# MANUAL

# Co-production in African weather and climate services

WISER
Weather and Climate Information Services for Africa

FUTURE CLIMATE FOR AFRICA

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## Lead authors

All authors have contributed equally and are listed alphabetically:
Suzanne Carter, SouthSouthNorth
Anna Steynor, Climate System Analysis Group
Katharine Vincent, Kulima Integrated Development Solutions
Emma Visman, Centre for Ecology and Hydrology, King's College London and VNG Consulting Ltd
Katinka Lund Waagsaether, Climate System Analysis Group

## Contributing authors

Julio Araujo, SouthSouthNorth
Fiona Percy, CARE International
Madeleine Thomson, International Research Institute for Climate and Society

Case study authors are cited on the individual case study.



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# About the programmes

## WISER

The Weather and Climate Services for Africa (WISER) programme's mission is to deliver transformational change in the quality, accessibility and use of weather and climate information services at all levels of decision-making for sustainable development in Africa. WISER is a programme of the UK Government's Foreign, Commonwealth and Development Office (FCDO), previously the UK Department for International Development (DFID), which is split into two components: one Pan-African, managed by the African Climate Policy Center (ACPC); and the other focused on East Africa, managed by the Met Office, based in the UK.

Under the East Africa component, five quick-start projects were commissioned in late 2015 and completed in 2018. A further series of projects comprising Phase 2 started in early 2018 and will be completed in 2020. WISER Phase 2 projects have a focus on applying co-production approaches in order to improve the uptake and use of weather and climate services. One Phase 2 project, TRANSFORM, was tasked with improving the learning and sharing of information between projects, and more broadly. This manual is a key deliverable of the TRANSFORM project and is intended to provide more practical information, drawing on learnings from WISER and other programmes.

The TRANSFORM project is a consortium led by SouthSouthNorth with the Climate System Analysis Group (CSAG) at the University of Cape Town, global consulting services company, ICF, the Overseas Development Institute (ODI) and the International Research Institute for Climate and Society (IRI) at Columbia University. All five organisations, as well as a range of partners engaged in climate services-related initiatives, produced co-production case studies sharing learning based on work they have done under a range of different programmes and initiatives, including:

- Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)
- Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA)
- Climate and Development Knowledge Network (CDKN)
- Enhancing National Climate Services (ENACTS)
- Future Climate for Africa (FCFA)
- Improving Water Security for the Poor (REACH)
- Science for Humanitarian Emergencies and Resilience (SHEAR).

Learnings from the WISER programme were turned into case studies using input from individual Phase 1 and 2 projects, with assistance from the TRANSFORM team. The manual also builds on the 2017 **Guidance on Equitable and Inclusive Co-production for Weather and Climate Services.** The WISER programme has also produced a large number of blogs and other materials on the topic of co-production.


IHH Humanitarian Relief Foundation Flickr, 2017

## FCFA

Future Climate for Africa is generating fundamentally new climate science focused on Africa, and ensuring that this science has an impact on human development across the continent.

Five research consortia are undertaking fundamental research to significantly improve the understanding of climate variability and change across Africa and the impact of climate change on specific development decisions. In addition, a range of case studies demonstrating flexible methods for integrating improved climate information and tools in decision-making are being prepared. Lastly, FCFA is contributing to improved medium- to long- term (5–40 year) decision-making, policies, planning and investment by African stakeholders and donors.

The five research consortia are AMMA-2050 (African Monsoon Multidisciplinary Analysis 2050), FRACTAL (Future Resilience for African Cities and Lands), HyCRISTAL (Integrating Hydro-Climate Science into Policy Decisions for Climate-Resilient Infrastructure and Livelihoods in East Africa), IMPALA (Improving Model Processes for African Climate), and UMFULA (Uncertainty Reduction in Models for Understanding Development Applications), supported by a coordination unit housed at SouthSouthNorth.

In FCFA, co-production has not been defined universally. However, a number of outputs have been produced related to the topic as listed below:

- **Briefing paper**: 'Transdisciplinarity, co-production and co-exploration: Integrating knowledge across science, policy and practice in FRACTAL'
- **Learning paper**: 'Developing decision-relevant climate information and supporting its appropriate application: Learning from the Zaman Lebidi BRACED consortium in Burkina Faso and collaboration with AMMA-2050'
- **Blog**: 'Co-production aspiration and reality: Co-production sounds lovely, but have we ever seen it?'
- **Blog**: 'How African cities' residents are creating climate change solutions'
- **Blog**: 'AMMA-2050 making strides in climate science and engaging stakeholders with climate information'.

Three of the research consortia and the coordination unit have provided case studies for this manual, outlining the rich learning from the programme as well as contributing to the guidance sections of this manual.


# Executive summary

Co-production is being used to improve the quality of weather and climate services and to encourage better use of these services in a range of decisions across many sectors. The key to a co-production approach is bringing together the producers of weather and climate information with those who use the information to make decisions, often using intermediaries to help connect these actors, in order to solve a problem where weather and climate information is relevant. A number of donors are encouraging the use of co-production to drive further improvements in weather and climate services.

The manual outlines six building blocks in the co-production process. These building blocks do not need to be followed sequentially. Co-production can be used for different purposes. As a result, co-production can be used in all, or some, building blocks depending on the problem to be addressed. Most research projects will involve users in the identification of research questions but not always in the co-development of solutions step, for example.

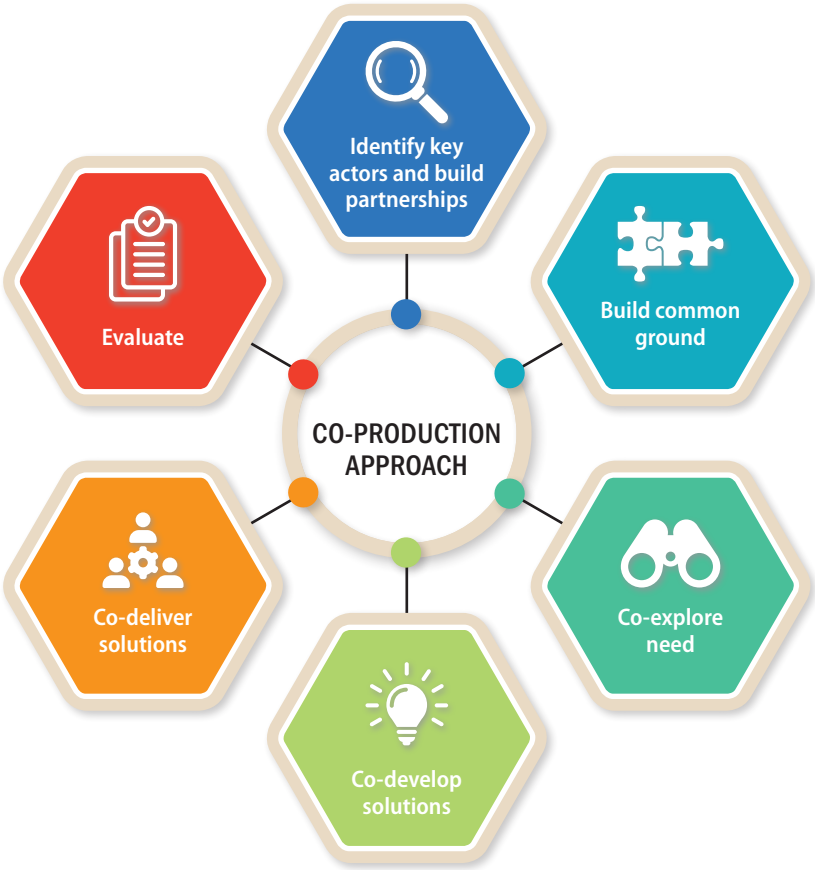


**FIGURE A:** The building blocks of co-production (building on models developed by AMMA-2050, *Visman et al., 2017b and KCL engagement in two BRACED consortia projects in Visman et al., 2018 and WISER 2017)*

This manual has devised a simple spectrum of co-production approaches, made up of consultative co-production on the far left, and immersive co-production on the far right.

- Consultative co-production is best suited for problems that are pre-defined and co-production is often limited to specific building blocks.
- Immersive co-production is best suited for exploration of problems where the outcome is flexible and might require a series of engagements to understand and solve problems.


**FIGURE B:** Spectrum of co-production approaches

The manual identifies ten principles for good co-production that have been drawn together from learning from a number of recent programmes including WISER, BRACED and FCFA:


**FIGURE C:** Ten principles for good co-production

Co-production has already helped to improve weather and climate services in Africa. A wealth of learning from 18 case studies from across Africa demonstrate how co-production can be done. Drawn on through the main text as 'in practice' examples (these can easily be found by looking for this icon ) and included as annexes, these case studies demonstrate how implementing the principles and building blocks play out in practice.

Co-production is often a resource intensive process and needs to be adequately supported both in terms of funding and time. However, the added value from taking a co-production approach can result in significant benefits:

- Co-production ensures that climate information is tailored to a specific context, and is therefore more likely to be valuable to the user.
- Co-production brings people together, which can create synergies and opportunities for resource sharing and creative thinking on cost effectiveness.
- Co-production ensures a wider reach and impact through multiple communication channels, engaging intermediaries and users, and improves the tailoring of communication to specific audiences.
- Co-production and joint ownership promotes integration of climate information into actions and likewise into plans and budgets.
- Co-production creates a virtuous cycle: investment in capacities to co-produce better, more relevant products and information, and enable more user-focused communication, leads to better understanding, use and benefits; which contributes to resilient livelihoods and economic development; and ultimately increases demand for more and better climate information.

There is growing evidence that co-production of weather and climate services can result in improved outcomes. For example, in the WISER Strengthening Climate Information Partnerships-East Africa (SCIPEA) project, co-production determined that the timing of seasonal forecasts was too late to be useful to farmers. The communities that embrace these kinds of initiatives see a substantial improvement in crop yields (WISER, 2019). The FCFA programme also shows that the co-production process, in and of itself, can be beneficial in building trust and laying the foundations for further collaboration. For instance, in the FRACTAL project, the relationships built between researchers and city officials have already resulted in additional collaborative projects such as climate change think tanks and additional research on climate change health impacts in Mozambique.

Transporting water, Kenya *(Source: B. Aygun/Milfoto, Flickr, 2011)*

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# 1 Introduction

## 1.1 Purpose of this manual

This manual provides guidance on a range of co-production approaches that can be used to develop weather and climate services that seek to address climate-related risks facing affected people, sectors and livelihoods. This manual is written by people involved with the WISER and FCFA programmes, both academics and practitioners. With co-production engaging a wide range of actors across sectors, institutions and levels of decision-making, the manual's intended audience includes those considering using co-production to improve the impact of their own work, as well as those commissioning the development of climate services. Such audiences may, for example, include national meteorological services, regional and global climate centres, research and project managers, research institutions, media, civil society and development actors. The manual brings together emerging learning and has also been informed by discussions undertaken in the WISER and FCFA programmes, as well as by the wider body of experience related to co-production of climate services.

There are many definitions of co-production, reflecting the many purposes for which co-production is used. The WISER programme defined **the co-production process** as '**bringing together different knowledge sources and experiences to jointly develop new and combined knowledge which is better able to support specific decision-making contexts**' (Kniveton et al., 2016).

This manual draws on case studies from across Africa, pulling out learning based on experience, providing principles and practical recommendations to guide co-production projects and processes. The manual is intended to support those involved in co-production, particularly those who are facilitating a co-production-centred project or a co-production process, ranging from the academic/practitioner project manager to national meteorological services and government officials wanting to integrate co-production principles into their own work processes.

This manual illustrates the diversity of aims and objectives for which co-production in climate services can be applied, recognising that these may significantly differ between research endeavours such as the FCFA-funded projects, and operational climate services, like those funded by the WISER programme.

Flore de Preneuf World Bank Flickr, 2017

The intention is for the principles and recommendations to be applicable across the African continent and beyond. On any continent, country or city local contexts may have similarities, yet they will also vary widely. For example, there is an endless multitude of African contexts. The continent has a wide variety of climatic zones, with over a billion people, spread across 55 recognised countries, with numerous cultures, religions, governance arrangements and languages. The relevance and applicability of the different principles and recommendations therefore needs to be considered within the context in which co-production is being implemented.

## 1.2 Structure of this manual

The manual is split into four chapters that provide guidance and understanding of co-production approaches. A set of short case studies, drawn from a range of different weather and climate services projects, are included as annexes. The main text draws directly on learning from a few of the most relevant case studies, identified as 'In Practice' examples, to illustrate the breadth of options for co-production to address different problems in different sectors and contexts. The 'In Practice' examples do not reflect the full range of examples that are available in the case study annexes. Readers are also able to quickly identify which case studies are most pertinent to their interests by looking at the map of all projects in Figure 6 on page 59.

The first chapter of the manual provides an introduction, setting out the purpose of the manual and how the manual is intended to be used.

The second chapter provides detail on the methods of co-production, looks at the spectrum of co-production approaches, sets out the building blocks to undertake it, and provides ten principles for good co-production. This chapter draws on learning from a range of weather and climate programmes and projects.

The third chapter deals with value for money and provides examples of how to demonstrate good value for money in co-production, the difference in value propositions between a co-production process and co-production product as well as thoughts on how to scale up and sustain co-production.

The fourth chapter provides overarching conclusions.

# 2 Co-production in the development of weather and climate services

## 2.1 Where does co-production come from?

While co-production is ideally suited to climate services, it has long been used in other fields as a mechanism for bringing together science and society to produce knowledge that is 'legitimate' and that is valid to all parties. Traditional models of knowledge production are often very 'top down' and linear in nature, whereby knowledge is produced by powerful actors – by scientists in academia, or technical experts, or bureaucrats for example – and is then transmitted to users of that knowledge. Co-production challenges this traditional model by recognising that collaboration between these typically-separate groups – often termed 'producers' and 'consumers' – can generate credible, salient and legitimate knowledge (Cash et al., 2003).

The idea of 'co-production' first arose in the 1970s in public services administration. Involving citizens through participation and empowerment was seen as a way of increasing the efficiency and effectiveness of various areas of public services, for example, education, health and public safety. Involving citizens in knowledge production, as opposed to having them just consume knowledge, is now common in developed countries, and is increasingly also practised in developing countries (Ostrom, 1996).

In developing countries, co-production arose in the 1980s when there were parallel critiques of the 'top down' model of development. The growth of participatory approaches (for example, Participatory Rural Appraisal) recognised that development is not always best designed by external experts applying technical knowledge from outside the context (Chambers, 1983). Instead, including the insights and perspectives of those people intended to benefit from the development can lead to more appropriate and effective interventions.

EU ECHO Martin Karimi Flickr, 2017

## 2.2 Co-production of weather and climate services

Learning from co-production highlights that the process of co-production is equally as important as the product that results (see sections 3.1.2 and 3.1.3 later). However, the nature of co-production means that it is impossible to be prescriptive and define exactly what it looks like. Instead the form that co-production takes depends on the aim, the context and the parties involved.

Co-production is rarely a linear process. While it is possible to outline some common building blocks that are undertaken in the co-production process, it is difficult to be definitive about what the co-production process should look like or, indeed, the order of these building blocks. Each co-production process is context-specific and may start at different points and follow different pathways. In addition, not all actors may be involved in each step (Visman et al., 2018).

It is important to note, however, that, while recommended, co-production is not a compulsory activity in the development of all weather and climate services. In some cases, co-production is inappropriate, for instance, due to timescales of the information being communicated, as in the development of aviation forecasts, for example. There are also different points at which co-production could be considered beneficial, depending on the service being developed. For instance, co-production could be employed during the product development, or during the communication phase, or both. Box 1 provides more information on the difference between co-production and climate services.

### BOX 1

### The difference between co-production and climate services

The terms 'climate services' and 'co-production' are often confused. However, they actually refer to two fundamentally different processes. The term 'climate services' came to the fore after the formation of the Global Framework for Climate Services (GFCS) in 2009. The framework was developed at the Third World Climate Conference in response to a growing demand for climate information in decision-making and has since become a prominent mechanism for addressing the identified gap between the societal need for climate information and what the producers supply. The GFCS supports a range of activities from making fundamental observational and climate modelling data available to decision-makers, to stakeholder engagement and capacity development.

During the implementation of the GFCS, it became increasingly evident that employing a predominantly data-focused approach to communicating climate information for decision-making was not resulting in a step-change in climate information uptake or use. This developed into a recognition that the majority of decision- and policy-makers are not specialists in the field of climate science, and the manner in which information was made available to them was a hindrance to them engaging with the information – even when the information is perceived by the producers as being easily accessible (Barsugli et al., 2013; Steynor et al., 2016).

In order to better understand the needs of the climate service users, approaches to climate services have been strengthening interaction with users, particularly in terms of incorporating users' expertise into the development and/or communication of climate information products in a user-producer dialogue process. This dialogue process often results in what is commonly referred to as 'co-production'. While co-production has become a central process *within* climate services, climate services, as a term, encompasses a much wider range of activities and outputs.

### 2.2.1 Spectrum of co-production types

Co-production comes in different forms due to a number of factors: (i) the specific context; (ii) the people involved; (iii) the purpose of the work; (iv) the funding framework, and so on. A unique blend emerges within any one process or project.

One way to organise and distinguish these forms, without trying to define them too tightly, is to look at them in terms of a co-production spectrum. The intention here is not to say that one is better than the other, but to recognise that there is a range. The spectrum is made up of consultative co-production on the far left, and immersive co-production on the far right.


**FIGURE 1:** Spectrum of co-production approaches

Since co-production is still an evolving concept in this field we may see an evolution in the approach. What we have termed consultative co-production in this manual may seem unambitious in hindsight a few years from now, when more immersive processes have been conducted. However, these co-production approaches are all examples of moving towards a more collaborative mode that seeks to improve decision-making so that outputs are useful in making better informed decisions.

#### Consultative co-production

On the consultative side of the spectrum, there is less flexibility in terms of the focus and process of co-production. The co-production focus and questions to be addressed may be fully or partially established before bringing together people with different knowledge and experiences. Outputs or products are, to varying extents, planned, designed and developed outside the co-production space, with people holding different knowledge and experiences coming together, at specific points of this process.

**IN PRACTICE:** The BRACED Gender 'Writeshop' case study is an example of a co-production process that leans towards the consultative side of the spectrum. The BRACED Knowledge Manager identified and conceptualised the output (four case studies) and the process and actors involved. Here, the bringing together of different experiences and knowledge happened, largely, through one very specific event, a carefully facilitated 'writeshop'. At the 'writeshop', the focus was on discussions being inclusive, equitable and constructive, to enable the different knowledge holders to share their knowledge and personal experiences, all of which then fed into the case studies.

**IN PRACTICE:** The Pathways to Resilience in Semi-arid Economies (PRISE) case study also focused on collaborative co-production in their design of research questions that would be most relevant to livestock value chain actors in Kenya. This brought out interesting issues about how migration and property rights are affecting resilience to climate impacts.

## Immersive co-production

On the immersive side of the spectrum, a broader range of actors are deeply involved, and people with different knowledge and experiences come together fluidly throughout the co-production process. There is greater flexibility, with the focus and the questions asked not being predefined, but emerging from bringing together people with different knowledge and experiences. The frequency and format of get-togethers are decided during the process as the co-production focus and needs emerge. Accordingly, the outcome, whether a manual, a policy brief or a learning objective, is not predefined, but is established through the co-production process. Here, the process and co-learning, which are often less tangible, can be equally as important as the outputs themselves, if not more so.

**IN PRACTICE:** The Forecast for Anticipatory Humanitarian Action (FATHUM) case study is an example of a project where the co-production process leans towards the middle-to-immersive side of the spectrum. Here, co-production has been incorporated as core to the working of the interdisciplinary project partners. At the design stage, the interdisciplinary partners co-produced the research questions and deliverables, which were then revisited by the team at different stages of the project. The kick-off meeting identified co-production rules for working in interdisciplinary teams. Effective and continuous communication within the project team has been central to the co-production process. Monthly FATHUM calls allowed everyone to be updated on progress, and to identify synergies both across the project and with non-FATHUM work. This strategy prompted co-production of research outputs that are relevant across different organisations.

**IN PRACTICE:** The co-production process in the FRACTAL case study displays immersive characteristics. FRACTAL was a transdisciplinary project aimed at advancing scientific knowledge about regional climate responses to human activities. It sought to work with decision-makers to integrate this scientific knowledge into climate-sensitive decisions at the city-regional scale. The FRACTAL project proposal's development was a co-production process. Processes and modalities for knowledge co-production are an integral part of the FRACTAL project design, from the team structure through to the engagements in each city. Learning Labs and Dialogues were central co-production methods, creating periodically convened spaces that brought together a broad range of stakeholders to constructively engage with complex burning issues. The Learning Labs and Dialogues were designed to be emergent, in that, beyond the broad thematic areas of climate and urban decision making, the specific themes of focus were completely open. When people from diverse disciplines and backgrounds got together in each city, they jointly identified city specific burning issues and key questions that became the focus of the co-production process. Outputs, whether policy briefs, input into ongoing policy process or learning outcomes, were further identified collectively by those engaged in the Learning Labs and Dialogues.

Importantly, it may not always be possible for an entire project to be classified as either immersive or consultative. Co-production may only be a sub-process of the overall project approach, for example, the BRACED Gender 'Writeshop' process formed part of a project that has no other co-production components. Or a project could hold a combination of both immersive and consultative co-production processes, with, for example, a project's consortia members working together through an immersive co-production process while engaging a wider group of stakeholders through a more consultative style of co-production. There are different motivations for doing co-production, and in some cases, processes with consultative characteristics will be more appropriate than processes with immersive characteristics and vice versa.

## BOX 2

### Types of co-production

Bremer and Meisch (2017) conducted a review of 130 climate change research papers about co-production. They typified eight perspectives on co-production (see Figure 2); two perspectives on describing co-production, and six perspectives on enacting it. Each perspective comes with its own motivations and approaches for working with co-production, and nurtures its own configurations of collaboration. Co-production does not always neatly fit into only one of these perspectives. In fact, 'good' co-production should encompass multiple types (Bremer et al., 2019).


**FIGURE 2:** Applying the co-production prism to climate service research questions
*(Source: Bremer et al., 2019; adapted from Bremer and Meisch, 2017)*

### 2.2.2 The building blocks of co-production

Keeping in mind that it is difficult to be prescriptive about the ideal co-production process, Figure 3 outlines a series of common co-production building blocks. These building blocks include: identification of key actors and building partnerships; building common ground; co-exploration of need; co-developing solutions; and evaluation, including continuous feedback and ongoing learning.

Each of these building blocks is introduced, in brief, in this section. For a more detailed overview of the practical implementation of these building blocks see section 2.4.

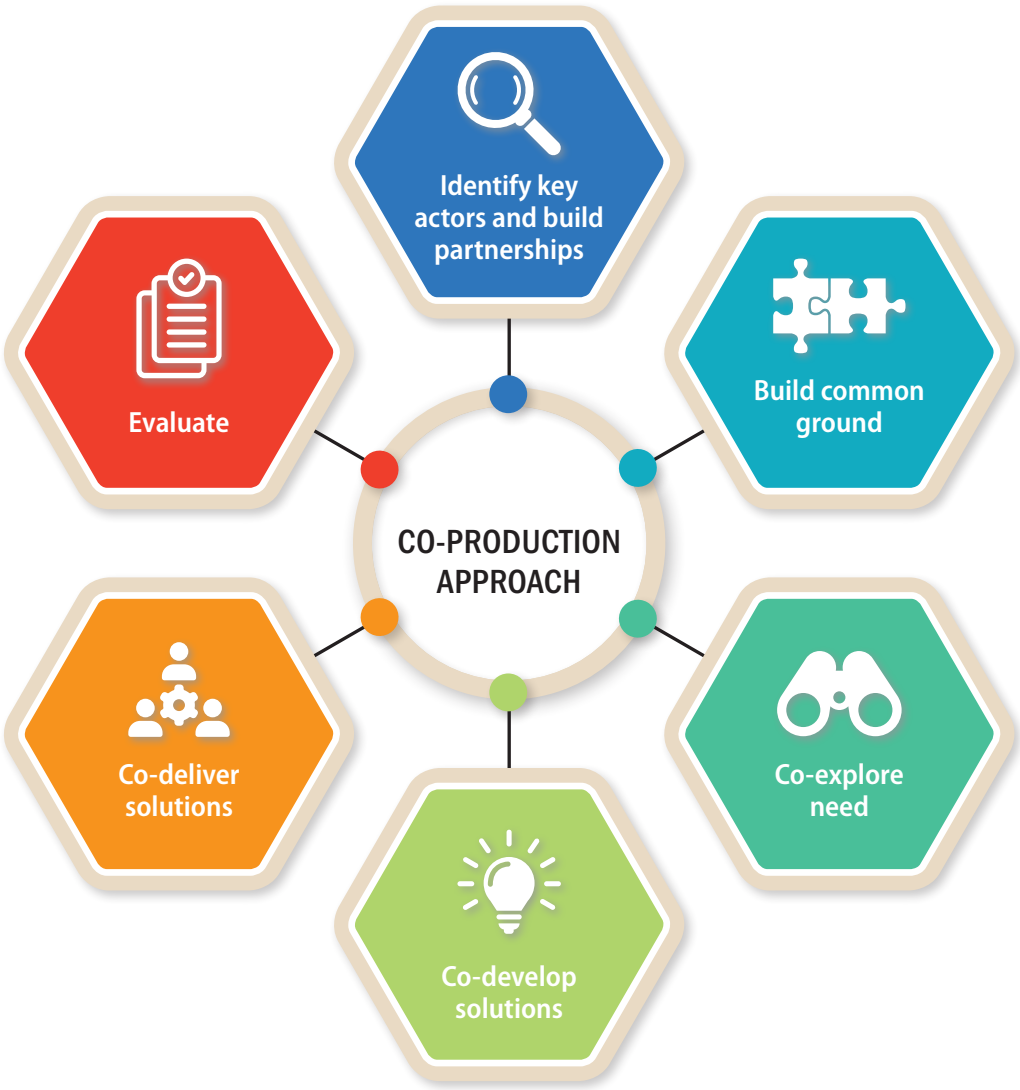



**FIGURE 3:** The building blocks of co-production *(Source: Building on models developed by AMMA-2050, Visman et al., 2017b and KCL engagement in two BRACED consortia projects in Visman et al., 2018 and WISER, 2017)*

A short description of the six building blocks follows:

## Identify key actors and build partnerships

At the outset of any co-production process, it is essential to ensure the inclusion of all the relevant actors. Excluding critical actors in the process can invalidate or undermine the co-production process. These actors include people from the three actor groups: producers, users and intermediaries (see section 2.2.3 for more detail on this). The selection of actors for co-producing a specific climate service is dependent on the areas of climate-related concern, sector(s) or region(s) of consideration. While some actors may have previous experience of working together, others may not. The range of actors may need to be extended and revised as the project focus matures and understanding about the ways to address this issue develops.

The process of identifying actors and building partnerships – as well as building common ground and co-exploring need – should be allocated ample time in project planning. Developing equitable, trust-based relationships should not be rushed and requires a series of interactions and repeated engagements in order to form an effective basis for co-production.

## Build common ground

Very early on in the process, it is necessary to develop a shared understanding, across actors, of the intention and desired outcomes of the co-production process. This includes identifying any competing priorities across the group. This building block is critical for managing expectations across all the actors and agreeing on foundational principles for the interaction going forward. An additional function of this building block is the capacity development of all actors to ensure an equal footing for discussion, across multiple disciplines, to take place throughout the co-production process.

## Co-explore need

The focus of this building block is on cementing the relationships and understanding between actors, which underpins the co-production process. It is about creating a space where a relationship of equals can form and thrive and where jointly defined issues can emerge as the focus of the co-production activities. This is also the building block in which the responsibilities and roles of each of the actors can be agreed upon and formalised, if necessary.

## Co-develop solutions

Through this building block, the actors can build on the identified issues to focus on a collaborative effort that will lead to the development of solutions. This will involve a series of knowledge exchanges and the contribution of a variety of expertise from across the actors. This building block results in an agreed-upon output (tangible or intangible) that aims to improve previous approaches and better enables the uptake and use of weather and climate information. Co-development should support ongoing feedback from those actors using the co-developed output in order to continually improve the delivery of weather and climate services.

### Co-deliver solutions

Once collaborative outputs have been agreed upon, this building block allows for the outputs to be effectively applied by the group or packaged and communicated to ensure that they are useful and usable by external user groups. The co-delivery process, again, requires agreement about how to communicate the output to ensure that it is accessible; that cultural considerations have been taken into account and that all contributors have been given appropriate acknowledgment. This process will also need to ensure that the actors who will be using the product are confident enough to appropriately use the co-produced service. Likewise, those 'intermediaries' responsible for onward communication, as well as feedback – such as media or extension services – should have the required capacities to both communicate and train other users, including an understanding about inappropriate uses of the climate service.

### Evaluate

Since co-production is often such an unpredictable process that ebbs and flows over time and involves so many actors, who would otherwise not work together, it is particularly important to schedule regular reflection and monitoring. Therefore, evaluation is a building block that is both stand-alone and also extends across all the building blocks in the co-production process. Each of the co-production building blocks should include an evaluative process in order to allow for ongoing feedback, learning from experiences to date and regular review of the process as it is unfolding, providing the space for course correction if required. Similarly, a review of the entire co-production process should be undertaken, usually towards the end of the process. This allows for the documenting of successes and failures as well as learning from the process that can inform future activities. This learning can also inform any further co-production activities within the same group of actors.

## 2.2.3 Actors in the co-production process

Recognising that there can be fluidity, for simplicity, we divide the predominant groupings of actors as follows:

- **Producers:** Those who produce weather and climate data and information. e.g. national meteorological services, university researchers, private sector forecasters, regional and global climate centres.
- **Intermediaries**: Those who support engagement between producers and users. e.g. sectoral experts, extension services, public engagement actors, economists, communicators, and donor-funded programme teams.
- **National, regional and local users**: Those who will take action based on the weather and climate information. e.g. government ministers, local government decision-makers, community-based organisations, sector-based service officers, farmers or pastoralists, urban planners and humanitarian agencies.

A more detailed description of the role of each of the actor groups, and the specific responsibilities within the co-production process, follows:

**Producers of climate information** include actors who hold or produce the raw scientific data (e.g. meteorological station data, remote sensing data, model outputs) and have the responsibility for converting this data into a form that is appropriate for the user of information.

## PRODUCERS

Producers hold a prominent role in the co-production process. The manner in which the producer approaches, integrates into, and is responsive to, the co-production process is often central to the success or failure of the process.

- **Meteorological services** provide historical data, real-time information, future forecasts and projections and analysed products. In developing this information they learn what information is needed by different users and what format they need them in, so that users can make decisions that incorporate weather and climate considerations. A co-production process may create new – and additional – demands from meteorological services. Some meteorological services also play an intermediary role.
- **Research institutions** with climate science expertise provide complementary data in many forms, including future projections from climate models and derived products such as impact analyses and other user-focused products. Researchers can also play an intermediary role (see below).
- **Local forecasters** provide forecasts based on local observations and knowledge, for example, tracking of vegetation, animal behaviour, forage conditions, astronomical features, etc.
- **Global and regional climate centres** support the development of new science and new products. A co-production process enables their efforts to be demand responsive.

