also be enhanced in this respect. Above all, in the case of risk pooling instruments at the micro level, opportunities to freely choose instruments or combine them with third-party risk finance and risk preparedness instruments are not yet being used exhaustively. Furthermore, the findings show that there is some scope for further risk-reducing interventions with risk pooling instruments. Incentives for further investment in risk reduction interventions implemented by target groups or stakeholders could play a greater role.

The German development cooperation instruments for transformative risk management considered in the module do address relevant areas. However, they do not yet offer any integrated and sustainable long-term solutions for human mobility in the context of climate change. Synergies with the broader BMZ migration portfolio are possible in this area, as many interventions are implemented here that, after certain adjustments, can also be relevant to climate migration.

Combining different instruments can improve the comprehensive management of residual climate risks. The different approaches in the case studies examined are each associated with specific strengths and weaknesses Box 25 in Section 4.5, for example, contains an overview of the combination of instruments in the case studies. The findings show that there is further potential to integrate the instrument groups and the impact pathways within instrument groups.

Target-group needs can be better taken into account through greater openness in the choice of instruments and their combination with other instrument groups. Moreover, if the instrument groups are effectively linked, the range of risks and target groups that can be covered (e.g. the particularly vulnerable) could also be expanded. A targeted supplementation of risk pooling with elements of third-party risk finance and risk preparedness can incentivise actors to implement further risk reduction interventions. If used appropriately, the market mechanism of CRI could be strengthened. Furthermore, the findings show that when risk pooling instruments are implemented, there is potential in some cases to implement further risk reduction interventions. So far, there are few incentives for target groups or actors to invest in further risk reduction interventions. However, appropriate incentives could ultimately also increase the effectiveness and impact of the risk transfer instruments.

A further evolution of German development cooperation to ensure openness in the choice of instruments, and their combination, can make the instruments for residual climate risk management more relevant, effective and impactful. The BMZ's comprehensive risk management approach is German development cooperation's existing framework for disaster and climate risk management. It encompasses various instruments for comprehensive risk management. The present evaluation module suggests that this approach should be further developed. Aspects of results-oriented instrument selection and integration should be elaborated and operationalised in order to provide a strategic guiding framework for programming and implementation. For example, needs assessments of target groups could be conducted regularly during implementation, in order to elicit preferred instruments or combinations of instruments. This guiding framework could also include criteria for commissioning interventions in a way that increases effectiveness and impact. Section 4.5 provides further guidance on the interplay of the instrument groups 'risk pooling', 'third-party risk finance', 'risk preparedness' and 'transformative risk management'.

In the course of this further evolution, particular attention should be paid to flexibility and cooperation with other actors. With interventions for residual climate risk management, the effectiveness of the selected instruments – also by comparison with alternative instruments – should always be kept in mind. It should also remain possible to realign interventions if they are not effective. In other words, if low effectiveness and impact are expected, it should be possible – even once an intervention has begun – to adjust the choice of instruments. This requires a certain flexibility in the use of instruments. This is the only way to enable a needs-oriented, adaptive approach. This flexibility requires an effective monitoring of the interventions, as well as mechanisms to enable a realignment during ongoing implementation. Since comprehensive risk management can in most cases only be achieved in cooperation with partner countries and other development cooperation actors, another important aspect of comprehensive risk management is integration and cooperation with interventions of other actors.

Here, the elaboration of the BMZ's core area strategy 'Responsibility for our Planet – Climate and Energy' as part of the 'BMZ 2030' Reform Strategy, and the strategic alignment of the BMU-ICI adaptation portfolio, provide momentum for the strategic refinement of the adaptation portfolio with a view to enhancing relevance, effectiveness and impact.

Against this background, the evaluation module makes the following recommendation. It is designed to make German development cooperation more relevant and effective with regard to comprehensive risk management:

Recommendation 3: The BMZ should further develop its existing approach to comprehensive risk management in order to achieve a stronger results orientation in the selection and combination of instruments. Building on this, the GIZ and KfW should operationalise this approach in the design and implementation of interventions.

Implementation guidance for recommendation 3:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Create a strategic guiding framework for the selection and combination of the instrument groups 'risk pooling', 'third-party risk finance', 'risk preparedness' and 'transformative risk management' for programming and implementation. (BMZ)
- In risk finance interventions (risk pooling and third-party risk finance), increase incentives for actors and target groups to invest further in risk reduction through adaptation. (GIZ, KfW)
- Intensify cooperation and coordination of interventions with partner countries and other development cooperation actors, in order to achieve comprehensive risk management. (BMZ, GIZ, KfW)

The findings of the evaluation also show that transformative risk management will gain in importance due to the expected increase in human mobility in the context of climate change. Moreover, they indicate that it is an important component of comprehensive risk management. German development cooperation therefore needs to develop sustainable approaches to human mobility in the context of climate change. German development cooperation's portfolio for the instrument group 'transformative risk management', and thus also the interventions addressing human mobility in the context of climate change, are relatively new. Moreover, they have barely any track record of similar interventions from which they could draw lessons learned. German development cooperation's efforts to include not only human mobility induced by extreme weather events, but also human mobility in response to gradual climatic changes, are therefore to be welcomed. At the same time, it is clear that specific areas of transformative risk management for adaptation to climate change are not yet covered in the adaptation portfolio.

The interventions in German development cooperation's adaptation portfolio do not yet offer integrated approaches to the transformative risk management instruments considered in this evaluation module. This reveals gaps as regards a comprehensive approach to human mobility in the context of climate change. The cases examined cover only a certain part of the relevant fields of action. The objective of the HMCCC intervention, which aims to generate applied knowledge on 'climate migration', is largely limited to the field of action 'context'. The UMIMCC intervention, on the other hand, primarily covers the field of action 'improvements at the destination'. Based on current forecasts for climate risks and human mobility in the context of climate change, sustainable long-term approaches and their implementation are necessary. Integrated approaches that take into account the place of origin, the migration process, the destination, the link between origin and destination, and the context, are promising. Synergies with interventions in the BMZ's broader migration portfolio can be used. One example would be the Special Initiative on Displacement and Migration. In such cases, certain specifics of climate migration should always be taken into account.

If mobility in the context of climate change is to be understood as a transformative risk management strategy and mobility is to be actively managed, then integrated transformative approaches geared to the context of climate change are necessary. This also enables potentially emerging conflicts to be nipped in the bud. Synergies can therefore also be expected with other areas of action in German development cooperation, such as peace and security.

The evaluation therefore arrives at the following recommendation. It is designed to increase the effectiveness and impact of transformative risk management interventions.

Recommendation 4: The BMZ should expand its portfolio for managing human mobility in the context of climate change as an important component of transformative risk management. It should also harness possible synergies with its migration portfolio. In light of current forecasts for climate risks, approaches to human mobility in the context of climate change that are sustainable in the long term should be (further) developed. To this end, approaches from migration interventions with a specific focus on climate change as a cause of mobility and migration can be used and further developed.

5.3 Assessment of effectiveness and impact (EQ3; Recommendations 5 and 6)

Evaluation question 3 examines the OECD-DAC evaluation criteria 'effectiveness' and 'impact': *How, and to what extent, are instruments for managing residual climate risks effective (in terms of their outcomes) and impactful?*

The **findings on evaluation question 3** show that German development cooperation has approaches and interventions to show in all the examined groups of instruments for residual climate risk management. When designing and implementing instruments, German development cooperation focuses on risk pooling. It also has a wide array of risk preparedness instruments. The third-party risk finance instruments are innovative. However, the existing opportunities offered by this group of instruments have so far only been partially utilised. The potential for further expansion and broader application of the instruments used is high.

Third-party risk finance instruments show results at output level, but only partially meet the benchmark for achieving the objectives at outcome level. For example, the IIF's finance reaches a large number of actors who are further expanding the climate risk insurance sector in developing and emerging countries. Overall, with regard to the general objectives of risk finance, all instruments have developed to some extent more slowly than expected. As a result, effectiveness at the outcome level has occurred, but not yet to the extent planned. There is potential for impact, but the methodology for estimating the number of beneficiaries is not sufficiently robust. The various components of the risk pooling instruments in some cases meet the benchmark for effectiveness, and in some cases are partially effective. In the case of risk pooling, both the effectiveness and the expected impact depend strongly on the context and on combination with other instruments. Impact measurement shows the same weaknesses as in the case of third-party risk finance. The benchmark for effectiveness of risk preparedness instruments is in some cases met and in some cases partially so, although this differs between the fields of action. Impact can be expected, but depends on the relevance of the interventions for partner countries and target groups. The benchmark for the effectiveness of the examined transformative risk management instruments is met to varying degrees, ranging from barely met to largely met for specific fields of action. Since implementation remains ongoing, it is not yet possible to assess the impact of the examined instruments of transformative risk management at this point in time.

Regarding coverage of residual climate risks, for example, there are gaps in the protection of high-risk groups and low-income groups, and coverage for uninsurable risks and high-cost events. Many implemented instruments for residual climate risk management in German development cooperation have the potential to serve as models. The focus on effectiveness and impact in risk finance instruments (third-party risk finance and risk pooling) can be strengthened. Given the strong focus on expanding the number of insured persons, there is a risk that the distinctly more complex tasks of reaching disadvantaged and marginalised groups, and building effective risk transfer for relevant climate risks, will take a back seat. Global third-party risk finance instruments, as in the case of the IIF investment fund, highlight the tension between scaling up and impact. Capacity development plays a pivotal role in all instruments considered. The module shows that capacities

were strengthened at national, subnational and local level. The transformative risk management instruments are also promising and innovative, but also require conceptual expansion and more widespread implementation in order to be sustainable in the long term. Moreover, there is further potential for expansion in the areas of cooperation under the UNFCCC (2015a), especially with regard to gradual changes and events with irreversible and lasting negative consequences or intangible losses and damages.

Since 2007, the area of residual climate risks has gained considerably more importance in international development cooperation. As already outlined in the introduction and the conceptual framework (Chapters 1 and 2), it can be assumed in the future that losses and damages from weather- and climate change-related events will increase in both frequency and severity. The empirical findings of this evaluation module confirm the growing importance of residual climate risks in the development context. They show how important it is to (i) design instruments that cover risks in a context-specific manner, (ii) increasingly implement pilot measures (also in conjunction with other instruments), and (iii) feed findings from this into networks in order to achieve a bespoke scaling-up of interventions.

In recent years, German development cooperation has come to hold an important position in international cooperation in the thematic area of 'residual climate risks'. Both responsible federal ministries (the BMZ and BMU) and the implementing organisations are committed to interventions for managing climate risks. In the thematic area of 'residual climate risks', German development cooperation is well networked internationally and works closely with national partner institutions. All of the selected case studies exemplify the innovative potential of German development cooperation in numerous areas:

- global structured funds for third-party risk finance (e.g. IIF)
- regional approaches to risk transfer (e.g. ARC)
- integration of residual climate risks into State Action Plans based on NDCs (e.g. CCA-RAI)
- index-based insurance concepts for climate risks and data availability (e.g. PrAda, RFPI III and SAGA)
- integrated interventions for climate risk and disaster risk management, and capacity building (in various forms, e.g. RFPI III and PrAda)
- approaches to human mobility in the context of climate change (e.g. UMIMCC and HMCCC).

In the field of residual climate risks, German development cooperation already has experience in designing, piloting and implementing measures. The evaluation module therefore suggests that, in cooperation with partner countries and international actors, it should carry out an inventory of proven instruments for residual climate risk management. It should do so in order to promote the context-specific implementation of these instruments on a broad scale by the various actors. Instruments that are identified as only partially tested should increasingly be piloted and accompanied by evidence-generating measures.

The findings show that the instruments for residual climate risk management already implemented have the potential to serve as models, and to be scaled up for German development cooperation. As well as testing and systematically collecting the lessons learned, it is also crucial to demonstrate the impact of these instruments. However, rigorous impact evaluations, which would be necessary to capture this impact, have so far barely been carried out for the examined interventions. Moreover, rigorous impact evaluation can only be fully meaningful if it is already in place at the beginning of the intervention. By using accompanying rigorous impact evaluation, German development cooperation can make a significant contribution to the increased and systematic testing of models, and the assessment of effectiveness and impact.

Against this background, the evaluation arrives at the following recommendation for strengthening residual climate risk management:

Recommendation 5: The BMZ should expand the portfolio of German development cooperation in the area of residual climate risks in terms of financial resources, the number of interventions and the instruments used. In cooperation with partner countries and other development cooperation actors, the BMZ should ensure that reliable findings on the effectiveness and impact of various instruments are generated and that the instruments used are selected on the basis of these findings.

Implementation guidance for recommendation 5:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Consider how greater use can be made of risk preparedness options in order to reduce losses and damages. (BMZ)
- In cooperation with partner countries and other development cooperation actors, perform an inventory of proven residual climate risk management instruments. Then use these broadly, but context-specifically. Where there has been little experience with implementation to date, pilot the instruments strategically. (BMZ)
- Further enable German development cooperation's residual climate risk management instruments to serve as a model. To do so, use accompanying rigorous impact evaluations to generate reliable findings on the impacts of the interventions and processes. (BMZ)

The empirical results of the case studies show that there is further potential to develop risk finance instruments (third-party risk finance and risk pooling) with regard to (potential) impact among target groups and final beneficiaries. **On the one hand, it is clear that there are weaknesses in the way the results of residual climate risk management interventions are measured.** For example, the most frequently used indicator is the number of insurance policies sold or the number of (direct and indirect) beneficiaries of an intervention. At the output and short-term outcome level, this indicator also has strengths, and it therefore makes sense to use it. For example, it is helpful in achieving broad impact and scaling up. In German development cooperation, however, the number of final beneficiaries is used as the priority indicator for demonstrating outcomes and impacts. Stipulating this metric means that little attention is then given to higher levels of impact (such as resilience or possible further adaptation to climate change). Furthermore, negative incentives are set for implementing organisations and actors on the ground. The number of indirect beneficiaries is also questionable from a methodological perspective. It represents a rather imprecise estimate of possible highly unspecific outcomes and impacts, with a clear tendency to overestimate them. Focusing on this metric can impair the relevance of interventions and ultimately undermine impact.