**Intermediaries** have content knowledge and play the role of a knowledge broker, or connector, in co-production.

## INTERMEDIARIES

They provide the opportunity for innovation, initiating a co-production process, linking climate information to an identified purpose within a sector or informing adaptation and resilience decisions in funded programmes. They have an overview of the full spectrum of actors and the knowledge value chain within which climate services are delivered. Their functions are to: (i) enable linkages; (ii) ensure meaningful interaction between actors; (iii) support 'language translation' so that producers and users understand each other; (iv) create or facilitate systems for knowledge access, combining different forms of knowledge (e.g. scientific and local), communication, and feedback on the use and impacts.

- **Non Government Organisations (NGOs)** can provide a link between all stakeholders involved in climate information services. They can facilitate two-way communication around the co-generation of localised information that is contextually relevant. Moreover, they can feed back to the producers on changing user needs. NGOs facilitate and maintain links between actors with various roles at different levels. NGOs advocate for climate information services and the resources to support them (Jones et al, 2016). As well as overcoming the producer-user barriers through dialogue, NGOs can also be users of climate services to inform their own policies and programmes.
- **Media organisations** play a key role in packaging and communicating climate information to various users. They support the development of user-based and locally relevant climate services through: (i) raising awareness about users' context-specific and changing climate information needs; (ii) raising user awareness of climate change impacts; (iii) highlighting the value

of co-produced climate information services in informed decision-making; and (iv) highlighting societal problems to research institutes that climate information could help address. They are important intermediaries between climate science and policy decision-makers, and support monitoring and evaluation of climate services. They identify connections between information from different sectors and climate information.

- **Government ministries**, including national meteorological services as well as extension and other service providers in agriculture, livestock, disaster risk reduction, water and other climate-sensitive sectors, provide sector-specific knowledge which can help to understand climate impacts. They may also double as users.
- **Research institutions** involving, for example, sectoral scientists and economists engaged in climate-service-related initiatives, can provide evidence that supports the usefulness and value of climate services to specific groups of people affected by climate-related risks facilitating uptake and application of research.

## USERS

**Users** are defined as people, or organisations, that benefit from access to, and the use of, climate information.

Users may also be intermediaries and, in some cases, producers. For example, national meteorological services are users of information from regional and global centres. One of the goals of using a co-production process is the creation of user-centred and user-led climate services that are more responsive to demand.

- **Government sectors**, such as disaster risk management, agriculture and food security, livestock, water, gender and health, play key roles in co-production. These technical services provide sector information and analysis and develop sector-specific advisories for integrating climate scenarios and information into sectoral adaptation, resilience planning and implementation. Government sector services are well positioned to inform producers on the information they need and to co-develop services that work. A good example is public health officials in Ethiopia working with producers to develop the ENACTS' Malaria Maproom.
- **Citizens,** particularly those whose lives and livelihoods are directly impacted by climate-related risks, can provide context to help frame the approach as well as feedback on the suitability of possible solutions.
- **Private sector actors**, such as farmer and pastoral groups, traders, agro-dealers, insurance and banking service providers, can inform and influence the types of information and the level of detail required in order to produce forecasts that are fit for purpose and which facilitate informed business and investment decisions.
- **Local leaders and livelihood groups**, such as local customary and religious leaders, women and youth representatives, natural resource managers, water user and farmer groups, are interested in forecasts and advisories that are relevant, suited to local contexts, timely and packaged in locally usable formats. They play key roles in developing trustworthy, contextualised and locally co-owned climate services that respect and blend with local and indigenous knowledge. As they are in touch with the people whose lives are impacted most by climate risks, local leaders and livelihood groups are important sources of information on the access, value, use, benefits and perceived impact of climate services.
- **Researchers** can both add value to climate services and use the services to inform their own research.

## BOX 3

### An example of actors and their roles in the Participatory Scenario Planning approach

As a multi-stakeholder platform for co-producing user-centred climate services, the Participatory Scenario Planning (PSP) approach brings together meteorologists, local forecasters, researchers, community members (women, youth, men), local government sectors, private sector actors, local NGOs and media. The PSP workshops provide these actors with a common forum in which to discuss important issues affecting the local area in relation to, and going beyond, seasonal climate forecasts. These are stakeholders who would not normally meet, yet their collective knowledge and expertise is essential for informed and successful adaptation. The PSP process places all actors and their knowledge on the same level, presenting an open space for stakeholders to negotiate local priorities and contribute to adaptation, with the assistance of an external facilitator. Figure 4 illustrates the different key stakeholders typically involved in the PSP process.


**FIGURE 4:** An example of types of stakeholders who are usually involved in PSP. This list is not exhaustive and is subject to change based on context. *(Source: ALP, 2017)*

## 2.3 Overarching principles of good co-production

Co-production opens up important opportunities for bringing together knowledge from a range of actors to jointly develop climate services that are better able to support people and sectors affected by climate-related risks. The following section identifies a series of ten principles that should be considered when undertaking co-production. These are drawn from emerging learning and resources jointly developed among partners engaged in a range of climate services-related initiatives that outline shared principles for guiding co-production (EUCOMS/EUPORIAS, 2014; Adams et al., 2015; WISER, 2017; Visman et al., 2018; Vincent et al., 2018a; Steynor et al., 2016, Taylor et al., 2017).

Each principle is described followed by commonly experienced challenges related to putting the principle into practice with tips to overcome them. Each principle draws on emerging learning from the case studies to help show how these principles might come up in practice.


**FIGURE 5:** Ten principles for good co-production

### 2.3.1 Tailor to context and decision

Climate services are expressly developed to address identified user needs. Co-exploratory processes between producers and users, for example through workshops or surveys, can unpack the decision-making context to understand the decision that the climate service can address. Various participatory tools can be used to explore the priorities and contexts of the decision that the co-produced climate service is intended to inform. This might include 'mess maps' (also called cross-boundary causality maps) or problem trees that highlight the linkages between problems, causes and solutions. Power mapping analysis could be used to identify who makes decisions, whether at a small scale or national scale (which could be assisted through analysis of policy coherence, e.g. Curran et al., 2018). Understanding of the decision context will shape the problem that the co-production process will address and the type of outputs that will be relevant. This principle should be considered throughout the project life cycle but is critical in identifying key actors and building partnerships as well as building common ground stages.

**IN PRACTICE:** Around Lake Victoria in Kenya, the WISER Western project investigated user decision contexts which led to the production of a daily weather forecast for fishermen to inform decisions around when to fish. Prior to that, only a national weekly forecast was available for most counties around Lake Victoria.

**IN PRACTICE:** In the USAID energy sector planning project in Tanzania, the project team made use of the contextual knowledge of past climate impacts, and the relative magnitude of these impacts on the power system, to enrich the findings of the power sector's climate risk assessment. This knowledge was also used to prioritise a core set of climate risks to be included in the power sector master plan, and incorporated into the sensitivity analysis.

### 2.3.2 Deliver timely and sustainable service

In the joint development of climate services, there may be conflicts in the time frames of interest to all the actors involved (e.g. the people at risk that an initiative is seeking to support, humanitarian and development agencies, meteorologists, researchers and funders). Climate services may be driven by meteorological practice rather than the priorities of the decision-makers for whom the information is developed. Climate information may lack the certainty, skill and spatial and temporal precision required to support longer term planning time frames (Nissan et al., 2019).

Managing expectations and aligning climate service delivery time frames between providers and users is important in the co-exploration, co-production and co-delivery of a solution so that the ultimate climate product arrives in a timely manner to inform its intended decision. The time and financial resources required to convene partners and build the trust and partnerships that are essential for the co-production process also needs to be taken into account and planned for. Timely delivery of climate products is particularly important with natural resource-based activities – for example, seasonal forecasts need to be delivered in time to inform crop planting seasons. The issuing of seasonal forecasts may, for example, be determined by key climate parameters (such as sea surface temperatures) rather than meeting the planning time frames of farmers needing to know which type of seed to buy and when to plant it. When time frames are adjusted to coincide with user needs there can be large scale benefits.

**IN PRACTICE:** In the WISER SCIPEA project the shifting of the seasonal forecast to earlier in the season saw communities that embrace these kinds of initiatives seeing a substantial improvement in crop yields (WISER, 2019)

Project-initiated services may prove successful over the course of the project, but might not continue when project funding ends. New or external intermediaries may, for example, facilitate co-production over the course of the project. Staff turnover among those partnering in climate services initiatives can be high, particularly among humanitarian and development organisations. Changes in political leadership may also result in institutional restructuring and reprioritisation that could reduce the interest in participating in co-production activities.

**TIP**

**To promote sustainability, ensure investment in building capacities among actors across decision-making levels to enable ongoing engagement between producers and users of climate services post-project.**

**IN PRACTICE:** Many of those partnering in Participatory Scenario Planning appreciated the collaborative approach, successfully advocating for county governments to budget resources to support its continuation within county climate outlook forums.

### 2.3.3 Build trust

Prior to working together, partners may not have a shared understanding of the process of co-production, including the different ways of working and the resources it requires. They may perceive co-production as a one-way transfer or 'dissemination' of knowledge to 'end' users, a one-off workshop or series of discrete engagement activities. A process-based approach to co-production recognises the importance of sustained collaboration for building trust and relationships between the various partnering institutions and groups (producers, intermediaries and users). Trust and relationships are built by, and in turn lead to, knowledge exchange between groups which is important to co-produce climate services. Building the trust and equitable relationships through knowledge exchange however takes time and resources, and each partner needs to be aware of the time required and the resources needed to achieve this.

Embracing a process-based approach from project inception enables partners to identify the most effective places and spaces for interaction and engagement across decision-making levels, sectors and disciplines to enable the co-production of relevant climate services. Whether consultative or immersive, a process-based approach enables a co-production initiative to identify where effort is placed and how the achievement of objectives is linked to other steps and actors.

Many of the case studies included within this guide, including UMFULA, FATHUM, the BRACED Gender 'Writeshop', FONERWA and Zaman Lebidi have recognised the need to invest in building relationships and trust between partners. In many cases, co-production in these examples builds on previously-developed relationships.

**TIP**

**Combinations of informal and formal engagement can assist in building partnerships, and may, especially at the outset, benefit from face-to-face interaction where there has been limited previous interaction.**

**IN PRACTICE:** The UMFULA project team invested a lot of effort into building positive relationships with partners to create the trust necessary for effective co-production. The team had an advantage because several of the members were already well known to government partners. They had meetings early on in the project with various partners and stakeholders to determine the specific nature of their interest in the project and how they wanted to be kept in touch, both in terms of communication medium and frequency (e.g. some people wanted a team member to drop in to their office every six weeks, whilst others were happy with more infrequent email updates). Responding to comments from government staff that they rarely hear from projects in between occasional visits from international researchers, the project team produced a one page update on progress with activities every six months and sent personalised emails to key partners, highlighting their areas of interest.

### 2.3.4 Embrace diversity and respect differences

Co-developing a relevant climate service requires a collaborative process built upon the inclusion of different people, from across different sectors, disciplines and levels of decision-making, each with different needs and incentives, knowledge and value systems, practises, languages and terminologies. This typically requires a willingness on the part of both climate information producers and users to embrace new roles, skills and ways of working. It also requires the establishment of a shared understanding of the complementary areas of expertise that each partner brings to the co-production initiative. For example, staff from national meteorological services may have limited capacities for engaging with stakeholders or communicating risk information. Researchers may have limited knowledge of the context where climate services are to be developed.

Partnering institutions often come from different districts, countries or regions, bringing practical issues in terms of identifying cost-effective forms of interaction, addressing visa or security issues or other travel constraints. Enabling co-production requires investment in approaches and frameworks that can overcome both physical, as well as intellectual, institutional, social, economic, political and other types of boundaries.

It is essential to embrace diversity from the project outset. It is vital to ensure that the co-production process facilitates effective communication among all partners, respects differing value and knowledge systems, builds common ground through establishing a shared understanding of key concepts and shared goals. Multi-stakeholder engagement supports effective communication as well, bringing respective knowledge on the networks and formats that are accessible to and trusted by the intended range of users.

**TIP**

**The collective knowledge and networks of co-production actors can greatly enhance the accessibility of co-produced services. Create spaces from the project outset to recognise and value the different types of knowledge that each individual brings to the process.**

**IN PRACTICE:** The FRACTAL project 'embedded' researchers in decision-making environments. This created improved understanding and empathy, allowing insight into how decisions are made to develop effective climate services.

**IN PRACTICE:** In the AMMA-2050 and BRACED Zaman Lebidi projects, climate information providers participated in engagements with decision-makers, employing approaches to strengthen users' understanding of key meteorological and climate concepts and developing their own appreciation of the specific decision-making processes the projects sought to address, through joint problem tree analysis and stakeholder mapping exercises.

**IN PRACTICE:** Employing frameworks that bring together expertise from across stakeholders, as supported within the World Bank Resilient Transport Strategic Assessment for Dar es Salaam, support the pooling of local and scientific knowledge of climate-related risks.

## BOX 4

### Engaging with national meteorological services

In some countries, national government systems can constrain the ability of national meteorological services to lead internationally-funded climate service initiatives or receive direct funding. In other countries, national contracting regulations and insufficient resource allocation at project outset may lead to difficulties in engaging national meteorological services as full project partners, as experienced in the BRACED Zaman Lebidi project.

**IN PRACTICE:** The Fund for Environment and Natural Resources for Rwanda (FONERWA) is the vehicle through which environment and climate change finance is channelled, programmed, disbursed and monitored. The FONERWA Climate Risk Screening Tool project had very limited financial resources. This meant that there was little to no direct funding available for incentivising Meteo Rwanda's participation. Without either capacity-building activities or financial support for Meteo Rwanda's time, their willingness to engage was limited.

National meteorological services staff may be overburdened with meeting existing commitments as well as engaging in a wide range of often poorly coordinated, externally-funded climate services initiatives. Beyond mandated duties for supporting aviation, national meteorological services may have more limited experience of supporting the climate information requirements of other sectors and levels of decision-making. In many countries, capacities to develop longer-term climate information are situated within research institutions. Systematic collaboration between national meteorological services and climate research institutions is often limited. Researchers frequently highlight the constraints of accessing the observational data held by national meteorological agencies.

**IN PRACTICE:** The Raising Risk Awareness (RRA) project dealt with this challenge by setting up Memorandums of Understanding with both meteorological services and researchers to clearly define roles and responsibilities and ensure access to observational data by creating good incentives for collaboration, in this case a joint academic paper.

### 2.3.5 Enhance inclusivity

Inclusion of a whole range of users, and their partnership in the process of producing a climate service, can help construct knowledge that is useful and useable. Similarly, including non-scientific knowledge can build legitimacy and increase access to information for non-expert users.

There is knowledge on stakeholder engagement, and how to do it, in the participatory development literature. This requires empathy and putting oneself in another's shoes, as well as creating a safe and open space in which dialogue can occur. Practically speaking, this may involve doing things differently. When a group of scientists come together, they may speak in technical jargon and present material in English using technology such as PowerPoint presentations. This may be intimidating and incomprehensible to a group of farmers. Similarly ensuring that women can participate may require that the timing and location of meetings takes into account the social norms that restrict women's mobility. The particular needs of people living with disabilities also need to be considered to improve the accessibility of any consultative and decision-making process.

As well as good practice in facilitating dialogues between different parties, particular care should be taken when identifying stakeholders as there is the risk of overlooking and excluding marginalised or less powerful groups. This requires particular empathy and open-mindedness. Evidence shows that scientists and climate information producers tend to gravitate towards people with similar educational backgrounds to them (Porter and Dessai, 2017). The danger here is that certain user groups end up not being represented and their views not heard, which could create solutions that reinforce inequality.

**TIP**

**Inclusivity is the responsibility of everyone but, without explicit attention, there is a risk that it is overlooked. Nominating a champion who coordinates monitoring and learning, and conducting awareness raising and training at the start on how to be inclusive, can improve successful inclusion.**

**IN PRACTICE:** UMFULA and FRACTAL involved policy-makers as the primary user groups, bringing together producers and users that have different thematic backgrounds and experience but are likely to have similar levels of education (in that most probably have an undergraduate degree). Those that involve local leaders and livelihood groups among the user groups, for example BRACED and Participatory Scenario Planning, have had to pay particular attention to ensuring inclusion given the different backgrounds, languages, and perceived 'knowledge' levels that require efforts to overcome. The BRACED Zaman Labidi example particularly highlights the difficulties of working in both French, English and a number of local languages. In Senegal, AMMA-2050 used a theatre forum to build empathy and space for listening to and inclusion of different sources of knowledge.

## BOX 5

### Key questions to ask when promoting inclusivity

The questions below can be applied in a wide range of contexts and settings and aim at improving inclusive meetings and activities so that the benefits of climate services can be distributed equitably (adapted from the BRACED Myanmar Alliance's Handbook, 2015 and from Gumucio & Schwager, 2019):

- Create spaces for many voices and narratives including physical access:
  - Where are meetings/activities being held? Can most people afford to travel to the venue?
  - Can people with reduced mobility, including wheelchair users, physically access the venue?
  - Does the timing of meetings prevent certain people for attending (e.g. colleagues who have child care duties might not be able to attend early or late meetings; partners based in different time zones might not be able to attend early/late video-conference meetings)
  - Are facilities provided for elderly people/pregnant women, e.g. toilets, seating?

- Opportunity to participate:
  - Are people aware that activities/meetings are taking place?
  - How can information channels be improved to reach diverse groups? (e.g. relying on radio or religious institutions to inform people in areas where there is no phone or internet coverage)
  - Is the language used appropriate to the context and to the level of education of users?

- Meaningful participation:
  - Is there space for non-scientists to speak up?
  - Are people's suggestions listened to? Are there mechanisms for ongoing dialogue and feedback?
  - How will language and use of words and materials be adapted to address the needs of people living with disabilities such as blind, deaf or mute people?

- Sharing relevant information:
  - Are information and communications technologies or media devices appropriate to the context and living conditions of users?
  - Are information and services relevant to the specific needs and interests of different gender groups?

### 2.3.6 Keep flexible

Flexibility is important in the co-production process because it is not possible to fully map out the process and outcomes at the start. Flexibility needs to be applied throughout the co-production process. As a result of continuous knowledge exchange, monitoring and learning, there may be a need to refine products and processes, extend activities and engage actors and areas of expertise not identified at the project outset.

Flexibility is also required on the part of all institutions and individuals participating in the co-production. For climate information producers, taking into account the different timelines and priorities of users may be new, and require acceptance of factors outside of their control that may affect timelines (Vincent et al., 2018b). Funding time frames for climate services initiatives are often short and fund management may lack sufficient agility to support the reallocation of resources required to ensure project objectives can be achieved. Realities such as turnover of staff may also cause progress to stall, and may necessitate repetition of parts of the process.

**TIP**

**Project managers can extend activities to take into account the additional time required to reach consensus in the co-production processes where multiple actors are coming together.**

**IN PRACTICE:** As demonstrated in the BRACED Zaman Lebidi case study, inflexible programming can constrain households from receiving the required inputs or information at the right time.

**IN PRACTICE:** In the UMFULA project, for example, flexibility was necessary to understand user needs for climate information in the agriculture sector. The initial co-exploration process identified interest in the increased occurrence of extreme events, but did not define the critical threshold for such events. The scientific team initially expected that users would be able to define their information needs but when this did not happen, they had to return to the drawing board to consider other methods of facilitating discussion to co-define what metrics are important (Vincent et al., submitted).

### 2.3.7 Support conscious facilitation

Conscious facilitation is a mindful process that provides a safe space to encourage and integrate multiple perspectives and knowledges. This requires a facilitator to create a space that diffuses power dynamics and hierarchies, and that allows different knowledges and experiences to be equally heard. Dominating voices can link to aspects such as rank and gender, as well as other power dynamics (e.g. funders), an assumed superiority of objective science and to perceptions of capacity of developed vs developing country actors. The facilitation process should ensure that everyone has a voice, and feels heard.

Knowledge that falls outside the so-called 'developed' world views still tends to be ignored or marginalised. Recognising that there are many world views, and a multitude of ways to see and make sense of the world, can allow for a variety of knowledges and experiences to be valued and heard.

If co-production is towards the consultative side of the spectrum, conscious facilitation may only be important at actual engagements, such as the planning and delivery of project stakeholder workshops. If co-production is more immersive, intending to work deeply and broadly with a variety of actors co-producing throughout, then conscious facilitation can be practiced throughout, from project conception and within project management processes, in addition to actual workshops and meetings. This can require ensuring that there is a thread between the events, and that participants at each event feel empowered to direct and steer the process of that and future events.

Facilitation and process design are skills in themselves, skills which a researcher or government or NGO practitioner may have limited or no background and training in. If such skills have not been brought in with the design of the project, the project team may need to contract external expertise at strategic points or, ideally, build these skills within the team by enabling team members to attend training courses.

**IN PRACTICE:** In the FRACTAL project the Red Cross Red Crescent Climate Centre is a core partner whose contribution and role is around facilitation and process.

**IN PRACTICE:** In the BRACED Gender 'Writeshop' case study a key focus was to allow every participant to contribute his or her own knowledge on the topic, enabling sharing of both 'expert knowledge' around gender equality and resilience, and of the 'lived experiences' of practitioners. The facilitator played a central role in ensuring inclusive and equitable discussions, with every participant invited to provide their view and opinion and given enough time to do so. Conscious framing of the discussions and process enabled participants to review each others' writing in a way that was honest and rigorous, yet respectful. The facilitator's consistent, efficient and inclusive facilitation was crucial to ensure the 'writeshop' was an inclusive, positive experience and supported honest and constructive discussions between participants.

**TIP**

**Make it known facilitation is a skill in itself, one which many people specifically train for and not something that team members are necessarily supposed to know how to do. This may motivate team members to think more deeply about the facilitation process, and to be more honest about how they feel about their ability to facilitate and what they feel comfortable facilitating.**

### 2.3.8 Communicate in accessible ways

Co-production should work towards all actors being able to exchange information and learn from each other. This requires good communications both within project teams and with wider stakeholders involved in the co-production process. Multi-stakeholder cross-disciplinary engagement enables contribution from a wide range of expertise, which enhances the interpretation of climate information and products. The packaging and presentation format of what is communicated to specific audiences needs to be carefully considered. There is also a large selection of communication channels that can be used to reach a range of users. Co-production encourages collective decision-making on what information is shared and co-designing the delivery and communication channels that will have the best impact.

Existing climate information products may use language, terminology, formats and forms of visualisation that are not readily understandable by non-technical experts. Climate information may be provided through a limited number of channels, accessible to only a small number of decision-makers. Limited resources and requirements to pay for communication via mass media, including TV, radio, and mobile phone-based technologies, may prevent access among the wider public.

**IN PRACTICE:** In WISER, the BBC Weather Wise project is working with local radio stations to generate more climate and weather stories, paying for better equipment to incentivise the time investment in attending training courses.

Where budget is available the provision of animations, videos and infographics can help to overcome communication challenges.

**IN PRACTICE:** In FCFA, cognitive and psychological expertise was engaged to ensure that the forms of visualisation employed across FRACTAL and AMMA-2050 promoted emerging understanding about the most effective approaches for communicating climatic uncertainties.

Working between partners in different countries often involves working across different languages. To increase the uptake of the climate services it is often necessary to translate key products into a range of languages, often beyond the national or official language in which climate services are initially generated if working at the community level.

**IN PRACTICE:** The Raising Risk Awareness project benefited from the translation of infographics into Swahili (Kenya) and Amharic (Ethiopia) to make the process of extreme event attribution easier to understand.

The wide range of partners engaged in co-producing climate services come from different disciplines and sectors, each with their own terminologies. Failure to jointly develop a shared glossary of key terms, for example 'skill' and 'confidence' when used in relation to forecasts, can lead to miscommunication of climate information and result in undermining trust. There may be difficulties in identifying how to communicate complex scientific terms and concepts, such as the probabilistic nature of climate information, in local languages. There may be a lack of officially recognised, standard terminology guides in the range of languages spoken by those people for whom climate services are intended (Visman et al., 2017).

**IN PRACTICE:** In Burkina Faso, the BRACED Zaman Lebidi project co-produced a Lexicon of Words and Weather Terms in three local languages by bringing together the expertise of meteorologists, social scientists, the national risk management agency, farmers, journalists, community leaders and linguists.

## TIP

**This principle is important across the whole life cycle of the project but is especially critical in the early phases to ensure that a joint understanding of terminology is co-developed and to budget for translation requirements. Accessible communication is also vital in co-developing and co-delivering solutions to ensure that they are provided through channels that reach and are trusted by intended users, and in formats and language that are relevant and understandable to the intended user.**

**IN PRACTICE:** During the development of the Multi-Hazard Early Warning System (MHEWS) for Coastal Tanzania a range of stakeholders, including fishermen, seaweed farmers and coastal traders, were involved in the identification of the most important hazards, as well as the development of easily understood pictoral symbols to represent these hazards in the forecast. For instance, a flood warning (*mafuriko* in Swahili) is represented by a partially submerged house.

### 2.3.9 Ensure value-add for all involved

To fully engage and contribute to a process, the actors involved need to see the value of what is being shared, learnt or produced. What is considered valuable will vary between practitioners and researchers, between different academic disciplines, between different applications and between different people directly impacted by climate risk. The value is shaped by how an actor is impacted by an issue, their scope of work, as well as their personal views of what is important or valuable.

Those who initiated and secured funding for a co-production process would see value in the proposed project activities in themselves (e.g. workshops and other engagement processes), and in the project outputs (e.g. reports and briefs). Their time will likely be paid for through the project, and in shaping the project they would have ensured that the project outputs speak to aspects that are considered valuable in their field (e.g. academic articles for researchers or an implementation tool for NGO actors).

For those not part of the project team, whose time spent in the process is not covered by project funding and/or who were not part of developing the project proposal or project idea, the value of engagement and time and efforts spent needs to be demonstrated. Some may be sufficiently motivated by the opportunity to learn about aspects relevant to their life, livelihood or work, and to network. For others, making committed long term or substantial contributions will likely also be shaped by the extent to which this adds concrete value to their security, income or areas of work. For instance, a person living in an informal settlement may only be interested in taking part in a focus group if the climate service initiative is seeking to address the flood risks they face. A city official and his or her superiors may only see the value of participation and contribution if the process, workshop or meeting focuses directly on the person's Key Performance Areas (KPAs), and/or contributes directly to a plan or strategy or project with which their unit or directorate are tasked.

**IN PRACTICE:** In the Raising Risk Awareness case study the co-production focused on developing pilot studies on extreme event attribution in Kenya and Ethiopia. Drought events were co-identified as the focus of these case studies, based on the relevance of drought events in both countries at that time. Attribution for drought can be complex, especially in places like East Africa where the seasonal variability is large. To better showcase attribution it may have helped the project to start with a heat wave case study where extreme event attribution is most easily discernible. However, a drought focus was more valuable to local project partners and actors involved and was therefore chosen for the pilots.

**TIP**

While a technical staff member may see the value of participating in a project or process, through, for example participation in its design, his or her manager may also need to be engaged in order for them to endorse their staff member's engagement in the process.

**TIP**

Co-developing a Monitoring Evaluation and Learning framework at the project outset, ensuring consideration of impact requirements of all partners, and revisiting this over the course of the project can be one way to ensure partners' respective needs are being addressed.

If such value has not been co-identified during project or process development, then it is important for the project team to create the space and to have the flexibility to allow actors involved to identify at the outset how the process can add direct value to them and/or their work, and to adapt it accordingly. While this may require the project team to make some compromises on their priorities, ensuring that all benefit from the co-production process will create a greater likelihood of deep and continued engagement of actors and sustainability. Creating a space that enables everyone to openly share their expectations helps keep them transparent and feasible, and avoids cases of expectations not being met and the subsequent erosion of trust.

**IN PRACTICE:** The Rwanda Climate Services for Agriculture programme has led to Meteo Rwanda producing some highly advanced, tailored climate services for the agriculture sector, such as the new 'flexible forecast' format developed in line with the **Participatory Integrated Climate Services** (PICSA). The co-production process has led to Meteo Rwanda learning how to better work with stakeholders, including farmers. This, in turn, has played a role in creating and improving the climate services value chain (and demand for services) in the country. There has also been value demonstrated for other partners. IRI's capacity to tailor maprooms to specific country/project needs has been built as a result of the co-production process. The value of new climate services to other actors has led to the PICSA approach being introduced in the Joint Action Development Forums (JADF) of local district governments and existing community programmes through faith-based organisations such as the Catholic Church – a clear indication of PICSA's impact and reach.

### 2.3.10 Improve transparency of forecast accuracy and certainty

Ensuring foundational knowledge of the scientific skill and probabilistic nature[1] of meteorological and climate information is essential for enabling partners to actively participate as equal partners in co-producing climate services (EUCOMS/ EUPORIAS, 2014; Beier, 2017; Visman, 2014; Kniveton et al., 2016; Visman et al., 2018). Working from a shared understanding of the possibilities and limitations of existing meteorological and climate science capacities, climate information producers and users can together identify the climate information that can support specific decision-making processes.

1 Forecasts are inherently uncertain due to the chaotic nature of the climate, inaccuracies in forecasting models and unknown future atmospheric concentrations of greenhouse gases and aerosols (Kniveton, 2014).

Engagement with climate services and national meteorological services may be new for some partners, requiring the building of foundational understanding of key meteorological terms and concepts. Equally where non-technical partners may not be aware of the current limitations of climate science and national observations networks, there may be a risk of raising currently unrealistic expectations. For example, farmers may want to know about the distribution of rain over the season, rather than total seasonal rainfall. Yet there may be limitations in national meteorological services' existing capacities to downscale forecasts to the time frames and geographic scales that farmers require. Similarly, there are significant risks in using climate change projections to inform longer-term planning without appreciating the levels of confidence in the information provided (Nissan et al., 2019).

Some meteorological services have been reluctant to communicate the probabilistic nature of climate information, considering that the difficulties of using uncertain information and misunderstandings over the skill of the forecasts may prevent people from using it. This has led to a number of national meteorological services not including numerical probabilities and instead describing these in terms of likelihood (for example, describing heavy rainfall as being 'highly' or 'moderately' likely) that are not clear to non-technical users. However, failure to communicate the accuracy and probabilistic nature of the information has also created mistrust of climate services, where people did not experience what was communicated as definite, or deterministic, information. For example, county government bodies and farmer groups in Kenya have, on occasions, threatened legal action against the Kenya Meteorological Department where they felt that the forecasts were not accurate and confidence levels were not sufficiently clear (Visman, 2014).

**IN PRACTICE:** Some projects, such as Zaman Lebidi, have supported non-technical partners, including local radio stations, to both appreciate the probabilistic nature of climate information and communicate this to targeted user groups.

Moreover, unwillingness to include probabilities within forecasts prevents the mainstreaming of climate services within decision-making processes. Enabling decision-makers to make climate-informed decisions requires clear communication of the level of forecast skill, or confidence in the climate information, as well as the joint establishment of agreed thresholds for acting on these. Climate information providers and users need to work together to identify how often decision-makers are willing to 'act in vain', when action taken on an agreed forecast probability threshold turns out not to have been required, as well as low/no regrets options, where action taken is cost-effective, regardless of outcome. See Box 6 for more information on Forecast-based Financing (FbF).

# BOX 6

## Transparently communicating forecast uncertainty

Because we cannot predict the future with total certainty, all forecasts have some 'uncertainty' about what might happen in the future. A key principle of Forecast-based Financing and subsequent action is that we need to understand the uncertainty of a specific forecast to know what action should be taken. Imagine that there is rain forecasted for a football match tomorrow. Should we cancel the match? If there is a 10% chance of rain, the match will go forward. If there is a 95% chance of rain, the match will be cancelled.

Deterministic weather forecasts state that a single event will happen. For example, a deterministic forecast is: 'there will be flood water levels tomorrow'. However, it is unclear if we should evacuate based on this forecast of flooding and how uncertain this forecast is.