According to empirical findings, this focus results from the fact that there is great pressure to achieve the InsuResilience Global Partnership's dominant target of 500 million insured persons by 2025. There is a strong focus on increasing the number of insured persons, with less attention being paid to other IGP targets. As a result, there is a risk that more complex objectives are pushed into the background. These include for instance reaching disadvantaged and marginalised groups, or effectively transferring relevant climate risks so that insured persons' losses and damages are truly covered. Global risk finance instruments face particularly significant challenges in this regard, as the IIF case study makes clear. The study shows that the aforementioned focus led, among other things, to the following situation for the final beneficiaries: Only limited target agreements on effective risk transfer and impacts were reached in advance with investment recipients. However, such agreements would be desirable in order to achieve impacts. In the case of one investment fund, agreements on targeting impacts can only be integrated to a limited extent during the term of the fund, although this opportunity can be used for future funds.

To assess whether risk transfer has been achieved for all target groups, and whether these groups are actually protected against the consequences of relevant climate risks, indicators must be included that go beyond the existence of an insurance policy. These can include, for example, effective financial protection against residual climate risks (e.g. coverage of relevant risks, timely disbursements, adequate level of disbursement and faster recovery after disasters), knowledge and awareness of the target groups to be reached for risk coverage, effects on general prosperity, or adaptation activities resulting from resources freed up. The evaluation module suggests examining further aspects for inclusion in the impact evaluation of risk transfer instruments, and applying them to a greater extent.

The empirical study shows that in order to achieve impact, a stronger focus could be placed on disadvantaged and marginalised groups when designing interventions. Disadvantaged and marginalised groups are only partially (and not very systemically) integrated into climate risk insurance and other risk finance instruments. The conclusions of this evaluation module suggest how they might be better integrated by combining instruments more extensively. For groups in a weak economic situation and with low solvency, risk finance instruments such as temporary or permanent premium subsidies in combination with risk pooling are appropriate. Particularly vulnerable groups can benefit from a combination of instruments such as risk reduction, risk preparedness and transformative risk management. For these groups and for non-insurable climate risks, more extensive combination with risk finance instruments also makes sense. These could include, for example, (trigger-based) emergency funds, high-risk pools, reserve funds, high-cost pools or even a (subsidised) risk structure compensation. By using such instruments and combining them more extensively, target groups can receiver broader and deeper cover, and residual climate risks can be better managed. The evaluation module suggests that German development cooperation might do more to address the issue of protecting disadvantaged and marginalised groups against residual climate risks.

Capacity development plays a pivotal role in all interventions considered. The module shows that capacities were for the most part strengthened at national, subnational and local levels. However, the relevance, effectiveness and impact of capacity development can be further improved. The analyses show that some of the interventions are not sufficient to strengthen the capacities of participants and political decision-makers in the long term. Nor are they sufficient to integrate capacities permanently into the institutional system. Training trainers is a promising approach in this respect, provided that self-financing and responsibilities after the end of the intervention are discussed and agreed on with the partners. In some cases, capacity development can also be better aligned with the target groups by taking greater account of the local context, thereby meeting their needs more appropriately. Overall, the evaluation module suggests that capacity development should be geared more towards achieving impact.

Furthermore, the evaluation also shows the importance of awareness-raising, and training in general climate risk management and financial literacy. The PrAda case study and the SAGA precursor intervention PSACC clearly showed how successful raising awareness of (i) climate risks, (ii) general climate risk management and (iii) the use of climate services and information, can be. However, in order to achieve impact and support participants' capacity development in the long term, what is needed is more training courses on financial literacy, and on raising awareness of CRI, that are also longer than those provided to date. The content of the training courses should also focus more strongly on these aspects. Risk pooling through CRI requires a considerable amount of awareness-raising effort in some contexts. This is partly due to the complexity of the instrument, but also due to a certain country-specific risk culture and lack of insurance culture. Other factors include lack of trust in insurance providers and distribution channels, in legal frameworks and in functioning consumer protection.

Against this background, the evaluation arrives at the following recommendation for increasing the impact of residual climate risk management instruments:

Recommendation 6: In order to take better account of the 2030 Agenda principle of 'leaving no one behind', the BMZ should issue directives to ensure a stronger focus on impact among target groups and final beneficiaries, especially vulnerable and marginalised groups. The GIZ and KfW should align their interventions for residual climate risk management accordingly.

Implementation guidance for recommendation 6:

Given the findings of the analysis, when implementing the recommendation it would be preferable to observe the following points:

- Revise the focus on the number of insured persons or the number of persons reached as the main indicator, as this could undermine the relevance and impact. Focus on indicators such as effective financial protection against residual climate risks. (BMZ)
- When designing interventions, place stronger emphasis on achieving impacts for disadvantaged and marginalised groups. This can be achieved for instance by using third-party risk finance instruments to integrate these groups into risk pooling instruments. (GIZ, KfW)
- In the case of capacity development approaches, focus on the outcomes and impacts, on enabling participants sustainably and on integrating these approaches into the partner institutions. (GIZ, KfW)

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7. ANNEX

7.1 Case study profiles

7.1.1 Case study on the Strategic Alliance GIZ and Allianz (SAGA)

Table 14 Profile of the Strategic Alliance GIZ and Allianz (SAGA), Morocco

Title of the intervention	Integrated climate risk management by small and medium-sized enterprises as adaptation to climate change		
Programme title	Global Programme: Private Sector Adaptation to Climate Change		
Term	11/2015 to 06/2019		
Volume	EUR 5.3 million		
CLA marker	CLA-2		
Programme/project	SAGA: Strategic Alliance GIZ and Allianz (2018–2020)	ACRI+: Advancing Climate Risk Insurance (2017–2018)	PSACC: Private Sector Adaptation to Climate Change (until 2017)
Commissioned by	BMU-ICI		
Implementing organisation and partner organisations	GIZ, ACS (Allianz Climate Solutions GmbH), Allianz Morocco	GIZ, MCII (Munich Climate Insurance Initiative)	GIZ, Alomran, ABH, RAMSA; ONEE, Ministry of Industry, Wali, Regional Council, Regional Investment Center, Regional Chamber of Commerce and Industry, CGEM
FC or TC	TC		
Scale (bilateral/ regional/global)	Global	Global	Global
Location of case study considered	Morocco, Ait Melloul Industrial Zone		
Objectives and fields of action on which the case study focuses	The overall objective is to prepare the ground for implementation of risk transfer solutions as part of an integrated flood risk management approach for SMEs in the Ait Melloul industrial zone.	Increase the resilience of SMEs in the Ait Melloul industrial zone to extreme weather events.	Effective approaches and instruments to build private-sector capacity for adaptation to climate change are scaled up in German and international development cooperation.
Target groups	Small and medium-sized enterprises in the Ait Melloul industrial zone, entrepreneurs, employees of these enterprises, management of the zone and local authorities, vulnerable groups, communities, local governments		
Contribution to international agreements (e.g. SDGs, Paris Agreement)	SDG 11 (Sustainable cities and communities) SDG 13 (Climate action) Paris Agreement		

Climate risk considered	Flood risks
Instrument groups	Risk pooling through climate risk insurance Risk preparedness

Source: DEval, authors' own table

The context

The Ait Melloul Industrial Zone is located in the Souss-Massa region. It is home to 300 companies, most of which are SMEs in the food processing industry. As a result of more frequent extreme weather events, the park has very often been affected by flooding in recent years. Due to a poor drainage system, and low risk awareness and poor risk preparedness by individual enterprises, losses and damages are high. Generally speaking, industrial estates are poorly prepared for disasters.

Contribution of the case study to the 'risk pooling' and 'risk preparedness' instrument groups

The Morocco case study comprises a sequence of instruments that can be assigned to instrument group 1 ('risk pooling'). Of particular relevance here are infrastructure, business insurance and the insurance market.

The BMU-ICI-funded project ACRI+ focuses on the role of insurance as an important instrument in the 'integrated climate risk management' approach. The project works on integrated climate resilience strategies to protect industrial areas from flooding. This strategy is supported by partnerships between different levels of government and the private sector. SAGA – a public-private partnership – engages with the project results.

The PSACC project in particular contributes to the cross-cutting issue of risk preparedness, as it relates to building private-sector capacity for adaptation to climate change.

The strategic relevance of the intervention stems from partnerships between different levels of government and the private sector in Morocco, as well as the involvement of Morocco's Ministry of Environment in implementing climate-resilient infrastructure. The intervention links the national level with the global project platform.

Logic of the intervention

The intervention aims to establish integrated climate risk management (ICRM) in order to improve the resilience of societies and promote sustainable development. This is to be achieved through an interplay of risk assessments, prevention and mitigation interventions, preparedness and risk transfer solutions. For the case study under consideration, risk transfer solutions are of particular relevance.

Various overarching objectives (impacts) were defined for the three interventions in the Morocco case study. The national climate risk insurance solutions are to complement private risk transfer solutions, and implementation should help to improve the allocation of private and public resources in the project countries. Furthermore, the interventions at the international level are designed to increase the use of insurance options in integrated climate risk management. Moreover, the risk transfer solutions (insurance) should be transferable to other industrial parks in Morocco. The insurance market is to become sustainable, and awareness raising and training are to help bring about economic change. The objectives state that SMEs have successfully adapted to climate change and are benefitting from these adaptation opportunities. Furthermore, their resilience to extreme weather events is to be strengthened and direct vulnerability reduced.

To achieve this, the following inputs are necessary: The insurance partners as well as bespoke climate risk management strategies and risk transfer instruments must be identified. Training materials and trainers need to be available, in order to strengthen insurance education, climate risk management, and awareness of climate change impacts and possible adaptation interventions. Moreover, various analyses must be carried out and made available, for example on climate risks or on asset valuation and gaps in risk management.

Building on these inputs, outputs were achieved. These include the development and implementation of a dialogue platform for relevant stakeholders, the adaptation of a diagnostic tool at country level for various sectors – besides the agricultural sector – and consultations at national level. Furthermore, educational training on climate risk awareness and training for managers of industrial parks are to be conducted, and the industrial zone's disaster contingency plans are to be improved. Other outputs include the development and scaling up of advisory approaches for the private sector and regarding the financing of climate adaptation interventions (general financial literacy).

Finally, building on the above points, the following outcomes should be achieved: Investment by SMEs should increase, they should trust insurance and be insured against climate risks; they should also use better developed and more effective climate risk management systems. Based on its size and structure, the risk pool should also be attractive to SMEs. Insurance should be integrated into the relevant emergency preparedness steps so as to complement existing SME risk management systems, and used by SMEs and industrial park managers. Results in the field of education include the training of mediators and multipliers who can now offer training on climate risks. The awareness of park managers and SMEs concerning climate risks will also be increased. Residual climate risks have been transferred, and improved climate risk data is available. Furthermore, local authorities should develop new adaptation plans and risk financing interventions, and support CRI with appropriate interventions and regulations. In terms of risk transfer, existing products should now relate to climate risks, and risk transfer options should be needs-based. The capacities of private-sector actors to adapt to climate change should also be strengthened.

7.1.2 Case study on Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III (RFPI Asia III)

Table 15 Profile of Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III (RFPI Asia III), Philippines

Title of the intervention	Module: Regulatory Framework Promotion of Pro-Poor Insurance Markets in Asia III (RFPI Asia III)
Term	01/2019 to 12/2022 (including extension)
Volume	EUR 2 million (total intervention)
CLA marker	CLA-2
Building on intervention	RFPI Asia I and RFPI Asia II (2013–2018, microinsurance, no focus on climate)
Commissioned by	BMZ
Implementing organisation and partner organisation	GIZ, Philippine Ministry of Finance
FC or TC	TC
Scale (bilateral/regional/global)	Regional (Viet Nam, Indonesia, Philippines)
Location of case study considered	Philippines
Objectives and fields of action on which the case study focuses	Objective: create an enabling strategic and technical environment for high-quality climate risk insurance for extremely poor, poor and at-risk people Fields of action: 1) create regulatory frameworks; 2) develop business models; 3) use digital technologies
Target groups	Extremely poor, poor and at-risk households, and micro, small and

	medium-sized enterprises
Contribution to international agreements (e.g. SDGs, Paris Agreement)	SDG 1 (No poverty) SDG 2 (Zero hunger) SDG 5 (Gender equality) SDG 8 (Decent work and economic growth) SDG 13 (Climate action) Art 7.1. of the Paris Agreement
Climate risks considered	Storms, flood risks and drought
Instrument groups	Risk pooling through climate risk insurance Risk preparedness

Source: DEval, authors' own table

The context

In the Philippines, the frequency and intensity of extreme weather events are increasing as a result of climate change. This leads to an increased destruction of assets and loss of income. The consequences hit the extremely poor, the poor and those at risk of poverty particularly hard. Disaster risk preparedness and adaptation programmes do exist, but often only have an impact in the medium to long term. There is no quick-acting and widely available financial protection for the extremely poor, the poor and those at risk.

Contribution of the case study to the 'risk pooling' and 'risk preparedness' instrument groups

This case study contributes to two instrument groups. The intervention under consideration aims to create enabling conditions for high-quality climate risk insurance. The case study's focus on the insurance-based approach clearly places it in the 'risk pooling' instrument group. At the same time, it also contributes to the 'risk preparedness' group, as the intervention places a strong focus on capacity development and the integration of insurance into national and local climate change adaptation and disaster preparedness strategies.

The particular relevance of the case study derives first of all from its focus on extremely poor, poor and at-risk groups. Secondly it results from the strong orientation towards capacity development approaches. Capacity development interventions form a strategic pillar of bilateral German cooperation. Their effectiveness in managing residual risks is therefore of major interest. The case study's potential for innovation lies in the fact that the government, as the policyholder, purchases policies for the extremely poor and poor population. This segment of the target group cannot afford premium payments, but is particularly vulnerable to climate risks. At the same time, such approaches are an interesting business model for insurance companies due to the high number of insured persons reached at relatively low administrative cost.

Logic of the intervention

The intended impact of the entire intervention is that national systems are created to reduce the impacts of climate change and directly insure the vulnerable population against climate risks (impact). To this end, a more enabling strategic and technical environment for climate risk insurance is to be created (module objective).

There is a market for insurance products in general in the Philippines, and the national government is aware of the topic. Experience with insurance exists at the micro, meso and national levels. First initiatives are also found in the area of climate risk insurance. In cooperation with the World Bank, for example, public buildings and infrastructure are being insured against climate-induced risks. On the private sector side, the Philippine Insurers and Reinsurers Association has gained experience with the development of index-based insurance funds, and is discussing the formation of a consortium to pool climate risks.