To understand the uncertainty in forecasts, scientists look at historical forecasts to see what happened in the past when flood levels were forecasted. They can count the instances of each of the following outcomes:

| | Yes disaster | No disaster |
|---|---|---|
| Yes forecast-based action | Worthy action | Act in vain |
| No forecast-based action | Fail to act | Correct rejection |

Based on the historical instances of acting in vain, scientists can estimate the False Alarm Ratio. In this case, if flooding happened only 50% of the time that flooding was forecast, then the False Alarm Ratio is 50%. This gives us an understanding of the uncertainty of the forecast, and we can decide if it is worthwhile to evacuate on a 50% chance of flooding.

Probabilistic weather forecasts already include an estimate of uncertainty. For example, a probabilistic forecast is: 'there is a 50% chance of flood levels tomorrow'. If these probabilities are reliable, then out of every 100 times you receive such a forecast, it should flood 50 of those times, and 50 of those times it will not flood.

Forecast-based Financing projects aim to verify the reliability of probabilistic forecasts, because sometimes the probabilities produced by the models can be skewed. Some models, for example, will issue forecasts saying 50% chance of flooding, but every time that forecast is issued, a flood happens. In those cases, an adjusted probability should be closer to 100%, and we would want to take stronger action based on that forecast.

Humanitarians are collaborating with weather forecasters and researchers to calculate this uncertainty and reliability information as part of FbF projects. It is critical information for forecasters to provide on an operational basis, so that users have a clear understanding of what kind of action they should take when they receive a forecast.

**IN PRACTICE:** FATHUM researchers have **calculated** the probability of flooding in different rivers in Africa when there is a seasonal forecast of above-normal rainfall. Using historical forecasts and information about historical floods from a flood model, they were able to calculate the probability of acting in vain. In many regions, such as in Togo, the probability of acting in vain turned out to be more than 50%. Therefore, humanitarians have decided to use these seasonal forecasts only for awareness raising, but not for delivering goods to at-risk populations.

It is vital to acknowledge that co-production of relevant climate services is a 'long-game'. Even where a climate service is tailored to support a specific climate-sensitive decision, the probabilistic nature of climate information necessarily means that the most likely outcome may not always occur. However, if the forecast is of sufficient skill, and co-production has enabled climate information providers and decision-makers to identify appropriate thresholds for action together, over the long-term it will be more cost effective to act rather than not act.

**IN PRACTICE:** A number of projects have developed training tailored to strengthen the integration of climate information within local government decision-making and radio programming. The Red Cross Red Crescent Climate Centre and other institutions have developed a range of **tools** designed to strengthen understanding of the probabilistic nature of climate information and how probabilistic risk information can be employed within specific decision-making processes, including how forecasts can be downscaled (for example, **participatory downscaling**) and the similarities and differences between levels of confidence in local and scientific sources of knowledge about the weather and climate (for example, **knowledge timelines**).

**TIP**

**From project outset ensure non-technical partners are confident in key climate concepts and terminology, as well as how to appropriately use probabilistic risk information within specific decision-making processes. Equally important is to ensure that national meteorological services are committed and able to clearly communicate the levels of accuracy and confidence within the climate information that they develop.**

## 2.4 Implementing the building blocks and principles of co-production

If we now take the overarching principles from section 2.3 and apply them to the building blocks of co-production from section 2.2.2, it results in a number of practical considerations that could guide the in-practice implementation of each building block of co-production.

This section outlines a selection of things to consider when implementing each co-production building block. This list is not exhaustive, but is presented to provide ideas on what a co-production process might incorporate. It is also important to note that many of these considerations are interchangeable across co-production building blocks and should not be considered at only one point in the process.

For example, the WISER Support to ICPAC project facilitated a group of 60 participants from multiple disciplines and sectors in the Greater Horn of Africa region to collectively develop a set of elements and principles for user-centred co-produced climate services. The result demonstrated the important interconnections between co-production and climate services and created a locally owned version comparable with the building blocks and principles in this manual.

Training of Sector Agronomists, Social Economic Development Officers, and Farmer Promoters on the use of the Participatory Integrated Climate Services for Agriculture (PICSA) approach, Muhanga District, Rwanda. *(Source: G. Nsengiyumva/ CIA, 2016)*

## IDENTIFY KEY ACTORS AND BUILD PARTNERSHIPS

- Identify and involve relevant actors
- Develop/create new networks or strengthen existing partnerships
- Gain political buy-in
- Enable open interaction amongst actors
- Recognise all partners' roles, strengths and limitations
- Recognise gender and cultural differences
- Prioritise listening
- Develop a clear plan, which is also flexible
- Develop any required contractual documentation
- Secure adequate resources for ALL partners
- Factor in sufficient time and resources to support the steps of co-production

### 2.4.1 Identify key actors and build partnerships

Ownership and sustainability of a climate service will be dependent on ensuring the **inclusion of all relevant actors**. Particularly important is enabling opportunities for those directly impacted by a climate-related risk to inform the prioritisation, shaping and development of the climate service. Without effective engagement, climate services may not be relevant to, or may even heighten inequalities for, marginalised groups.

To ensure the climate service can be continued in the long term, initiatives need to be informed by the decision-making context. The frameworks, **partnerships and networks** required to support the co-production process may need to be strengthened or extended in some way, and **political buy-in** secured across relevant decision-making levels.

**IN PRACTICE:** The Ethiopia ENACTS case study worked with the Climate and Health Working Group (CHWG) to bring together a diverse community of operational and academic stakeholders in Ethiopia. In particular, the Ethiopian Public Health and Nutrition Institute (later the Ethiopian Public Health Institute) took a lead role in developing new products and services that responded to requests from the Ministry of Health. Malaria experts from the USAID office and many young researchers from universities across Ethiopia were invited to participate in the workshops. In this way the CHWG laid the foundation for a broad network of stakeholders to work at the interface of climate and health.

The selection of actors for the co-production process can also significantly affect the sustainability of the approach developed. For example, where intermediary roles are undertaken by externally-funded actors, such as international NGOs, it will be important that the co-production approach builds the capacities within national actors across decision-making levels to enable ongoing engagement between producers and users of climate services after the project ends.

**IN PRACTICE:** The CARE project selected a local task force to plan the Participatory Scenario Planning workshop. The task force involved sub-national government officers from the meteorological agency, planners, agriculture, disaster risk management and other relevant sectors, as well as some NGO and civil society participants particularly where they were leading adaptation and resilience programmes. This allowed for political buy-in to be gained across the relevant decision-makers.

**IN PRACTICE:** Established networks, partnerships and political buy-in was essential for the implementation of the Multi-Hazard Early Warning System project in coastal Tanzania. The Tanzania Meteorological Agency's (TMA) work to implement the Global Framework for Climate Services (GFCS) required it to collaborate with key stakeholders, including government ministries and other stakeholders, to raise awareness of weather and climate information services. In addition shorter project partnerships with the World Meteorological Organisation (WMO) and the UK's national meteorological service enabled TMA to draw on experience and learning and stimulated an interest in a co-production approach to ensure MHEWS delivered accessible and relevant information to prioritised users.

At the outset of a co-production activity, partners may not recognise respective areas of expertise or initially value the knowledge that particular actors bring. In building partnerships, it is important to **build mutual recognition and respect** of complementary areas of expertise within the co-production process, recognising the strength and expertise that each partner brings to the process. Some scientists may not, for example, recognise the value of local or indigenous forms of knowledge about the weather and climate. Some actors may seek to take on the roles of others, underestimating the expertise involved. Actors may fail to officially recognise the contribution of everyone within co-produced outputs. Those facilitating interaction among the actors will need to foster skills in **learning to listen** in order to appreciate the knowledge of all partnering actors and include the voices of marginalised groups.

**IN PRACTICE:** The World Bank-funded Resilient Transport Strategic Adaptation for Dar es Salaam project brought together a wide range of organisations including investors, operators, city planners, disaster risk managers and engineers. The diverse engagement enabled the pooling of historical climate data and stakeholders' local knowledge of historical flood extent and duration, and specific impacts on transportation services, identification of critical transportation links, as well as broader economic and social impacts when roads become impassable. This provided a valuable basis for underpinning the direction of the modelling approach to map areas at risk of flooding.

Building trust and **equitable partnerships** among co-production actors takes **time and resources**. Combinations of informal and formal engagement can assist in building partnerships, and may, especially at the outset, benefit from face-to-face interaction where there has been limited previous interaction. **Developing formal agreements** between multiple partners is demanding. Partners often work in different regions and languages, and each needing to meet specific national and institutional contractual requirements. Each partner needs to be aware of the capacities and resources required to enable them to engage in co-production, and the implications for this in terms of recruiting and/or capacity building.

**IN PRACTICE:** In the FONERWA risk screening tool case study, the partnerships were formalised in a Memorandum of Understanding that outlined responsibilities of the project team and the partner that was required to formalise the partnership.

The range of expertise included at the outset may not have identified all the required discipline-specific areas of expertise, for example, in economics or behaviour change, that becomes apparent as the project evolves. It is important that projects retain flexibility, both in available finance and adaptive management, to be able to engage additional actors.

## 2.4.2 Build common ground

The actors in a co-production process may assume that they have shared aims, but without making these explicit, competing priorities may result in a discontent as some actors are perceived to prioritise benefits for their own organisation or group over those that support the wider group. Actors may also bring different ways of working, priorities, value systems and incentive structures. For instance, academic career paths have only recently, and in some countries, recognised the importance of demonstrating the social and economic benefits of investment in research. Partnering researchers may be reluctant to prioritise decision-makers' needs over more cutting-edge research questions. For their part, decision-makers and more operationally-focused actors may see scientific approaches as prioritising academic papers over tangible benefits for those whose lives and livelihoods are directly impacted by climate risks. **Recognising their differing agendas and incentives**, actors need to **jointly develop an impact plan** that benefits the whole group (Visman et al., 2018).

Similarly, there is also increasing recognition of the need for projects to jointly **agree the foundational principles and ways of working** at the outset to guide their collaborative work. Section 2.3 outlines ten principles drawn from evolving learning on approaches to effective co-production of climate services. These guiding principles will need to be contextualised for each climate service initiative, with partners jointly reflecting, from project outset, on how the principles can support and be operationalised within their ways of working.

**IN PRACTICE:** In the FRACTAL project, the Learning Labs and Dialogues were used as a means for stakeholders within cities to gather, get to know each other and share and develop knowledge. A lot of focus was given to developing a shared understanding across actors, and to collectively explore the intention and desired outcomes of the process.

Engagement with climate services may be new for some actors, requiring the **building of foundational understanding** of key meteorological terms and concepts. For their part, some meteorologists and climate scientists may not be accustomed to engaging with decision-makers or identifying their climate information requirements and, therefore, require capacity building in this regard.

### BUILD COMMON GROUND

- Make clear impact or benefit requirements from all the actors
- Reach a shared vision and common purpose
- Develop agreed principles and ways of working together
- Strengthen climate information providers 'understanding of the decision-making context and decision-makers' understanding of key climate concepts

Plateau Game *(Source: F. Affholder, 2018)*

### 2.4.3 Co-explore need

This building block is focused on **advanced relationship building** which forms the basis for identifying jointly defined issues. Importantly, it is not the primary intention of the co-exploration building block to extract new knowledge or outputs from any of the actors (Taylor et al., 2017). Rather, it is the intention of this building block to **develop essential trust and relationships** between multiple actors and form a **mutual understanding** of all actors needs and priorities. The co-exploration process also allows for the development of a shared understanding of the context in which each of the actors works, which may influence their framing of the issues in the development of a climate service.

**IN PRACTICE:** In AMMA-2050, a theatre forum was used to promote dialogue between actors on an equal basis, as well as encourage actors to reflect on their own behaviour.

During co-exploration it is important to create a space that allows for the free flow of ideas, learning and understandings, in particular, maintaining an environment that is not influenced by biases from one or more actors. This creation of an **unbiased environment** will allow for issues to emerge organically so that issues can be jointly identified and prioritised for further action in the development of a climate service. This **organic emergence** process also helps to facilitate the identification of issues of mutual concern for the group, that take into account pressing societal problems or inequities.

**IN PRACTICE:** In the REACH case study, local residents affected described the specific contexts in which they use climate information and also the limitations of what climate information is currently available. Rising insecurity, especially livestock raids, were connected to periods of acute water stress. They identified the need for reliable climate information for local law enforcement agencies to be able to put additional security measures in place during periods of higher risk.

The co-exploration building block allows the group to **build and define a common purpose** which provides the framework around which **roles and responsibilities** of any future actions could be structured.

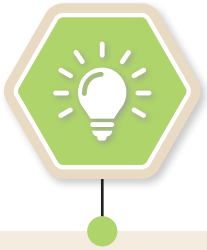
**IN PRACTICE:** In the PRISE case study, co-production of research questions led to the set up of targeted joint working groups. These groups elaborated specific inputs to the Narok County Integrated Development Plan that were based on emerging PRISE research findings in Kenya.

There is the possibility that there will be no collaborative future action required by the group of actors. It is possible that either no jointly-defined issues emerge or that a collaborative effort to solve the defined issues is not an appropriate way forward.

Similar to partnership building and building common ground, the co-exploration process should not be rushed. The co-exploration process requires sustained and regular interaction to form long-lasting and equitable relationships among all the actors, as well as to maximise any subsequent co-production processes.

#### CO-EXPLORE NEED

- Create a space for ongoing interaction and relationship building
- Create a relationship of equals amongst partners
- Maintain an unbiased and open agenda
- Allow for learning and understanding to take place in all directions (among actors)
- Allow for burning issues to emerge through the process
- Jointly identify issues to work on, to address a concern prioritised by the people whom an initiative seeks to support
- Clearly map out co-production roles and responsibilities



## CO-DEVELOP SOLUTIONS

- Support ongoing learning and research that takes into account local culture and knowledge
- Enable knowledge exchange amongst all partners
- Gain consensus agreement of the group
- Integrate learning from previous experiences (successes and failures)
- Develop plans for succession and sustainability

### 2.4.4 Co-develop solutions

The aim of this building block is to jointly develop an output that can better address a specific climate service need. The improved co-produced service may include changes in both the process through which the service is developed as well as the output produced. For example, the service may, for the first time, enable climate products to be provided in **languages and in formats** that are understandable to previously marginalised groups. Or the process for co-developing the solution may democratise service provision, enabling those who use the climate service to provide feedback, report on use, identify remaining or emerging challenges and inform future improvements.

**IN PRACTICE:** The Raising Risk Awareness project engaged with key decision-makers and the media about extreme event attribution analyses which informed the types of outputs that would be most useful to the key actors (including the media). This resulted in a range of communications products, including videos, animations, infographics and an image library.

Co-development of improved climate services requires **exchange of knowledge among all actors.** By enabling the bringing together of the respective expertise of actors, the group can together co-develop solutions that are better able to meet a specific climate service need.

**IN PRACTICE:** The co-development of the FONERWA climate risk screening tool took place in partnership with the International Center for Tropical Agriculture (CIAT), and built on previous work that they had undertaken. Both parties had mutual interest in strengthening FONERWA's capacity and developing climate-smart practices within Rwanda. Although no formal partnership was established, this mutual interest led to an informal agreement between the project team and CIAT on the co-development of the product through desk-based analysis combined with local knowledge and data of what is happening on the ground.

To enable uptake and use, the solution needs to be **relevant to the knowledge, culture and value systems** of the users that the service seeks to support. This, in turn, requires that the solution is informed by an understanding of these systems or that the co-production initiative commissions research to develop this understanding. Research to support the co-development and piloting of solutions needs to be undertaken in culturally-relevant ways that ensures feedback and joint validation with the people that the co-produced service seeks to support. All actors in the co-production process need to be afforded opportunities to inform the co-developed solution.

**IN PRACTICE:** In the Climate Risk Narratives project, engagements were undertaken with organisations and institutions in the city that have varying levels of influence over city development (including *inter alia* government, private sector and civil society). Through these engagements, city researchers collected information on climate risk perceptions, reactions to the draft climate risk narratives, as well as information on how these narratives might be updated to better capture the ideas of a broader range of stakeholders. In this way the climate risk narratives were validated with local knowledge.

Co-production has a particularly important role in promoting actors' willingness to **learn from both success and failure.** Actors may be understandably reticent to share instances of failure due to fears that this will affect organisational credibility and future funding. Emphasising ongoing, open and transparent learning, where all actors' knowledge is equally valued and there is commitment to continuous improvement of climate services recognises that it is only through learning from what has not worked that actors will, together, craft successful solutions.

A wide range of climate services initiatives have been undertaken, or are ongoing, and there are important efforts underway to ensure that the context-specific and transferable learning from across these can usefully inform complementary co-production initiatives. There is an urgent need to identify and integrate learning about how the **sustainability of climate service** initiatives can best be supported (as outlined in section 3.2).

Researchers Suzgo Kaunda (University of Malawi), Lapologang Mogale (University of Botswana) and Chipo Plaxedes Mubaya (Chinhoyi University of Technology) discuss the way forward for co-producing climate narratives at a workshop in Cape Town. *(Source: A. McClure, 2018)*

## CO-DELIVER SOLUTIONS

- Ensure co-branding and ownership of the product by the group
- Consider/incorporate local cultures and languages
- Build capacity amongst the recipient group
- Ensure accessibility of product, as well as ongoing feedback
- Co-develop a plan for communicating the climate service and solutions that ensure maximum impact

### 2.4.5 Co-deliver solutions

To promote wider ownership and sustainability of the co-produced output, it is vital to respect the contribution of the wide range actors involved in co-production. **Joint development of branding** can encourage buy-in and provide non-technical partners a readily identifiable contribution, as well as facilitate the tracking of the use and resulting changes supported through the initiative. Enabling ongoing feedback from users of the service will both promote ownership and enable continuous improvement of the service, informed by, and responding to, user specific needs.

Standard definitions of key terms will ensure that the co-produced climate service is accessible and understood. It may require that they are provided in a **range of languages** beyond those currently used by the national meteorological services, necessitating standardised translations of these key terms. Co-delivery also needs to consider whether co-produced services are provided in ways that recognise the different learning styles and **value systems** of social groups, individuals and institutions. Some people may, for example, prefer sharing learning through existing social and religious networks or through scenarios or plays, while others may prefer more formal training. The methods, spaces and places for co-delivery of climate services can build on and link with existing preferences, while ensuring that these do not perpetuate lack of access for those frequently marginalised.

The collective knowledge and networks of co-production actors can greatly enhance the accessibility of co-produced services. For example, partners with expertise in social and mass media, who have direct experience of working with the intended user groups, can ensure that co-produced services are provided through trusted channels and networks and reach intended users. Partners with expertise in language, communication and psychology can support the delivery of services in formats and languages most relevant and understandable to the intended user groups.

**IN PRACTICE:** In BRACED Zaman Lebidi, forecasts were broadcast in local languages, which were then relayed by local radios to rural people, listeners' groups, muncipal councillors, village councils for development and early warning committees.

Ensuring understanding among users of the co-produced climate services is vital if they are to be appropriately used., Ensuring sufficient confidence in appropriately employing the climate service within specific processes is particularly important. For those intermediaries who are supporting onward communication,

it is vital to ensure that they have the capacities and confidence to communicate these climate terms and concepts, as well as to support others to appropriately use climate services. Where required, such **capacity building** needs to ensure confidence in communicating and using probabilistic risk information in understandable ways. Clear communication of the levels of accuracy and confidence of the climate services is foundational to building trust in the co-produced services.

**IN PRACTICE:** The ENACTS experience highlights that stand-alone training events are insufficient to build capacity in user groups to proactively use climate information. Workshops need to be reinforced with appropriate online training materials, followed through with technical support and engagement with peers who are also interested and motivated to use climate information. In Tanzania, the ENACTS' approach has evolved slowly with a series of in-country workshops and hands-on training. In Building Climate Services for Agriculture in Rwanda, farmer promoters (volunteer community members) were trained to be farmer-to-farmer extension agents. The farmer promoters then built capacity among farmers to use and understand weather and climate information.

**IN PRACTICE:** In the USAID Tanzania energy project, capacity development was undertaken through intensive working sessions to communicate findings on climate risk and build capacity for assessing and developing adaptation options to address the climate risks.


Community members in Rwanda discuss the seasonal forecast during a presentation on the Rwanda Climate Services for Agriculture Project. *(Source: A. Nyandwi/MINAGRI Rwanda, 2017)*

## EVALUATE

- Regularly review and co-evaluate the product and the process
- Continue to monitor and reassess the solution after completion
- Ensure ongoing learning and continuous feedback loops
- Document successes or failures in the process

### 2.4.6 Evaluate

The purpose of evaluation is not only to ensure that the intended end goal or product is delivered, but also that the various interests and preferences of the different parties are met in the process. Given the wide variety of backgrounds and expectations, this can allow for early detection of problems and provide opportunities to 'course correct' (Wall et al., 2017). Evaluation should therefore be planned from the very inception of the project.

Tracking the impact of climate services can be hard. But if co-production is recognised as a process, it becomes easier to track changes across each building block in the process. This will help identify how these changes may be contributing to reducing the risks and enhancing the opportunities of those people whose lives and livelihoods are most directly impacted by weather and climate (Kniveton et al., 2016).

**IN PRACTICE:** In Rwanda, the Climate Services for Agriculture programme was able to build on experiences and evaluations of the application of PICSA in other contexts. Among the learnings were the fact that a typical one-time, survey-based needs assessment is not enough to adequately capture user (farmer) needs. However, an iterative co-production process that captures and aggregates users' needs and evolving demand as they gain experience has proven to be beneficial. Similarly, learning from experience highlighted the importance of feedback processes to bring out users' voices in improved climate services.

Enabling ongoing monitoring and review also enables actors to learn about what is working and what is not. Where fully integrated within the process, learning can inform **continuous improvements** to climate services. **Sharing this learning** with those engaged in complementary initiatives is vital to building shared understanding about where co-production of climate services may be most effective and how this is best enabled. The relatively young nature of co-produced climate services means that there are very few post-project evaluations of sustainability and value. However, many of the co-production examples included here have included a strong element of reflection and multi-directional learning which has influenced the evolution of their process.

**IN PRACTICE:** In the BRACED Zaman Lebidi project a series of learning events were organised related to: the development and communication of climate information, gender, integrating climate information within local government decision-making and co-production related to resilience building. Learning on each topic was synthesised in a series of policy briefs which were discussed at the project's quarterly Steering and Technical Committee meetings, as well as being shared with BRACED partners and more widely.

**Budgeting appropriate time and money for reflection**, multi-directional learning and monitoring, evaluation and learning (MEL) increases the likelihood of success and sustainability. **Documenting successes and failures** along the way also helps to build an evidence base for co-produced climate services which is currently lacking. However, there is a need to also define what criteria will be used for measuring success as they might differ, reflecting the different interests (Wall et al., 2017).

A meeting with community members as part of the Rwanda Climate Services for Agriculture Project. *(Source: A. Nyandwi/MINAGRI Rwanda, 2017)*

Andrew Heavens Flickr, 2017

# 3 Finding the value in good co-production

Co-production can take many shapes and forms and requires an investment in time – the shortest project length in the case studies is 18 months. In addition, due to the highly collaborative nature of co-production, the costs for convening multiple face-to-face sessions (workshops, visits etc.) can add up. However, when considering whether or not to use a co-production approach, keep in mind the benefits of the approach and whether these will help you meet your intended objectives. This section looks to help projects identify value-for-money approaches as well as ways to help measure the value of the co-production process and co-produced products.

## 3.1 Value for money

Co-production is usually – but not always – resource and time intensive, and this can raise concerns over whether it is good value for money. The benefits of taking a co-production approach are as follows:

- Co-production ensures that climate information is tailored to a specific context, and is therefore more likely to be valuable to the user.
- Co-production brings people together, which can create synergies and opportunities for resource sharing and creative thinking on cost effectiveness.
- Co-production ensures a wider reach and impact through multiple communication channels, using intermediaries and users, and improves the tailoring of communication to specific audiences.
- Co-production and joint ownership promotes integration of climate information into actions and likewise into plans and budgets.
- Co-production creates a virtuous cycle: investment in capacities to co-produce better, more relevant products and information and enable more user-focused communication leads to better understanding, use and benefits; which contributes to resilient livelihoods and economic development; and ultimately increases demand for more and better climate information.

The longer term benefits of co-production have been observed in the ENACTS and Participatory Scenario Planning approaches. In both cases the co-production investments made have resulted in meteorological services (national and county level) being more aware of user needs and building their capacity to address the needs of the users they are servicing. In addition this improves the understanding of how weather and climate information can be used in decision-making by users. More information on the scaling up and sustainability of these approaches is described in section 3.2.

### 3.1.1 Measuring the value of co-production approaches

Measuring the value of co-production can be done in many ways, ranging from quantitative and qualitative evaluation to more comprehensive assessment of the socio-economic value of a co-production process.

The '3 E's' from the Guidance Notes on Implementation of WISER **Value for Money and Socio-economic Benefit Framework** (based on DFID's, now FCDO's, principles) breaks down the measurement of value for money into three components: Economy, Efficiency and Effectiveness. Table 1 shows some examples of how consultative and immersive projects have demonstrated their value for money against the three E's. In addition, a 4th 'E' for Equity has been added and provides examples of how to achieve better equity.

**TABLE 1:** Examples of economy, efficiency, effectiveness and equity

| | EXAMPLES |
|---|---|
| **ECONOMY** (inputs, i.e. spending less). This refers to using the lowest cost use of goods and services within a project and ensuring that input unit costs are benchmarked against market norms | • Host meetings at partners, offices and government buildings that do not require venue hire.<br>• Employ project representatives in country that can host meetings as needed.<br>• Build on existing networks and relationships where possible.<br>• Make use of other workshops, or convening opportunities where some of the partners will be coming together, to reduce costs.<br>• Make use of preferential rates for hotels and other services that are available through one or more partners.<br>• Staff costs can be lower in country compared to international experts, who also require travel costs.<br>• Co-host meetings with those engaged in complementary initiatives (e.g. A joint BRACED/ AMMA-2050 workshop on integrating climate information in local government decision-making allowed for pooling of project stakeholder engagement resources). |
| **EFFICIENCY** (i.e. spending well). This refers to ensuring the quality and quantity of inputs are appropriate to achieve the envisaged outputs and that inputs are managed in an efficient way during project delivery | • Local partners do not require international travel expenses. Try to find partners that are based locally, as far as possible, to minimise travel costs.<br>• Maximise opportunities, (e.g. UMFULA co-hosted a panel discussion on climate information that was open to the public in Malawi while in country for a project meeting).<br>• In country staff can make better use of opportunities to collaborate (e.g. In FRACTAL, embedded researchers in city,were able to make use of opportunistic events/ developments).<br>• Include training for staff that will be taking on the delivery of the climate service in the long-term. |
| **EFFECTIVENESS** (i.e. spending wisely). Demonstrating that the chosen outputs are the most effective way to achieve the outcome | • Apps are easier to use than websites in many countries as they requires less bandwidth.<br>• Ensure that the intended target groups are reached in meetings and ensure accessibility of outputs (e.g. women may not be allowed to attend community leaders' meeting; or are not comfortable speaking in English/other languages) and make alternative convening spaces available as needed.<br>• Engaging with existing mechanisms to promote science- policy-practice coordination and building the co-production capacities of local researchers can make an initiative less reliant on external support and promotes sustainability (e.g. Zaman Lebidi). |

| | EXAMPLES |
|---|---|
| **EQUITY**<br>(i.e. implementing fair activities)<br>Development is only of value if projects demonstrate equal concern for people's needs and outcomes do not maintain inequalities but benefit everyone. | • Involve grassroot organisations and users of the climate service in sharpening and focusing research questions and identifying research sites such as in the case of the PRISE programme.<br>• Conscious facilitation should be a guiding principle throughout the project life cycle, adopting an approach that diffuses power dynamics and hierarchies and allows different knowledges and experiences to be equally heard.<br>• To compensate for inequalities, projects need to actively seek to reach and involve people who are otherwise traditionally marginalised in decision-making processes (e.g. The PSP dedicated a two-day workshop to sharing different information where all actors and their knowledge are considered to be equally important). |

### 3.1.2 Measuring the value of the co-production process

The co-production process is often undervalued by funders in performance metrics. To some extent, this results from a need to quantify outcomes of projects. However, the process of co-production is often as valuable, if not more valuable, than the development of a knowledge product, because the process of co-production can create a basis for future and ongoing collaboration. Moreover, tracking each building block in the co-production process enables projects to demonstrate impact even within (often) short project time frames (Kniveton et al., 2016). For instance, changes in partnership relationships, engagement and trust between multi-disciplinary actors are often precursors to co-produced products. These changes can be assessed before the co-produced product is available or taken up.

Some of the less tangible results of co-production include the following:

- Building sustained personal and professional relationships that form the basis for ongoing and new collaboration.
- Enabling a greater understanding of decision-making processes between partners from different disciplines, backgrounds and professional functions (e.g. building an understanding of the climate modelling uncertainties among the users of climate services).
- Enabling the open flow of information between different actors and combining knowledge of actors
- Raising awareness and building capacity among multi-disciplinary groups that would otherwise not have been possible.
- Developing climate information products that are more in tune with specific contexts and realities, as they are directly informed by those who will be making use of the products.
- Fostering ownership of the final products leads to greater uptake and sustainability of the project outcomes.
- Contributing to the democratisation of risk governance.
- Behavioural change in how people are using weather and climate information to make informed decisions, or is leading to resources being directed to support the ongoing provision of that service.

**IN PRACTICE:** The FRACTAL project allowed city officials to engage in the academic thought process through casual, sustained conversations that included multiple perspectives. The project process allowed them to own the research process while building capacity around the use of climate information in policy decision-making. The value for the researchers lay in achieving a greater understanding of the city's processes, identifying the gaps in information flow, and developing a context-specific and context-sensitive understanding of the role of climate information in the decision-making process.

While the value of the process is undeniably harder to quantify than the development of tangible products, this should not deter an effort to recognise the value of the process as part of performance metrics. Such metrics might include, for example:

- Assessing how the process has deepened various knowledge holders' understanding of a subject area, including the capacity developed as a result of the project.
- Assessing the enhanced understanding of multiple disciplinary perspectives.
- Documenting the relationships built through the process and tracking any new projects or formalised partnerships that occur in the future as a result of the relationships built.
- Monitoring the effectiveness and uptake of the final co-produced products.

For example, in a project designed to develop an NMHS capacity development assessment tool for sustainable Climate Information Services, particular measures were proposed to explicitly measure user interaction. These included, for instance, metrics such as:

- Written material that documents user interaction.
- Number of formally signed Memorandums of Understanding between the NMHS and a user sector.
- A written procedure for incorporating user feedback into NMHS systems.

Many of the case studies in the annexes demonstrate the value of moving away from project terms of reference that require the development of co-produced climate service products through quantifiable step-by-step processes. Projects should rather move towards a focus on more sustained, reflexive and emergent process approaches that allow for flexibility, and include all knowledge holders as equal partners in the process.

### 3.1.3 Measuring the value of co-produced products

A co-produced product can take many forms (e.g.seasonal forecast, climate risk narrative, maproom). Products are often easier to measure the impact of than processes in terms of value for money and direct benefits people gained by using the weather and climate information to make an informed decision. Some of the ways to measure the value of co-produced products include the following:

- Number of products being produced.
- Number of people using the product.
- Number of people that have changed their decision based on the product.

The benefits for co-produced products are generally able to be measured within six months to a year of the product being developed.

**IN PRACTICE:** In the WISER **Strengthening Climate Information Partnerships**-East Africa (SCIPEA) project, a community-based climate services programme packaged and communicated tailored climate information to vulnerable people affected across Kenya by supplying them with long-term information. 'The communities that embrace these kinds of initiatives see a substantial improvement in crop yields,' said Jasper Batureine Mwesigwa, a PhD student at the University of Nairobi, who is involved in with the Food Security and Nutrition Working Group (FSNWG) and the Famine Early Warning Systems Network (WISER, 2019). This result highlights the fundamental difference that reliable information can make.

The main challenge with quantifying a product's value is the sustainability. All too often, once a project ends, the resources needed to produce the product can also be compromised. In the following section, some ideas of how to overcome this challenge are provided.

## 3.2 Moving to scale and sustainability

Ensuring sustainability of co-production is largely a matter of proving to the actors involved that there is value in the process or product and then looking for ways to move from the project-funded system into a longer-term community or government-sustained process. This is not always easy but is vital if the long-term benefits of co-production are to be realised. Projects should: (i) ensure that the long-term sustainability is considered early on and; (ii) look to include partners who might take on the long-term role once the project ends, ensuring the development of a monitoring, evaluation and learning process that can evidence changes and demonstrate the value of climate service initiatives.

Successful co-production approaches can be tried out in new contexts or scaled up which is another way of ensuring that the value of the co-production is sustained. Scaling is dependent on the following conditions to be met, outlined by WRI (2015):

- **Resources**, including financial resources, institutional capacities – especially staff time – and communications technology.
- **Partnerships** between government agencies, NGOs and the private sector.
- **Local context** is taken into account, including local culture and work with local actors and groups.
- **Learning approach** may need to be modified based on a new location. Ensure there is opportunity to learn and refine the approach. It is also important to make sure that the integrity and quality of the approach is maintained.

**IN PRACTICE:** The Enhancing National Climate Services initiative was initially established as a dialogue between the National Meteorological Agency in Ethiopia (NMA) and the health community through the creation of a 'Climate and Health Working Group'. This group, managed by a local NGO, undertook a series of joint training events so that each community better understood the needs and perspectives of the other. The project focuses simultaneously on the availability, access and use of climate information. Since NMA created its ENACTS climate products and launched its ENACTS Maprooms in 2011, more than ten other countries in Africa have implemented the ENACTS approach, with varying levels of sophistication. The East Africa's Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) is increasingly providing the needed technical support for national meteorological services in the region. However, investments in the technology and supply side of ENACTS is dwarfed by investment needs on the uptake side – both internally by the meteorological services (national to local), across sectors and with the people affected. The co-production of products and services is a critical part of the ENACTS philosophy, ensuring that there is co-learning during the process and that users' articulated needs are used to change the way climate services are developed and delivered.

ENACTS Data and Services has been developed with technical support from the International Research Institute for Climate and Society and a wide range of donors, including WISER. A high degree of institutional buy-in results from ensuring that all the technical work and training of meteorological agency staff is conducted at their offices, respecting their policies and procedures. Recent evidence for this is two unsolicited standard operating procedure documents – one on data and one on maprooms – developed by Ethiopian staff for the management of their technical ENACTS procedures. Moving technical support from IRI to the regional climate centre ICPAC also promotes institutional ownership at the regional level. The incentive to continue the development of ENACTS data and services comes from local demand. Throughout the implementation process the meteorological services provide resources for the management of the services and the time for staff training.

**IN PRACTICE:** The Participatory Scenario Planning approach was successfully developed and piloted in one county in Kenya. Three neighbouring counties were interested in replicating the approach, which was then adopted by all 47 Kenyan counties. The wide-scale adoption of the PSP approach in Kenya was made possible mainly due to Kenya's devolution of government powers. This brought the Kenya Meteorological Department (KMD) and a Ministry of Agriculture Agricultural Sector Development Support Programme (ASDSP) to county level. This enabled the establishment of coordination and collaboration at county level and between counties, with buy-in and support from national level.

Subsequently, the PSP approach was adopted in Ethiopia, facilitated by an institutional agreement between CARE Ethiopia, the National Meteorology Agency, the Regional Disaster Risk Management Coordination Commissions in the Oromia, Afar and Somali regional states. The Ethiopia Red Cross and Red Cross Climate Centre have picked up the PSP approach and continue to support its institutionalisation.

The key factors that have enabled widespread scaling of the PSP model include:

- **Continuous needs-based capacity building of** meteorological services, government sectors, community institutions, local and international development organisations, private sectors, media and other actors on the approach and its contribution to disaster risk management, adaptation and climate-resilient decision-making.
- **Enhancing the visibility, role and capacity of county directorates of meteorology in Kenya,** enabling better focus on the provision of timely and relevant services to meet the needs of users.
- **Systematising learning and reflection** in the PSP workshops has resulted in a dynamic and evolving approach that should be tailored to context and use.
- **Recognising the importance of the intermediary facilitation role.**
- **Sharing the approach and its outcomes** at fora such as the Greater Horn of Africa Climate Outlook Forums (GHACOF). Climate services and adaptation conferences create good opportunities for discussing how PSP works and how it contributes to disaster risk management, adaptation and climate-resilient decision-making.
- **Creating new linkages** and gathering ideas on how to further evolve the approach.

An impact assessment was conducted under WISER and the Adaptation Learning Programme (ALP) to generate evidence to back up these findings. Challenges to sustainability are largely related to maintaining the integrity and quality of the process, ensuring sustainable resources are in place and responding to changing user demands within the constraints of the science product development. It can also be challenging to keep ensuring that: user needs continue to be heard; there is interaction between sectors; collective interpretation continues; and communication of certainty and quality is transparent.


Julio Araujo, 2017

# 4 Conclusion

There is no 'one size fits all' approach. Co-production needs to be customised and adjusted for the individual needs of the decision context that the process seeks to support.

Building on existing resources, guides and sets of principles, this manual demonstrates a growing body of learning about how co-production can contribute towards more effective climate services. While seeking to guide ongoing initiatives, this learning is emerging. It has not yet been formally adopted or widely integrated within research funding or institutional training.

The co-production of weather and climate services is a process. Co-production initiatives may start at different points in this process. Not all building blocks or principles may be relevant to a particular initiative. Nevertheless, this manual maps out how co-production has happened in the examples we have collected. The case studies show the wide variety of approaches to applying co-production to improve weather and climate services. Learning from a wide range of producers, intermediaries and users, demonstrate the varied uses for co-production in the case studies.

Measuring the value of co-production can be complex as, often, the exact start or end point of the process is not defined from the outset. Measuring the value of both the co-production process and products helps to give the full picture when evaluating co-production. Ensuring sustainability of the the climate services delivery is largely dependent on building co-production systems into existing structures so that they can be continued, expanded and replicated in the future.

F. Affholder (CIRAD), 2018

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# Annexes

## Case Studies


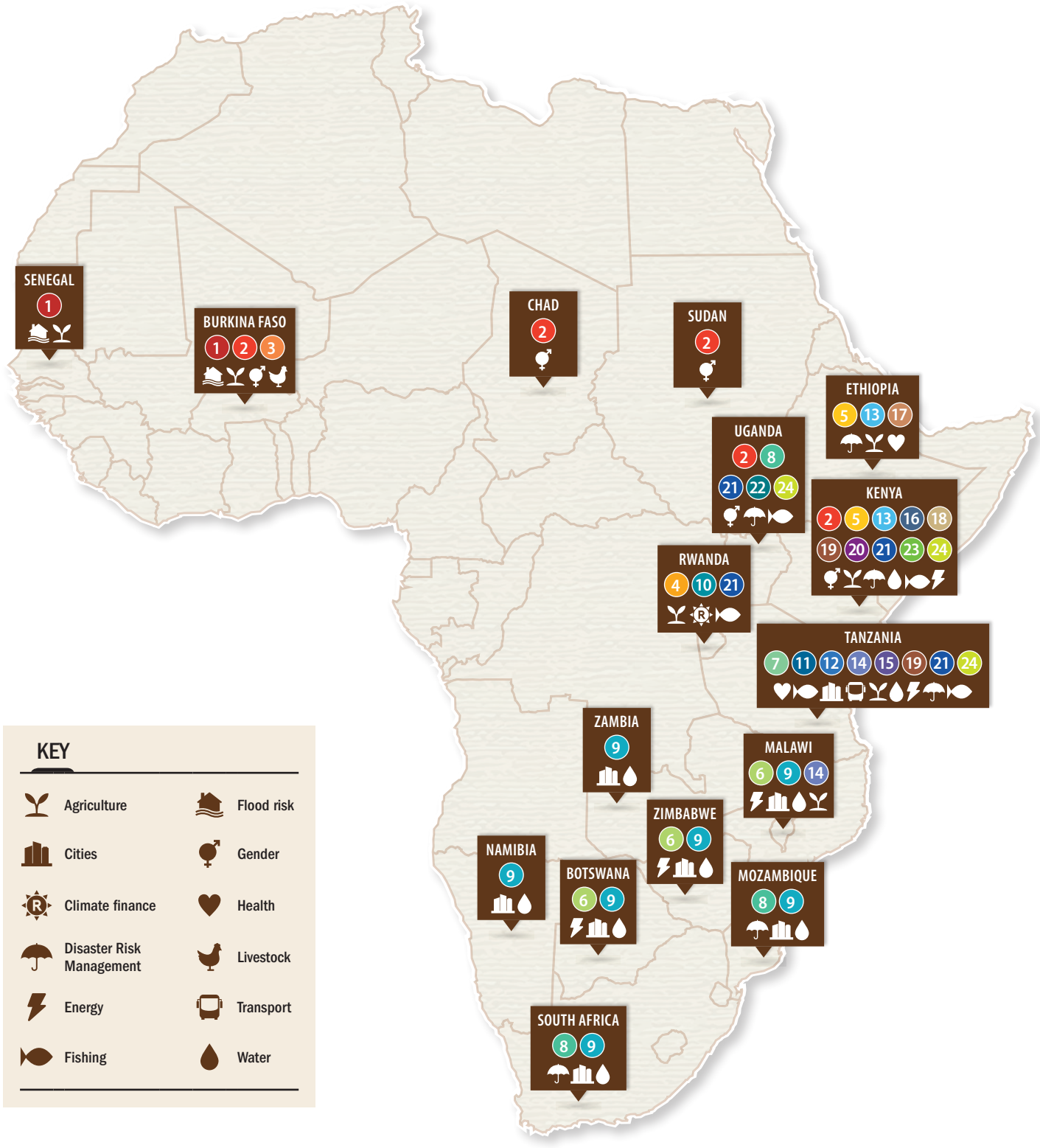


**FIGURE 6:** Case studies of co-production, which countries they cover and the sectors involved

# AMMA-2050: Combining Scenario Games, Participatory Modelling and Theatre Forums to Co-produce Climate Information for Medium-term Planning


## Authors

**Emma Visman,** *VNG Consulting (emma@vngconsulting.org.uk);* **Dominic Kniveton,** *University of Sussex;* **François Affholder, Françoise Gérard, Frédérique Jankowski,** *Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD);* **Laure Tall,** *Institut Sénégalaise de Recherches Agricoles (ISRA);* **Fowe Tazen,** *(Institut International d'Ingénierie de l'Eau et de l'Environnement (2iE);* **Tanya Warnaars,** *Centre for Ecology and Hydrology (CEH);* **Adeline Barnaud, Cécile Berthouly,** *Institut de Recherche pour le Développement (IRD).*


## Aim of the project

The **African Monsoon Multidisciplinary Analysis 2050** (AMMA-2050) project aims to improve understanding of how the West African monsoon will be affected by climate change in the coming decades and to facilitate the use of this information to inform preparedness and adaptation decision-making on the 5–40 year timescale. The project's pilot studies focus on urban flooding in Ouagadougou, Burkina Faso, and climate-smart agricultural practices in Senegal.

## Dates

June 2015–November 2019

## Countries

West Africa, with pilots in Senegal and Burkina Faso

Theatre Forum organised in Senegal with Kaddu Yaraax group. *(Source: A. Barnaud, IRD, 2018)*

## Aim of co-production:

Enabling medium-term decision-making to be supported by emerging understanding of climate-related risks requires bringing together expertise from across sectors, disciplines and decision-making levels. Co-production required establishing common understanding of the decision-making contexts, key climate science concepts and scientific understanding of the region's future climate. A range of approaches was employed to bring together knowledge and data from across disciplines (climate science, hydrology, agriculture), and particular groups of decision-makers, to explore context-specific issues and options. Sustainability was sought by working through existing mechanisms and strengthening the knowledge exchange capacities of partnering researchers within the region.

## Context:

AMMA-2050 has worked across decision-making levels. At sub-national scale the project supported planning on urban flood risk in Ouagadougou, Burkina Faso. In Senegal, AMMA-2050 has supported national and decentralised adaptation and agricultural planning processes, engaging with *Comité Régionale du Changement Climatique* (Regional Committee on Climate Change) in Fatick. The project has contributed to the development of the National Adaptation Plans of Senegal and Burkina Faso, and the knowledge and practices of regional institutions, engaging with the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL).

## Who was involved and what were their roles?

An adapted Participatory Impact Pathways Analysis (PIPA) process, developed by the University of Sussex, provided a 'road map' for supporting a range of co-production processes led by different AMMA-2050 partners. Researchers from *Centre de Coopération Internationale en Recherche Agronomique pour le Développement* (CIRAD) have employed the Plateau Game to share information about climate change, evaluate changes in farmers' strategies and identify adaptation options, debate policies and validate modelling. Subsequent participatory modelling enabled (sub-state) regional decision-makers and agricultural professionals to review and inform the pilot's bio-economic model of farming systems. CIRAD, *Institut de Recherche pour le Développement* (IRD) and *Institut Sénégalaise de Recherches Agricoles* (ISRA) have developed a Theatre Forum, a form of participatory theatre employed to support collective analysis and explore alternatives between different stakeholders (Boal, 1979), enabling exchanges between researchers and civil society actors (Heras and Tàbara, 2014). To strengthen facilitation skills, the Centre for Ecology and Hydrology (CEH) provided researchers with stakeholder engagement training and coordinated a workshop to share co-production approaches with WASCAL.

## How was co-production done?

### Build common ground

An adapted **Participatory Impact Pathways Analysis** (PIPA) process has provided an overall framework for project engagement. The pathways approach recognised the need to: (i) listen to people's different framings of the risks that climate change poses; (ii) encourage different people's participation in decision-making; and (iii) co-develop pathways to achieve 'climate-proofed' development. The resultant 'road map' supports a range of co-production processes led by different AMMA-2050 partners.

### Co-explore need; co-develop solutions

The Plateau Game enables participants and researchers to share knowledge and explore practical and policy options. Each plateau – or board – represents several farmers' fields, adapted

## What was co-produced?

- **An assessment of the impacts of climate change on agriculture in Senegal**: Information on the genomes of pearl millet varieties is being linked to climate metrics to identify the traits most likely to be needed in a future climate. The resilience of agronomic practices and soil ecosystem services is also evaluated under High Impact Weather events (including rainfall, length of growing season, dry spell and high temperature).

- **A bio-economic model of farming systems in the Peanut Basin:** This explored the influence of changes in climate, crop varieties and farming systems – such as intensification of agriculture – and interventions – such as insurance.

- **Tailored climate information that can support flood-risk management**: Policy options are explored through high-resolution model hydrological simulations of the extent and impact of future flooding in Ouagadougou. Intensity Duration Frequency (IDF) curves – a standard tool used in hydrological engineering – are developed to meet requirements for informing infrastructural development in Senegal and Ouagadougou.

- **A Theatre Forum piece designed to promote multi-actor discussion on climate change impacts on agriculture and adaptive strategies**: The piece highlights the importance of all actors being aware of the inter-connected, long-term implications of their current decisions and actions.

### Benefits of the co-production approach

- Decision-makers have identified variables of interest which modellers had previously not thought relevant. In Burkina Faso and Senegal, in addition to temperature and rainfall, decision-makers requested medium- and long-term information on strong winds, as they are a source of erosion in agriculture and structural damage (2iE, 2018).
- The co-production approaches have enabled researchers to review the assumptions underlying the framing of their models.
- Iterative discussions have enabled researchers and decision-makers to jointly explore the relevance of different adaptation policy options in the context of a changing climate.
- Researchers have had the opportunity to undertake research with colleagues from across disciplines within which they have not worked before. They have also developed a better understanding of decision-makers' needs.

to reflect farmers' perceptions of space, soil type, equipment and other factors (D'Aquino, 2016). Farmers choose their activities (cropping system and livestock) and allocate their resources (labour and cash) to activities. Their output depends on the resource they use and on the climate – represented by a 'climate card' – which gives rain distribution across the board's cells. After the harvest, farmers have to feed their family, reimburse credit and so on. If the output is insufficient, they can sell animals, ask for help from other players or propose other options. The process is interspersed with discussion as participants reflect on what is happening in the game. All discussions are recorded, transcribed and analysed.

Participatory modelling affords an exploratory space for decision-makers to test the impacts of different policies and for researchers to better appreciate decision-making contexts. In Senegal, workshops between (sub-state) regional decision-makers and representatives of the agricultural profession supported a review of the bio-economic model and Plateau Game, enabling researchers to learn about issues that needed to be considered in modelling.

Theatre Forum promotes dialogue between actors on an equal basis, as well as encouraging actors to reflect on their own behaviour. A performance is characterised by three main stages: (i) Actors play a story inspired by real facts and existing tensions; (ii) A moderator then invites debate to bring out feelings, interpretations and proposals to resolve tensions; (iii) Spectators then come to replace one or more of the characters to test possible solutions and collectively discuss them. The other actors remain in character, improvising their responses. To promote discussion, the Senegalese Theatre Forum group, Kaddu Yaraax, have added a 'trial' after the first showing of the piece, where the spectators judge whether the behaviour of each character is good, neutral or bad.

#### Co-deliver solutions

AMMA-2050 has sought to strengthen the knowledge exchange capacities of existing scientific and decision-making bodies rather than creating new mechanisms or intermediary actors. AMMA-2050 shared its co-production approaches within a collaborative workshop with WASCAL to inform the development of the WASCAL Competence Centre and jointly develop a road map on how to strengthen linkages between researchers and policy-makers in West Africa (WASCAL/CEH, 2018).

## Lessons to learn from:

- **Use a range of approaches:** AMMA-2050 employed a range of approaches that has increased decision-makers' appreciation of how specific types of climate change information, such as IDF curves, can inform long-term investments. These approaches have also increased partnering researchers' understanding about the vital importance of engaging decision-makers throughout the process of developing climate information so that these resources are adopted to strengthen climate-resilient development.
- **Ensure transferrable approaches:** Project approaches have been employed to support decision-making processes across a wide range of contexts and are therefore transferrable.
- **Tailor approach to the context:** While there is emerging learning about the potential benefits of co-production, there is no 'one size fits all' formula. The contextualisation and framing of approaches is essential to ensure they are tailored to support specific decision-making processes. Each step in the process of co-producing climate services requires different types of approaches, and varying levels of engagement between different groups of actors.
- **Agree on the principles, sustainability and benefits:** Recognising that co-production requires the bringing together of expertise and knowledge from across diverse groups of actors, it is essential to:
  - at the outset, reach agreement on the principles that will underpin collaborative work;
  - ensure the facilitation required to support effective interaction between researchers and decision-makers, build trust and promote networks that can be sustained beyond the lifetime of the project; and
  - explicitly recognise the differing impacts that each partner seeks, ensuring that everyone gets some benefit from the co-production process.

It is equally important that expectations are realistic, acknowledging that the time needed to deliver scientific results may not match decision-making time frames.

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# BRACED: Sharing Lessons on Promoting Gender Equality through a 'Writeshop'


## Authors

**Virginie le Masson,**
*Overseas Development Institute*
*(v.lemasson@odi.org.uk)*


## Aim of the project

The **Building Resilience and Adaptation to Climate Extremes and Disasters** (BRACED) project aims to build resilience in development projects. Promotion of gender equality is considered a key element of building the resilience of the population to climate extremes and disasters. Thus, the project aimed to document and learn different approaches to addressing gender inequality from the 15 consortia of non-governmental organisations (NGOs) funded by BRACED.

## Dates

July–September 2016

## Countries

Representatives from projects implemented in Myanmar, Uganda, Kenya, Chad, Sudan and Burkina Faso

Participants of the BRACED 'Writeshop' in London *(Source: V. le Masson, 2016)*

## Aim of co-production:

The co-production approach used was a 'writeshop'. A 'writeshop' is an intensive, participatory workshop that aims to produce a written output (e.g. case studies or a full report). Participants may include researchers, NGO staff, policy-makers, farmers, students – anyone who has, in one way or another, been involved in the experiences to be documented. These participants engage in an iterative way of writing, reading, reviewing and discussing their case studies with the aim of publishing their finalised reports at the end of the 'writeshop'. The objective was to collectively write and review four case studies presenting how the NGOs used gender approaches in the design and implementation of their projects.

## Context:

While gender equality is one of the priorities of the donor and research component of the project, the 15 consortia of non-governmental organisations funded by BRACED addressed the issue of gender inequalities in different ways considering their differing contexts. Therefore, co-production was needed in order to better understand, document and learn from these different approaches.

## Who was involved and what were their roles?

The 'writeshop' was co-organised by members of the Knowledge Manager (KM) of BRACED, the Overseas Development Institute and the Red Cross Red Crescent Climate Centre (ODI). It involved representatives of four consortia, the 'Implementing Partners'. The four NGOs who took part in the 'writeshop' included Mercy Corps (Uganda), ActionAid (Myanmar), Concern (Sudan/Chad) and Christian Aid/Kings College London (Burkina Faso). In total, the workshop involved 15 participants. Seven participants represented the consortium in which they worked as national and international practitioners, advisors or researchers. These representatives acted as 'authors'. The remaining participants included researchers and project officers from the Overseas Development Institute (leading the Knowledge Manager), who acted as 'editors', and also one independent gender and climate expert, and two facilitators from the Red Cross Red Crescent Climate Centre. One representative of the donor also attended one day.

## How was co-production done?

### Co-develop solutions

This co-production exercise involved three stages.

First, and before the 'writeshop', practitioners – supported by researchers – conducted an initial round of analysis to produce four first drafts documenting the gender approach followed by their respective consortium. Researchers from the KM created a template with key questions to help authors create their first

## What was co-produced?

- **Four case studies**: The primary goal of the week-long 'writeshop' aimed to produce four case studies to document NGOs' gender approaches in the implementation of their activities on resilience.
- **A synthesis report of the whole process**: The report was co-produced to share lessons with other implementing partners within BRACED and any other NGOs working on building resilience.

### Benefits of the co-production approach

- Having practitioners author their own case studies was important in promoting self-reflection and ownership of the analysis and in compiling recommendations that were ultimately much more tailored to the projects' context and needs than if they had been written by people external to the project.
- The 'writeshop' was a conducive space for peer-learning and enabled critical reflection. Some of the participants did not necessarily have expertise on gender mainstreaming but the participation of people from different backgrounds and levels of understanding of the concept helped create an enabling environment for participants to raise questions and share best practices and advice.
- The 'writeshop' built the capacities of participants to not only adapt their project or their research to new knowledge gathered around gender mainstreaming and inclusion, but also to respect and draw on the diversity of perspectives and experiences.

draft and ensure that all four teams addressed the same questions but documented their own context. The authors had between four and six weeks to conduct their analysis, which involved key informant interviews with their own colleagues and members of their consortium.

Second, the 'writeshop' itself was held in London and lasted one week. It followed a clear methodology to help participants co-produce four research case studies of publishable quality. During the first two days, each team presented the first draft of their paper and reviewed the work of others, discussed different views and suggested revisions. The second drafts were presented and reviewed again on the third and fourth days – going through a third round if necessary – until the participants agreed on the quality of the case studies. The objective was to allow every participant to contribute his or her own knowledge on the topic. The facilitators ensured the discussions were inclusive, with every participant invited to provide their review and opinion equitably. They ensured that everyone had enough time to contribute, and they constructively, exchanged critical but respectful feedback, discussing points of agreement and disagreements. Editors assisted the authors in compiling the comments and addressing them before presenting the next draft.

Third, after the workshop, the case studies were edited by independent editors and reviewed again by the authors, who also needed the sign-off of their consortium colleagues before publication of the case studies. The communication team of the KM finalised the publishing process. In parallel, one researcher from the KM wrote a synthesis paper to reflect on the learning from the 'writeshop' and compile recommendations for all NGOs funded by BRACED. This synthesis paper was reviewed by the gender expert who participated in the workshop and an independent reviewer. The resulting synthesis and three case studies were published together a few months after the 'writeshop' (Le Masson, 2016; Opondo et al., 2016; Hilton et al., 2016; Rigg et al., 2016). The fourth case study was not published in the end as the final sign-off from the NGO consortium was never granted, partly for fear that the analysis of gender inequalities and recommendations to remedy gender issues would be too controversial in regard to the political context in which they work.

## Lessons to learn from:

The 'writeshop' proved an original and very effective method to co-produce knowledge products involving researchers and development practitioners. This process can be replicated in any contexts to produce a wide range of documents, from case studies to research papers, project proposals or policy briefs. The success of a 'writeshop', however, depends on a number of key factors:

- **A common language is vital**: Each participant must speak the language used in the document(s) to ensure their meaningful participation and understanding of key concepts. Where some participants do not share a common language, instant translation must be provided.
- **The timing and duration**: Depending on the nature of the document to be produced, the 'writeshop' needs to occur at a suitable time (e.g. in the inception phase of a project, at the end of a research programme, during an important policy development, etc.) so that participants can provide informed inputs and useful recommendations.
- **Diversity of participants**: The more diverse the group is, the more detailed and critical the review process can be.
- **Appropriate facilitation and support**: Consistent, efficient and inclusive facilitation is crucial to ensure the 'writeshop' offers a positive experience and supports honest and constructive discussions between participants.

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# BRACED: Developing and Communicating Information that Can Support Climate Resilience: Learning from Zaman Lebidi, Burkina Faso


## Authors

**Emma Visman,**
*King's College London and independent consultant (emma@vngconsulting.org.uk);*
**Malick Victor,**
*independent consultant;*
**Camilla Audia, Frances Crowley, Mark Pelling,**
*King's College London.*


## Aim of the project

The **BRACED** project aims to enhance the resilience of people at risk of climate shocks and stresses within four provinces across East, Centre North and North of Burkina Faso. One component focused on the development and delivery of accessible, timely, relevant climate information.

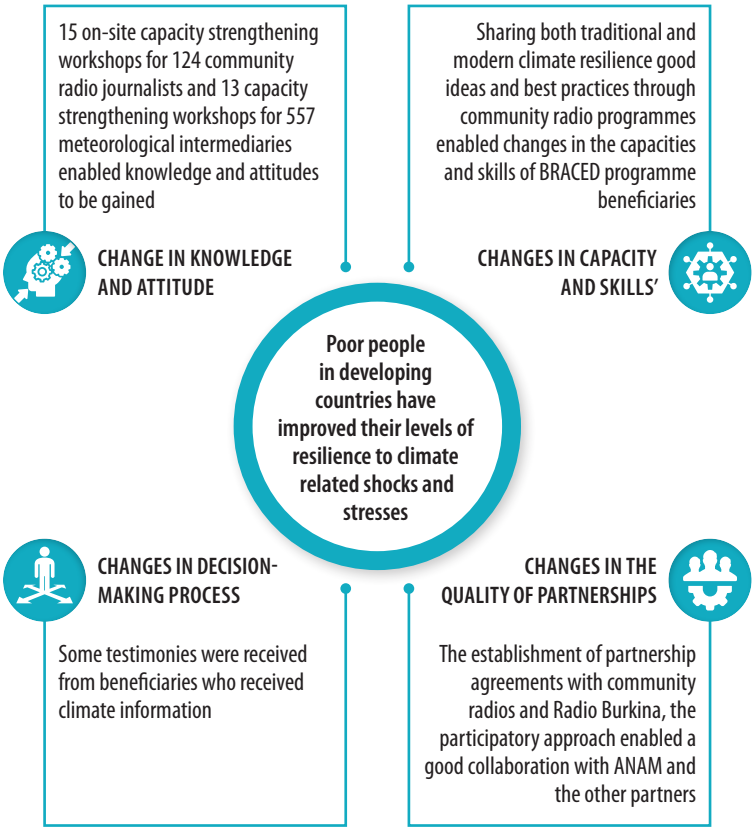
## Dates

January–August 2014 (project development phase): January 2015–March 2018 (main project)

## Countries

Burkina Faso

## AREAS OF CHANGE




Domains of change resulting through Zaman Lebidi. *(Adapted from: Silva Villaneuva et al., 2016)*

## Aim of co-production:

Co-production related to climate services included the following:

- Strengthening the technical and communication capacities of national meteorological services to enable partners to jointly develop forecasts tailored to support agro-pastoralists.
- Developing the technical and journalistic capacities of local community radio stations to address climate risks within ongoing programming and engagement with listening groups.
- The joint development of a Lexicon of Words and Weather Terms in three local languages.
- Reinforcing the integration of climate information within local early warning decision-making bodies and processes.
- Supporting opportunities for ongoing learning between the providers and users of climate services.

## Context:

Bringing together partners operating at local, national and international scales, Zaman Lebidi worked at village level with local governance structures and community organisations. With particular focus on women and children, the project targeted 1.3 million people living in areas where the principal livelihoods are farming and livestock. Prior to the project, among the partners and at-risk people in the areas where project activities were undertaken, access to, and use of climate information, was low. Products of the Burkina Faso National Meteorological Agency/*Agence National de la Météorologie* (ANAM) were considered unreliable, overly technical and inaccessible.

## Who was involved and what were their roles?

Coordinated by Christian Aid, the BRACED Zaman Lebidi consortium brought together NGOs working in water infrastructure, health, agriculture, gender and communications, the national meteorological agency ANAM, the Met Office, *Radiodiffusion Télévision du Burkina* (RTB), Internews, King's College London (KCL) and national academic institutions. KCL developed a learning framework and coordinated a series of learning events on communicating climate information, integrating climate information within local government decision-making and co-production related to resilience building. The Met Office provided training, including post-event analysis, forecasting and verification, and ANAM and the UK Met agency shared differing climatological datasets and climate information needs. Project partners, with ANAM, jointly developed climate information tailored to support agro-pastoralists in the zones of project focus. Internews trained and provided mentoring to radio producers and technicians to enable the broadcast of this information. They also coordinated the co-production of a Lexicon of Weather Terms, bringing together the expertise of a wide range of actors.

## How was co-production done?

### Identify key actors and build partnerships; build common ground; co-explore need

Recognising the complexity of factors that impact on the climate resilience of rural households in Burkina Faso, the Zaman Lebidi consortium brought together multiple actors with diverse expertise working across scales. Time was required to build a common understanding, with some partners having no prior experience of working with national meteorological services and others no operational experience in Burkina Faso. There were language constraints between Anglophone and Francophone partners and populations speaking different local languages. There was also a need to translate between the sector-specific, technical terminologies of meteorology, climate science, humanitarian

## What was co-produced?

- **A suite of decision-relevant, non-technical climate information services**: These included seasonal forecasts, weather warnings and resilient farming practices tailored to support agro-pastoralists and provided through a range of languages and channels, including email, community radio and SMS/IVT platform via mobile phone.
- **A Lexicon of Words and Weather Terms**: This provided definitions in three local languages (Moore, Gurmencéma and Fulfuldé), French and English, and included a guide to the abbreviations employed within the project-initiated SMS climate services.
- **A series of learning papers**

### Benefits of the co-production approach

- Co-production and communication of relevant climate information via accessible channels increased access to, and use of, climate information. Farmers used the forecasts to decide where, when and what to plant and how to protect their assets from severe weather events, disease and pests.
- Among project partners, there were notable changes in the knowledge and attitudes, capacities and skills, and the quality of partnership (see image).
- Many partners felt that working in a consortium with multiple, diverse organisations was a major strength in developing integrated approaches to resilience building.
- Learning workshops and joint village-level assessments created spaces for sharing information and building trust. Having an academic partner with a learning remit supported the ring-fencing of resources for learning.
- Actors recognised the need to ensure continuation of climate services post-project. ANAM and CONASUR budgeted for the continued communication of climate services and training of focal weather intermediaries. Local radio stations agreed to continue transmitting climate services. The project supported ANAM's development of a Climate Information Communications Strategy.

aid, disaster risk reduction, development and resilience-building programming and academic research. During the Project Development Phase, KCL developed a framework and principles to support agreement about ways of working and to promote internal and wider learning.