Nonetheless, broad sections of the population have no access to climate risk insurance. According to GIZ, the strategic and technical conditions required for high-quality climate risk insurance are not in place among governmental and non-governmental actors. Governmental actors and insurance regulators have little knowledge about climate risk insurance and how it can be integrated into disaster and climate change adaptation strategies. The thinking of private insurance providers is unspecific, especially with regard to digital payment and payout models. Clients, on the other hand, have little experience with insurance against extreme weather events, and the poorest segments of the population cannot afford regular premium payments themselves.

In this context, three outputs of the intervention are intended to help better protect the vulnerable population against climate risks (impact): The first output is a concept paper describing how climate risk insurance can be integrated into local and national climate adaptation and disaster preparedness plans (output 1). To achieve this output, three activities will be undertaken: The first step is to explore state financing options for climate risk insurance (activity 1). This is necessary because the state is to purchase the insurance for the extremely poor or poor target group. In a second step, local governments will be selected as partners for developing and implementing climate risk insurance solutions (activity 2). In the third step, the concept paper will be developed (activity 3). Once ready, the concept paper will help improve policy and regulatory frameworks for the implementation of climate risk insurance solutions (outcome 1). To this end, it will first initiate the development of a national strategy for climate risk insurance. Furthermore, it should help integrate climate risk insurance into national and local climate change adaptation and disaster preparedness plans.

The second output is available climate risk assessments and an insurance product developed to completion (output 2). Five activities will be undertaken for this purpose: In a first step, local governments will be selected as partners for developing and implementing climate risk insurance solutions (activity 1). Secondly, key data will be provided for product development, for example on vulnerability, and losses and damages (activity 2). Based on this, a digital platform will be developed to make the data available (activity 3). Next, insurance products plus marketing and distribution strategies will be developed based on the data (activity 4). In a final step, the implementation of climate risk insurance solutions will be tested (activity 5). The final insurance product should help private insurers to offer climate risk insurance on the market (outcome 2). The climate risk insurance should encourage insurance companies to adopt the business model. The third output is a digital platform (output 3). The activity comprises developing the platform. The provision of the platform should lead to it being used by government partners, insurers and segments of the target group for (knowledge) sharing, sales marketing and purchasing as well as modelling (outcome 3).

7.1.3 Case study on African Risk Capacity (ARC)

Table 16 Profile of African Risk Capacity (ARC)

Title of the intervention(s)	Modules: Drought Insurance for Africa (ARC), further development of African Risk Capacity Ltd.
Term	Various projects with different durations (start: 2013-2020) Term of the fiduciary holdings: 03/2014 to 03/2034
Volume	Fiduciary holding: EUR 35 million Technical Assistance: EUR 6.5 million ARC Replica: EUR 10 million plus EUR 8.5 million (COVID-19) ARC premium subsidisation (COVID-19): EUR 11 million
CLA marker	CLA-2
Building on intervention/ linked interventions	Modules: Supporting the introduction of replica policies at African Risk Capacity
Commissioned by	BMZ
Implementing organisation and partner organisations	KfW, African Union, governments of the African Member States
FC or TC	FC
Scale (bilateral/regional/global)	Regional (Member States of the AU)
Location of case study considered	Multi-country
Objectives and fields of action	Objective: Increase the resilience of African countries to extreme weather events by improving access to and use of needs-based climate risk insurance. Fields of action: (1) research and further development; (2) strengthening African risk management and its financing; (3) expanding insurance coverage within AU member states
Target groups	Vulnerable population groups
Contribution to international agreements (e.g. SDGs, Paris Agreement)	Integration into the InsuResilience Initiative (2015) of COP 21 and the InsuResilience Global Partnership (2017) of COP 23 Contribution to the AU Agenda 2063 SDG 5 (Gender equality) SDG 13 (Climate action)
Climate risk considered	Since the beginning: drought Since 2020: tropical cyclones In the future: further climate risk events
Instrument groups	Risk pooling (national risk pooling, insurance market) Third-party risk finance Risk preparedness

Note: DEval, authors' own table. Source: based on ARC documents and project data.

The context

African countries are particularly hard hit by the increase in the frequency and intensity of extreme weather events as a result of climate change. The starting point of African Risk Capacity is that African governments have only limited capacity for efficient and fast-acting reduction of the effects of climate change (which include losses and damages in the agricultural sector, and the risk of political instability) (ARC, 2016). Rather than pursing a proactive approach, when faced with natural hazards government leaders usually call for humanitarian aid, borrow and/or use the national budget to cope with disasters. This not only constrains economic growth, but also jeopardises the financing of development projects. This in turn has negative consequences for the resilience of vulnerable populations to climate hazards (ARC, 2016).

Contribution of the case study to the 'risk pooling', 'third-party risk finance' and 'risk preparedness' instrument groups

Against this background, the African Union established African Risk Capacity in 2012. Its aim is to establish a capacity development process to include innovative, Africa-specific climate risk insurance solutions within the framework of ARC Limited, which was launched in 2014. German development cooperation supports the emergence and work of ARC through a variety of financial contributions. These include a fiduciary holding for the reserve fund of the regional insurance pool. Consequently, the case study can be assigned to the instrument groups 'risk pooling', 'risk preparedness' and 'third-party risk finance'. The strategic relevance of the intervention is based on the combination of an index-based insurance pool with early warning systems and capacity-building interventions. The latter are the responsibility of the ARC Agency, which forms part of ARC in cooperation with ARC Ltd. Through comprehensive capacity building, the strengthening of contingency plans and the expansion of monitoring systems, the institution makes a relevant contribution to the instrument group 'risk preparedness'. One element of strategic potential lies in the fact that the establishment of the insurance company creates a specialised counterpart to the existing arrangements for handling financing in the ministries. This should improve the investment climate and increase the liquidity of governments facing climate extremes. Here, risk pooling reduces the cost to the countries involved of maintaining reserve funds in case of a crisis, or of purchasing commercial insurance products. Furthermore, the use of a weather-based early warning system promises more timely payouts (ARC, 2016). The programme stands out not only for its large-scale design, but also for its focus on intergovernmental dialogue and a promotion of self-initiative and ownership by the countries involved.

Logic of the intervention

The main objective (impact) of ARC is to establish (cost-)efficient management and financing systems for extreme weather events throughout Africa. This is designed to sustainably protect the livelihoods of vulnerable population groups. In a holistic approach, government capacities for preventing and managing natural hazards (currently droughts and tropical cyclones) will be built and strengthened.

Three broad strategic objectives are being pursued:

Field of action 1: Dynamic and innovative research and further development

Following the establishment of ARC, investments are initially being made in establishing and further developing risk quantification and modelling methods. This area of activity focuses on the Africa RiskView (ARV) modelling programme, which uses rainfall data and vulnerability indices to estimate drought costs. Triggers for insurance payouts are set on this basis. The previous focus on drought was expanded to include cyclones in 2020 and floods in 2021. Furthermore, standards and guidelines for contingency plans are drafted and revised every six months. When doing so, ARC refers to background research as well as data and cost-benefit analyses. In this context, ARC promotes dialogue with regional and local early warning organisations as well as research centres. Furthermore, ARC Ltd. invests in the development of innovative insurance products and financing mechanisms. The latter includes the piloting of the 'Licensing for Development' (L4D) initiative. The initiative's licence fees are intended to serve as a source of income for further developing the ARV programme.

Field of action 2: Strengthening African risk management and its financing

One key output of the institution is capacity development. For this purpose, each member country has access to a nine- to twelve-month capacity building programme. This is adapted on a country-specific basis to ensure that ARC activities align with national platforms and agendas. To this end, technical working groups are formed in each country. These plan the process of developing or acquiring capacities in the areas of risk modelling (especially in the application of ARV), early warning systems, contingency planning, risk transfers and pooling. Sources of funding for climate risk insurance are identified, and the competitiveness of ARC-Ltd. insurance solutions in relation to the private insurance sector is analysed. At the same time, a gender strategy has also been designed. Undergoing the capacity-building process is a prerequisite for joining the risk pool.

Field of action 3: Expanding and institutionalising ARC insurance solutions and activities

To reduce dependence on foreign lenders, ARC aims to steadily expand its coverage. This includes securing long-term financing via the existing member states. Among other things, complementary insurance through regional providers will be promoted. Furthermore, ongoing collaboration with state actors is designed to reduce dependence on ARC's training activities. It also aims to integrate financing mechanisms and other activities into the respective national risk management frameworks. The current strategy also envisages the participation of local civil society organisations, which are likewise expected to access ARC insurance through ARC Replica (ARC, 2020).

In summary, key outputs include ongoing capacity building (particularly on ARV and contingency planning tools), and the implementation of an Africa-wide and African-owned risk pool with parametric climate risk insurance. These aim to achieve a number of outcomes:

In the short term, it is expected that member states will gain a better understanding and improved technical capacity for managing extreme weather risks. Robust contingency plans and insurance solutions will also be provided. In the medium term, it is envisaged that timely insurance payouts and contingency plan implementation will enable governments to respond swiftly and effectively to climate risk events, and protect the assets and livelihoods of vulnerable households. At the same time, greater regional, national and international dialogue is expected to create awareness. This will enable better coordination of actors for disaster management and climate risk finance. Consequently, in the medium and long term ARC's activities are expected to lead to a positive impact on the participating countries' risk management and financing policies and practices. Continuous dialogue with international and national stakeholders is expected to create greater appreciation of, and thus demand for, ARC products and services in non-member states. This should have the effect of establishing ARC as the primary insurance institution on the African continent. Together with the envisaged institutionalisation, it is expected that the ARC Agency will become a financially independent organisation and that ARC Ltd. will be able to repay the capital to its lenders. All in all, the interventions will ensure that the countries involved are better able to anticipate climate risks in good time, prepare for them effectively and manage them appropriately.

The ultimate impact will thus be that the governments of ARC member states are empowered to manage extreme weather events such as to ensure that vulnerable populations are financially protected. This will also enable the member states to continue pursuing the sustainable development goals regardless of climate extremes.

7.1.4 Case study on Adaptation of Agricultural Value Chains to Climate Change in Madagascar (PrAda)

Table 17 Profile of Adaptation of Agricultural Value Chains to Climate Change in Madagascar (PrAda)

Title of the intervention	Module: Adaptation of Agricultural Value Chains to Climate Change in Madagascar (PrAda)
Programme title	Environmental policy, conservation and sustainable management of natural resources in Madagascar
Term	03/2017 to 02/2022
Volume	EUR 17.5 million (of which EUR 7.5 million is a combined financing contribution of the EU)
CLA marker	CLA-2
Building on intervention	Transitional development assistance intervention to strengthen the resilience of the rural population in southern Madagascar (PN 2012.1998.9)
Commissioned by	BMZ
Implementing organisation and partner organisations	GIZ Ministry of Agriculture, Livestock and Fisheries of the Republic of Madagascar, Météo Madagascar, regional directorates for agriculture and livestock; National Centre for Applied Research and Rural Development; directorate for agricultural and rural training, directorate for partnerships and investment promotion; directorate for information systems of Madagascar; Université d'Antananarivo, Madagascar
FC or TC	TC
Scale (bilateral/regional/global)	Bilateral
Location of case study considered	Madagascar, in the regions of Anosy, Androy and Atsimo-Atsinanana
Objectives and focal fields of action	Objective: The performance of actors in selected agricultural value chains that are particularly vulnerable to climate change is increased. Field of action: Access to insurance products for actors in agricultural value chains to insure against climate- and weather-related events and the resulting loss of income
Target groups	Actors of selected agricultural value chains - Seed and seedling suppliers, farmers, traders, processors - Value chain supporters (regulatory authorities, research institutions, public and private advisory service providers, NGOs, credit institutions, insurance companies) Women (22 per cent of small businesses in the country are run by women.) Youth
Contribution to international agreements (e.g. SDGs, Paris Agreement)	SDG 1 (No poverty) SDG 2 (Zero hunger)

	SDG 5 (Gender equality) SDG 8 (Decent work and economic growth) SDG 9 (Industry, innovation and infrastructure) SDG 12 (Responsible consumption and production) SDG 13 (Climate action) SDG 14 (Life below water)
Climate risk considered	Drought
Instrument groups	Risk pooling (agricultural insurance; insurance market) Risk preparedness

Source: DEval, authors' own table

The context

Agriculture forms the livelihood for the majority of the Malagasy population, who are therefore highly dependent on the availability of natural resources. At the same time, the actors along the agricultural value chains have only a low level of professionalisation. This is due to their limited market access and market information, and a weakly developed culture of entrepreneurship. The main actors in the intervention at the micro, meso and macro levels do not have the necessary methodological knowledge to drive the further development of value chains. At the same time, the island state of Madagascar is hard hit by the effects of climate change due to its geographical location. The performance of actors in agricultural value chains, which are particularly vulnerable to climate change, is correspondingly inadequate (core problem). The Government of Madagascar has recognised the need to adapt to climate change, and is striving to strengthen the country's resilience to its effects.

Contribution of the case study to the 'risk pooling' and 'risk preparedness' instrument groups

This case study relates to two instrument groups. As the intervention aims to introduce parametric climate risk insurance for selected agricultural value chains, it contributes to risk pooling. This is intended to insure the target group against unforeseen climate-related events and the resulting loss of income, thereby increasing their resilience to the impacts of climate change.

In the area of risk preparedness, the case study includes sub-interventions in the drafting of the new insurance law that are also relevant beyond insurance, namely for risk assessment, risk analyses and the institutional structure for managing residual risks.

The strategic relevance of the bilateral intervention PrAda results from the fact that it covers traditional agricultural value chains for cash crops and complements risk reduction interventions.

Logic of the intervention

Relevant value chains were selected in Madagascar's arid southern regions of Anosy, Androy and Atsimo-Atsinanana. Systematic and practical methods are to be used to boost the performance of the various actors. Three fields of action are implemented through PrAda:

1. Improve access to quality agro-meteorological and agronomic advisory services
2. Improve the structural frameworks for agricultural value chains
3. Enable access to insurance products for actors in agricultural value chains to insure against climate- and weather-related events and the resulting loss of income.

The evaluation module examines the risk pooling instrument in field of action 3, which encompasses the introduction of CRI. It also examines the activities on the national regulatory framework for CRI, which are addressed in the risk preparedness instrument group. The activities in this field of action aim to ensure access to insurance products for operators in the selected agricultural value chains (outcome). This gives operators of these value chains the opportunity to insure themselves against unforeseen weather-related events and the resulting loss of income. In turn, this will increase their resilience to the impacts of climate change.