A workshop in 2016 provided a first opportunity for the national meteorological service to directly discuss with humanitarian and development partners the climate information which they produce. This provided a foundation from which to develop a common understanding about the processes required to produce and deliver decision-relevant climate information. Partners recognised the importance of engaging with local knowledge in building the trust, cultural appropriateness and livelihood relevance of national meteorological service's forecasts.

#### Co-develop solutions

Partners jointly developed climate information tailored to support agro-pastoralists in the zones where BRACED partners were operating. Uncertainty over long-term responsibility for translating climate information into contextualised advice on livelihood approaches highlighted the need for ensuring engagement with extension services.

Internews worked with radio stations which, prior to the project, had mostly not been broadcasting weather or climate information. They provided production and communication training, emphasising the importance of bringing together local and scientific knowledge and ensuring inclusion of diverse perspectives. Joint research among the focus at-risk populations enabled the identification of appropriate ways and terms for communicating climate information, as well as existing good practices for addressing climate risks.

Internews also coordinated the co-production of a Lexicon of Weather Words and Terms that sought to reduce misunderstandings between meteorological experts, journalists and decision-makers. Bringing together farmers, journalists from local radio stations, community leaders and meteorological agency officials over two days, the group identified 517 key terms that required definitions in non-technical language. The development of the definitions took nine months and involved meteorological experts from ANAM and the Met Office, journalists, researchers from the National Centre for Scientific and Technological Research/*Centre National de la Recherche Scientifique et Technologique* (CNRST), the National Council for Emergency Assistance and Rehabilitation/*Conseil National de Secours d'Urgence et de Réhabilitation* (CONASUR), farmers, linguists, translators, sociologists, engineers, forecasters and community leaders.

#### Co-deliver solutions

RTB broadcast ANAM forecasts in local languages, which were then relayed, by local radios, to rural people, listeners' groups, municipal councillors and village councils for development, and early warning, committees. The Radio Listening Committee, comprising Internews and journalists specialising in national languages, monitored the quality of radio programmes.

Forecasts were simultaneously broadcast via Digital solutions for agriculture (ESOKO's) EcoData platform via mobile phone to 1 200 intermediaries. The platform made it possible to both directly reach targeted groups and collect instantaneous feedback.

### Ongoing learning

To enable learning to inform ongoing work, KCL facilitated a series of learning events. Learning was synthesised in a series of policy briefs and discussed in the project's Steering and Technical Committee meetings, as well as being shared widely.

## Lessons to learn from:

- **Ensuring the involvement of the national meteorological services from the project design phase**: Insufficient resource allocation at project outset, and meeting national contracting regulations, led to difficulties in engaging ANAM as a full project partner. The evolving situation also highlighted how engagement may be affected by changes in political leadership and policy priorities.
- **Investing sufficient time:** Time is needed to build a shared understanding of, and common approach to, the steps in the process of developing decision-relevant climate services.
- **Clarifying roles and responsibilities:** Each step in the co-production process should be clear on roles and ensure that these are sufficiently resourced.
- **Flexible programming**: Building resilience to climate risks requires flexible programming and extended time frames. Given the short project time frame, partners felt obliged to deliver climate information to meet programme time frames rather than as required by seasonally-based livelihood activities.
- **Promoting sustainability by working through existing channels and networks:** Strengthen the capacities of local government and consider the benefits of using existing channels and networks alongside the constraints related to mobile coverage, energy supply and the sustainability of project-initiated channels, such as SMS.
- **Resourcing ongoing individual, organisational and wider learning**: Partners preferred face-to-face collaboration and practical approaches, such as training. Partners particularly highlighted the importance of exploring new ways of conducting local research and learning.
- **Develop institutional incentives:** Value the respective engagement of researchers, technicians, practitioners and decision-makers in the co-production process.
- **Inclusion**: There were unresolved challenges in reaching women due to the timing of radio broadcasts and women's preference for word-of-mouth communication. Investing in building capacities for co-production as close as possible to those people whom a climate service is seeking to support is critical. There is a need to move co-production from a set of project-level activities towards an integrated institutional and professional pathway for learning-based action at local, national, regional and international levels.

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# RCSA: Bringing Climate Services to People Living in Rwanda's Rural Areas


## Authors

**Alison Rose,**
*(arose@iri.columbia.edu);*
**James Hansen,**
*International Research Institute for Climate and Society (IRI) and CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS);*
**Desire Kagabo,**
*International Center for Tropical Agriculture (CIAT)/CCAFS*


## Aim of the project

**The Rwanda Climate Services for Agriculture (RCSA) programme** seeks to transform Rwanda's rural farming groups and the economy by improving climate services and agricultural risk management at local and national government levels in the face of a variable and changing climate.

## Dates

October 2015–December 2019

## Countries

Rwanda

Community members in Kayonza District, Rwanda, discuss the seasonal forecast during a presentation on the Rwanda Climate Services for Agriculture Project. *(Source: A. Nyandwi/MINAGRI Rwanda, 2017)*

## Aim of co-production:

The Rwanda initiative includes four key approaches to co-production: (i) at the level of project design; (ii) at the community level through a structured participatory communication process; (iii) at the national institutional level working with the national meteorological service and agriculture sector agencies; and (iv) embedding an iterative process to collect, aggregate and prioritise farmer feedback into climate service planning. Co-production aimed to improve the suite of climate information products available to the agriculture sector; overcome capacity constraints on both the supply and use of services, and ensure sustainability after the programme ends.

## Context:

The programme was designed to be implemented at a national scale, and had no pilot phase. This limited opportunity for face-to-face dialogue and co-learning among farming groups and climate information providers. Instead, the project partners acted as an intermediary network to accelerate co-learning, and to build capacity on both sides.

## Who was involved and what were their roles?

The project is led by the **CGIAR Research Program on Climate Change, Agriculture, and Food Security** (CCAFS). CCAFS project leaders, based at the **International Center for Tropical Agriculture** (CIAT) in Rwanda and the **International Research Institute for Climate and Society** in New York, act as intermediaries among the various national and international partner institutions and facilitate the co-production processes.

CCAFS/CIAT facilitated training for agricultural extension staff and volunteer Farmer Promoters in the **Participatory Integrated Climate Services** (PICSA) process. In Rwanda, Farmer Promoters are volunteer community members who are trained to be farmer-to-farmer extension agents. The Farmer Promoters, in turn, then train and facillitate farmers to use and understand weather and climate information through the PICSA process.

At the provider level, national institutions – **Meteo Rwanda** and the **Rwanda Agriculture Board** (RAB) – were engaged with the planning process. They also interact continuously with IRI though knowledge exchange and learning. The project supports Meteo Rwanda to design, deliver and incorporate user feedback into a growing suite of weather and climate information products and services tailored to the needs of agricultural and food security decision-makers. IRI hosted multiple engagements/training workshops with Meteo Rwanda to produce new climate information products used in the PICSA process, and products identified by RAB for government-level agricultural planning.

## How was co-production done?

The Rwanda initiative includes several key approaches to co-production. First, the project was designed by an agricultural research-for-development network (CCAFS) that has enough expertise in agricultural development and climate science to span the boundaries between agricultural user needs and Meteo Rwanda. Planning involved several workshops, where team members and local key partners gathered to develop the project's vision and guiding principles, devise work plans and timelines, and plan monitoring and evaluation activities, among others (Munyangeri et al., 2017).

## What was co-produced?

- **A platform for co-production at the micro scale**: The project was successful in helping implement a mechanism (PICSA) to support interaction of farmers and their local advisors at a large scale. Through this process, the project has demonstrated the feasibility of scaling up participatory communication and planning. To date, over 1 600 government staff and volunteer farmer promoters have been trained who have, in turn, trained more than 130 000 farmers in the PICSA process.
- **A suite of climate information products**: Meteo Rwanda now has one of the most advanced suites of online climate information products, tailored to the known needs of farmers and other agricultural decision-makers in Africa.

## Benefits of the co-production approach

- Co-production has played a role in creating and improving the climate services value chain in Rwanda.
- Co-production led to a change in perception in valuing other stakeholder knowledge at institutions. For instance, Meteo Rwanda has learned how to better work with many stakeholders, including farmers.
- Knowledge exchange and co-development has influenced IRI's work on maprooms. For example, it has become clear that offering some aspects of the maprooms in local languages is important for uptake.
- Co-production has built IRI's capacity to tailor maprooms to specific country/project needs.
- The confidence and knowledge of Meteo Rwanda has been significantly increased through the co-production approach.
- Through partnerships with local NGOs, the PICSA approach is being introduced in the Joint Action Development Forums (JADF) of local district governments. The introduction of PICSA into existing community programs through faith-based organisations such as the Catholic Church is a clear indication of PICSA's impact and reach.

### Co-explore need

The PICSA approach, which was the core farmer climate service delivery vehicle used in this programme, is an example of co-production on a micro scale. The process brings together farmers and trained intermediaries to collaboratively identify options and management decisions for their particular local context. PICSA uses historical climate records, seasonal forecasts and participatory decision-making tools to help farmers identify and plan livelihood options that are suited to their local context, including climate. This process builds farmers' capacity to understand climate information, and engages farmers and their advisors in collectively identifying and implementing management responses to climate information. The process utilises a training-of-trainers approach to scale up. At the outset, agricultural professionals received training; they, in turn, trained and supported Farmer Promoters. The Farmer Promoters then trained farmers to use and understand climate information. This process,intends to build the credibility and legitimacy of climate information among rural groups.

The project is adapting PICSA to use improved seasonal forecasts, at a scale that is useful for agricultural decision-making. Forecast graphs are presented in a way that shows the probabilities associated with any threshold (e.g. minimum rainfall to meet crop demand) that might be relevant to management options (so-called probability-of-exceedance format). The training builds on a participatory approach developed at IRI and piloted successfully in Kenya, Zambia, Senegal and Tanzania (Hansen, 2016). That leads farmers through a stepwise process that helps them relate their collective memory of past agricultural seasons to time-series graphs. Farmers then understand the probability-of-exceedance format, and the probabilistic nature of the seasonal forecast, in other words, that something like an El Niño can shift the probability of rainfall during an upcoming season (Hansen et al., 2007).

### Build common ground; co-develop solutions

A significant component of the effort focuses on working with Meteo Rwanda to expand the products that it provides, and their underlying data, based on farmers' climate information needs and reqirements of the PICSA approach. The project builds on the IRI's Enhancing National Climate Services (ENACTS) approach, which focuses on the creation of reliable climate information suitable for national and local decision-making. The ENACTS approach integrates local observations and global monitoring data. For example, rainfall products are created by merging satellite data with station observations to provide greater accuracy smaller scales – both in terms of time and geographical space (Dinku et.al., 2017).

The project is supporting major changes to the kinds of climate information that the national meteorological service provides freely and routinely. The ENACTS approach addresses gaps in climate information and also serves the needs of the expanded PICSA process.

As PICSA expanded to use the new, seasonal, 'flexible forecast' format, this change partially defined the products that Meteo Rwanda developed with the support of the project.

## Lessons to learn from:

- **The need for investment in capacity:** For co-production to improve climate services, users must have capacity to effectively articulate demand for improved climate information products and services that may not yet exist, and NMHS must be prepared to change the services they provide in response. Capacity constraints on the demand and the supply sides must be addressed for co-production to be effective.
- **Iterative co-production process:** A typical one-time, survey-based needs assessment is not enough to adequately capture user (farmer) needs. However, an iterative co-production process that captures and aggregates users' evolving demand as they gain experience has proven to be beneficial.
- **Process of communication:** Climate communication processes, such as PICSA, can provide a platform for interaction between farmers and information providers, giving farmers a voice with the intermediaries who work with them, and supporting their decision-making processes.
- **Diversity of approaches:** Co-production of climate services for farmers at the national scale requires different processes than the face-to-face dialogue that is feasible at a pilot scale. In particular, co-production requires institutions that can legitimately capture, aggregate and prioritise farmers' needs.
- **Wide range of stakeholders**: Bringing together the national extension service, RAB, Meteo Rwanda, and boundary experts led to significant changes in the products and services that were offered.
- **The feedback process**: Processes are important for bringing out the users' voice in improved climate services.

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# ALP: Participatory Scenario Planning for Local Seasonal Climate Forecasts and Advisories

## Authors

**Alebachew Adem;**
**Sheri Lim;**
**Fiona Percy**
*(fiona@careclimatechange.org);*
**Calistus Wachana,**
CARE International

## Aim of the project

The **Adaptation Learning Programme** (ALP) for Africa, implemented by **CARE International**, enhanced the capacity of vulnerable households in sub-Saharan Africa to adapt to climate change and climate variability. ALP pioneered community-based adaptation (CBA) approaches and actions with people affected, government institutions and civil society and documented learning and successful practices from experiences among practitioners, researchers and policy actors, Africa-wide and globally. Participatory Scenario Planning (PSP) was one of these approaches.

## Dates

2010–2017

## Countries

This case study covers PSP adoption in Kenya and Ethiopia. PSP was also implemented in Ghana, Niger and Malawi.

An agro-pastoralist in Garissa, Kenya, reading climate advisories
*(Source: CARE ALP/E. Aduma, 2014)*

## Aim of co-production:

The purpose of PSP is to enable decision-making and planning to be informed by locally tailored, co-produced forecasts and advisories. The PSP approach aims to facilitate a multi-stakeholder forum for:

- access to, and collective interpretation of, seasonal climate forecasts, in order to co-produce information that is locally relevant and trusted;
- communication and interpretation that combines knowledge from local actors, sectoral service providers and climate science;
- developing scenarios, advisories and climate-informed plans for decision-making that are more responsive to local needs, and which strengthen climate resilience in livelihoods, sectors, development and risk management processes;
- better informed and coordinated action between sectors to support local priorities and adaptation strategies and to deliver user-centered climate services; and
- iterative learning and dialogue to continuously co-develop climate information and services that are responsive to users' changing contexts and needs.

## Context:

The Adaptation Learning Programme recognised that improved interpretation and communication of climate information to vulnerable rural people and local governments is key to supporting

communities' ability to adapt. Farmers and pastoralists identified the seasonal timescale as the most important for their decisions and planning. ALP developed the Participatory Scenario Planning seasonal climate forecast approach as an inclusive, multi-stakeholder and user-centered service at local government level.

## Who was involved and what were their roles?

The PSP process brings together meteorologists, traditional forecasters, researchers, community members, local government from all sectors available to attend, private sector actors, local NGOs and media, with a strong emphasis on ensuring women's participation. The PSP two-day workshop places all actors and their knowledge on the same level, providing an open space to discuss local priorities, climate information, their contribution to adaptation efforts and to collectively develop forecasts, scenarios and advisories. Meteorological departments present scientific forecasts and learn what information is needed by different users. Traditional forecasters present forecasts based on local observations and knowledge. Community members review the past season and shape the climate information into scenarios for the coming season to ensure it is contextualised, timely and packaged in locally usable formats. NGOs and researchers share experiences linking climate information and adaptation and resilience initiatives. Government sectors inform sector analyses and develop sector advisories integrating the climate scenarios. The private sector shares the types of forecasts and details needed to inform business and investment decisions. Media help guide the process of packaging and communicating climate information to various users.

## How was co-production done?

### Identify key actors and build partnerships; build common ground; co-explore need

The local government started by selecting a local task force to plan the PSP workshop with CARE. The task force involves sub-national government officers, from the meteorological agency, planners, agriculture, disaster risk management and other relevant sectors, plus NGO and civil society participants, particularly those leading adaptation and resilience programmes. The task force comprises

## What was co-produced?

- **Collectively agreed seasonal forecasts**: These combined local, scientific and technical knowledge from users' perspectives.
- **Actionable advisories and sectoral plans**: A range of recommended actions and plans were developed for different sectors and stakeholders based on the forecast information collectively agreed.
- **Agreed methods and messages for communication through a range of channels**: Determining the information that needs to be communicated to whom and when, to help with decision-making and planning. The methods and media for communication and messages will differ for different users.

## Benefits of the co-production approach

- Combining knowledge sources and collective interpretation ensures the forecast is tailored for the local context, increases trust and ownership by the community and increases understanding and respect by meteorological agencies. This approach also builds relationships among participants, encouraging them to cooperate in decision-making and planning.
- Government sectors have a better understanding of climate forecasts from meteorological services. They can use the information to make decisions based on the needs of local users; for sectoral planning and to provide targeted service delivery.
- Meteorological services in Kenya and Ethiopia are now perceived to be more relevant as PSP has enabled active engagement with local and regional users.
- People affected are able to make more informed decisions by understanding seasonal forecast information, climate change and variability, flexible planning and risk management.
- The dialogue process facilitated by PSP ensures actors shift from 'accessing' climate information to 'interpreting and using' it for decisions and planning in managing climate risks and opportunities.

actors embedded in the planning cycles of different sectors with the capacity needed to follow up on the actions from the PSP workshop. Climate knowledge brokers, or intermediaries, play an essential role in designing and facilitating the process so as to ensure identification and participation of the relevant stakeholders representing all local and community interests at the PSP workshop, and to create the space for equitable collaboration.

### Co-develop solutions

The PSP process is grounded in: (i) engagement of all stakeholders, recognising their various roles, responsibilities, knowledge, capacities and limitations; (ii) collective interpretation of climate information through combining local, scientific and technical knowledge from users' perspectives; (iii) communication of outcomes through a range of channels; and (iv) feedback and interactive learning to co-develop climate services that respond to dynamic decision contexts. Every stakeholder has a role to play in the design, production, analysis, packaging and communication of information and advisories. The PSP workshops are conducted as soon as a seasonal climate forecast is made available from the national meteorological services. The workshop provides a multi-stakeholder forum to access, understand and combine meteorological and local seasonal forecasts; to interpret the forecasts, transforming them into locally relevant and actionable information in order to develop advisories and for use in seasonal decision-making and planning. Participants consider climatic probabilities, assess their likely hazards, risks, opportunities and impacts based on a review of the past season and current livelihood and environmental resources, and develop scenarios based on the assessment. Discussing the potential implications of these scenarios on various sectors and livelihood sources leads to agreement on plans and contingencies that respond adequately to the levels of risk and uncertainty. Workshop participants collectively determine the communication of advisories and information – the timing, the audiences, the channels, the format and the languages – in order to reach all actors who need to use the information in good time to inform decisions and plans.

### Co-deliver solutions

PSP forms part of the adaptation planning process, linking community plans and local government response, support and higher level plans. Actors at all levels and across sectors are involved in using the information agreed during the workshop in their planning, decision-making and communications. Stakeholders are responsible for supporting the implementation and facilitation of actions identified within the advisories and seasonal plans.

The scenario-based advisories are packaged and communicated to broader groups of people affected and users through a variety of different means decided by PSP workshop participants, including SMSs, community radio broadcasts, PSP advisory brochures, existing social communication channels and informal meetings. Media and other actors are responsible for communicating these advisories to the audiences and decision-makers they reach.

## Lessons to learn from:

- **Highlighting uncertainties:** While forecast information is important, its value for decision-making is only realised when uncertainties are explicit and the range of possibilities are considered. Rather than planning around the most likely forecast outcome, scenario-based planning considers a series of outcomes given the uncertainty in the climate, and broader, context. From the scenarios, participants generate a range of options and strategies to manage risks.
- **Involvement of stakeholders**: Design and delivery of a relevant climate service requires the involvement of all stakeholders at all stages of the process. Platforms for equitable dialogue are also necessary in order to fully understand and interpret climate information, levels of uncertainty and the need, use and usefulness of the climate service.
- **Matching local knowledge with climate data**: Linking local knowledge of previous climate and livelihood impacts with past climate data, and linking climatic information with crop data such as rainfall requirements can reinforce collaboration and better tailoring, thus allowing for improved interpretation and application of future forecasts.
- **Integration into sectoral planning processes**: For continued effectiveness, the PSP process should be institutionalised in sectoral planning processes, to ensure climate services are integral to adaptation planning, disaster risk management and climate-resilient development.
- **The value of M&E systems**: Systems for continuous monitoring and evaluation of the PSP process so as to generate feedback and learning on the use of seasonal forecasts and advisories is important to continually improve the process and ensure it is meeting the needs of users.
- **Role of climate knowledge brokers**: The role of climate knowledge brokers is essential in providing neutral intermediaries to facilitate communication, dialogue and feedback to service providers, and in enabling equitable co-production processes.

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# Climate Risk Narratives: Co-producing Stories of the Future


## Authors

**Katinka Lund Waagsaether**
*(katinka@csag.uct.ac.za);*
**Alice McClure;**
**Anna Steynor;**
**Chris Jack**


## Aim of the project

The **Climate Risk Narratives** project was designed to help foster better uptake of climate information into decision-making processes at the city scale. The narrative process is an engagement device for interrogating, deliberating and building knowledge about climate risk.

## Dates

October 2017–September 2018

## Countries

Botswana (Gaborone), Zimbabwe (Harare) and Malawi (Blantyre)

Discussing a climate risk narrative for Gaborone *(Source: A. McClure, 2018)*

## Aim of co-production:

Climate risk narratives are stories describing a subset of plausible – yet certainly not definitive – futures within the spread of climate projections, intertwined with local context, impacts and vulnerabilities. The Climate Risk Narratives project set out to:

- better understand how people from different backgrounds engage with climate information, particularly the narratives;
- better understand how the narrative process might be refined to suit people from particular backgrounds or accommodate a broader group of stakeholders; and
- develop narratives for Blantyre, Gaborone and Harare with a variety of stakeholders in these cities with the aim of presenting these at a local city forum.

## Context:

Within this project, the narrative work has been conducted at the city level within three southern African countries. The approach was developed in response to decision-makers' struggle to interpret climate projections in the form of spatial plots and graphs, with uncertainty presented as ranges of quantiles or similar. Narratives are an alternative to this means of communication. They are textual stories of plausible climate futures to which stakeholders can add their knowledge of potential contextual impacts and solutions.

## Who was involved and what were their roles?

The project process was led by a team of researchers from the University of Cape Town (UCT), University of Botswana, Chinhoyi University and the Polytech University of Malawi. The process included co-production of both the project design and of the narratives. Firstly, the core research team, which included researchers from all these universities, co-designed the planned activities and engagements. This ensured that the project was designed in a way that was relevant to each city. Secondly, the core research team, together with a range of stakeholders from the three cities, co-produced the climate risk narratives for Blantyre, Gaborone and Harare. The in-city research partners led the facilitation processes of stakeholder engagements in their respective cities, with the support of the ICLEI (Local Governments for Sustainability) partners.

## How was co-production done?

### Build common ground

This project emerged out of another, larger project (FRACTAL) where the actors involved had already worked together and built common ground, laying the foundations and building the relationships for this project.

### Co-explore need

In October 2017, the core research team met at a workshop to explore socio-economic related sensitivities in cities of interest, such as outdated stormwater drainage systems, lack of disaster management capacity and informal urban development in floodplains, and how climate might intersect with these sensitivities.

## What was co-produced?

- **Project design**: This included the process in each city.
- **Climate risk narratives**: These covered the cities of Gaborone, Harare and Blantyre.

## Benefits of the co-production approach

- The co-production process resulted in the start of discussions around the integration of climate information into the work of city officials. The process also raised awareness about the potential climate change impacts in the cities.
- Discussions and the bringing together of various stakeholders led to 'less tangible' benefits, such as relationship-building across institutions and seeing the 'bigger picture' of climate-related issues, as well as potential solutions. These relationships set the foundation for ongoing knowledge exchange on issues of climate change (e.g. the exchange of phone numbers between a representative from the meteorological department in Botswana and other city stakeholder groups).
- The co-production process enabled conversations between knowledge holders in the city, contributing towards increased capacity and receptivity, the ability to 'actively and critically reflect on one's own knowledge and that offered by others' (Scott and Taylor, 2019), towards climate information within the city.

Having spent a day collectively exploring and unpacking these sensitivities, team members from Blantyre, Gaborone and Harare spent some time brainstorming what they thought their city might look like in 2040. As these researchers were not climate scientists, they focused on producing general socio-economic narratives – stories outlining the discussed sensitivities, without a particular focus on climate.

### Co-develop solutions

After the workshop, climate scientists reviewed the initial draft narratives for Blantyre, Gaborone and Harare through a climate lens, ensuring that, when overlaying the range of plausible climate futures, the narratives were credible. After receiving this feedback, the narratives were reviewed and expanded further by the in-city researchers and their colleagues.

Using the narrative drafts as a basis, in-city researchers then conducted engagements with government, private sector and civil society organisations and institutions with varying levels of influence over development in each city. Engagement methods included the distribution of a survey co-developed by the core research team, workshops and individual engagements. Through these engagements, city researchers collected information on climate risk perceptions, reactions to the narratives, as well as information on how these narratives might be revised to better capture the ideas of a broader range of stakeholders.

In order for the process to best fit the context, these in-city engagements were slightly different in each city. For example, in Zimbabwe, political turmoil during the course of the project meant that the city practitioners' attention was focused, understandably, elsewhere, and engagements were more challenging to organise. Harare city officials were therefore interviewed individually. In Gaborone and Blantyre, structured and highly participatory workshops were held, to which a variety of participants were invited. Through these various engagements in the cities, the in-city researchers further shaped and developed the climate risk narratives for their city.

### Evaluate

After in-city engagements had taken place, the core research team from across southern Africa met again at a second workshop in July 2018. The main objectives of this workshop was to reflect on the processes in each city; to explore the data that was collated and to collectively decide on a set of useful outputs. In particular, the group reflected on the processes in each city and how a variety of stakeholders, in different contexts, received the narratives.

## Lessons to learn from:

- **Flexibility**: Responding to the unique dynamics of a specific city or context requires an element of flexibility. Different contexts involve different political and social dynamics that need to be acknowledged and respected.
- **Location-sensitive**: Appropriate co-production approaches are always location-sensitive. It should never be assumed that what worked well in one location will easily transfer to a different area. However, several principles, such as inclusion, and valuing different voices and types of knowledge equally, are readily transferable.
- **Valuing less tangible outputs**: It is important to see the value of the 'less tangible' outputs, such as conversations triggering actions and the building of relationships.
- **Conscious facilitation is required**: To ensure that strong voices do not dominate quiet voices, conscious facilitation is required. However, ultimately, it is inevitable that the final product will reflect a certain set of participants' perspectives. It is therefore important that a set of textual or graphic narratives are not considered the final climate information output for a city to be inserted into decisions. Rather, these stories should be iterated, continuously incorporating perspectives from a broad set of stakeholders.

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# ENACTS: Developing Climate Services for Malaria Surveillance and Control in Tanzania


## Authors

**Madeleine Thomson**
*(mthomson@iri.columbia.edu);*
**Aisha Owusu,**
*International Research Institute for Climate and Society (IRI);*
**Sumaiyya Thawer,**
*Swiss Tropical Institute Tanzania*


## Aim of the project

The aim of the **Enhancing National Climate Services** (ENACTS) project is to create operationally relevant climate services for the national malaria programme in Tanzania.

## Dates

2012–present

## Countries

Tanzania

Participants at Climate Services for Resilient Development (CSRD) Technical Exchange: ICPAC and National Climate Maprooms – Existing and New Tools for Drought Monitoring and Forecasting in Eastern Africa, held in Zanzibar, August 2017 *(Source: Catherine Mungai, CCAFS, 2017)*

## Aim of co-production:

The purpose of the co-production process in Tanzania was to identify both general and specific climate information needs of the health sector – primarily the malaria community – that could be reasonably filled using the **Enhanced National Climate Services** (ENACTS) data and products delivered via the ENACTS Maprooms of the **Tanzanian Meteorological Agency**. The aim of this co-production process was to inform malaria decisions in a systematic way and change relationships, trust, and demand in a manner that had not been realised though previous singular and siloed approaches.

## Context:

ENACTS creates quality assessed climate data at the national level, combining the best available global and local data. Through ENACTS Maprooms – a data tailoring service – the data is tailored to create pre-digested products and services that explicitly meet the needs of operational communities, specifically in the agriculture and health sectors. The evolution of these ENACTS Maprooms is dependent on a co-production process that requires pro-active user engagement and iterative interaction with ENACTS implementers and maproom developers.

## Who was involved and what were their roles?

Initially the **International Research Institute for Climate and Society**, a boundary institution, led on co-production activities. The IRI had the role of intermediary in the process as it has strong links to both the meteorological and health community. Also the IRI is well positioned to access external funding to support capacity-building activities for both the health and climate sectors. However, once the ENACTS Maproom services were integrated into the malaria control programme planning process, the National Malaria Control Programme (NMCP) continued to engage directly with the Tanzania Meteorological Agency and reported back to the IRI on continuing progress, when requested.

The major and multiple actors involved in this co-production process through different initiatives included: (i) the TMA who implemented ENACTS, built internal capacity and helped train users; (ii) the National Malaria Control Programme of the Ministry of Health who engaged in stakeholder discussions, trained NMCP district-level staff and gave feedback on relevance and usability of information provided; (iii) the President's Malaria Initiative (PMI) – both Centre for Disease Control (CDC) and US Agency for International Development (USAID) staff – who invested time and energy in the coordination and identification of funding; (iv) the **Swiss Tropical Institute** and the **Ifakara Health Institute** (IHI) who provided technical support to the NMCP; (v) the **Global Framework for Climate Services** project partners who organised training activities; (vi) the **Roll Back Malaria** executive board who identified new ways of expressing the value of climate information in terms of reputational risk to control programmes; and (vii) coordinating staff from the **World Health Organization** (WHO) Tanzania Office and World Meteorological Organization/WHO Joint Office (Geneva) who provided resources, coordination and political engagement between the Ministry of Health and the TMA.

## What was co-produced?

- **Readily available maprooms**: Designed using global data, maprooms were recreated using higher quality ENACTS data products. ENACTS products and services were tested for use in specific health contexts and modified as needed based on user recommendations.

- **New ENACTS Maproom products and tools**: These were tailored for the national malaria programme in Tanzania. One specific tool, Weighted Anomaly Standardized Precipitation (WASP), was developed to assist with the assessment of the impact of interventions. A description of the tool and its use was later published in a special issue of the *American Journal of Tropical Medicine and Hygiene*. This issue, on malaria impact assessment, was organised by the President's Malaria Initiative (Thomson et al., 2017). This new tool was then integrated into other implementing countries of the ENACTS Maprooms.

## Benefits of the co-production approach

- The National Malaria Control Programme reported a significant improvement in the responsiveness of the Tanzania Meteorological Agency to their requests. A much greater interest from the malaria community in using climate information has been observed.
- The capacity at the TMA to implement ENACTS and maintain the system over five years has significantly changed the ability of the TMA to service user needs.
- The co-production processes in Tanzania have already extended beyond individual projects and beyond IRI's facilitation. For example, the NMCP incorporated 'climate information' as a component of its National Malaria Transmission Surveillance System – a part of the larger, integrated and comprehensive Malaria Surveillance Framework.

## How was co-production done?

Co-production of climate services for malaria in Tanzania was first initiated in 2012 in response to a request to IRI by members of the Tanzanian Malaria Impact Evaluation Group involving NMCP, Ifakara and the President's Malaria Initiative (Smithson et al., 2015). Over the years, different requests have been made to the TMA and IRI, and new capacities in the malaria community, and at the TMA, have been developed.

### Co-develop solutions

In practice, the ENACTS implementation approach in Tanzania has evolved slowly over time with a series of in-country workshops, hands-on training, and other interactions involving multi-stakeholders (policy-makers, practitioners, meteorologists, etc.) and technical support to the TMA and the NMCP. Specifically, technical support to the TMA to develop the ENACTS data and Maprooms was provided with USAID funding through a cooperative agreement with the IRI.

Co-production processes effectively began at the point where decision-relevant climate products were being conceptualised. The process involved the development of climate data, information, products and services as well as their uptake and use by practitioners, researchers and policy-makers. ENACTS was conceived through the ongoing interaction of climate and sectoral specialists at the IRI with over a decade of practical experience working with national meteorological services and health practitioners in Africa.

### Co-deliver solutions

Evidence of the utility of ENACTS data and services for malaria control and elimination programmes was shared at a number of capacity-building workshops in Tanzania and Ethiopia. These engagements helped to communicate the approach amongst the malaria community and get further buy-in from policy-makers and practitioners in the co-production process.

## Lessons to learn from:

- **Continued support and engagement:** Through experience, the IRI/NMCP and the TMA found that stand-alone training events are insufficient to build capacity of users to proactively use climate information. Workshops need to be reinforced with appropriate online training materials, follow-through technical support and engagement with peers who are also interested and motivated to use climate information.
- **The need for a basic understanding of climate:** A basic understanding of how the climate works and how climate drives health impacts is also critical for the user community.
- **Involvement of high level organisations:** The IRI found that engagement at the higher policy level in the malaria community was also important – both through the IRI's status as a World Health Organization Collaborating Centre – and its direct work for the President's Malaria Initiative in Washington DC and the Global Framework for Climate Services. Policy congruence is clearly critical in the development of climate services as it creates the link between international funding streams and national priorities.

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# FATHUM: Forecast for Anticipatory Humanitarian Action


## Authors

**Liz Stephens,**
*University of Reading;*
**Erin Coughlan de Perez,**
*Red Cross Red Crescent Climate Centre*
*(coughlan@climatecentre.org)*


## Aim of the project

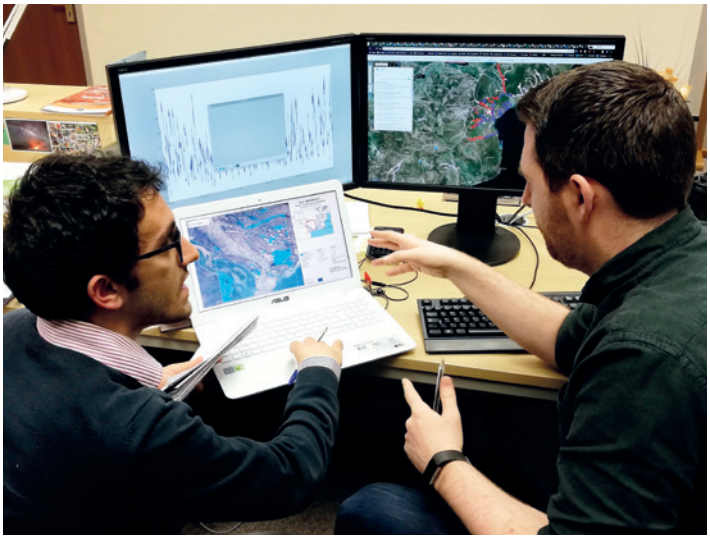
The aim of the **Forecast for Anticipatory Humanitarian Action** (FATHUM) project is to undertake research to support the implementation and scale-up of Forecast-based Financing (FbF) locally, nationally and internationally. Forecast-based Financing comprises a set of initiatives, undertaken by the **Red Cross Red Crescent movement** and other humanitarian agencies, which makes funding available for early action on the basis of early action protocols or standard operating procedures developed by teams of humanitarians and weather forecasters. FATHUM researchers are linking together research on forecast predictability and skill, complex drivers of risk, multi-actor perspectives on successful implementation and financing mechanisms to catalyse and facilitate the scale-up of Forecast-based Financing for effective, appropriate and impactful action before a disaster.

## Dates

December 2016–November 2021

## Countries

Uganda, Mozambique and South Africa



Mapping flood hazards in Mozambique *(Source: D Decremer, 2019)*

## Aim of co-production:

Co-production activities in FATHUM included designing and conducting research to ensure that project outputs would lead to actions within the humanitarian community. FATHUM research is produced with cross-disciplinary and cross-continent connection and reflection. Researchers work together with practitioners to talk through the implications of research as results emerge so that outputs can be co-designed in the most relevant and useable format.

## Context:

Within the FATHUM project, co-production is defined as full collaboration in all aspects of the research, from defining topics, co-designing and co-implementing research and encouraging interdisciplinary reflections on research outcomes to publicising and applying the research results.

In order to analyse forecasts and select and assess worthwhile actions, humanitarian practitioners needed to involve the research community. In addition, it was critical for scientists to collaborate with humanitarian practitioners on an ongoing basis to ensure that the research being carried out, and associated deliverables, best met the emerging and dynamic needs of the FbF community.

## Who was involved and what were their roles?

The **Red Cross Red Crescent Climate Centre** has acted as an intermediary, helping explain research priorities to scientists and translate research results into language that is clear for disaster managers. The Climate Centre and the German Red Cross have also supported the convening of an interdisciplinary group of partners in the global and regional Dialogue Platforms on FbF. The university researchers have also acted as intermediaries between the humanitarians and the producers of global climate data, such as the **European Centre for Medium Range Weather Forecasts** (ECMWF). The researchers will provide an overview of the data that is available, and feed back to the global data producers the requests and ideas of the interdisciplinary consortium for upstream changes to forecast development.

One of the four Work Packages involves a social anthropologist whose role is to document different perspectives on the FbF initiative from international donors through to local Red Cross volunteers. In addition, researchers in a different Work Package have undertaken fieldwork at community level to best understand how Forecast-based Financing can work in different contexts.

## How was co-production done?

### Identify key actors and build partnerships; build common ground; co-explore need

At the design stage, FATHUM research questions were co-produced between university partners with interdisciplinary expertise, the Red Cross Red Crescent Climate Centre, the **Overseas Development Institute** and the **World Food Programme** (WFP). These partners were all involved in the initial Dialogue Platforms for Forecast-based Financing, and had engaged with national Red Cross Red Crescent societies and climate service providers such as the ECMWF, which is now implementing the Copernicus Climate Change Service.

### Co-develop solutions

The **University of Reading**, as the Principal Investigator of the grant, has led on co-production activities. Geographical distance means that most engagements during the year happen on Skype and email. Annual project meetings and smaller meet-ups

## What was co-produced?

- **Research within four Work Packages**: FATHUM research is produced with cross-disciplinary (and cross-continent) connection and reflection. Research included:
  - how far in advance flooding can be forecasted;
  - the relevance of the local context for enhancing or discouraging the effectiveness of FbF;
  - multi-stakeholder definitions and criteria for success in FbF; and
  - the political economy of scaling up FbF.

### Benefits of the co-production approach

- The constant collaboration has allowed the project to evolve to produce research deliverables that are most needed by the different implementations of FbF carried out by Red Cross Red Crescent societies on the ground, avoiding researching outdated questions.
- The most useful and valued co-production in terms of the climate services knowledge value chain are the 'take-home messages' of the research work.
- After the research is produced, the co-production process of workshopping the results in terms of their relevance for disaster management has helped ensure they are fully applied.
- There is already evidence of collaboration on new projects and grants among the partners.
- The co-production process has played an important role in informing improved climate services that are more relevant for the needs of FbF.

across different Work Packages have provided time for people to collaborate face-to-face. This process was largely dictated by geographical distance; meeting more regularly in person may have built better relationships to ease co-production but this was simply not feasible in terms of time or budget.

Co-production is prompted by effective communication, which enables the identification of points of interaction across different Work Packages. Initially, the challenge at the beginning of the project was to come up with a process for engaging that did not overwhelm. The plan was for the Work Package leaders to have regular virtual meetings, allowing them oversight of all the ongoing activities within each Work Package. Regular summary emails were sent to the whole team, but it was not clear who was reading them. Subsequently, a regular time for a monthly call for everyone was scheduled. Depending on internet connection, most people are able to join. The monthly FATHUM calls allow everyone to be updated on progress, and to identify synergies across the project and with external work, prompting co-production of research outputs that are relevant across different organisations. These calls have developed organically in structure, but, in general, have worked well, with team members going on to share relevant outcomes with people and organisations flagged during these calls.

#### Co-deliver solutions

Initial engagement with the humanitarian community suggested that there may be over-optimism about the potential of seasonal rainfall forecasts to be used for flood forecast-based action. FATHUM researchers addressed this by co-designing and implementing research that showed the limitations of using such forecasts in this way (Coughlan de Perez et al., 2017) and developing more decision-relevant seasonal river flow forecasts (Emerton et al., 2018).

The Mozambique Red Cross is using FATHUM research on cyclone wind speeds and flood risk in its Early Action Protocol, which has been approved for forecast-based funding by the International Federation of Red Cross and Red Crescent Societies. Other countries that are developing their protocols have also started to consult the result of forecast analysis done by FATHUM researchers, including Kenya, Uganda, and Ethiopia.

During Cyclones Idai and Kenneth, which affected Mozambique in 2019, FATHUM researchers worked with the UK Department for International Development, now the Foreign, Commonwealth and Development Office (FCDO), and other partners to deliver flood hazard and exposure briefings. It was the first time this information

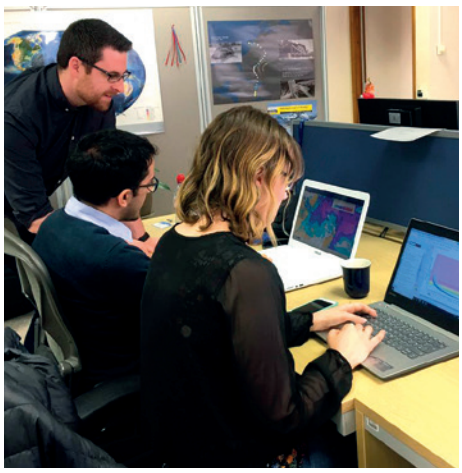
had been provided in an operational context and the approach taken evolved based on feedback from FCDO about what information was required by decision-makers during the events.

Based on questions and discussions with FATHUM researchers, the team co-produced an operational guidance document for practitioners, called 'What can go wrong with FbF?'. This features guidance and advice to help humanitarians avoid potential pitfalls in this work, based on learning so far.

## Lessons to learn from:

**Including practitioners as co-investigators:** The grant is still in progress, so it is difficult to evaluate what has worked. FbF only emerged in 2013. Prior to that there was very little engagement between humanitarian practitioners and academics on large research projects about Early Warning Early Action. As a result, the approach of including practitioners as co-investigators within an interdisciplinary project team has been a step in the right direction.

**Cross organisation connection and reflection**: Certainly, there is now a growing academic community around FbF which, in many ways, pivots around research being carried out by the FATHUM team. The critical component for FbF research is to ensure that there is cross-disciplinary and cross-continent connection and reflection, and that researchers are working together with practitioners to talk through the implications of research as results emerge so that outputs can be co-designed in the most relevant and useable format. This is often achieved by establishing personal connections, which ideally needs to be done at an early stage within the project.



SHEAR (Rebecca Emerton and Andrea Ficchi) working with operational forecasters at ECMWF on the flood emergency report on cyclone Kenneth *(Source: H. Cloke, 2019)*

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# FRACTAL: Learning Labs, Dialogues and Embedded Researchers in Southern African Cities

## FUTURE RESILIENCE FOR AFRICAN CITIES AND LANDS (FRACTAL)

*Growing Climate Knowledge for Action in Urban Africa*


Graphic representation of FRACTAL co-production process *(Source: FRACTAL, 2016)*


### Authors

**Katinka Lund Waagsaether** *(katinka@csag.uct.ac.za);*
**Alice McClure,** *Climate Systems Analysis Group, University of Cape Town*


### Aim of the project

The aim of the **Future Resilience for African Cities and Lands** (FRACTAL) project is to: (i) advance scientific knowledge about regional climate responses to human activities such as burning fossil fuels, changing land surface cover etc.; and (ii) to work with decision-makers to integrate this scientific knowledge into climate-sensitive decisions at the city-regional scale, particularly for water-, energy- and food-related decisions with a lifetime of 5 to 40 years. FRACTAL is designed to work across disciplines within the scientific community and foster strong collaboration between researchers, city government officials and other key decision-makers in southern Africa.

### Aim of co-production:

Processes and modalities for knowledge co-production are an integral part of the FRACTAL project design, from the team structure through to the engagements in each city. In its most basic sense, knowledge co-production in FRACTAL can be defined as the combining of two or more different types of knowledge, skills and working practices by bringing together people who think and act in often very different ways in order to create new knowledge for addressing societal problems of shared concern and interest. The co-production approach is used to provide a mutual learning platform where capacity building can take place and the ethic of working together and collaboration for solving problems in cities is facilitated.

## Context:

The project has been implemented at the city-regional scale to influence decision-making in the city context. Co-production was not explicitly defined in the proposal, and, as noted in the FRACTAL working paper on 'Transdisciplinarity, co-production, and co-exploration' (Taylor et al., 2017), the understanding of co-production is evolving throughout the project. Co-production was not introduced at a certain stage to produce a climate-related product but is a continuous, ongoing working ethic and principle for building relationships to solve problems related to climate change in southern African cities.

## Who was involved and what were their roles?

Climate Systems Analysis Group (CSAG) led the consortium of researchers who designed and implemented the co-production process. Researchers were embedded in the cities of Lusaka, Maputo, eThekwini, Windhoek, Harare, Gabarone, Blantyre and Cape Town. The Embedded Researcher works to sensitise academics and practitioners so that neither enter engagements (e.g. Learning Labs or Dialogues) with ignorance, and plays a crucial role in understanding and bringing together the two spaces of academia and practice.

## How was co-production done?

### Build common ground

The Learning Labs and Dialogues are co-production spaces for stakeholders within cities to gather, get to know each other and share and develop knowledge. Dialogues are smaller, more focused gatherings aimed at unpacking particular elements of a broader, complex issue defined in the larger Learning Labs. Both are periodically convened in the three FRACTAL cities to understand the socio-economic context of these urban areas, unpack how climate change might intersect with these dynamics and co-produce knowledge that will contribute to climate resilient development.The frequency of Learning Labs and Dialogues vary from city to city based on how the process and engagements have evolved, with twelve Learning Labs having taken place across the three cities to date.

## Dates

June 2015–June 2019

## Countries

Zambia, Namibia, Mozambique, Zimbabwe, Botswana, Malawi and South Africa

## What was co-produced?

- The most significant co-production element of FRACTAL is the **learning process** itself. Transdisciplinarity co-production, in FRACTAL, is an inclusive approach for creating new knowledge and generating research that contributes to solving complex problems in cities. Emphasis is placed on the knowledge that FRACTAL produces, as well as the lessons learned through the process of people from different disciplines and backgrounds working together.
- **Policy briefs and inputs to policy documents:** These were proposed by government representatives and co-developed through consecutive engagements by practitioner and scientist.
- **Climate change narratives for FRACTAL cities:** co-produced through repeated discussions and additions enabled through FRACTAL Learning Labs and Dialgoues.

## Benefits of the co-production approach

- Having a transdisciplinary co-production approach has changed mindsets and led to a recognition of the value of other disciplines, other industries and other people and to an awareness of the importance of collaboration. Relationship building is a key benefit. Because people are heard, they want to continue engaging and thus see value in these learning processes.
- Learning is also a key benefit of participating in the process.
- Gaps in knowledge for climate-resilient decision-making have been filled through conversations and interactions among climate scientists, governance researchers or decision-makers themselves, producing tailored, tangible knowledge outputs through climate change conversations in the Learning Labs and Dialogues.

### Co-explore need; co-develop solutions

Rather than a neatly, pre-designed step-by-step process, the project enabled a very open and emergent, yet somewhat messy space, from which learning, knowledge and products would emerge. Because of this, co-production processes have differed from one city to the next and defining the concept neatly for the project as a whole is difficult. A commonality across each of the cities is the use of Learning Labs and Dialogues as the key mechanisms of co-production. These processes are designed to be emergent and co-productive, gathering people from diverse disciplines and backgrounds in a room to identify and unpack burning issues for each city and generate a joint knowledge output. Also key to each city process is the Embedded Researcher approach. Embedded Researchers are supported by representatives from partner universities and municipalities, playing a central role in establishing networks and relationships and organising the Learning Labs and Dialogues in each city.

The Embedded Researchers are contracted by partner universities in FRACTAL cities but sit and work within the municipal governance structure. They play an intermediary role between city officials, researchers and politicians, ensuring ongoing and effective flows of communication, data and information. The FRACTAL Embedded Researchers have been crucial for facilitating conversations and knowledge exchange between science, policy and practice, thus supporting transdisciplinary knowledge co-production.

### Co-deliver solutions

While FRACTAL co-production is strongly focused on process and learning, there have been co-delivery of discrete outputs such as city policy briefs, working papers, journal papers and city-specific climate risk narratives. However, solutions start with people and the FRACTAL process has focused strongly on growing the networks within the city to tackle complex problems.

### Evaluate

Learning is integral to the FRACTAL processes. The FRACTAL learning framework facilitates learning among all actors and feeds into the project's monitoring and evaluation process.

## Lessons to learn from:

- **Need sufficient time**: Building relationships and trust takes time. As highlighted by a FRACTAL partner, having sufficient time for each engagement, and for the number of engagements over a period of time, is the biggest success factor that comes to mind.

- **Facilitation**: How and what one facilitates is central to enabling learning and collaboration. Ensuring that the process and learning is fun, takes place in a safe space and enables the building of trust and relationships is key.
- **Valuing the less tangible**: Learning, trust and relationship building is central to enabling good co-production. It is important that all partners involved see the value of these characteristics of co-production. Thus, an open dialogue on these was included at the beginning of the Learning Lab process.
- **Continuity of persons engaged**: Institutions and organisations engaged in the co-production process need to understand the importance of continuous participation in the process by the same individuals. Designing events that people enjoy, and from which they derive a personal and professional value, is an important motivator for people to stay in the process.
- **Not underestimating the challenge of the 'third space'**: The difficulty of working in a 'third space' – a hybrid space where individuals from different backgrounds come together – should not be underestimated, and any project and process should be designed with this in mind. A 'third space' may, for example, be the space in which a social and physical scientist get together to share and produce knowledge; the space in which an academic and a city practitioner get together, or the space in which all of the above come together to share and produce knowledge. It is a space that will break down the disciplinary/professional/practitioner binaries, and allow for the production of new types of knowledge.
- **Flexibility**: All actors need to feel ownership and see the value of what is being learnt or produced. This requires all actors to be engaged from initial project design, or, if this is not possible, the project should be designed with a high level of flexibility, enabling content to be shaped during the course of the project.

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Lusaka 3rd Learning Lab *(Source: R. Jones, 2017)*

Lusaka 5th Learning Lab *(Source: R. Jones, 2017)*

# FONERWA: Climate Risk Screening Tool


## Authors

**Julio Araujo,**
*SouthSouthNorth*
*(julio@southsouthnorth.org)*


## Aim of the project

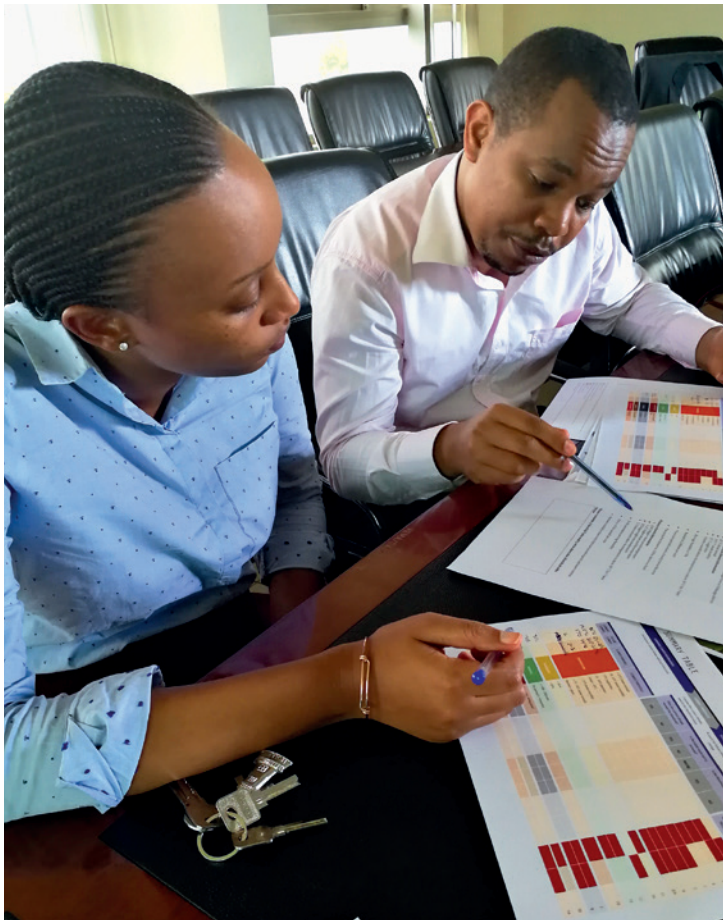
The **Coordination, Capacity Development and Knowledge Exchange Unit** (CCKE), under the **Future Climate For Africa** (FCFA) programme, developed a pilot project for **Rwanda's Green Fund** (FONERWA), Rwanda's Green Fund. The project centred on developing the capacity of FONERWA's project appraisal team to perform a rudimentary screening on all project proposals. The aim was to strengthen the review of applications for climate risks, and provide FONERWA with information they can share with applicants to better incorporate climate information into project design and implementation.

## Dates

February 2016–May 2018

## Countries

Rwanda



Participants engaging with the climate risk screening tool at a FONERWA workshop *(Source: J. Araujo, 2017)*

## Aim of co-production:

While the process was not initially defined as co-production, the project team established that, in order for the project to develop appropriate solutions, mutually build capacity and create ownership, co-production was necessary. One of the limitations to the causal approach to co-production was around financing co-production activities. Since the project did not begin with a co-production approach in mind, there was no allocated funding for multiple co-production activities and incentives. Similarly, this meant that there was a limited budget for project activities which did not involve finance for securing partner institutions. Therefore, financial incentives were not possible for motivating work/activities between the project team and partners. The co-production approach was aimed at building capacity within the FONERWA appraisal team, creating a sense of ownership and validating the results.

## Context:

FONERWA funds a wide range of environment and climate change projects, from community to national scales. While FONERWA funds projects from multiple sectors, the risk screening tool only covers agriculture. However, the principles of the tool can be applied to multiple sectors. Both the FONERWA staff and the project applicants had low capacity with regards to climate risks and climate change impacts. In order to both build the capacity of the relevant people as well as develop a tool that is relevant and accessible, co-production was necessary.

## Who was involved and what were their roles?

CCKE was the project team that led the co-production process. Initially, the project team expected to co-produce a climate information factsheet with the Rwanda meterological agency, **Meteo Rwanda**. However, the initial process, when it began, was one-sided, favouring the project team's work, which created tension with the partners and prevented co-production taking place with Meteo Rwanda.

In order to develop contextually relevant climate-smart agriculture information, the FCFA project team worked in partnership with the **International Center for Tropical Agriculture** to inform the development of a risk screening tool.

In order to ensure that the risk screening tool was appropriate for FONERWA's needs, further co-production occurred with the FONERWA team, in particular their private and public sector specialists who deal directly with the project teams applying to the fund.

## How was co-production done?

The co-production process was run through a combination of formal and informal relationships with project partners. However, no co-production was done with regards to the climate data and information that was used in the initial **climate factsheet** that was developed for FONERWA. As the co-production process was not initiated at the start of the project, a certain level of trust and goodwill was needed before the partners were able to collaborate with the project team.

## What was co-produced?

- **A Climate Risk Screening Tool:** This tool, informed by climate-smart agriculture information, was co-produced to support the FONERWA appraisal process. The tool collates crop and livestock information relating to current climate impacts to provide an improved understanding of climate impacts and the associated risks for project development and sustainability as well as options for potential solutions, such as a range of Climate Smart Agriculture (CSA) practices.

### Benefits of the co-production approach

- The co-production process increased the capacity of FONERWA project staff to discuss and make sense of climate information.
- The process has lead to greater trust between the project team and partners, which could allow for easier collaboration on any future project.
- A key outcome of the approach is the ability of FONERWA to implement a formalised process to screen agriculture projects for climate risks and support staff in decision-making.

Initially, it was expected that climate information for the climate factsheet would be co-produced with Meteo Rwanda. This involved an initial desk-based draft from the project team and a workshop to discuss findings and explore options for future versions of the factsheet. However, the initial process was one-sided, favouring the project team's work, which created tension with the partners and led to a decline in the interest to participate in the output. As a result, the factsheet was still completed but was not endorsed by Meteo Rwanda, reducing its credibility in-country. The partnerships were formalised in a Memorandum of Understanding that outlined the responsibilities of the project team and the partner. However, issues around financial incentives and/or capacity development meant that the co-production failed to take place.

#### Co-explore need

The co-production process with FONERWA took place at two formal workshops and training sessions, and the Project Document (PD) clinic – a workshop FONERWA runs, to help project developers build their final proposals. While the entire FONERWA team were involved in the workshops, the core co-production revolved around collaborations with their private and public sector specialists who deal directly with project teams applying to the fund. These engagements were used to explore the type of information needed to promote uptake of climate information and influence the FONERWA review process. During these workshops, FONERWA staff shared insight on how the project could improve their decision-making. Additionally, input from sector specialists gave rise to multiple revisions to the risk screening tool.

#### Co-develop solutions

Co-production occurred with the CIAT through multiple in-country engagements, and expanded on previous **CIAT work**. The project team defined co-production, which included the joint creation of information through a desk-based analysis and design from the project team and validating the results from the in-country partner. No formal partnership was established. However, mutual interest in the importance of strengthening FONERWA's capacity and developing climate-smart projects within Rwanda allowed for an informal agreement between the project team and the partner on work to be co-produced.

#### Co-deliver solutions

Throughout the co-production process, the risk screening tool was intended to be a FONERWA product that fit with their existing processes. While the co-production process created a sense of ownership, the final tool was branded as a FONERWA product and

not under the FCFA branding guidelines. This further added to the sense of ownership by FONERWA. An initial baseline survey, and subsequent surveys, tracked the perceived change in capacity among the FONERWA staff. Similarly, the training workshops were designed to build the capacity of the group, while the PD clinics and use of the tool was designed to begin the process of building the capacity of the project developers. Within all workshops, the participants were introduced to the basics of climate change and climate processes, including the methodology for the climate factsheet and the risk screening tool. Each engagement with the participants built on the progress of the last.

## Lessons to learn from:

The co-production approach worked well in terms of building capacity and creating a tool that is tailored and useful for the user needs. However, the approach would have been more effective were there more funds available and more regular in-country engagements. Some of the key lessons are outlined as follows:

- **Supporting capacity for co-production:** While co-production worked well to primarily incentivise participation in the project and build trust, without financial incentives it was not possible to appropriately attract partners who do not have a vested interest in the project outcomes. Not having dedicated funds for partner needs, such as capacity building and/or remuneration, significantly reduced their ability and willingness to co-produce. A certain level of capacity is needed before co-production of information and products can take place. Without this, users struggled to fully articulate their needs, which initially hindered the project team from developing an appropriate product.
- **Importance of a clear process:** Having a clear process for co-exploration and co-production at the start of the project would have provided better results for identifying the actual needs of FONERWA early on.
- **Collaborative nature of the project:** Sustainability of the project is driven by the co-design of the tool to align with FONERWA's project appraisal process. Similarly, co-producing information with local experts and branding the tool under FONERWA's guidelines created a greater sense of ownership.
- **Opportunity to replciate the process:** This process could be replicated within a similar context, especially for other emerging climate funds that currently do not have a structured climate risk screening process. In order for this process to function at its best, it would require higher levels of collaboration between the funding agency, the national meteorological service, local academic institutions and the teams applying to the fund.

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# MHEWS: Multi-hazard Early Warning System for Coastal Tanzania


## Authors

**Jean-Pierre Roux,**
*SouthSouthNorth;*
**Ladislaus Chang'a,**
*Tanzania Meteorological Agency;*
**Tim Donovan,**
*Met Office*


## Aim of the project

The initial project aimed to co-develop and implement a five-day weather forecast that included a **Multi-hazard Early Warning System** (MHEWS) for Tanzania's coastal communities, particularly those engaged in maritime and fishery activities. Subsequent to the project, the Tanzanian Meteorological Agency (TMA) has successfully operationalised the service as one of its standard forecasting products. As of March 2019, TMA produces the five-day MHEWS forecast on a regular basis.

## Dates

2016–2018

## Countries

Tanzania

| Alama za Athari | | | |
|---|---|---|---|
| Joto Kali: |  | Maporomoko ya Ardhi: |  |
| Mvua Kubwa: |  | Upepo Mkali: |  |
| Mafuriko: |  | Mawimbi Makubwa: |  |

New pictorial symbols were developed based on local needs. For instance, the symbol for 'strong winds' (*upepo mkali* in Swahili) consists of two bent-over palm trees. *(Source: Tanzania Meteorological Agency five-day forecast, 14 August 2018)*

## Aim of co-production:

TMA and the Met Office collaborated to bring together different stakeholders with different aims during the exploration, development and production of the MHEWS.

- **Exploratory phase**: TMA's aim was to build awareness around the agency's general mandate, mission and services. The World Meteorological Organisation's Strategy for Service Delivery and its Implementation Plan was the approach adopted. This approach builds partnerships and common ground between the meteorological service and intermediary stakeholders. It also aligns with the Global Framework for Climate Services (GFCS), which ensures weather information reaches the most vulnerable people affected in Tanzania.
- **Design phase**: The aim of co-production shifted to ensuring that the information in the new forecast, and the way information is presented, would be accessible and relevant to targeted end-users.
- **Production phase (ongoing)**: The aim has shifted to improving dissemination of the new forecast. New co-production skills have also been employed to develop accessible and relevant sectoral advisories based on the seasonal forecast.

## Context:

The MHEWS project originated from a recognition by TMA that they should take action in response to the Sendai agreement on Disaster Risk Reduction. A project between the Met Office and TMA under the WISER programme was funded to address the Sendai framework and the local need of vulnerable fisheries along the coasts and resulted in the MHEWS.

## Who was involved and what were their roles?

The TMA is the producer of the MHEWS service. In collaboration with the Met Office, TMA sought to build partnerships and common ground with national ministries, such as the Disaster Management Department (in the Prime Minister's Office), the Ministry of Agriculture, Livestock and Fisheries, and the Ministry of Transport, which oversees aeronautical policy and regulations. Raising awareness of WCIS in Tanzania and the TMA's mandate was key to establishing common ground with these institutions. These ministries provided political legitimacy for the proposed sectoral, geographic, and temporal focus of the TMA's forecasting services and agreed to support the dissemination of the MHEWS.