The impact of the intervention is to boost the performance of actors in selected agricultural value chains that are particularly vulnerable to climate change (Anosy, Androy and Atsimo-Atsinanana). To this end, the regulatory framework at national level is to be improved (outcome). To achieve this, the first step is to analyse and, if necessary, advise on the amendment of insurance regulations. In addition, the understanding of CRI – also as an inventory of the legislation, especially as regards index-based insurance – as well as the insurance industry's interest in CRI, will be examined. The next step of these interventions is to bring about regulatory improvements at the national level (output 1). Furthermore, building on these interventions, awareness-raising and training of key actors (Ministry of Agriculture, Central Bank, insurance companies) will take place and a strategy for financial inclusion will be implemented (output 2).

A further area is the structural frameworks for value chain actors and insurance products. This should give actors in selected agricultural value chains access to appropriate insurance products (outcome). In addition, the meteorological database is to be improved. Further outcomes relate to increasing the income of the target group, insuring selected actors against climate risks, and strengthening the resilience and performance of the target groups through improved access to meteorological information. To achieve these, Météo Madagascar will be supported in generating meteorological information and recommendations for action (output 2). An awareness-raising and information campaign for value chain stakeholders will also be carried out (output 1). These steps will build on the comprehensive vulnerability analysis intervention.

Furthermore, the value chain actors are to be positioned more professionally, the structural framework conditions for value chain actors are to be improved and adaptation interventions are to be piloted. For this purpose, a value chain analysis and a baseline survey that includes the identification of target group are necessary. In a next step, these should lead to advisory services for (i) the Ministry of Agriculture and Livestock on designing target group-specific awareness-raising activities (output 1), and (ii) value chain actors on organisational and technical issues (output 2).

7.1.5 Case study on the InsuResilience Investment Fund (IIF)

Table 18 Profile of the InsuResilience Investment Fund (IIF)

Title of the intervention	Module: Climate Insurance Fund IV (new fund name as of 2017: InsuResilience Investment Fund, IIF) (includes modules for accompanying interventions and premium subsidies)
Term	12/2013 to 06/2029 (until 2017 as Climate Insurance Fund)
Volume	Fiduciary resources: EUR 57.31 million for Funds I-IV Accompanying interventions (Technical Assistance) I-III: EUR 11.25 million Premium subsidies I-III: EUR 6.26 million
CLA marker	CLA-2
Building on intervention/linked intervention	Climate Insurance Funds I-III
Commissioned by	BMZ
Implementing organisation and partner organisations	KfW BlueOrchard (fund management) CelsiusPro (coordination of Technical Assistance)
FC or TC	FC
Scale (bilateral/regional/global)	Global (CRI intermediaries with a focus on poor and vulnerable population groups)
Location of case study considered	Global; one borrower and one equity investment recipient were also studied
Objectives and fields of action	Objectives: Access to and use of insurance against extreme weather events is increased. Vulnerability to climate change is reduced. Fields of action: Financing through credits and equity investments, Technical Assistance and premium subsidies
Target groups	Beneficiaries: poor and vulnerable (including climate-vulnerable) households and enterprises in developing countries Investment recipients: CRI intermediaries operating in developing countries Investors: private and official investors
Contribution to international agreements (e.g. SDGs, Paris Agreement)	SDG 2 (Zero hunger) SDG 13 (Climate action) G7 declarations on COP21 and COP22 InsuResilience Global Partnership
Climate risk considered	Extreme weather events
Instrument groups	Risk pooling Third-party risk finance

Source: DEval, authors' own table

The context

Due to their geographical location and limited access to resources, developing countries are particularly vulnerable to the consequences of climate change. Furthermore, extreme weather events have a devastating effect on these countries, partly due to their high dependence on agriculture. Insurance can help reduce the effects of extreme weather events. However, there are financing gaps in the scaling up of climate risk insurance.

Contribution of the case study to the 'risk pooling' and' third-party risk finance' instrument groups

The IIF addresses residual climate risks through third-party risk finance. In so doing it supports companies in helping to develop and expand risk pooling. Its overall objective is to support the adaptation of developing countries to climate change by providing insurance. At the fund level, the IIF is classified as general risk finance, as various investors give capital in order to invest in the high-risk market of CRI in developing countries. Besides economic and political risks, extreme weather events can also increase investment risk. Through the fund, the investors' risk is spread across a large number of investment recipients. This means that the loss is shared in case of non-repayment of the loan (debt fund), or in case of a loss in value of the company (equity fund).

At the same time, the case study of the financing of insurers within the debt fund is directly linked to the 'risk pooling' instrument group. The sub-case study of a borrower provides information on multi-risk insurance for medium-sized and small enterprises that is financially supported through a global investment fund. The second sub-case study of an equity investment recipient focuses more on risk transfer products in general, as an alternative approach to risk pooling. The technology company provides weather data and supports other MFIs in building and establishing risk transfer products by developing models and digital solutions.

Logic of the intervention

The IIF is a fund established with official resources to promote climate risk insurance in developing countries. It comprises a debt fund and an equity fund. The debt fund targets microfinance institutions. The equity fund provides finance in the form of credits or equity investments to other actors in the insurance value chain – such as insurance companies or technology companies, e.g. for weather data – to support their contribution to climate risk insurance. In the debt fund, credits are repaid on an ongoing basis and money is reallocated, while in the equity fund, commitments last until the end of the fund's life (ten years) – at which point they are sold (DOC-16). The target was to supplement BMZ deposits of about 70 million US dollars with private investor deposits of 230 million US dollars. This would then create a fund with resources totalling 300 million US dollars, through which a total of 400 million people were to be insured by 2020[35].

An impact investment manager (BlueOrchard) was commissioned by KfW to identify investors and investment recipients in order to raise and allocate resources. The fund has a so-called waterfall structure in which 'junior tranches' – earmarked for official capital – cover losses first, before the 'senior tranches' subsequently have to assume losses. The senior tranches, which are earmarked for private investors, are thus less risky. Furthermore, dividends are paid to senior tranches first, before junior tranches subsequently also receive them. The fund is managed by a supervisory board and various investment committees. These committees are made up of experts appointed by KfW and other shareholders. Investment decisions are made in accordance with the agreed investment guidelines.

In addition to financial resources, Technical Assistance is also available for the respective activities, if this is desired or deemed necessary by the investment recipient or the fund management. This mainly concerns the distribution and marketing of the CRI, and is coordinated through the designated contractual partner CelsiusPro. CelsiusPro therefore invites tenders for advisory services in order to provide the Technical Assistance in the country concerned. The third instrument is premium subsidies. This can be used for a limited period to cover the costs incurred when introducing insurance, and to create incentives to buy. This instrument has so far been a little used component of the IIF.

[35] When it became foreseeable that the target would not be met, a new date of 2025 was set.

The Theory of Change of the IIF is thus as follows: At the input level, credits or equity investments are offered by the IIF to finance the development or scaling up of CRI. This financing can be supplemented by Technical Assistance (especially for product development and distribution) and in a few cases by premium support.

This is intended to bring more suitable products to market at output level, ensured by the support of technology companies, insurance companies and microfinance institutions. The underlying assumption is that financing and technical knowledge are lacking above all, and that companies are generally interested in introducing CRI. The interventions are designed to increase both the number of products on the market and – at the short-term outcome level – the number of people insured. The latter is a main indicator of the IIF. It is based on the assumption that households and small and medium-sized enterprises are interested in an insurance solution, and that it is mainly their lack of such a solution, or a solution that fits, which is a problem. Technical Assistance plays a complementary role here. It is also assumed that without external financial support, MFIs will not be able to expand insurance sufficiently in order to meet the demand. Thus, as a medium-term outcome in case of a climate risk event, the insured persons are to be guaranteed financing for the losses and damages incurred. Policyholder losses will also be reduced. As a long-term impact, the aim is to strengthen resilience and adaptation to climate change. This is to be achieved by reducing concern about losses and damages, and freeing up reserves to implement adaptation interventions.

7.1.6 Case study on Climate Change Adaptation in Rural Areas of India (CCA-RAI)

Table 19 Profile of Climate Change Adaptation in Rural Areas of India (CCA-RAI)

Title of the intervention	Field of action: Climate Change Adaptation in Rural Areas of India (CCA-RAI)
Programme title	Indo-German Environment Programme in Rural Areas (IGEP-RA)
Term	2015-2019
Volume	EUR 17.60 million (all IGEP-RA components including increase in funding)
CLA marker	CLA-2
Building on intervention	From 2009 to 2014 as a separate CCA-RAI module (2006.2161.5); partial continuation in CAFRI (2020-2022; 2018.2255.0).
Commissioned by	BMZ
Implementing organisation and partner organisations	GIZ Ministry of Environment, Forest and Climate Change
FC or TC	TC
Scale (bilateral/regional/global)	Bilateral
Location of implementation considered	2009-2014: West Bengal, Tamil Nadu, Madhya Pradesh, Rajasthan 2015-2019: Himachal Pradesh, Punjab, Telangana, Tamil Nadu
Objectives and focal fields of action	Objective: Public and private interventions minimise climate change risks in rural areas. Fields of action: 1)) technical support to national government on policy instruments; 2) capacity development on losses and damages, as well as climate risk management, planning and implementation of adaptation interventions, M&E, climate finance; 3) improved access to climate finance
Target groups	Poor sections of the population and disadvantaged marginalised groups in rural regions of India

Contribution to international agreements (e.g. SDGs, Paris Agreement)	SDG 1 (No poverty) SDG 2 (Zero hunger) SDG 5 (Gender equality) SDG 6 (Clean water and sanitation) SDG 13 (Climate action) Art 7.1. of the Paris Agreement
Climate risk considered	No explicit focus
Instrument groups	Third-party risk finance Risk preparedness

Source: DEval, authors' own table

The context

India is among the countries that are already affected by climate change, and will remain heavily exposed to it in the future. The rural population is particularly vulnerable. Their livelihoods depend on climate-sensitive sectors such as agriculture, fisheries and forestry. Losses and damages that occur in connection with global warming therefore affect this group in particular.

Contribution of the case study to the 'third-party risk finance' and 'risk preparedness' instrument groups

This case study covers the instrument groups 'risk preparedness' and 'third-party risk finance'. It focuses on interventions to build capacity for managing residual risks, and losses and damages that result from them. In terms of risk preparedness, developing effective strategies to deal with shocks and stressors, and enabling their application, should help limit the negative effects of residual climate risks. The case study also examines instruments for emergency financing and financing of losses and damages, and thus the third-party risk finance group.

The particular relevance of the case study stems from two features: Firstly, the intervention under consideration explicitly includes policy instruments that are used in the area of losses and damages. Secondly, there is particular potential for innovation in the combination of capacity development approaches with the orientation towards a national climate fund.

Logic of the intervention

The intended impact of the intervention under consideration is to minimise the risks of climate change in rural areas of India through public and private interventions (impact). The intervention is designed to contribute to the implementation of policies and programmes for climate-sensitive rural development by public and private actors in the country (module objective IGEP-RA).

The Indian Government is already working to mainstream climate change interventions as a cross-cutting issue in national and state sectoral policies. The national Ministry of Environment, Forest and Climate Change has asked all federal states to develop State Action Plans on Climate Change (SAPCCs). Furthermore, a National Adaptation Fund for Climate Change (NAFCC) has been set up, from which the states can access funds by submitting project proposals.

According to GIZ, however, the implementation of climate-sensitive policies and programmes is suffering from limited capacities. Insufficient knowledge, so it is said, is hindering the targeted acquisition of financial resources. Technical and managerial staff in the ministries that conduct rural development programmes are not yet comprehensively performing their tasks in implementing the action plans on climate change.

In order for public and private interventions to successfully minimise the risks of climate change in rural areas, the intervention under consideration is to make contributions to three overarching areas (outcomes): Firstly, policy instruments for managing climate risks, and monitoring & evaluation (M&E) systems for adaptation to climate change, are to be institutionalised at national and federal state level. Secondly, the capacities of relevant actors at national and state level for planning and implementing adaptation interventions, for M&E, for losses and damages, for climate risk management and for climate finance are to be improved. Thirdly – and to complement the above – access to national and international climate finance sources is to be improved.

To achieve the first contribution – institutionalisation of policy instruments – the intervention is to generate the following outputs:

- At the national and state levels, there are two policy documents/operational guidelines on climate adaptation, monitoring, losses and damages, and climate finance (output 1).
    - To this end, GIZ will provide the MoEFCC with technical and process advice.
    - A workshop on losses and damages will be organised at national level.
    - A study on damages and losses will be conducted in Tamil Nadu and Odisha.

- Three M&E approaches to track the implementation of institutional capacity development interventions and the implementation of adaptation interventions have been developed (output 2).
    - GIZ will provide advisory services for this purpose.

- Revised action plans on climate change are available in several Indian states (output 3).
    - GIZ will advise on the revision and
    - provide a study on the effects of climate change in the water sector.

To achieve the second contribution – improved capacities – the intervention is to generate the following outputs:

- Four national or state education and training institutions have integrated modules on 'planning and implementing adaptation interventions', 'M&E' 'losses and damages', 'climate risk management' and 'climate finance' into their curricula (output 1) .
    - GIZ will provide technical advice on adapting the curricula.

- Further training for planners and decision-makers has been carried out (output 2).

To achieve the third contribution – improved access to finance – the intervention is to generate the following outputs:

- Investment plans targeting climate finance for prioritised sectors such as agriculture, water and infrastructure are available for Tamil Nadu, Himachal Pradesh, Telangana and Punjab (output 1)
- Innovative project ideas for applying for funds from the National Adaptation Fund for Climate Change and the Green Climate Fund have been developed and submitted to the MoEFCC for approval (output 2).
    - To this end, GIZ will conduct workshops on writing project proposals.
    - It will also be directly involved in revising the proposals.