During the exploration and development phase, the TMA and the Met Office engaged with a wider group of users and intermediaries through workshops. Users included fishermen, seaweed farmers and traders along the coast, but also several radio stations, which were targeted as the main intermediaries for communicating daily weather forecasts to coastal areas. Users contributed their knowledge on how coastal fishing, farming and trading groups understand and interact with extreme weather events and weather information. In collaboration with a professional communications officer, they also contributed to designing new pictorial symbols to represent hazards. An early version of MHEWS was test-run with a sample of end-users. The preceding co-production assisted in shifting the early warning system from a weather forecast to an impact-based forecast.

Further collaboration between the TMA and the Met Office integrated the MHEWS into the TMA's forecasting services through Standard Operating Procedures (SOPs).

## What was co-produced?

- **A multi-hazard early warning system for coastal affected people engaged in fishing, farming and trading**: The MHEWS consists of a five-day forecast of hazards, including high temperatures, intense rainfall, flooding, strong winds, high waves and landslides. It presents the information in terms of pictorial symbols and colour-coded impact-based warnings rather than metric values, such as knots for wind and millimetres for rainfall.
- **Symbols for hazards**: Users identified the most important hazards and developed easily understood symbols for representing the hazards pictorially. For instance, a flood warning (*mafuriko* in Swahili) is represented by a partially submerged house and strong winds warning. *Upepo mkali* in Swahili is represented by palm trees that are bent over (see image).

## Benefits of the co-production approach

- Multi-stakeholder workshops to co-develop MHEWS increased the TMA's knowledge of what end-users want from the service and how users would like to receive the information so that it can be accessed and used. The workshops also increased TMA's facilitation skills to host multi-stakeholder discussions.
- High-level partnership-building meetings with national ministries raised the awareness of weather and climate information services and the value of the TMA. It also supported political buy-in and support from national ministries to communicate the MHEWS.
- Including radio stations in multi-stakeholder workshops, and hosting dedicated training session for journalists alongside these workshops, increased the capacity of radio stations to report on weather forecasts, particularly impact-based forecasts.
- Hosting a multi-stakeholder workshop alongside the National Climate Outlook Forums increased the capacity of sectoral experts to interpret weather forecasts in terms of sectoral impacts.
- Employing co-production, in general, contributed to the TMA's implementation of the GFCS, and expanded the network of intermediaries that receive the MHEWS and the channels through which the TMA and intermediaries can reach end-users.

## How was co-production done?

Different stakeholders were engaged in different ways to build partnerships, and explore and develop a MHEWS. The MHEWS project used the World Meteorological Organisation's Service Delivery and Implementation Plan as a framework, based on global best practice.

### Identify key actors and build partnerships

Actors and partnerships were identified over the course of many years of implementing of the GFCS. Through high-level meetings and presentations, the noted stakeholders were engaged to raise general awareness on the TMA's services and mandate.

### Co-explore need; co-develop solutions

The TMA hosted several multi-stakeholder workshops in partnership with the Met Office. These workshops brought together users, government, NGOs, and radio stations. The workshops:

- identified the most important hazards;
- developed better ways to communicate hazards to users;
- improved the capacity of the TMA and disseminators to communicate the MHEWS; and
- tested and reviewed early drafts of the MHEWS.

Between workshops, the TMA and the Met Office worked together closely to develop Standard Operating Procedures for producing the MHEWS.

### Co-deliver solutions

The TMA is solely responsible for producing the MHEWS, but collaborates with intermediaries to improve the dissemination of the forecast. Twice a year, in February and September, the TMA presents the seasonal forecasts at the National Climate Outlook Forums. Most notably, the TMA has used these as forums to promote impact-based forecasting as well as co-production as a methodology. Recently, the TMA has co-produced advisory statements with sectoral experts and extension officers based on their expertise and the seasonal forecast.

### Evaluate

To date, no co-production has been employed to evaluate the MHEWS.

## Lessons to learn from:

- **Framework for a clear approach:** The development and implementation of a National Framework for Climate Services provides a clear process for national meteorological services through which to expand their capacity to deliver new and improved climate services, utilising co-production approaches.
- **Build capacity:** The process of building institutional capacity to operationalise new and improved weather and climate information services, particularly impact-based forecasting, can take from several years to decades. Utilising co-production approaches not only supports individual project delivery, but wider institution building.
- **Assess the feasibility of co-prodution**: Prior to engaging in co-production processes for a pilot project, a careful assessment needs to be done by the NMHS and core partners to ensure that there is sufficient resources for the NMHS to operationalise the project in a sustained manner. Otherwise, investment in co-production processes, which can be costly, could have very limited impact after the project.

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# Resilient Transport Strategic Assessment for Dar es Salaam


## Authors

**Dr. Molly Hellmuth**
*(molly.hellmuth@icf.com);*
**Maya Bruguera,** *ICF;*
**Nikos Papachristodoulous,**
*IPE Triple Line;*
**Silvio Peirero, Robin Bloch,** *COWI;*
**Julie Rozenberg,**
*World Bank*


## Aim of the project

The project aimed to assist transportation planners and investors in identifying and addressing current and potential future flood risks to existing infrastructure and planned investments in Dar es Salaam's Bus Rapid Transit. The project included the following aspects:

- Assessing the current and future climate vulnerability of the existing transport infrastructure to flooding in Dar es Salaam under a broad range of potential future conditions.
- Identifying immediate and cost-effective adaptation solutions to increase the robustness of the new BRT system's operational elements as well as the port access roads.

## Dates

October 2016–February 2019

## Countries

Tanzania


Stakeholders identified a range of adaptation measures to address priority vulnerabilities. *(Source: ICF, 2018)*

## Aim of co-production:

The co-production aimed to connect relevant decision-makers and experts in order to consider the ramifications of climate change and consequent flooding impacts on Dar es Salaam's Bus Rapid Transit (BRT) network and services currently, and in the future, and identify adaptation solutions. Co-production included the following aspects:

- Validating and enhancing the flood risk modelling by incorporating local knowledge of historical flood extent and duration.
- Improving information on specific flood impacts on transportation services.
- Improving information on broader economic and social impacts when roads become impassable.
- Identifying and evaluating adaptation measures to mitigate flood risk.

The co-production process attempted to guide stakeholders along the path from assessing vulnerabilities, to identifying and evaluating adaptation measures, to the practical integration of these measures into transport planning. Close collaboration with stakeholders throughout the project was intended to build capacity for thinking through climate impacts and adaptation approaches, and was intended to build buy-in for implementing adaptation measures and addressing flood risk.

## Context:

The co-production was done at the level of the project, which was at the scale of Dar es Salaam's transport network. The co-production process was highly collaborative and involved two intensive, interactive workshops involving a broad range of stakeholders. The co-production process and overarching project were essential for helping BRT stakeholders make decisions around BRT investment priorities related to climate resilience.

## Who was involved and what were their roles?

The World Bank initiated, managed and funded the project, including the co-production process, over a two-year period. Climate and flood risk management consultants (ICF and COWI) acted as intermediaries in designing and facilitating workshops with stakeholders, translating technical climate change projections into decision-relevant information, and facilitating feedback on impacts, criticalities, and effective adaptation strategies.

The co-production process brought together transportation and city planners, transportation engineers, disaster risk managers, climate scientists, and flood risk managers, among others. Specifically, key actors included: Dar es Salaam Rapid Transit (DART) Agency; the **World Bank**; Tanzania National Roads Agency (TANROADS); Dar es Salaam City Council (DCC); Tanzania Port Authority (TPA); Ministry of Works, Transport and Communication (MOWTC); Vice President's Office (VPO); Ministry of Lands, Housing and Human Settlements Development (MLHHSD); consulting and engineering firms **ICF**,

## What was co-produced?

- **Recommendations to increase climate resilience:** Recommendations on near-term actions to increase the resilience of the BRT system's assets, which are presently vulnerable to floods and hence to frequent disruptions, were co-produced.
- **Recommendations to incorporate climate resilience in the future**: Recommendations on how to incorporate climate resilience into the design of BRT lines under planning were co-produced.

## Benefits of the co-production approach

- The greatest benefit of the co-production approach is the improved ability of transportation managers, planners and investors to conduct transport planning that is informed by flood risk maps that incorporate climate projections. The flood risk maps and transportation assessment allowed for the identification of areas at high risk, and an understanding of key flood risk management strategies.
- The co-production of information created the most value within two phases: (i) the multi-stakeholder interpretation and ground-truthing phase; and (ii) communication. Within these two phases, co-exploring knowledge from climate scientists and decision-makers improved the knowledge of flood risk extent and impacts, critical transportation nodes, current levels of adaptive capacity, and identified adaptation priorities which will serve as a basis for enhancing the resilience of the BRT system.
- All parties benefited from the co-production, as the process enhanced the resulting products as well as the capacity of local stakeholders to adapt to climate change.

COWI and Ecorys; President's Office – Regional Administration and Local Government (PO-RALG). ICF also engaged the Tanzania Meteorological Agency at the outset of the project to discuss historical flood risks, and to gather historical precipitation data.

## How was co-production done?

The co-production method is designed to produce more useable climate information and to tailor scientific information to the decision-making context through regular consultation between climate information providers and transportation planners.

### Identify key actors and build partnerships; build common ground; co-explore need

The co-production process brought together organisations with a stake in the BRT system – including investors, operators, city planners – and those with specific relevant expertise – including disaster risk managers and engineers – who could contribute to the identification of critical road segments, assets and areas at risk, and to the prioritisation of solutions to address these risks. These actors were identified by the DART agency.

### Co-develop solutions

The co-production approach involved developing climate data. This was done through retrieving historical climate data and using stakeholders' local knowledge to map areas at risk of flooding. Multiple stakeholders were involved to validate and further develop the findings, including direct impacts to transport infrastructure and services, identification of critical transportation links, and broader social and economic impacts resulting from transport disruption. Stakeholders were engaged in order to identify plausible strategies to mitigate flood impacts to critical BRT assets and services.

### Co-deliver solutions

The co-production approach involved communicating with stakeholders in order to increase their awareness of potential climate change impacts on transport, and the types of response measures, thereby building local stakeholders' capacity to undertake adaptation.

## Lessons to learn from:

- **Establishing relationships and buy-in takes time**: Stakeholder consultations were limited, in part due to competing priorities, which required modifying the engagement strategy to focus as much as possible on eliciting feedback on risks and adaptation measures, and less on providing lengthy background information on the approach or on climate change.
- **Flexibility should be anticipated in project design and approach:** Building in flexibility into the approach can be challenging, as it can alter project scope, including timing and cost. At the same time, in order to be responsive to stakeholder needs or availability, and data constraints, flexibility must be built into the process. In the case of this project, stakeholders wanted information beyond what the models provided, which resulted in additional analysis, but more useful information.
- **Making better decisions in the face of uncertainty**: While it can appear daunting to make sense of uncertain climate change information in decision-making, stakeholders were able to partially bridge this gap given their experience with current flood risk. The idea that future flood risks may change was not a barrier for stakeholders, but rather seemed to be best interpreted as an opportunity to improve resilience of both current and future infrastructure.

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# RRA: Climate Attribution for Extreme Weather Events in Ethiopia and Kenya


## Authors

**Suzanne Carter,**
*SouthSouthNorth*
*(suzanne@southsouthnorth.org)*


## Aim of the project

The **Raising Risk Awareness** (RRA) project aimed to inform policy decisions by using the latest climate science to understand the role of climate change in the occurrence of extreme events, such as droughts, in four developing countries. The project worked toward bridging the communication gap between the users (media, communicators and policy-makers) and the producers (scientists) to better understand future climate risks associated with extreme events.

## Dates

January 2016–June 2017

## Countries

Ethiopia and Kenya

Participants at a Raising Risk Awareness workshop, hosted at the Climate Change Directorate campus in Nairobi, Kenya. *(Source: C. Mathieson, 2016)*

## Aim of co-production:

The co-production focused on developing a pilot study and joint academic paper for Kenya and Ethiopia. Key stakeholders jointly identified a suitable case study for piloting the extreme event attribution methods in each country. One of the goals of extreme event attribution is to ascertain whether the increased or reduced likelihood of an extreme event, such as drought, is due to climate change. The co-production approach was strongest within the climate data analysis. This enabled learning about extreme event attribution building skills within the country to undertake future attribution analyses. The project engaged with researchers, government officials, civil society and the media to raise awareness about extreme event attribution.

## Context:

The project was conducted at national level, working with the national meteorological service and national universities. The pilot studies defined a specific area, covering multiple sub-national jurisdictions. Co-production was needed to define a useful pilot study and to ensure the transfer of technical capacities to enable local institutions to undertake an extreme event attribution analysis.

## Who was involved and what were their roles?

The World Weather Attribution (WWA) initiative is an effort led by Climate Central with the **Red Cross Red Crescent Climate Centre**, the **University of Oxford**, the University of Melbourne and the Royal Netherlands Meteorological Institute that collectively undertake extreme event attribution analyses all over the globe. The Climate and Development Knowledge Network (CDKN) collaborated with WWA, using existing CDKN and Red Cross networks, comprising decision-makers, the media and other stakeholders in the two countries to kick start collaboration.

WWA scientists led the co-production of pilot studies in collaboration with five climate scientists in Ethiopia and Kenya, who acted as project champions, ensuring mutual participation in the co-production process and building local capacity to undertake future studies. CDKN led the process of formalising partnerships (Memorandum of Understanding) between the project team and the national meteorological service.

Oxford University hosted two separate week-long learning exchanges between the project team scientists and scientists from Ethiopia and Kenya respectively in order to co-produce the pilot studies.

## How was co-production done?

### Identify key actors and build partnerships; build common ground

In the initial scoping visit, the project team had meetings with a wide range of stakeholders to test interest and demand. After the visit, the national meteorological services and the ministry responsible for their oversight were engaged about possible pilot studies that might be suitable. The pilot studies for the two droughts were agreed through a series of virtual conversations, ensuring the expressed interests of local decision-makers were met. If the project team had suggested a study without consultation it is possible that a heat wave, which is easier to analyse, may have been chosen.

## What was co-produced?

- **Analysis and academic papers**: Analysis and academic papers of two drought events in Kenya and Ethiopia, co-owned by local scientists, were jointly produced.
- **A policy brief**: In Kenya, a policy brief was co-produced with the project scientists and the local Red Cross to ensure that the information was relevant and easily accessible.
- **Communications products**: Videos, animations, infographics, an image library and pilot study analyses were provided for media and journalists, with translation into local languages, as requested in early consultations.

## Benefits of the co-production approach

- Co-production increased the level of engagement of local scientists by making them part of the pilot study process and ensuring skills and technical capacities were built. For policy-makers, the co-production process piqued their interest but due to the pilot study results the recommendations that could be made were not specific enough for them to apply.
- Working with both meteorological agencies and academics in-country contributed to the success of the approach by: (i) creating stronger links between these actors; and, (ii) by sharing the knowledge of how to do attribution studies across institutions. Co-production led to joint ownership and authorship of the pilot studies, allowing for greater knowledge sharing and access to data.
- Co-production created the space for the project team and decision-makers to guide the direction of the research and ensure that the chosen pilot study (drought) was relevant to their decision context. Unfortunately, the results were not specific enough to take action.

### Co-develop solutions

The co-production approach was strongest in producing the pilot study analyses, which involved five champions from meteorological services and academia. Setting up clear Memorandums of Understanding worked well. Partners knew who was responsible for what and what financial resources were available for the project. As a result, the project successfully built the capacity of five local scientists to undertake extreme event attribution studies in the future. One scientist has undertaken an analysis of a flood in Kenya since the project finished.

### Co-deliver solutions

Project workshops were held to deepen collaboration and share results from the pilot studies. Workshops were designed to be highly participatory with many group activities and opportunities for local experiences to be shared; for example: a poster session in Ethiopia for local scientists, and serious games, such as the Red Cross Red Crescent Climate Centre's game, Climate Attribution Under Loss and Damage: Risking, Observing, Negotiating (CAULDRON). Scientists primarily attended these workshops, although smaller numbers of other stakeholders also participated and provided useful perspectives.

The project also engaged with key decision-makers and the media about extreme event attribution. A breakfast briefing with the media in Kenya in the scoping phase was particularly successful in raising awareness about the project and eliciting feedback on the types of outputs that would be most useful to the media. This informed the communications products produced (videos, animations, infographics and image library). Collaboration between the Kenyan scientists and the Kenyan Red Cross led to a policy briefing for decision-makers and the media.

## Lessons to learn from:

- **Trust and cooperation are foundations of joint delivery**: Co-production led to trust between the partners and the setting up of the relationships required for good cooperation, learning and joint delivery.
- **Delays can reduce impact**: The pilot studies were delayed with knock-on impact on the communication of results. This meant that there was less scope and opportunity for policy influence than was originally intended.

- **Incentivise collaboration**: Incentives for collaboration and joint ownership included joint academic publications with local scientists. However, more could have been done to help ensure continuation. Sustainability rested on the interest of the local scientists to continue investigating the role of climate change in extreme event attribution studies. Involving more local scientists could have helped to further ensure the sustainability of the work past the short project life cycle.
- **Trusted communicators**: Policy engagement and media interaction were best conducted via local champions or organisations (e.g. Red Cross), as these messages are not necessarily trusted if from foreigners, especially in Ethiopia.
- **Start with technical collaboration**: Due to the technical nature of the work, co-production between scientists was deemed the most appropriate starting point, but it is hoped that this could change over time once extreme event attribution is better understood locally.

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# UMFULA: Co-producing Climate Information for Medium-term Planning in the Water-Energy-Food Nexus

## Authors

**Katharine Vincent,**
*Kulima Integrated Development Solutions (katharine@kulima.com);*
**UMFULA Malawi team**

## Aim of the project

**Uncertainty Reduction in Models for Understanding Development Applications** (UMFULA) aims to improve the availability and use of climate information for medium-term (5–40 year time frame) decision-making in the water-energy-food nexus.

## Dates

2015–2019

## Countries

Malawi and Tanzania
(This case study focuses on Malawi)

Meteorologist Yobu Kachiwanda, of Malawi's Department of Climate Change and Meteorological Services, displays the co-produced climate briefs to members of the public and school children on World Meteorological Day 2018. *(Source: DCCMS, 2018)*

## Aim of co-production:

Many African countries have recognised climate change in their national development plans and adopted climate change policies. How to incorporate climate information in decision-making is still a barrier. This disconnect stems from a 'usability gap' between climate science producers and users, which acts as a major barrier to the effective use of climate information to inform planning and adaptive decision-making. Our ethos was that, by working across the boundary with users, we would be able to provide more useful and usable information that more closely meets demands to inform medium-term planning processes relating to water, energy and agriculture.

## Context:

The motivation for co-production came from consultation within country (Vincent et al., 2014). Government technical staff lamented the fact that they are often presented with reports from complex models, which they do not know how to use. They also cannot access the source material. Department of Climate Change and Meteorological Services (DCCMS) staff also highlighted the challenges they face in being able to meet increasing demands for information from government departments with a very slim organisational structure and significant pressure on staff resources. Co-production took place at national level.

## Who was involved and what were their roles?

The Department of Climate Change and Meteorological Services (DCCMS) was involved in the design of the content and presentation of future climate scenarios. The Ministry of Agriculture, Irrigation and Water Development (MoAIWD), the Department of National Parks and Wildlife, and related programmes and organisations such as the Shire River Basin Management Programme and the Electricity Supply Corporation of Malawi Limited (ESCOM) played a role in conceptualising and co-developing the open access **Water Evaluation and Planning (WEAP) system model** through regular engagement, feedback and iteration.

## How was co-production done?

### Identify key actors and build partnerships; build common ground; co-explore need

DCCMS were involved in a pilot case study for the Future Climate For Africa programme that took place in Malawi in 2014. The interest generated by this pilot case study was critical to UMFULA including Malawi in its proposal. We were able to design the project so as to capitalise on the needs identified in earlier initiatives, so we knew that our aims had been user-informed (Vincent et al., 2014). Through initial scoping, we cemented an emerging relationship with the Department of Climate Change and Meteorological Services, and were allocated an official desk officer to coordinate liaison.

In addition to the partnership with DCCMS, we identified three groups of key actors with whom to build partnerships:

1. A contact group comprised of representatives of other projects investigating complementary issues (for example: the FCFA FRACTAL project, WFP/WMO who implement the Global Framework for Climate Services in Malawi, the World Bank, which is responsible for the Shire River Basin Management Programme and the Pilot Programme for Climate Resilience). This association enabled us to cross-check information needs and ensure that we were contributing to addressing those needs, thereby also reducing demands on government partners.

## What was co-produced?

- **Future climate projections for Malawi:** The climate brief outlines recent trends, future projections of temperature and rainfall, and changes in extremes in Malawi (Mittal et al., 2017)
- **A Water Evaluation and Planning (WEAP) system model:** The model projects future water availability under climate change.
- **Projecting future water availability in Lake Malawi and the Shire River basin:** The brief presents the outcomes of the WEAP model to project future water availability reflecting future climate projections (as presented in the climate brief), demand and the effects of water management strategies (Bhave et al., 2019).

## Benefits of the co-production approach

- Regular contact and process-based updates encourage country ownership, enables us to keep abreast of emerging decision needs, and also helps to identify and address any emerging issues.
- Iteratively developing the WEAP model with stakeholders, through engagement and collaborative discussion forums, has meant that the model better incorporates evolving infrastructure in the region, and the corresponding changes in the needs of decision-makers. Greater ownership is the result.
- Maintaining multiple 'levels' of engagement has also been helpful. For example, in addition to the regular technical discussions, we also have senior researchers meeting with government directors to maintain high-level strategic links, which reinforces support for the technical links.

2. Our case study partners, including in the Ministry of Agriculture, Irrigation and Water Development, are our core co-production partners. Engagement is based on their stated preferences around frequency of contact and preferred communication medium.
3. Broader stakeholders are in-country partners who have an interest in the project but are not directly involved in it. They are kept in touch on our progress through six-monthly one-page stakeholder updates, as well as outputs when released. Updates and outputs are communicated to stakeholders through their preferred medium (email or face-to-face delivery).

### Co-develop solutions

The climate brief was developed following a workshop with DCCMS in which they provided direction on the content and presentation of projections. The WEAP model was co-developed through regular engagement with our case study partners. We met with them individually in the early stages, and then, in later stages, held collaborative learning fora which enabled presentation and review-and-refinement of previous inputs, as well as discussion between partners with different priorities.

### Co-deliver solutions

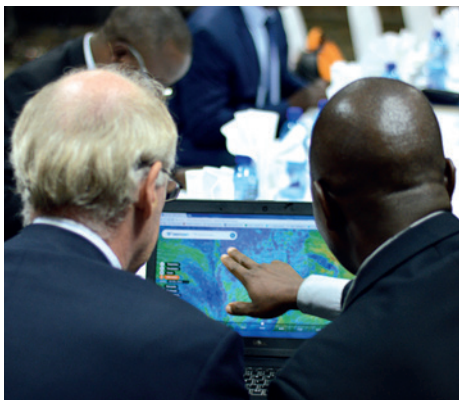
The government of Malawi has cited the climate brief in the drafts of the National Resilience Strategy and the Third National Communication to the United Nations Framework Convention of Climate Change (UNFCCC). The photo shows DCCMS meteorologist Yobu Kachiwanda presenting the brief on World Meteorological Day 2018.

## Lessons to learn from:

- **Co-production is time-consuming and costly**: Financial support for routine office tasks on the part of African country government counterparts – such as being able to send emails with attachments (e.g. when we requested rain gauge data) – also need to be considered, since such 'standard' office facilities are not always in place.
- **Relationship management is important**: We would have failed to build a functional and productive relationship had we not proactively maintained communications and engagement.
- **Joint branding can be important**: Very clear and equitable joint branding of co-produced outputs may avoid situations of confusion. Whilst the climate brief clearly acknowledged DCCMS, it was branded as FCFA. This impedes DCCMS ownership

and can also impede legitimacy among other government departments, who look to DCCMS as their source of weather and climate information.

- **Building capacity ensures sustainability**: To be sustainable, co-production needs to involve an element of staff capacity building throughout the process. Involving technical staff from MoAIWD in the design and development of the WEAP model means that they will be able to continue to use and apply it to different circumstances after the end of the project. The project also produced a series of knowledge-based briefs (FCFA, 2016; Conway et al., 2017) aimed at creating discerning consumers of information.



UMFULA team collaborates with DCCMS
*(Source: K. Vincent, 2017)*

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# IRRP: Building Resilience in Tanzania's Energy Sector Planning


## Authors

**Maya Bruguera,**
**Molly Hellmuth,** *ICF*
*(molly.hellmuth@icf.com);*
**David Yates,**
*University Corporation for Atmospheric Research*


## Aim of the project

The **USAID Integrated Resource and Resilience Planning** (IRRP) project supported Tanzania's national power utility, the **Tanzania Electric Supply Company Limited** (TANESCO), to develop a Power System Master Plan (PSMP) built around a 'least-regrets' power resource investment portfolio that is more resilient to long-term risks, including climate impacts. To identify this portfolio, the project used the IRRP framework. IRRP is a strategic power system planning approach. It builds off of traditional least-cost resource planning by using scenario analysis to identify and prioritise a least-regrets portfolio that best meets priority objectives across a broad range of potential futures. This case study focuses on the use of IRRP to integrate climate change risks and resilience considerations into power system planning, with a particular emphasis on the risk of drought to hydropower.

## Dates

July 2015–April 2018

## Countries

Tanzania

Participants coming together for the project's Climate Risk and Resilience Workshop. *(Source: ICF, 2017)*

## Aim of co-production:

The co-production aimed to support the development of a power systems master plan by leveraging climate science and TANESCO's local knowledge to:

- develop and validate the results of a climate risk assessment of Tanzania's power sector;
- prioritise climate risks facing TANESCO's power system;
- develop a scenario for the highest priority climate risk ('drought scenario') for inclusion in the power sector modelling;
- assess the sensitivity of different power sector investment portfolios to the drought scenario against a range of performance metrics;
- identify adaptation measures to address climate risks associated with the selected least-regrets portfolio; and
- increase TANESCO's awareness of climate risks and capacity to address these risks in power system planning.

The co-production method promoted sustained interactions of project stakeholders over time in order to effectively integrate TANESCO's knowledge of climate impacts into the project. The method embraces uncertainty in climate information, and focuses users on identifying power sector investments and adaptation measures that address critical risks.

## Context:

Co-production was done at the level of the project, which involved the development of a national scale power investment plan. Co-production was critical in undertaking Integrated Resource and Resilience Planning and developing the least-regrets power resource portfolio for the Power System Master Plan. Leveraging TANESCO's knowledge of past climate impacts and the relative magnitude of these impacts on the power system enriched the findings of the power sector climate risk assessment. In addition, TANESCO prioritised a core set of climate risks to include in the power sector master plan, and to incorporate into the sensitivity analysis. TANESCO rated the performance of different potential power sector investments against a broad range of system performance metrics, such as climate change emissions, reliability under drought and cost, in order to identify the least-regrets portfolio. Additionally, the repeated collaboration between climate experts and TANESCO helped heighten the power provider's awareness of how climate change might impact their system and advanced their capacity to consider these risks in the future.

## Who was involved and what was their role?

The IRRP project brought together a range of stakeholders, including power sector stakeholders from TANESCO, and power sector, water and climate change experts from ICF, and the Stockholm Environment Institute (SEI). ICF led the co-production activities, arranging the meetings and working sessions with TANESCO. USAID-IRRP led the co-production of the climate projections and impact information in collaboration with TANESCO. Similarly, USAID-IRRP held workshops, working sessions and training sessions with TANESCO, which led to validating the climate risks, adaptation responses and the results of the WEAP-Tanzania model.

## How was co-production done?

Co-production was undertaken through a formal partnership between the USAID-IRRP project and TANESCO. In addition, the project engaged a broader set of stakeholders – including the Ministry of Water – to raise awareness of climate change implications for hydropower and agricultural water use.

## What was co-produced?

- **A Power Sector Master Plan**: A long-term, least-regrets, power sector master plan, which includes climate risk and resilience considerations, was co-produced.
- **A report on climate risk and resiliency in the Tanzanian power sector**: The report includes climate change risks to, and adaptation options for, power generation, transmission and distribution, and demand at a sub-national scale.
- **A future drought scenario**: The scenario is for use in the IRRP scenario analysis to test the different investment portfolios' resilience to drought.

## Benefits of the co-production approach

- Co-production resulted in integrating climate change risks into long-term power sector planning and decision-making.
- Translating climate information into climate risks to the power sector was key in engaging stakeholders and enabling the co-production process.
- The co-production components that were most useful were the climate data development and multi-stakeholder interpretation and validating. These processes enabled stakeholders to communicate local knowledge of climate risk and their climate resilience priorities.
- Collaborating with key power sector stakeholders resulted in a plan that is: (i) informed by potentially broader and more robust data, information, and insights; (ii) has greater buy-in from key stakeholders; and, (iii) instils confidence in investors that the country has a collective strategy.

In the context of the IRRP project, co-production is the production of knowledge about climate risks through a partnership of climate experts (USAID-IRRP), water resources managers, and power sector stakeholders and decision-makers (TANESCO). USAID-IRRP produced the climate information and translated it into decision-relevant information on risks for the power sector decision-makers. USAID-IRRP then collaborated with TANESCO to prioritise climate risks facing the power sector, and to assess the different power sector investment portfolios' sensitivity to drought, the top-priority risk. Engagement took place through intensive working sessions in Dar es Salaam, and through regular email and phone communications.

### Co-develop solutions

- **Climate data development:** USAID-IRRP translated historical and projected climate change information into potential impacts to the power sector, then worked with TANESCO, who identified drought as the most critical risk. USAID-IRRP developed a future drought scenario based on historical daily re-analysis data, and developed the WEAP-Tanzania model to assess the impact of climate change on hydropower production.
- **Multi-stakeholder interpretation, validation:** USAID-IRRP developed a report outlining climate change risks to generation, transmission, distribution and demand at a sub-national scale, as well as potential adaptation responses to these risks. USAID-IRRP collaborated with TANESCO to validate these results, prioritise the risks and identify and evaluate potential adaptation responses. After developing the three investment portfolios, TANESCO evaluated the sensitivity of each one to drought based on their performance against fuel security and reliability, cost, greenhouse gas emissions, and other metrics.
- **Communication:** USAID-IRRP trained TANESCO staff, including hydropower managers and others, on the WEAP-Tanzania model. USAID- IRRP also used intensive working sessions to communicate findings on climate risk and build capacity for assessing and developing adaptation options to address climate risks.

### Evaluate

The evaluation of investment portfolio sensitivity to a range of risks, including climate change, informed the choice of a least-regrets power sector master plan. The least-regrets plan allows stakeholders to assess the importance of power system resilience to changing circumstances and unexpected events relative to a least-cost plan which focuses solely on system cost. The least-regrets plan is a foundational element in enabling greater investment in the power sector, which is necessary to advance Tanzania's economic development.

## Lessons to learn from:

- **Establishing relationships and buy-in takes sustained effort and time**: Given that project consultations compete with other stakeholder priorities and activities, consultations must be designed to be efficient and maximise opportunities for stakeholders to provide critical feedback and insight. Extensive and regular consultations allowed for the development of relationships, significant co-production of strategies and solutions, and an integrated power systems master plan. At the same time – in part due to competing priorities – stakeholder engagement was, at times, challenging, over the duration of the project.
- **Co-production of useful climate information was undertaken through the lens of decision-relevant climate impacts to the power sector**: Stakeholders were most interested and engaged in discussions surrounding climate impacts, and avenues to address these impacts. Stakeholders identified with the idea that future climate impacts to the power sector may change, given the changes they have already experienced.
- **Integration of co-produced climate information into existing planning approach was helpful**: Power sector planners were more engaged because the Power System Master Plan development was demand-driven and because climate change risk was just one of many risks taken into consideration in the power planning process. The IRRP process is flexible, replicable and is currently being applied in other contexts, notably in Ghana.