7.1.7 Case study on Urban Management of Internal Migration due to Climate Change (UMIMCC)

Table 20 Profile of Urban Management of Internal Migration due to Climate Change (UMIMCC)

Title of the intervention	Module: Urban Management of Internal Migration due to Climate Change (UMIMCC)
Programme title	Adaptation to climate change in urban areas in Bangladesh (part of the special initiative 'Tackling the Root Causes of Displacement, (Re-)integrating Refugees')
Term	01/2015 to 12/2017 (phase 1), 01/2018 to 12/2022 (phase 2)
Volume	Phase 1: EUR 5 million; phase 2: EUR 15 million (of which EUR 5 million German contribution, EUR 10 million EU co-financing contribution)
CLA marker	CLA-2
Building on intervention	Phase 1: 'Resilient and inclusive urban development (RIUD)' (PN 2013.9770.2), 'Adaptation to climate change in national and local development planning' (PN 2014.2107.2), 'Climate change adaptation for urban development in Bangladesh', 'Promotion of the Climate Change Unit in coordinating the Bangladesh Climate Change Strategy and Action Plan (BCCSAP)' (PN 2012.9754.8), 'Geo-information for urban development' (PN 2012.2096.1) Phase 2: 'Improving access to remittances and other financial services' (PN: 2015.4069.9)
Commissioned by	BMZ
Implementing organisation and partner organisations	GIZ Primary lead partners: Ministry of Social Welfare (MoSW), Department of Social Services (DSS); regional: city corporations of Rajshahi and Khulna (phases 1 and 2), Barisal, Sirajganj and Satkhira (phase 2), national: Bangladesh Planning Commission
FC or TC	TC
Scale (bilateral/regional/ global)	Bilateral
Location of implementation	Bangladesh. In phase 1: cities of Khulna and Rajshahi; phase 2: cities of Khulna, Rajshahi, Barisal, Sirajganj and Satkhira
Objectives and focal fields of action	Core objective: Improve the lives of climate migrants through needs-based interventions. Fields of action: Phase 1: Creation of an information base, infrastructure development, training; Phase 2: Training, poverty reduction, improved access to public services, financial sector connectivity, direct interventions
Target groups	Poor, urban population in selected hotspots with a high proportion of climate migrants, with a special focus on women
Contribution to	SDG 1 (No poverty)

international agreements (e.g. SDGs, Paris Agreement)	SDG 11 (Sustainable cities and communities) SDG 13 (Climate action)
Climate risk considered	Effects of climate change-induced internal migration in urban areas (including increasing poverty risk and distribution conflicts)
Instrument group	Transformative risk management

Source: DEval, authors' own table, based on project documents

The context

Globally, Bangladesh is one of the countries hardest hit by the impacts of climate change, especially flooding (Ali, 1999; Monirul Qader Mirza, 2002). The lives of the rural population in particular are badly affected by climate change. Experts therefore assume that migration by the rural population towards urban centres will increase (Kartiki, 2011). There, however, the life situation of climate migrants usually does not improve. They often find themselves in urban slums, where they have to eke out a livelihood without adequate access to essential basic goods and services such as sanitary facilities or stable buildings. In many places, slums are formed in areas with a high environmental risk (high risk of flooding, toxic pollution from factories, etc.), which further worsens the lives of the arriving migrants (Ahmed, 2014).

Contribution of the case study to the instrument group 'transformative risk management'

UMIMCC addresses these problems by aiming to sustainably improve the livelihoods of climate migrants in selected slums in the cities of Khulna and Rajshahi.

In an integrated approach, the intervention includes both climate migrants and vulnerable population groups in general. It is divided into two phases, both of which were covered by this case study.

The first phase aims to improve livelihoods, the second to diversify them. The second phase is co-financed by the EU. This enabled the intervention to be expanded to include three partner cities (Barisal, Sirajganj and Satkhira), and to integrate an additional field of action ('financial sector connectivity').

The contribution of UMIMCC to climate migration under the instrument group 'transformative risk management' thus consists of improving (i) the livelihoods of climate migrants at the destination and, to some extent, (i) the contextual conditions (such as access to social services). The intervention does not focus on activities that include the place of origin, the migration process, the links between place of origin and destination, and the broader context (e.g. laws, capacities at the meso or macro level).

As a component of the Bangladesh Resilient Livelihoods Programme, the particular relevance of the project lies in its vulnerability-related and comprehensive approach. This approach aims to increase local resilience in the long term. Emphasis is placed on the active involvement of the target group and networking with regional political and economic actors. As an innovative intervention, information hubs were established to serve as contact points for the affected population. Through capacity-building interventions within the city government, an attempt is being made to achieve sustainable impact.

Logic of the intervention

The aim of UMIMCC is to improve the lives of climate migrants in selected slums in urban centres in Bangladesh (impact). To achieve this, a demand-driven expansion of service provision is to take place, with a special focus on the integration of vulnerable population groups into local financial and training markets. In conjunction with capacity development for decision-makers, this should help make the livelihoods of the target group more robust. In turn, this should help boost resilience to the above-mentioned urban hazards and increase social security. The intervention pursues five outcomes:

Outcome 1 (phase 1): expanded knowledge base. The design of the intervention should be needs-oriented, gender-sensitive and evidence-based. Through a study, slums with a disproportionately high number of climate migrants are identified in the partner cities. Expectations and needs of the target groups are to be

determined in a participatory manner – using workshops, interviews and surveys. Furthermore, capacity-building interventions are to be implemented in the partner-city corporations (training, coaching, workshops, learning and study tours). These interventions aim to improve the information and data base on human mobility in the context of climate change. This in turn should expand the knowledge base on this topic.

Outcome 2 (phase 1): improved basic infrastructure. To expand the infrastructure in the slums in line with demand, basic services are first of all to be inventoried. Through cash-for-work initiatives, the basic infrastructure of the slums (such as roads, public toilets and wells) will be improved. In the medium term, this will create employment opportunities for climate migrants.

Outcome 3 (phases 1 & 2): improved training. Another focus of the intervention is on the training of climate migrants. To this end, relevant sectors for the employment of climate migrants will first be identified. This will be done through interviews with small and medium-sized enterprises, plus an analysis of the structure of the local economy. Based on this, informal training programmes for the further vocational training of slum dwellers will be developed, implemented and subsequently revised in cooperation with local companies. The training component proved successful in phase 1 and will be continued in phase 2; here the training period will be increased from three to six months. Furthermore, in phase 2, courses will be held to teach basic entrepreneurial skills to facilitate self-employment.

Outcome 4 (phase 2): improved financial situation. Direct support for particularly needy households will ensure immediate poverty reduction. Households will receive a breeding animal (goat or cow) as well as relevant information on the cultivation of fodder, the care of the animals and the marketing of animal products in the context of urban farming. Politicians at regional and national level will be informed about poverty reduction practices, and local actors will be supported in sharing lessons learned (for example through workshops). Furthermore, the use of financial services within the target group will be promoted by linking them with local (micro-)finance institutions.

Outcome 5 (phase 2): use of services. Given the largely inadequate access of the target group to public social services, climate migrants and vulnerable households will be advised on the availability of social services and on their entitlement to these services. For this purpose, central counselling centres (known as information hubs) will be established. Furthermore, a policy dialogue on the public welfare system for the urban poor is being promoted at the Ministry of Social Welfare.

7.1.8 Case study on Sustainable Management of Human Mobility in the Context of Climate Change (HMCCC)

Table 21 Profile of Sustainable Management of Human Mobility in the Context of Climate Change (HMCCC)

Title of the intervention	Sustainable Management of Human Mobility in the Context of Climate Change (HMCCC) (global programme)
Term	11/2017 to 04/2020
Volume	EUR 4 million
CLA marker	CLA-2
Building on intervention	Risk assessment and management for adaptation to climate change(PN 13.9757.9), Global programme on migration and development (PN 2015.2139.2), Sector project on displacement (2017.4030.7), Soil protection, combating desertification, sustainable land management (PN 2017.2010.1)
Commissioned by	BMZ
Implementing organisation and	GIZ

partner organisations	Philippines: Department of Environmental and Natural Resources (DENR), Department of Science and Technology, Commission on Population (POPCOM), Climate Change Commission (CCC), National Economic and Development Authority (NEDA), Department of the Interior and Local Government (DILG)
FC or TC	TC
Scale (bilateral/regional/global)	Global (Philippines, Pacific and Caribbean regions)
Location of case study considered	Philippines
Objectives and focal fields of action	Core objective: Generate applied knowledge for the sustainable management of human mobility in the context of climate change by German and international development cooperation. Fields of action: (1) advisory services to German development cooperation; (2) generation of knowledge products; (3) regional or (sub-)national interventions for capacity building and dialogue between actors
Target groups	Climate migrants, especially vulnerable groups (women and persons with reduced mobility), host communities
Contribution to international agreements (e.g. SDGs, Paris Agreement)	SDG 1 (No poverty) SDG 2 (Zero hunger) SDG 3 (Good health and well-being) SDG 5 (Gender equality) SDG 10 (Reduced inequalities) SDG 13 (Climate action) Contribution to the recommendations of the Task Force on Displacement (COP25)
Climate risk considered	Human mobility in the context of climate change (CM), especially resettlement and internal displacement as a consequence of slow-onset climate change
Instrument group	Transformative risk management

Source: DEval, authors' own table, based on project documents The HMCCC global programme is being implemented in the partner country Philippines and in the partner regions Pacific and Caribbean. This case study looks only at the global programme's implementation in the Philippines. In January 2020 the global programme was extended (until April 2023). At that point it received additional funding (to the tune of EUR 10.28 million, including EUR 0.28 million in co-financing from the New Zealand Ministry of Foreign Affairs and Trade, MFAT). It was also expanded regionally (to include the Philippines, and the Pacific, Caribbean, Horn of Africa and West Africa regions) and thematically. Its title is the 'Global Programme on Human Mobility in the Context of Climate Change'. The current module objective (as of March 2021) is: 'The development-oriented management of (internal) migration, disaster-induced displacement and voluntary and planned resettlement of people in the context of climate change, is improved.' In November 2020, the global programme was expanded once again through co-financing by the MFAT.

The context

In the Philippines, gradual climate change (sea level rise) and extreme weather events (tropical storms) are increasingly threatening the livelihoods of coastal communities, especially poor smallholders (Bohra-Mishra et al., 2017; Chandra et al., 2017). In this context, migration is becoming an increasingly important adaptation strategy for local populations to escape the negative effects of climate change (Laurice Jamero et al., 2017). In most urban regions of arrival, this creates multiple social challenges (overburdened infrastructure, resource scarcity or increased potential for conflict) (Munslow and O'Dempsey, 2010; Reuveny, 2007). In the Philippines, the issue of climate migration (CM) is a matter of political and social debate (Ranque and Quetulio-Navarra, 2015; Salva et al., 2012; Thomas, 2015). Moreover, the topic of CM is a field of active

research with increasing numbers of scientific publications every year (Berlemann and Steinhardt, 2017; Warner et al., 2010). However, there is currently a lack of 'applied' knowledge that would enable better responses to the challenges of CM at the levels of both local governance and international development cooperation (DOC-30).

Contribution of the case study to the instrument group 'transformative risk management'

This evaluation module was interested primarily in implementation of the HMCCC global programme in the Philippines. The focus of the global programme there was on the connection between gradual climate change and internal migration. The key contribution of the intervention to the instrument group 'transformative risk management' is the generation of applied knowledge on human mobility in the context of climate change. In the Philippines, the nationally and locally oriented intervention focuses less on the meticulous compilation of data, and more on an interactive learning process. By promoting exchange between regional actors and dialogue with government decision-makers, it hopes to achieve sustainable impacts. At the same time, the vulnerability-oriented, gender-sensitive and interdisciplinary approach aims to strengthen the general competencies of German development cooperation for CM management. Furthermore, the knowledge generated is intended to stimulate discussion of the topic of 'CM' within international development cooperation. It is hoped that this discourse will contribute to the recommendations of global frameworks (such as the United Nations Global Compact on Migration). It is also hoped that it will lead to a development-oriented adaptation of CM policy strategies in the Philippines.

Logic of the intervention

With its three fields of action, the main objective (impact) of the HMCCC Global Programme is to improve applied knowledge on CM. This implies that the knowledge and data base will first be expanded though a process of participatory discourse, and then used and continuously developed by the actors involved. In this way, capacities for development-oriented climate migration management are to be built among both the project executing agencies and the local institutions. The intervention pursues two outcomes:

Outcome 1: Knowledge base is expanded. First, a broad inventory of previous knowledge on CM (global knowledge, but with an explicit focus on the pilot regions: the Philippines, the Caribbean and the Pacific) is to be conducted, based on which research needs will be identified. Sources of information will include census data, technical studies and policy strategies. Furthermore, a consultation on policy recommendations for action will be undertaken. In this context, platforms and information mechanisms for CM management will be established and scaled up at interministerial level. One focus here will be on feeding information sources into new and existing databases. Based on this synthesis, processing and scaling up of knowledge, a next step will be to produce studies, position papers and method papers on CM management. Taken together, these interventions will expand the knowledge base on human mobility in the context of climate change.

Outcome 2: Knowledge is used. To generate advisory content for German development cooperation, lessons learned with CM management will be processed using information materials and innovative forms of communication (such as storytelling). Through consultations with international organisations and experts from research institutions, strategically relevant topics will be identified. Based on this, written recommendations will be drafted for the BMZ. As well as advisory activities, regional, subnational and national interventions for capacity building and dialogue between actors will be supported. At the same time, local government units will be identified where exchange platforms are to be established and training and advisory services on the topic of 'CM' carried out. In combination, these interventions should ensure that the knowledge gained is mainstreamed in the administrative structures of the partner country.

7.2 Background documents

7.2.1 Study on flood modelling in Morocco

Background

Besides gradual changes, global climate change is causing an increase in extreme weather events (IPCC, 2018b). In Morocco, floods have historically caused the greatest economic losses and damages (World Bank, 2013). Between 2000 and 2013, 13 severe floods caused 427 million US dollars in losses and damages (World Bank, 2016). Although flooding is a nationwide issue, some provinces are particularly hard hit. For example, 60 per cent of flood damage occurs in the provinces of Kenitra, Tetouan, Casablanca, and Sidi Kacem (World Bank, 2013).

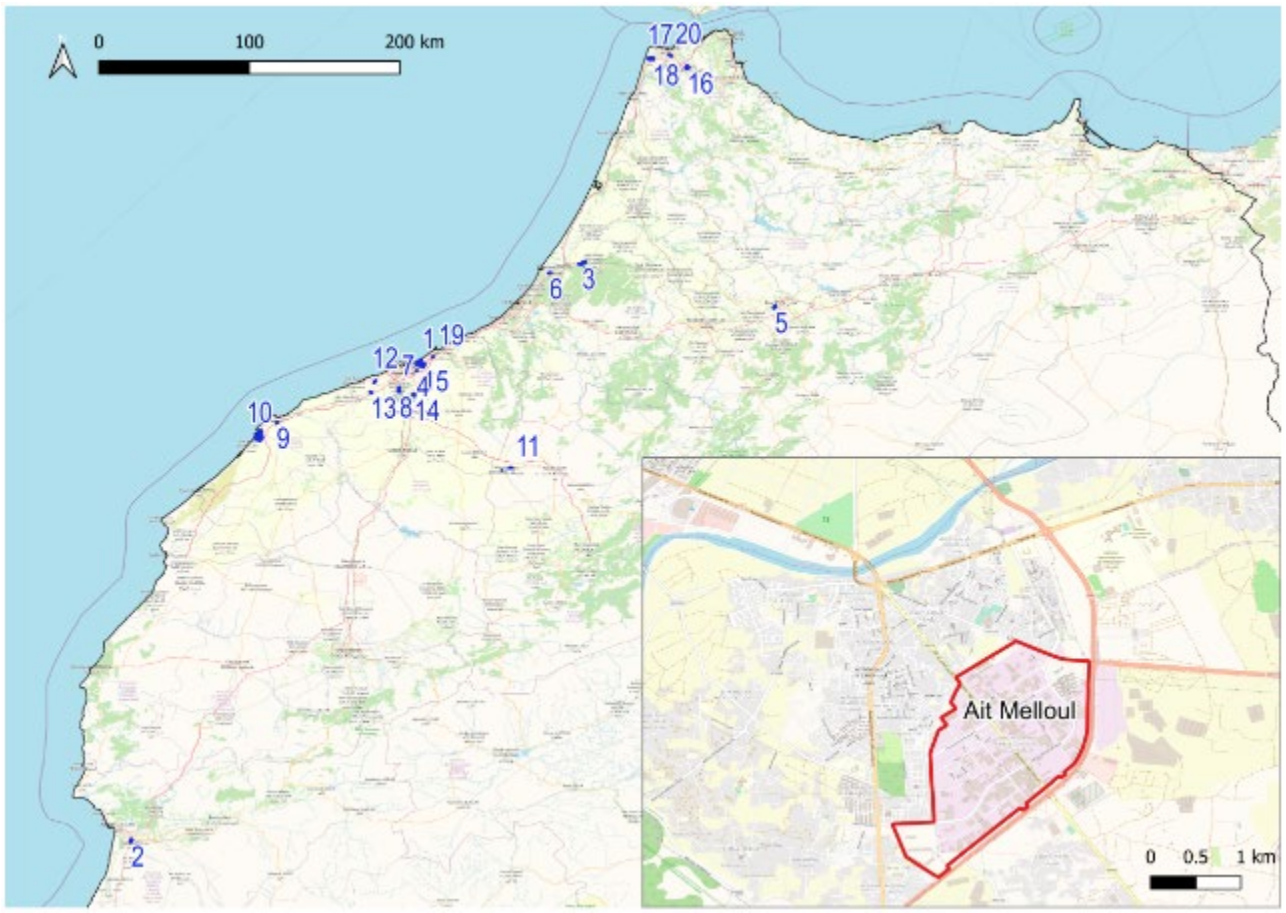
German development cooperation aims to support Morocco in adapting to climate change. Climate risk insurance is a new instrument for cooperation. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, in cooperation with the Allianz Insurance Group, is currently implementing flood risk insurance in the Ait Melloul industrial zone in south-western Morocco. This is located in the Souss-Massa region, near the city of Agadir. The selection of Ait Melloul as the project location was based on climate risk assessments of a predecessor project (PSACC), and the possibility of continuing the existing cooperation with local cooperation partners. Here, DEval evaluates the relevance of the intervention in Ait Melloul using data from a flood modelling exercise. Specifically, it answers the following question:

Q1: Is the flood risk in the Ait Melloul industrial zone statistically higher than in 19 comparable industrial zones in Morocco?

Data and methods

Industrial zones. In collaboration with a local expert, a list of registered industrial zones (N = 54) was compiled for Morocco. These industrial zones were studied qualitatively for climate risk factors (river flooding, heavy rainfall, droughts, windstorms, heat waves, etc.), and assessed on the basis of various characteristics (number of enterprises, sectors, age of the industrial zones, management typology). Based on this list of characteristics, all industrial zones were selected in which (1) more than 100 micro, small and medium-sized enterprises are active, and which (2) have a moderate or high flood risk, according to expert assessments and information from the literature (World Bank, 2013). Based on these selection criteria, a sample of N = 20 industrial zones was drawn. The industrial zones in this sample were manually geocoded. The geocoding was verified and adjusted by a local expert through on-site visits and external sources of information (including publications, websites and unpublished site plans). The resulting vector geospatial data was used for the geographic analysis. Figure 14 shows the geographical location of the 20 industrial zones in the sample. Relevant information on each industrial zone can be obtained from Figure 14.

Figure 14 Location of the 20 industrial zones with high climate risk



Source: DEval, authors' own graphic. The box shows the Ait Melloul industrial zone (no. 2, bottom left); details on the industrial zones are shown in Table 22.

Table 22 Relevant information on industrial zones in Morocco

No.	Name	Size (sq. km)	Sectors	Established (year)
1	Ain Sebaa	6.2	Precision mechanical industries, chemicals, logistics, textiles, wood, packaging, electrical and aviation components, metallurgical industries, oil, energy distribution, construction, foodstuffs	1956
2	Ait Melloul	3.5	Foodstuffs, chemicals, metal industries	1988
3	Atlantic Free Zone	5	Automotive components	2010
4	Be' M'Sik Sidi Othmane	0.6	Textiles, metallurgical industries, electronic products	1982
5	Bensouda	2.8	Textiles, mechanical industries, household appliances, printing technology, foodstuffs, chemicals, packaging materials, electronic products, composite materials	1980
6	Bir Rami	1.1	Carpentry, building materials, metallurgical industries, chemicals, foodstuffs	1984
7	Bouskoura	1.8	Textiles, mechanical industries, household appliances, printing technology, foodstuffs, chemicals, packaging materials, electronic	2003

			products, composite materials	
8	CFCIM Ouled Salah	1.2	Chemicals, phosphates, chemical engineering, steel, power generation (coal-fired power)	2012
9	El Jadida	1.2	Textile, leather, steel and pharmaceutical industries	1976
10	Jorf Lasfar	24.7	Textiles, foodstuffs, chemical and para-chemical products, building materials, carpentry, electronic products, metal industries	1982
11	Khouribga	0.2	Chemicals, foodstuffs, textiles, steel and metallurgical products	1980
12	Ouled Azzouz	1.6	Chemicals, pharmaceuticals, construction products	2010
13	Sahel Had Soualem	0.7	Pharmaceuticals, chemicals, foodstuffs, construction products, mechanical industries	2000
14	Sapino Nouaceur	2.7	Aviation components, percussion mechanical industries, chemicals, cosmetics	2009
15	Sidi Bernoussi	5.5	Wood, steel, electronic products, chemical and para-chemical products, textiles, foodstuffs, automotive industry	approx. 1960
16	Tanger Automative City	4	Automotive industry, aerobatic products, renewable energy components	2014
17	Atlantic Free Zone	1.2	Media, electronic products, aviation, chemicals, automotive industry, textiles, foodstuffs	1999
18	Tanger Gzenya	3.8	Textiles, chemicals, carpentry, foodstuffs, printing technology, building materials	1996
19	ZI Mohammedia	0.9	Steel and metallurgical products, chemical and mechanical industries, petrochemicals, foodstuffs, power generation, electronic products, textiles and leather, paper	1990
20	ZI Tanger	1.3	Textiles, foodstuffs, electrical goods and equipment, mechanical industries, automotive industry	1990

Source: information based on qualitative data collected by local experts (telephone and face-to-face interviews, online research)

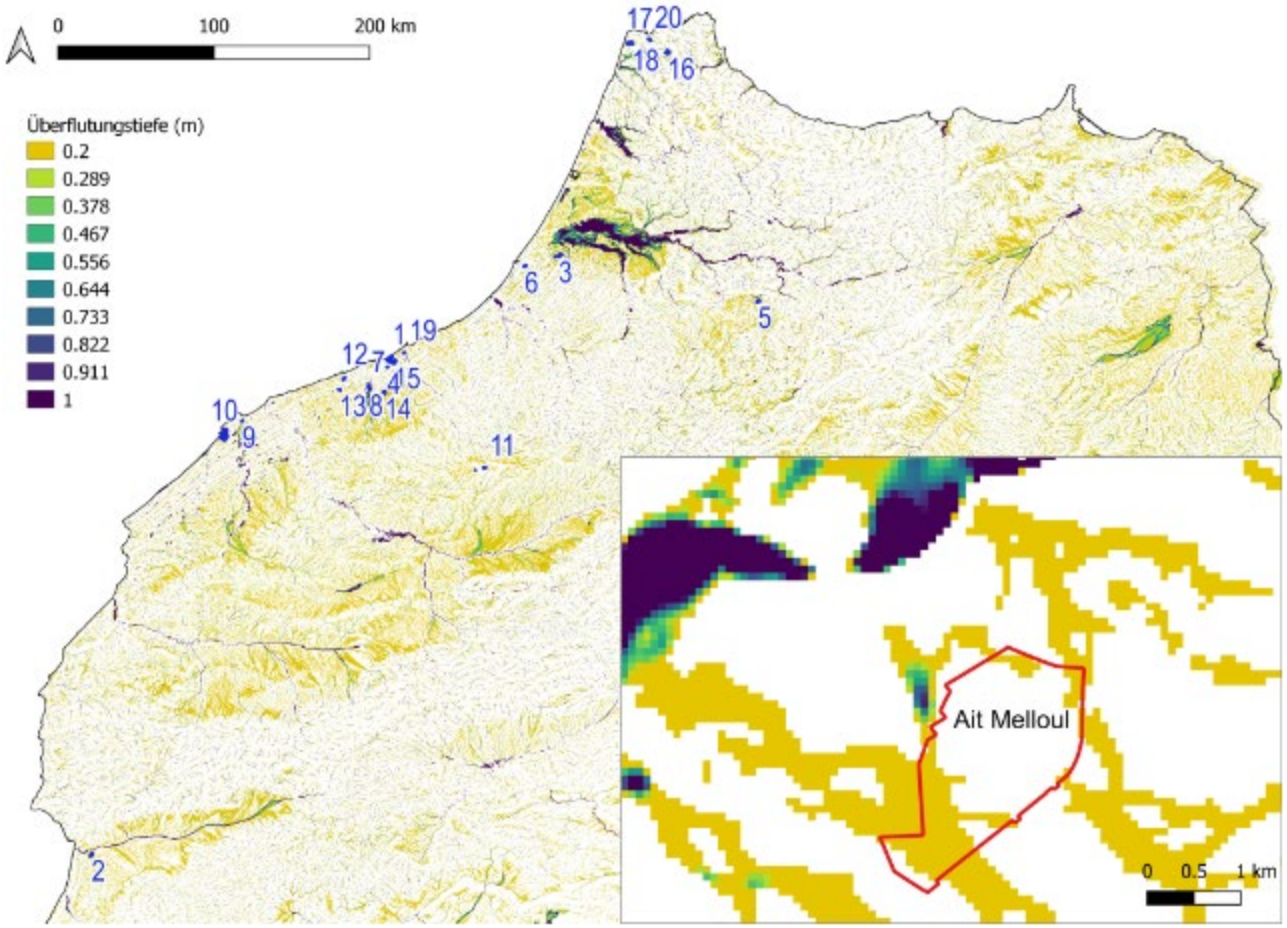
Flood modelling. Flood modelling was carried out in collaboration with the company RSS-Hydro (Schumann and Kettner 2020). A commercial version of the LISFLOOD-FP 2-D flood model was used (Bates et al., 2010). The model calculates the inundation depth for grid cells with a resolution of 90 meters, taking into account river flow (fluvial) as well as precipitation amounts (pluvial) (Sampson et al., 2013). In addition, the model also takes into account infrastructure (such as canals, dikes, lowland areas) used to protect against flooding (Sampson et al., 2015).

High-resolution topographic information (90-meter resolution, NASA MERIT SRTM-DEM) (NASA JPL, 2013) plus simulated river flow and measured precipitation, serve as initial data for the model. To calculate the river flow, the hydrological model HBV (Hydrologiska Byrans Vattenbalansavdelning) (Bergström, 1992; Seibert and Vis, 2012) was adjusted for 14 parameters (Beck et al., 2016). Separate hydrological models were

computed for each of the 17 river basins in Morocco.[36] Daily precipitation and temperature data for the period from 1979 to 2018 were required as input for the HBV model as well as the LISFLOOD-FP model. These data were obtained from the United States National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center (CPC).

Flood depths were calculated for different return periods. Return periods are maximum river flows that can be statistically expected in a certain period of time. For this purpose, historical data on maximum river flows for the 40-year observation period were extrapolated using a cumulative Weibull distribution (probability distribution) for more extreme scenarios. We used a return period of 1 in 100 years as an extreme event, which is what many insurance companies base their premium calculations on (Ludy and Kondolf, 2012). Figure 15 shows the calculated flood depths for such an event in Morocco.

Figure 15 Flood depth in a one-hundred-year flooding scenario



Source: authors' own graphic. The box shows an enlargement of the Ait Melloul industrial zone in the Souss-Massa region (no. 2).

Zonal statistics. The zonal statistics method calculates the mean value of all pixels that lie within the boundaries of an industrial zone. This makes the industrial zone the unit of analysis. Using zonal statistics, we calculated the average flood depth for a '1-in-100-year event' for each industrial zone. Alternatively, pixels can also be considered as the unit of analysis (Ajisegiri et al., 2019; BenYishay et al., 2018). We therefore created an additional dataset with pixel values. Table 23 shows summary statistics for inundation depths.

[36] Uncertainties in the hydrological model parameters must be taken into account in the modelling (Beven, 2000). To take account of these uncertainties in the parameters as objectively as possible, for each river we generated 2,000 normally distributed random values around the regional parameter for each river (Beck et al., 2016) . These random values were used to calculate 2,000 models, and the average value was used as the best representation of the real value.

Table 23 Summary statistics for relevant variables

	Level	Unit	N	Min.	Max.	Mean value	SD
Mean flood depth	IZ	cm	20	0	49.29	5.85	11.1
Ait Melloul (GIZ project location)	IZ	1|0	20	0	1	0.05	0.22
Mean flood depth	Pixels	cm	9,988	0	337.24	4.38	15.61
Ait Melloul (GIZ project location)	Pixels	1|0	9,988	0	1	0.05	0.21

Legend: IZ = industrial zones, SD = standard deviation

Statistical analysis. To answer the question of whether Ait Melloul has a higher flood risk than the 19 comparable industrial zones, we used Ordinary Least Squares (OLS) regression models. Equation (1) formally describes the model used.

$$y = \alpha + \beta_1 x_1 + e \quad (1)$$

We modelled the difference in mean flood depth (y) by comparing the Ait-Melloul industrial zone with 19 other industrial zones (β_1). In equation (1), the parameter α represents the mean flood depth when all control variables have a value of 0. Parameter *e* represents the normally distributed error value. Due to the small sample size (N = 20), significance tests were performed using robust standard errors (see OLS IZ model, Table A2). The same model can be calculated for the much larger sample of pixels (N = 9,988), which greatly increases the statistical power (see OLS pixel model, Table A2). To take account of the fact that multiple pixels belong to one industrial zone, and that there is thus a degree of redundancy in the information, we grouped the standard errors using the Huber-White method (Huber, 1967; Nawrotzki and DeWaard, 2018; White, 1980) for industrial zones. This model, however, only calculates a mean flood depth. In reality, each industrial zone has a different flood risk. This can be factored in using random effects multi-level models. (Luke, 2004). Equation 2 therefore formally represents the random effects model (Luke, 2004).

$$y_{ij} = \alpha + \beta_1 x_{1j} + u_j + e_{ij} \quad (2)$$

This model has a two-level structure, with pixels (i) embedded in industrial zones (j) (see RE pixel mode, Table A2). Thus, a separate flood mean t (random intercept) is calculated for each industrial zone, which is expressed by the random effects term u_j. The treatment effect of the GIZ-implemented project (β_1) also operates at the industrial zone level, which is expressed by the index j (x_{1j}). The statistical calculations were performed in R (R Core Team, 2019) using the lme4 package (Bates et al., 2015) for the random effects multi-level model.

Findings

The findings from the calculation of the regression models are shown in Table 24.

Table 24 Regression models to calculate the difference in flood depth between Ait Melloul and 19 comparable industrial zones for a one-hundred-year flood event.

	OLS IZ model		OLS pixel model		RE pixel model	
	b	sig.	b	sig.	b	sig.
Constant	6.04	*	4.49	**	6.04	*
Ait Melloul (GIZ project location)	-3.95		-2.4	+	-3.95	
Regression model statistics						
AIC	158		83,228		80,989	
N (IZ)	20				20	
N (pixels)			9,988		9,988	
R2	0.01		0.001			
Var (pixels)					192.575	
Var (constant)					128.128	

Note: OLS IZ model = OLS regression model for industrial zones, calculated with robust standard errors; OLS pixel model = OLS regression model for pixels with standard errors clustered using the Huber-White method (Huber, 1967; Nawrotzki und DeWaard, 2018; White, 1980); RE pixel model = random effect multi-level model; AIC = Akaike Information Criterion (Akaike, 1974); Var = variance component.
*Levels of significance: + p < 0.10, * p <0.05, ** p < 0.01, *** p < 0.001*

The constant in the OLS IZ model indicates that the mean flood value for the 19 comparable industrial zones is 6.04 centimetres. Ait Melloul, which is the only industrial zone where climate risk insurance is implemented, has a lower flood depth of 2.09 centimetres (6.04-3.95) in the OLS IZ model, although this difference is not significant. The difference is marginally significant in the OLS pixel model (b = -2.4; p < 0.10), but not in the RE pixel model. In all models, the sign of the effect is negative. This observation allows us to answer our research question ('*Is the flood risk in the Ait Melloul industrial zone statistically higher than in 19 comparable industrial zones in Morocco?*'): Ait Melloul tends to have a lower flood risk than comparable industrial zones. Flood insurance would thus be as important in other industrial zones as it is in Ait Melloul.

However, it must be taken into account that even a mean flood depth of two centimetres (ankle deep), as in Ait Melloul, is to be classified as non-trivial, and results in local depths of ten to 20 centimetres (knee deep). A connected water body with a corresponding volume already has considerable currents in which objects, refuse and mud can be washed away. This can lead to considerable losses and damages, and would thus legitimise the provision of an insurance product.

7.3 Background documents on the DEval website

7.3.1 Baseline study on climate risk management in the Philippines in the project region of the GIZ intervention RFPI III (2020)

Römling, C. und A.K. Becker (2021), „Baseline-Studie zu Klimarisikomanagement auf den Philippinen im Projektgebiet von RFPI III. Onlineanhang“, in: Leppert, G., et al. (2021), E*valuierung von Maßnahmen zur Anpassung an den Klimawandel. Instrumente zum Umgang mit residualen Klimarisiken*, Deutsches Evaluierungsinstitut der Entwicklungszusammenarbeit (DEval), Bonn, https://www.deval.org/fileadmin/Redaktion/PDF/05-Publikationen/Berichte/2021_Klima/DEval_2021_Onlineanhang_Baseline_Klimarisikomanagement_Philippinen.pdf (German only)

7.3.2 Discreet choice experiment on preferences for climate risk management options among micro-sized enterprises in the Philippines

Becker, A.K. und G. Leppert (2021), *Eliciting Entrepreneurs' preferences on climate risk management strategies. A discrete choice experiment with micro-sized enterprises in the Philippines*, German Institute for Development Evaluation (DEval), Bonn, https://www.deval.org/fileadmin/Redaktion/PDF/05-Publikationen/Berichte/2021_Klima/DEval_2021_DCE_Climate_Risk_Philippines.pdf

7.3.3 Literature review of human mobility in the context of climate change

Stojanov, R. et al. (2021), "Human mobility in the context of climate change and development cooperation. Online Appendix", in: Leppert, G. et al. (2021), *Evaluierung von Maßnahmen zur Anpassung an den Klimawandel. Instrumente zum Umgang mit residualen Klimarisiken.* Deutsches Evaluierungsinstitut der Entwicklungs-zusammenarbeit (DEval), Bonn, https://www.deval.org/fileadmin/Redaktion/PDF/05-Publikationen/Berichte/2021_Klima/DEval_2021_Online_Appendix_Human_Mobility_Climate_Change.pdf

7.4 Regression analysis

Table 25 Variable descriptions for RFPI baseline study regressions

Variable	Description	Type	Number of observations	Average	Standard deviation	Min.	Max.
CRM index	Index variable from different variables to elicit specific climate risk management activities	0-1	599	0.329	0.155	0	0.95
Presence of CRI	Enterprise has CRI	binary (0 = no CRI, 1 = CRV is present)	599	0.017	0.128	0	1
Relevance of insurance	Interviewee's response to the statement that insurance is highly relevant for protecting against the effects of climate change	categorical (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)	599	3.184	0.444	1	4
Exposure	Cumulative frequency of experienced climate risk events based on 4 climate risk event types and the categories 0 = never, 1 = once or twice, 2 = more than twice	numerical (0-X)	599	3.965	2.166	0	8
Impact	Number of times high or moderate impacts reported for all climate risk events experienced since 2017 for 5 different categories of losses and damages	numerical (0-X)	599	20.324	16.392	0	60
Compensation	Compensation received for moderate or high impacts	binary (0 = no, 1 = yes)	599	0.324	0.468	0	1
Training	Participation in training on climate risks	binary (0 = no, 1 = yes)	599	0.419	0.494	0	1
Climate risk information	Perceived awareness of climate risks	categorical (1 = not aware, 2 = somewhat aware, 3 = largely aware, 4 = fully aware)	599	2.613	0.682	1	4

Variable	Description	Type	Number of observations	Average	Standard deviation	Min.	Max.
LN net income	Logarithmic net income for a typical year (gross income minus expenses)		599	10.430	1.279	6.215	15.502
Net income	Net income for a typical year (gross income minus expenses)	numerical, in Philippine pesos (PHP)	599	83,248.95	253,944.8	500	5,400,000
LN assets	Logarithmic value of assets		599	10.214	1.133	7.601	14.509
Assets	Value of assets	numerical, in PHP	599	60,389.57	147,978.9	2,000	2,000,000
LN age of enterprise	Logarithmic age of enterprise		599	1.491	1.065	0	4.174
Age of enterprise	Age of enterprise	years	599	7.823	9.298	1	65
Urban location	Urban place of work	binary (0 = rural, 1 = urban)	599	0.269	0.444	0	1
Education	Educational status	categorical (1 = primary school completed, 2 = secondary school completed)	599	2.673	0.548	1	3
Age	Age of interviewee		599	45.720	12.089	18	79
Male	Male gender of interviewee		599	0.199	0.399	0	1

Regressions on baseline study RFPI

Variable	(1) Climate risk management index		(2) Possession of climate insurance		(3) Insurance as a relevant instrument	
Exposure	−0.00744**	(0.0036)	0.00179	(0.0033)	0.0164	(0.0108)
Impact	0.00275***	(0.0005)	0.0000148	(0.0005)	0.00360**	(0.0015)
Compensation	0.0234*	(0.0139)	-0.000421	(0.0128)	-0.135***	(0.0415)
Training	0.0936***	(0.0121)	0.00809	(0.0112)	-0.0835**	(0.0361)
Climate risk information	0.0362***	(0.0084)	0.0169**	(0.0078)	0.138***	(0.0253)
LN net income	0.00681	(0.0050)	0.00297	(0.0047)	-0.00483	(0.0150)
LN assets	0.0110*	(0.0056)	0.00814	(0.0052)	0.0543***	(0.0168)
LN age of enterprise	-0.0154***	(0.0056)	0.00669	(0.0052)	0.00351	(0.0166)
Urban location	0.0228*	(0.0128)	-0.0155	(0.0119)	0.129***	(0.0385)
Education	0.0137	(0.0108)	-0.00162	(0.0100)	0.0469	(0.0323)
Age	0.000283	(0.0005)	-0.0000691	(0.0005)	0.00161	(0.0015)
Male	0.00412	(0.0143)	0.00907	(0.0132)	-0.0416	(0.0427)
Constant	-0.0562	(0.0707)	-0.152**	(0.0656)	2.029***	(0.2117)
N	599		599		599	
R2 within communities	0.147		0.0268		0.0808	
R2 between communities	0.848		0.0940		0.975	
R2 total	0.227		0.0281		0.155	

Note: Standard errors are shown in parentheses. Level of significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

7.5 Evaluation matrix

Table 26 Evaluation matrix

Evaluation questions	Benchmark	Case studies	Data collection and analysis methods	Primary data sources	DAC criterion
Evaluation question 1: To what extent are German development cooperation's instruments for managing residual climate risk relevant to partner countries and target groups?					Relevance
Specific question 1.1: To what extent do the objectives of the intervention in the course of implementation align with the objectives of relevant strategies and agendas (global, regional, partner countries, BMZ)?	The objectives of the interventions align with the objectives of relevant strategic frameworks and (global) agendas.	PrAda	QUAL, TOC	DEV, GOV, DDP, BEN, EXP	Relevance
		SAGA	QUAL, TOC	DEV, DPP, GOV, BEN, STG, EXP	
		RFPI	QUAL, TOC, DOKA, QUANT	DEV, GOV, BEN	
		ARC	DOKA, QUAL	DEV, EXP, MSG	
		IIF	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP, STG, BEN	
		CCA-RAI	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP	
		HMCCC	QUAL, TOC, DOKA	GOV, EXP	
		UMIMCC	QUAL, DOKA	DEV	
Specific question 1.2: To what extent does the intervention align with the development needs of the target groups?	The objectives of the interventions align with the needs of the target groups and the objectives of the partners (country, region, world; including relevance of the instrument, relevance of the climate risks	PrAda	QUAL, TOC	DEV, GOV, DDP, BEN, EXP	Relevance
		SAGA	QUAL, TOC	DEV, DPP, GOV, BEN, STG, EXP	
		RFPI	QUAL, TOC, DOKA, QUANT	DEV, GOV, BEN	

Evaluation questions	Benchmark	Case studies	Data collection and analysis methods	Primary data sources	DAC criterion
	covered, openness in the choice of instruments, relevance to disadvantaged groups).	ARC	DOKA, QUAL	DEV, EXP, MSG	
		IIF	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP, STG, BEN	
		CCA-RAI	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP	
		HMCCC	QUAL, TOC, DOKA	GOV, EXP	
		UMIMCC	QUAL, DOKA	DEV	
Evaluation question 2: To what extent do German development cooperation's instruments manage residual climate risks comprehensively?					Relevance, coherence, effectiveness and impact
Specific question 2.1: To what extent do the instruments of German development cooperation meet the benchmark of managing residual risks, and covering residual losses and damages, comprehensively (in terms of relevance)?	The interventions are relevant to comprehensive residual climate risk management (including coverage of relevant residual climate risks, conduct of climate risk assessments and comprehensive coverage of climate risks).	PrAda	QUAL, TOC	DEV, GOV, DDP, BEN, EXP	Relevance
		SAGA	QUAL, TOC	DEV, DPP, GOV, BEN, STG, EXP	
		RFPI	QUANT, QUAL, TOC, DOKA	DEV, GOV, BEN	
		ARC	DOKA, QUAL	DEV, EXP, MSG	
		IIF	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP, STG, BEN	
		CCA-RAI	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP	
		HMCCC	QUAL, TOC, DOKA	GOV, EXP	
		UMIMCC	QUAL, DOKA	DEV	
Specific question 2.2: To what extent do the	The interventions are effective for	PrAda	QUAL, TOC	DEV, GOV, DDP, BEN, EXP	Coherence,

Evaluation questions	Benchmark	Case studies	Data collection and analysis methods	Primary data sources	DAC criterion
instruments of German development cooperation meet the benchmark of managing residual risks, and covering residual losses and damages, comprehensively (in terms of effectiveness and impact)?	comprehensive residual climate risk management (including integration into overall climate risk management, and combination with other interventions).	SAGA	QUAL, TOC	DEV, DPP, GOV, BEN, STG, EXP	effectiveness and impact
		RFPI	-	-	
		ARC	DOKA, QUAL	DEV, EXP, MSG	
		IIF	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP, STG, BEN	
		CCA-RAI	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP	
		HMCCC	QUAL, TOC, DOKA	GOV, EXP	
		UMIMCC	QUAL, DOKA	DEV	
Evaluation question 3: How, and to what extent, are instruments for managing residual climate risks effective (in terms of their outcomes) and impactful?					Effectiveness, impact
Specific question 3.1: To what extent does the intervention achieve its objectives (at outcome level)?	The interventions achieve their objectives at outcome level. The interventions make a clear contribution towards the achievement of objectives at outcome level. Contribution and quality of political control and implementation of the intervention Unintended outcomes (outcome level)	PrAda	QUAL, TOC	DEV, GOV, DDP, BEN, EXP	Effectiveness
		SAGA	QUAL, TOC	DEV, DPP, GOV, BEN, STG, EXP	
		RFPI	-	-	
		ARC	DOKA, QUAL	DEV, EXP, MSG	
		IIF	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP, STG, BEN	
		CCA-RAI	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP	
		HMCCC	QUAL, TOC, DOKA	GOV, EXP	
		UMIMCC	QUAL, DOKA	DEV	

Evaluation questions	Benchmark	Case studies	Data collection and analysis methods	Primary data sources	DAC criterion
Specific question 3.2: To what extent have the intended (social, economic and environmental) impacts of the intervention occurred/to what extent are they foreseeable?	Impacts of the interventions can be identified and/or foreseen. The interventions make a clear contribution towards the identifiable/foreseeable impacts. Unintended impacts	PrAda	QUAL, TOC	DEV, GOV, DDP, BEN, EXP	Impact
		SAGA	QUAL, TOC	DEV, DPP, GOV, BEN, STG, EXP	
		RFPI	-	-	
		ARC	DOKA, QUAL	DEV, EXP, MSG	
		IIF	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP, STG, BEN	
		CCA-RAI	QUAL, TOC, DOKA	DEV, DDP, GOV, EXP	
		HMCCC	QUAL, TOC, DOKA	GOV, EXP	
		UMIMCC	QUAL, DOKA	DEV	

Legend: Data collection and analysis methods: DOKA = desk study, QUAL = qualitative interviews, QUANT = quantitative survey, TOC = ToC workshop; data sources: DEV = implementing organisations, DDP = partner organisations, GOV = government representatives, EXP = experts, BEN = target groups, STG = secondary target groups. See Annex 7.8 for definitions of target groups.

7.6 System for assessing the evidence

The evidence was systematically assessed using a synthesis grid. This was performed in three stages: by source, by stakeholder group and by case study. The structure of the case study-specific synthesis grids was based on the MAXQDA coding system (see Annex 7.7 for the dimensions of assessment). The grids also included the findings obtained using other methods (such as the baseline study). They were aggregated at the instrument group level.

The individual stages for assessing the evidence were as follows:

- In **stage 1**, for each code in the synthesis grid, the responses from each source were paraphrased and synthesised in a first step. In a second step, a level of agreement of each source was determined for the benchmark of that code. For example, the benchmark for code 1.3.1 was 'The intervention is designed to meet the development needs of the target groups'. The level of agreement with this benchmark was rated on a five-point scale from 'strongly disagree' with the statement to 'strongly agree'. In a third step, the evidential quality of each source was assessed in terms of its meaningfulness (for example, knowledge of the subject matter) and bias (for example, whether a response was dubious or whether an attempt was made to convey a particular interpretation of the subject matter).
- In **stage 2** a synthesis was performed for each stakeholder group. For this purpose, the responses on the respective code were summarised and a qualified mean value was created. In case of divergence and differing opinions in the stakeholder group, opinion clusters were formed, which were analysed and synthesised separately. A group was described as divergent if it included both positive and negative responses on the agreement scale.
- In **stage 3**, the responses and agreement on the benchmarks were synthesised across stakeholder groups at case study level. Here, the procedure was analogous to stage 2, except that no divergence analysis was necessary in this step.

7.7 Dimensions of assessment and benchmarks

The dimensions of assessment are based on those developed in the DEval guidelines on the OECD-DAC criteria for development cooperation. They were used to answer the evaluation questions. In the analysis, they were supplemented by subcategories that more accurately reflect the benchmarks (see evaluation matrix in Annex 7.5).

Box 26 Assessment of relevance

The 'relevance' criterion focuses on the intervention's design. It refers to the extent to which the objectives and design of the intervention align with the (global, country and institution-specific) needs, priorities and policies of beneficiaries and stakeholders (individuals, groups, organisations and development partners). It also refers to the ability of the intervention's design to adapt to a change in circumstances. Relevance is **assessed in each case** with regard to 1) the **time of the intervention design**[37] and 2) from **today's**[38] **perspective**. When assessing relevance, DEval also pays particular attention to the intervention's alignment with the German Government's basic development policy orientation.

[37] In DEval evaluations, this 'time of the intervention design' corresponds to the original date of the plans when an intervention begins, i.e. the rollout of an action plan or instrument, the creation of an initiative, the adoption of a strategy, etc.

[38] In relation to the current standards, knowledge and environment.

In this evaluation report, the following assessment dimensions and questions were applied when assessing relevance:

Alignment with policies and priorities

To what extent do the intervention's objectives align with the (global, regional and country-specific) policies and priorities of the (development) partners and the German Government, in particular the BMZ? To what extent do they take account of the relevant political and institutional environment?

Alignment with needs and capacities of the beneficiaries and stakeholders

To what extent are the intervention’s objectives aligned with the development needs and capacities of the beneficiaries and stakeholders involved (individuals, groups and organisations)?

To what extent are the intervention’s objectives geared to the needs and capacities of particularly disadvantaged and vulnerable beneficiaries and stakeholders (individuals, groups and organisations)? With respect to groups, a differentiation can be made by age, income, gender, ethnicity, etc.

Adaptability – response to change

To what extent was the intervention adapted in the course of its implementation in response to changes in the environment (with regard to risks and potentials)?

Box 27 Assessment of coherence

This criterion refers to how well the intervention fits in with other interventions in a country, sector or (international) institution, as well as with international norms and standards. Internal coherence addresses the synergies and division of tasks between the intervention and other interventions of German development cooperation and also the intervention’s consistency with the relevant international norms and standards to which German development cooperation adheres. External coherence considers the intervention’s complementarity, harmonisation and coordination with the interventions of other partners, donors and international organisations. When assessing coherence, DEval looks at how closely the intervention matches the international cooperation policies of the European Union and relevant multilateral organisations (OECD, UN, World Bank, etc.). The 'coherence' criterion relates both to the intervention’s design as well as to the results it achieves.

Internal coherence

Within German development cooperation, to what extent was the intervention designed and implemented (in a sector, country, region or globally) in a complementary manner, based on the division of tasks?

To what extent are there synergies and/or inconsistencies between the policies and interventions of German development cooperation and other policy areas of the German Government (environmental protection, foreign and security policy, trade, agriculture, etc.)?

To what extent are the instruments of official German development cooperation (Technical and Financial Cooperation) and non-governmental development cooperation meaningfully interlinked within the intervention (in terms of both design and implementation)? Are synergies leveraged?

External coherence

To what extent does the intervention complement and support the efforts of the beneficiaries and stakeholders (subsidiarity principle)?

What comparative advantages can be identified for German development cooperation, and how should these be rated?

To what extent has the intervention’s design and implementation been coordinated with other donors’ activities?

To what extent are there synergies and/or inconsistencies between the policies and interventions of German development cooperation, and the international cooperation of the European Union and other relevant multilateral institutions (OECD, UN agencies, World Bank, etc.)?

To what extent has the intervention been designed to use existing systems and structures (of partners/other donors/international organisations) for implementing its activities? To what extent are these systems and structures used?

Box 28 Assessment of effectiveness

The criterion 'effectiveness' refers to the extent to which the intervention has achieved, or is expected to achieve, its objectives (at outcome level), including any differential results across beneficiary and stakeholder groups. It examines the achievement of objectives in terms of the direct, short-term and medium term results. Besides implementation, DEval evaluations also look in particular at the level of political control by the BMZ and, where appropriate, other federal ministries.

In this evaluation module, the following assessment dimensions and questions were applied when assessing effectiveness:

Achievement of the intended objectives

To what extent does the intervention achieve the (intended) objectives as originally planned (or as modified to cater for changes in the environment)?

Contribution to the achievement of objectives

To what extent have the intervention's outputs been delivered as originally planned (or as modified to cater for changes in the environment)?

To what extent have the delivered outputs and increased capacities been used, and equal access to these outputs (e.g. in terms of physical, non-discriminatory and affordable access) guaranteed?

To what extent has the intervention contributed to the achievement of the objectives?

To what extent has the intervention contributed to the achievement of objectives at the level of the intended beneficiaries?

To what extent has the intervention contributed to the achievement of objectives at the level of particularly disadvantaged or vulnerable groups of beneficiaries and stakeholders? (These may be broken down by age, income, gender, ethnicity, etc.)

Which internal factors (technical, organisational or financial) are decisive for achievement/non-achievement of the intervention's intended objectives?

Which external factors are decisive for achievement/non-achievement of the intervention's intended objectives (also taking into account the anticipated risks)?

Quality of implementation

To what extent is the political control of the intervention by the BMZ (and, where relevant, other federal ministries) appropriate?

What assessment can be made of the steering and implementation of the intervention by the implementing organisations/civil society/private sector?

What assessment can be made of the quality of steering and implementation of, and participation in, the intervention by the partner/lead organisation?

Unintended results

To what extent can unintended positive/negative direct results (social, economic, environmental, political and among vulnerable beneficiary groups) be observed/anticipated?

To what extent has the intervention responded to the potential benefits/risks arising from the observed or anticipated unintended results?

Box 29 Assessment of impact (higher-level development results)

Based on recognisable higher-level development changes (at impact level), the criterion of 'higher level development results' (at impact level) relates to the extent to which the intervention has already produced significant positive or negative, intended or unintended results at the overarching level (contributions to the observed changes), or is expected to do so in the future. This includes any differential results across different stakeholders and beneficiaries. This criterion refers to the results of the intervention.

In this evaluation module, the following assessment dimensions and questions were applied when assessing impact:

Higher-level (intended) developmental changes

To what extent can higher-level development changes (social, economic, environmental and political changes and the interactions between them) to which the intervention will/is designed to contribute be identified/foreseen? (Specify time frame where possible.)

To what extent can higher-level development changes (social, economic, environmental and political changes and the interactions between them) be identified/foreseen at the level of the intended beneficiaries? (Specify time frame where possible.)

To what extent can higher-level development changes to which the intervention will/is designed to contribute be identified/foreseen at the level of particularly disadvantaged/vulnerable groups of beneficiaries and stakeholders? (These may be broken down by age, income, gender, ethnicity, etc.) (Specify time frame where possible.)

Contribution to higher-level intended development changes

To what extent has the intervention actually contributed to the identified and/or foreseen higher-level development changes (social, economic, environmental and political changes, and the interactions between them, taking into account political stability) that it was designed to bring about?

To what extent has the intervention achieved its intended (original and, where applicable, revised) development objectives?

To what extent has the intervention achieved its (original and, where applicable, revised) development objectives at the level of the intended beneficiaries.

To what extent has the intervention contributed to higher-level development changes/changes in the lives of particularly disadvantaged or vulnerable groups of beneficiaries and stakeholders that it was designed to bring about? (These may be broken down by age, income, gender, ethnicity, etc.).

Which internal and/or external factors (technical, organisational or financial) were decisive for achievement/non-achievement of the intervention's intended development objectives?

To what extent has the intervention achieved structural or institutional changes (e.g. for organisations, systems and regulations)?

To what extent did the intervention serve as a model and/or achieve broad-based impact?

How would the situation have developed without the intervention?

Contribution to higher-level unintended development changes

To what extent can higher-level, unintended development changes (social, economic and environmental and political changes, and the interactions between them) be identified/foreseen? (Specify time frame where possible.)

To what extent does the intervention contribute to observable/foreseeable unintended (positive and/or negative) higher-level development results?

To what extent does the intervention contribute to observable/foreseeable unintended (positive and/or negative) higher-level development results at the level of particularly disadvantaged or vulnerable groups of beneficiaries and stakeholders? (These may be broken down by age, income, gender, ethnicity, etc.)

Which internal and/or external factors (technical, organisational or financial) are decisive for the occurrence of unintended higher-level development changes?

This evaluation used the following rated scale for the evaluation criteria:

Table 27 DEval's rating scale for evaluations

Category	Explanation
Over achieved	The intervention clearly exceeds the benchmark for the evaluation criterion applied. Findings demonstrate a result well above the benchmark.
Achieved	The intervention meets the benchmark for the evaluation criterion applied. Findings demonstrate that the benchmark has been met.
Largely achieved	The intervention largely meets the benchmark for the evaluation criterion applied. Findings predominate which demonstrate that the benchmark has been met.
Partly achieved	The intervention partly meets the benchmark for the evaluation criterion applied. The numbers of findings demonstrating that the benchmark has been met, and those demonstrating it has not, are (more or less) equal.
Barely achieved	The intervention barely meets the benchmark for the evaluation criterion applied. Findings predominate which demonstrate that the benchmark has not been met.
Not achieved	The intervention does not meet the benchmark for the evaluation criterion applied. Findings demonstrate that the benchmark has not been met.

7.8 Pseudonymisation of the actor groups

The following abbreviations were used to pseudonymise participants in interviews or ToC workshops:

BEN: Interviews/ToC workshops with final beneficiaries such as households, enterprises (primary target group)

DDP: Interviews/ToC workshops with direct partners (such as IIF investment recipients, implementing NGO or [local] partner organisations, insurance companies if they are a direct target group; no government partners as they fall under GOV)

DEV: Interviews/ToC workshops with development actors and implementing organisations (such as embassy, BMZ, BMU, GIZ, KfW, World Bank, BlueOrchard or consultants responsible for implementation)

DOC: internal (non-public) documents of the intervention (programme documentation, project proposals, modification offers, ToCs etc.)

EXP: Interviews/ToC workshops with representatives of civil society, academia or journalists who are not involved in the implementation of the intervention

GOV: Interviews/ToC workshops with persons from national or regional government institutions in the partner country

MSG: Interviews/ToC workshops with several stakeholder groups where responses cannot be attributed to individual groups

STG: Interviews/ToC workshops with secondary target group; groups that benefit from the intervention without being a direct target group

7.9 Evaluation team and contributors

Core team	Position
Dr Gerald Leppert	Senior evaluator and team leader
Alexandra Köngeter	Evaluator
Kevin Moull	Evaluator
Dr Raphael Nawrotzki	Evaluator
Dr Cornelia Römling	Evaluator
Dr Johannes Schmitt	Evaluator
Sylvia Vogt	Project administrator

Contributors	Position
Dr Reinhard Mechler	External peer reviewer
Dr Marcus Kaplan	Internal peer reviewer (DEval)
Dr Martin Noltze	Senior evaluator and team leader
Jana Balzer	Student employee
Ann-Kristin Becker	Student employee
Alexandra Mieth	Student employee
Laura Pargen	Student employee
Lara Schmitz	Student employee
Nikolas Schöneck	Student employee
Laura Slembeck	Student employee
Manuel Tran	Student employee

Responsible	Position
Dr Sven Harten	Head of Department