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# PRISE: Co-exploring Relevant Evidence for Policy Change in Kenya


## Authors

**Robina Abuya**
*(rabuya@kenyamarkets.org);*
**Charles Warria,**
*Kenya Markets Trust (KMT)*


## Aim of the project

**Pathways to Resilience in Semi-arid Economies** (PRISE) aims to strengthen the commitment of decision-makers in local and national governments, businesses and trade bodies to rapid, inclusive and resilient development in semi-arid regions in Kenya, Tanzania, Ethiopia, Burkina Faso, Senegal, Pakistan, Tajikistan, and Kyrgyzstan. It does so by deepening their understanding of the threats – but also the opportunities – that semi-arid economies face in relation to climate change. PRISE is part of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) programme.

## Dates

2014–2018

## Countries

Kenya

Laikipia County Deputy Governor, Hon. John Mwaniki addressing participants at the PRISE county stakeholders' dissemination workshop *(Source: KMT, 2018)*

## Aim of co-production:

The aim of the co-production was to ensure ownership and sustainability of PRISE research evidence, findings and recommendations with the key policy and decision-makers with whom the consortium works. Ownership of research evidence was considered a pre-condition for decision-makers to act on the evidence. Findings demonstrate that PRISE was successful in this approach in Kenya. The co-produced evidence on specific climate adaptation options in semi-arid environments, such as projections of temperature, rainfall, human and livestock population, was used by Narok and Kajiado Counties to define some of their interventions in the County Integrated Development Plan and the county spatial plan respectively.

## Context:

Co-production approaches were used throughout the project duration, including identifying research sites, designing research questions, project implementation, sharing of findings, and in the monitoring and evaluation process. Co-production was needed to ensure PRISE research evidence addressed the current real

and urgent needs of stakeholders, and worked towards the goal of building resilience in semi-arid regions. Secondly, the purpose was to embed findings and recommendations into the concrete actions embedded in particular national strategies (such as the National Wildlife Conservation Strategy 2030 and National Climate Change Action Plan 2018-2022) or County Development Plans and spatial plans.

## Who was involved and what were their roles?

Kenya Market Trust (KMT) and the Overseas Development Institute (ODI) led the co-production. KMT played the main role of convenor, communicator and facilitator. ODI offered support in all aspects including participation in the design and communication to partners. KMT already had existing structures to be able to take up this role, drawing on in-house staff, established networks and strong presence in Kenya. This meant the role would continue beyond the project.

The actors involved included KMT and ODI technical teams, national and county government stakeholders, private sector players, business enterprises, organised groups (e.g. women's groups at the county level), individual community representatives and marginalised groups including women and youth. These actors helped to sharpen the focus of PRISE research questions, and helped to identify potential sites to collect data. Some were directly interviewed, others were invited to validate the research findings, and in other instances PRISE shared specific research finding relevant to them.

## How was co-production done?

Co-production was run through a targeted and consultative process, during which the different actors jointly identified the key challenges the project needed to address, and research areas that would have optimal, fast, fair and resilient returns.

## What was co-produced?

- **Impacts of climate change on livestock numbers:** Based on climate modelling research of past climate (rainfall and temperature) and future projected changes of temperature and rainfall, an estimate of the impact to livestock numbers in semi-arid counties of Kenya were made. These estimates were then presented to county governments and other stakeholders, who, together with the research team, developed specific adaptation options suitable to the county in question.
- **Jointly developed adaptation options to the most common climate risks** (e.g. drought, heat waves, floods) were also incorporated into the Narok County Integrated Development Plan (CIDP 2018-2022).

## Benefits of the co-production approach

- Co-production increased the ownership of the research results.
- Co-production of research was a way to increase stakeholders' knowledge of the implications of climate change on the resilience of semi-arid economies and on equity issues.
- Co-production resulted in agreed study site selection. This was instrumental in ensuring the support from local decision-makers, including their willingness to participate in data collection and sharing.
- Co-production supported researchers to understand the specific pressures decision-makers are under and their need for well-targeted research products.

### Identify key actors and build partnerships; build common ground; co-explore

The interaction at the beginning of the project, and throughout the research phase, between the research teams and the decision and policy-makers was instrumental for the research to have traction with the decision-makers. At the initial stages, KMT worked with state and non-state actors in helping crystalise the problem and identifying potential research sites. Stakeholder engagement at the outset of the research process resulted in identifying the following issues: (i) how climate change impacts on migration patterns and how migration affects households ability to adapt to climate change impacts; (ii) assessing climate risks and adaptation options through upgrading of livestock value chains from production to consumption (vertical transformation) and diversification within or across sectors, for example milk and tourism, among others (horizontal transformation); (iii) identifying elements of the enabling environment that would strengthen the resilience of private sector actors; and (iv) assessing how different property rights regimes influence adaptation investments and economic development in semi-arid regions of Kenya.

### Co-develop solutions

KMT held several consultative discussions and meetings with various stakeholders, including state and non-state actors, to get their insights and to share PRISE climate-related research evidence. Stakeholder meetings at local, county and national levels were used to co-develop adaptation options. More targeted joint working groups elaborated specific inputs to the Narok County Integrated Development Plan based on emerging PRISE research findings.

### Co-deliver solutions

During implementation, consultation helped stakeholders understand how the data was generated and analysed, and allowed for joint interpretation of what it means, what the implications are and how to apply the data to inform and/or influence policy and practice.

## Lessons to learn from:

- **Getting buy in:** The interaction at the beginning of the project, and throughout the research phase, between the research teams and the decision- and policy-makers was instrumental for the research to have traction with the decision-makers.

- **Misalignment of time frames:** In some instances, the project wanted to use the research findings to inform county policies and strategies, but this did not materialise fully as these documents were at different stages of completion. Some of these strategies had yet to start, but we hope stakeholders involved in these policy processes will use the evidence and policy recommendations that we have shared with them. Additionally, it can take a long time for policy-makers to use evidence, even if co-produced. This is especially true at local government levels because of different priorities (e.g. to demonstrate immediate results and economic growth versus a more cautious development approach based on integrating climate risks).
- **Balancing research with action:** Some stakeholders wanted the project to pilot or implement some of the research findings but there was no budget for implementation activities. If we were to do it again, we would have undertaken research combined with action, especially to prove that identified adaptation options were economically viable, socially acceptable and able to tackle specific climate risks and inform partners. This could be done in the second phase of research after gathering evidence.
- **Work with existing representative bodies:** It was very helpful using representative bodies, especially the Kenya Private Sector Alliance, both in mobilising relevant stakeholders and ensuring the research findings reach a wider audience and are used in crucial policy documents.

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Laikipia County Workshop *(Source: KMT, 2018)*

# NMA ENACTS: An Example of a Co-produced Climate Service Fit for Purpose


## Authors

**Aisha Owusu**
*(Aisha.s.owusu@gmail.com);*
**Madeleine Thomson,** *IRI;*
**Adugna Woyessa,**
*Ethiopian Public Health Institute*


## Aim of the project

The **Enhancing National Climate Services** (ENACTS) initiative aims to improve availability, access and use of climate information for national and sub-national decision-makers. This case study is focused on the experience of ENACTS in Ethiopia which is led by the National Meteorological Agency (NMA).

## Dates

2011–present

## Countries

Ethiopia

Ethiopian decision-makers are now accessing high-resolution climate information from maprooms to improve agricultural output, water resource management and malaria control at the local level. *(Source: AC Today, 2019)*

## Aim of co-production:

Within the Ethiopian ENACTS project, co-production has been used to: (i) initiate dialogue between the climate community and different climate-sensitive sectors; (ii) build capacity in both communities to produce and use climate information; (iii) identify new climate services based on user needs and the meteorological service's capacity to deliver; and (iv) work towards the delivery of climate services to multiple users from national to local levels.

## Context:

The starting point for the ENACTS co-production process in Ethiopia was a Google-funded project (2008-2011) called 'Building capacity to produce and use climate and environmental information for improving health in East Africa' (Connor et al., 2011). The co-production process described below was developed during the course of this project and created the foundation for the ENACTS initiative, now being implemented in more than ten countries in Africa – in part with WISER support.

## Who was involved and what were their roles?

The critical initial partners were the National Meteorological Agency (NMA) of Ethiopia and the Anti-Malaria Association (AMA) – a local non-governmental organisation – and the Ministry of Health (MoH). A significant early development of this project was the creation of a Climate and Health Working Group (CHWG), co-chaired by the Ministry of Health and the NMA with the AMA as the Secretariat. Co-production during this phase of the project involved establishing trust amongst the partners and the building of capacity in both health and climate communities to enable them to work constructively together. The CHWG ran for

a number of years and was instrumental in organising a series of climate and health workshops in Ethiopia, including the Pan-African 'Climate and Health in Africa 10 Years On' Workshop in Addis Ababa in April 2011 (Omumbo et al., 2011). As a boundary institute, the International Research Institute for Climate and Society played a pivotal role in providing technical support to both climate and sectoral partners. Over time, the ENACTS initiative attracted additional resourcing from a variety of donors and the Ethiopian Public Health Institute (EPHI), researchers at Addis Ababa University and the USAID's Presidents' Malaria Initiative (PMI) played an increasingly important role in focusing attention on climate services for malaria control in Ethiopia, amongst other priorities.

## How was co-production done?

### Identify key actors and build partnership

The Climate and Health Working Group was able to bring together a diverse community of operational and academic stakeholders in Ethiopia. In particular, the Ethiopian Public Health and Nutrition Institute (later the Ethiopian Public Health Institute) took a lead role in developing new products and services that responded to requests from the Ministry of Health. Malaria experts from the USAID office also participated in the working group – and were able to contribute expertise and funding. Many young researchers undertaking Masters or PhD programmes from many universities across Ethiopia were invited to participate in the workshops – some of whom later were sponsored to undertake specific health field research using climate data. In this way the CHWG laid the foundation for a broad network of stakeholders to work at the interface of climate and health.

### Build common ground

Workshops conceived and implemented by the CHWG were always targeted to specific national and sub-national health or development issues, involved both research and implementation partners, focused on locally identified priorities, engaged in trust-building exercises between the meteorological service and sector communities, and were designed to build a shared language that all parties could understand.

### Co-explore need

An important part of the design of the workshops was to always invite important leaders from the Ministry of Health to open the workshop and present the broad policy landscape relevant to the particular discussion to the participants prior to the workshops start. This way the workshop co-production processes explored solutions that could respond to issues raised by policy-makers.

## What was co-produced?

- **Datasets**: Quality assured historical and monitoring (recent and current) rainfall and temperature products at 4km grid resolution and daily time resolution were created by NMA which can be used to develop climate products tailored to user needs.

- **Online 'maprooms':** Maprooms were installed on the NMA website and used to communicate the output images of the data and derived products via the NMA's website (access via iri.columbia.edu/ENACTS). Products were co-designed and/or revised with user communities to support specific health, agriculture and water decision-making processes. Co-developed Maprooms include:
  - A multi-purpose El Niño-Southern Oscillation (ENSO) Rainfall and Temperature Maproom.
  - A health specific Malaria Elimination Climate Surveillance Suite (MECSS).
  - Other maprooms developed for agriculture and water are not discussed further here.

## Benefits of the co-production approach

- By integrating data availability, access and use into one conceptual framework, the co-production processes around ENACTS in Ethiopia has helped overcome multiple barriers to climate services development and uptake.
- Co-production processes have enabled sectoral and climate users to help define products and tools that may serve their specific areas of interest. For example, the ENSO Maprooms developed for Zambia were identified by both climate and health users as important to the Ethiopian context and were subsequently replicated and installed in the Ethiopian ENACTS Maproom and used by the health and climate community for their own purposes.
- Co-production processes have allowed the sectoral communities to identify the climate services they need and want as opposed to the meteorological services providing products and services they *think* the users want – e.g. rapidly outdated paper bulletins.
- The development of ENACTS data and services have become institutionalised in NMA with the development of standard operating procedures. ENACTS has also changed the institutional structure of NMA to enable cross-departmental collaborative activities – since ENACTS requires input from a number of different departments and can also serve the needs of multiple departments.

### Co-develop solutions

Workshop reports highlighted contributions made by each individual and institution, and the recommendations that emerged from the process were agreed collectively and publicly at the end of the workshop. Over time, the workshops increasingly incorporated targeted training materials to help participants familiarise themselves with climate concepts and ENACTS data and products. Climate service products developed as a result of workshop recommendations were then incorporated into training materials and used during subsequent training and further iterated upon. Development of new maprooms were based on:

1. Co-produced workshop recommendations for specific climate services for example, the Malaria Elimination Climate Surveillance Suite (MECSS)
2. Maprooms developed in other countries that, after presentation to CHWG were recommended for development in Ethiopia, for example, the ENSO Maprooms which were first developed in Zambia.
3. Maprooms developed for one sector (e.g. health) found to be relevant to others. Simple changes in the presentation of the Maprooms were made by NMA to enable a new user community to participate in the process (e.g the development of a Water Maproom by recreating the General Climate Maprooms using Water Basin boundary files as opposed to administrative boundaries). This maproom has recently been prioritised by NMA in relation to the hydropower crisis associated with the 2019 drought.

Co-production processes provided opportunities for the NMA and sectors to develop personal relationships and discuss difficult issues – such as data sharing policies – in a constructive environment. Cost recovery of meteorological data in Ethiopia is mandated by law and so NMA is constrained in sharing data publicly at no charge. NMA will however provide the data free of charge on demand from government and academic institutions. Even where meteorological data is free (or at low cost) the process of accessing the data is cumbersome and this acts as a barrier to uptake. Co-designed solutions include an online 'Authorisation' tool which would allow designated individuals to access the ENACTS data directly. However, this is yet to be implemented.

### Co-deliver solutions

The development of co-delivered solutions means that both producers and users of climate information are able to promote the uptake and use of the services developed. In the Ethiopian context, this means a formal relationship between institutions and the sharing of data, tools and knowledge. The Ethiopian Institute of Agriculture Research (EIAR) and the Ministry of Agriculture have accessed the entire ENACTS daily dataset to enable EIAR to co-develop crop forecasts and other decision-support systems for farmer advisories. The EPHI is currently exploring a similar opportunity.

### Evaluate

We are not aware that the ENACTS initiative in Ethiopia has been formally evaluated by an independent organisation. However, evidence of its value to sectoral partners is increasing. At a technical level, ENACTS is routinely promoted by partner organisations in Ethiopia. Requests for training in maproom use by different agencies e.g. CARE, EPHI, International Federation of the Red Cross, Christian Aid, MoA etc is exceeding current capacity at NMA. Demand for the recent developments in the Water Maproom comes directly from the Minister of Water, Energy and Irrigation in response to the 2019 drought.

## Lessons to learn from:

- **Collaboration**: The conceptual framework for ENACTS emerged out of a collaboration between climate and non-climate experts at IRI and partners in Ethiopia – and is itself a co-produced initiative.
- **Equitable participation:** In order for co-production to take place, there needs to be a level playing field for all actors to participate equally. For this to happen, the user communities need to have sufficient capacity to review and discuss the climate information services currently available or being proposed. Users also need capacity to imagine, within plausible limits, what might be available to them in the future so that they can instigate effective demand for new products and services.
- **Institutional awareness needed**: Because government and non-government agencies often have high staff turnover it is essential that there is broad incorporation of climate knowledge into professional training across sectors.
- **Trust building takes time but is vital:** The climate community needs to honestly share their learning in data and services development and to work proactively to fill the climate services gap that they and users identify. When this happens the user community are also more likely to share their data and information challenges and look for solutions. This only comes from building trust between disparate communities, which takes political will, time and resources.
- **Ingredients for success**: After a decade of engagement with the development of climate services in Ethiopia, proactive problem solving, patience and persistence are key elements that underpin the success of the programme.
- **Purposeful development**: Climate service development must be understood as a journey where knowledge from different actors is both shared and built. However, in the end, climate services must deliver some new opportunity to decision-makers to make better decisions. It is not a journey without a destination!

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# REACH: Improving Water Security for the Poor in Turkana County, Kenya


## Authors

**Judy Omumbo,**
*The African Academy of Sciences (j.omumbo@aasciences.ac.ke);*
**Margaret Opondo,**
*University of Nairobi;*
**Dan Olago,**
*University of Nairobi*


## Aim of the project

The **REACH** programme aims to produce robust and accessible evidence for governments, municipalities and other investment/policy decision-makers in Africa (Kenya and Ethiopia) and South Asia (Bangladesh), to ensure sustainable delivery of water services to multiple users at scale, and better understand the cost-benefits and trade-offs associated with investment decisions. It addresses the interactions between water security risks and poverty reduction across three intersecting dimensions: resource sustainability, inclusive services and sustainable growth. This case study focuses on the study site in Lodwar, Kenya.

## Dates

2015–2021

## Countries

Kenya

Local communities must travel long distances in search of safe water in Turkana County, Kenya. *(Source: D. Ochieng Ong'ech, 2018)*

## Aim of co-production:

The co-production of information by researchers and formal agencies (county government and NGOs) and private sector partners is intended to build research capacity, deliver interdisciplinary research and increase demand for science to promote and improve water security. Stakeholders are engaged in:

- undertaking institutional and household level water audits to gather data, including on current climate risks;
- provision of information on the quality and sustainability of water sources, supply and use behaviour, and participation in the mapping and testing of quality of borehole water and auditing the connection and reliability of piped water supplies; and
- providing information that has been used to generate climate and hydrological scenarios/tools that helps decision-makers to make better decisions by incorporating considerations on risks and trade-offs.

This continuous engagement, through stakeholder group meetings and focus group discussions, better informed the research framing, the current research, and also facilitates uptake of the research findings by policy/decision-makers and practitioners.

## Context:

Lodwar Town is a newly emerging and rapidly growing town with considerable potential for development, since the institution of devolved governance across Kenya in 2010, and the recent discovery of economically viable oil deposits. Water stress is a key concern for Lodwar and several stakeholders have an interest in the water sector. Equitable provision of safe water is a challenge and can only be achieved if all stakeholders are committed to achieve the goal of equity.

Seasonal rainfall forecasts have been regularly available from the national meteorological service, although their value has decreased because the users perceive the predictions as sometimes unreliable. However, weather and climate information, and other relevant knowledge, is being embedded in the drought monitoring system that is part of the mandate of the National Drought Management Authority (NDMA). Most actors in the water sector use this 'translated' climate information, rather than direct reference to the drought forecast, to inform decisions.

A Country Diagnostic Report was produced in 2015, to help frame the parameters for knowledge co-production (REACH, 2015). The co-production was planned at project level, at the scale of Lodwar Town. The co-production process is highly collaborative and involves interactive workshops with local government and associated committees, and water user groups. Co-production is intended to help stakeholders understand the complex interaction between rainfall variability, water security, and poverty, and how to mitigate these.

### Who was involved and what were their roles?

The multi-country REACH programme is led by an interdisciplinary team from the Oxford Water Network at Oxford University, UK. The disciplines within this network include geography, environmental

## What was co-produced?

- **Water audit:** A water audit was conducted, in June 2017, to document the details of the supply and distribution of water to Lodwar Town. The water audit identified certain areas (e.g. Nakwamekwi area) that suffer from water shortages partly due to inadequate yields from boreholes (Dulo et al., 2017). The town's piped water supply is occasionally interrupted, requiring citizens to rely on untreated water sources, for example from the local river, or from privately-operated tankers for supplying water (bowsers) (Haines et al., 2018).

- **Stakeholder coordination:** Multiple actors in the sector were identified, their interactions, where power is located, those with ability to influence decisions, and those who make decisions and their sources of funding were clarified (Haines et al., 2017). The research was then able to improve the understanding of the role of stakeholder coordination in identifying opportunities and challenges for water security interventions in an area of significant hydroclimatic variability, climate shocks, governance challenges and multiple competing priorities for water use.

- **Climate and hydrological information** to support stakeholders in the water sector has been produced. There is only one climate observing station in Lodwar town, so satellite and model data were used to understand better the spatial variability of rainfall during the different seasons and trends through time (Olago, 2018).

- **A novel decision-making tool** was applied to model the response of the Turkwel River basin's water resources system to growing demand for water and climate stressors (Hirpa et al., 2018). This computer-based decision-making tool allows decision-makers to understand the ways in which the water supply and demand system responds to climate variability under different water use scenarios. For example, increased water demand, especially due to expanded irrigation, has a strong negative impact on the resilience of the basin's water resource system to droughts caused by the global climate variability. Such new insights have been shared with stakeholders so that they are better able to comprehend the risks to groundwater resources.

## Benefits of the co-production approach

- Setting up Water Security Observatories to collect data over a long time period on social vulnerability and water use in water stressed environments allows for the measurement of the socio-economic impacts of water vulnerability.
- Improved water security, and improved data fed into planning for various outcomes, including drought early warning systems.
- The research programme has achieved government buy-in, which is important to bring in sectors that may not normally be considered climate sensitive, such as security services.
- Initiation of a five-year Water Service Delivery Plan for Lodwar Town will improve the county's ability to design, deliver and monitor water security interventions. The climate data generated are being used to inform this delivery plan.
- Implementation of the Women in Water (WiW) fora revealed some previously unconsidered gendered aspects within the water sector.

change, enterprise and the environment, engineering science, biomedical engineering, international development, anthropology and zoology. REACH is implemented by national teams that form a consortium of global leaders in water science, policy and practice. The Kenya programme is a partnership with hydrologists, climate scientists, behavioural scientists and environmental law from the University of Nairobi's Institute for Climate Change and Adaptation.

A wide range of stakeholders participated in the co-production by providing information and validating data. These included national government and Turkana county water management authorities, the Kenyan Meteorological Department, National Drought Management Authority, National Environmental Management Authority, as well as local companies, UN organisations, NGOs and civil society groups.

## How was co-production done?

The co-production method is designed to support data-driven decision-making and to tailor scientific information to the decision-making context through regular consultation and feedback.

### Identify key actors and build partnerships

In the initial phase of the research there was a ten-week study of the institutions involved in water decision-making that focused on access to, knowledge of, and use of weather and climate information and how much weather/climate knowledge is integrated into water decisions in Lodwar Town.

### Co-explore need

Local resident communities described the specific contexts in which climate information is used and also the limitations of currently available information. For example, they expressed a need for improved information on rainfall seasonality as the seasonal calendars that they were accustomed to were no longer reliable due to increased rainfall variability. They also connected rising insecurity (livestock raids) to periods of acute water stress and raised how reliable climate information would assist them and local law enforcement agencies to put security measures in place during periods of higher risk.

Interviews with the local government's water management institutions – Water Resource Authority (WRA), Ministry of Water and Sanitation – and the Kenyan Meteorological Department showed that their planning was hampered by climate data gaps and a paucity of information on river flows between the Turkwel Gorge dam and Lodwar Town.

An important output of this project is that it highlights the need for improved climate services. For example, Hirpa et al., 2018 reported that the increasing demand on ground water sources due to expanded irrigation exerts a significant negative impact on the resilience of Lodwar's water resource system to droughts caused by global climate variability. The local meteorological service identified the challenge of delivering reliable seasonal forecasts based on observations from a single observing station in a very large county with nomadic communities and serious security concerns. The cost of station data and the complicated process required to negotiate access to them also limited data sharing. The research noted that an effective water management strategy would require investment in an improved hydro-climatic monitoring system and a need to understand better the drivers of the increasingly variable rainfall and its inter-linkages with surface and ground waters.

## Lessons to learn from:

- **Broaden the data sources**: There are large Arid and Semi-Arid Land (ASAL) regions that are underserved by climate observation stations on the ground. Use of satellite-based data offers the best solution currently to redress this situation as they offer local data at good scale.
- **Capacity needs to be built up**: The use of climate data and services for decision-making has not achieved its full potential as the capacity of the users needs to be built to understand the data outputs, while data producers also need to learn how best to package the information for users. Co-production of climate and hydrological data for planning and management is skewed towards the experts due to its technical nature, the required computing resources and know-how to make use of large global datasets. For this reason, with few exceptions, the users are only able to participate at the data gathering stage. Consequently, the capacity to develop evidence-based data in institutions that manage water resources, and that of the practitioners and people affected at large, to understand and interpret such outputs, needs to be enhanced.

This research is ongoing, and it will be important to re-examine these lessons and feed the learnings back into the study design as the research progresses.

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# DARAJA: Co-designing Weather and Climate Information Services for and with Urban Informal Settlements in Nairobi and Dar es Salaam


## Authors

**Sunayana Sen,**
*(sunayana@resurgence.io);*
**Mark Harvey,**
*Resurgence;*
**Sabrina Ohler,**
*Kounkuey Design Initiative (KDI);*
**Stella Stephen,**
*Centre for Community Initiatives (CCI)*


## Aim of the project

**Developing Risk Awareness through Joint Action** (DARAJA) is a project under the WISER programme that aims to improve access to, and enhance the use of, relevant weather and climate information by residents of informal settlements in Nairobi, Kenya and Dar es Salaam, Tanzania. An inclusive forecasting service, which operates at city scale and is localised further, and an early warning service, co-designed with community members, will enable residents to be more resilient and better prepared to take adaptive measures. City authorities can also use this system for better urban management.

## Dates

April 2018–September 2020

## Countries

Kenya and Tanzania

DARAJA stakeholders, including Kenya Meteorological Department, Kenya Red Cross, community members, radio stations and project consortium, at the DARAJA co-design workshop in Nairobi (*Source: P. Kipkemboi, 2019*)

## Aim of co-production:

DARAJA has taken a systems-wide, co-production approach and has brought together disparate actors to work together for the first time, including the National Meteorological and Hydrological Services (NMHSs) and community development organisations.

The aim is to co-design interfaces and services for Weather and Climate Information (WCI) that address the needs of the residents of informal settlements. Co-producing the service between users and producers was intended to increase the knowledge and uptake of WCI. A common language/terminology and shared understanding of the purpose was established at the start of the process in order to increase understanding of WCI and engender a sense of ownership in the community, thereby increasing the demand for, and use of, WCI. Similarly, this process, which includes feedback loops between the community and the NMHS, was designed to better align the forecasting services with community needs so as to create a more tailored and actionable forecast. This will not only improve climate resilience at the individual, community and city level, but also improve trust between residents and the NHMS.

## Context:

Urban residents operate inside a complex and interconnected system. However, often, various actors in the city-system operate in fragmented ways. To effectively service the WCI needs of residents at a community and a city scale, a dynamic systems-wide, co-production approach is required. Historically, NMHSs have focused on developing Weather and Climate Information Services (WCIS) for sectors such as agriculture, aviation and marine. As urban cities are growing rapidly, leading to the increased need for WCIS, NMHSs need to work with urban communities to co-develop WCIS that are relevant for urban spaces.

## Who was involved and what were their roles?

DARAJA is coordinated by **Resurgence Urban Resilience Impact Ltd.** It is implemented by **Kounkuey Design Initiative** (KDI) in Nairobi and by the **Centre for Community Initiatives** (CCI) in Dar es Salaam. They play the key role of convening the stakeholders, facilitating the collaboration process and implementing the pilot services and other project activities. The implementation of these pilot services was led by the project consortium in collaboration with the stakeholders.

KDI and CCI convened a number of consultations, group dialogues, design workshops, feedback sessions and periodic survey/interviews, which brought together: residents of informal settlements, whose local knowledge tailored the forecast messages; school teachers in Dar es Salaam; the Kenya Red Cross Society (KRCS) in Nairobi; city authorities (Water and Sanitation Department, Disaster Management Authority, Urban Planning, etc); mass media channels and a community of practice – The World Bank and the Trans-African Hydro-Meteorological Observatory (TAHMO) in Dar es Salaam and the project Forecast-based Preparedness Action (ForPAc) in Nairobi – to collaborate with their respective National Meteorological and Hydrological Agencies, the Kenya Meteorological Department (KMD) and the Tanzania Meteorological Authority (TMA). The aforementioned stakeholders, in collaboration with KMD and TMA, have co-produced new, localised, daily forecasts and have also improved aspects of other forecasting products, such as more intuitive weather icons. Mass media channels have a unique insight into effectively communicating at scale. Thus, city-wide and community radio stations played a significant role in co-producing the reference and impact description guides and in co-designing the radio pilot.

## What was co-produced?

- **An inclusive communication system** to disseminate localised, regular and early warning forecasts at different scales (settlement-wide and city-wide).
- **User-centric weekly and daily forecasts** which include intuitive graphics and icons, city forecast zones designating target settlements, and expected impact descriptions when relevant.
- **New DARAJA pilot services** which use channels (SMS, radio, social media and community gatherings) and actors (community leaders and members, school students and teachers) for communicating weather forecasts and early warnings. Such channels and actors have been identified as being the most effective and preferred by the community.

## Benefits of the co-production approach

- Through a direct channel of communication with the NMHS and an interactive and constructive workshop process, marginalised and vulnerable communities are given agency and their requirements are validated.
- Continuous direct interaction throughout the co-production process created an opportunity to learn from technical experts, increasing users' awareness and understanding of weather information. This heightened awareness and sense of ownership, from being integral in the co-production process, resulted in an uptake of forecasts, increased forecast-based action at individual, community and city level, and improved trust in the system.
- The continuous interaction between organisational stakeholders and users increased the understanding of the users' context and their needs. The project created a shared space for direct communication, such as the WhatsApp group with stakeholder representatives. These initiatives have motivated organisational stakeholders to improve their products and services to meet the needs of users such as the NHMS and radio/media outlets.
- Feedback channels created between all the stakeholders has led to increased responsiveness, trust and an improved forecast from the NHMS.

## How was co-production done?

### Identify key actors and build partnerships

DARAJA brought together a range of stakeholders, including those who already exist in the urban WCI system and those who should be a part of the system. A mapping of how information flows through channels and actors was undertaken to identify the key actors to be included in the process. To support the development of locally relevant systems, it is critical that a local and trusted actor plays the role of convenor as such a person has a strong understanding of the local context and can elicit a greater buy-in from local stakeholders. A key element of building partnerships within this system was to create an environment of trust by fostering a shared understanding of the problem, a common goal of building climate resilience and multiple opportunities to work together.

### Co-explore need and co-develop solutions

The project co-designed pilot projects in each city through highly interactive, co-design workshops with media stakeholders, community members and city authorities. The stakeholders and project consortium worked intensively with the NHMSs to co-design awareness campaigns and communication systems that included dissemination and feedback. This was done to ensure that weather forecasts and early warnings would reach the most vulnerable communities and to create feedback loops back into the forecasting centres of each weather agency. This process was supported by data to help create a shared understanding of the problem and the system. Through discussions and workshops, the NHMS and users came to a common understanding. The NHMS determined the needs of users and users grasped the science and limitations of the NHMS and weather forecasting. Through this process, the stakeholders co-explored and co-designed the potential improvements that can be made in existing WCIS.

For example, during a two-day workshop with all the stakeholders and the NMHS, participants shared insights based on their collective experiences. Several guides were produced, which explore technical terms used by the NHMS but not easily understood by others. Collaborative exercises created an opportunity to develop a shared definition of technical terms typically used by the NMHS. For instance, participants unpacked the meaning of 'showers', then came up with an intuitive or locally relevant description.

### Co-deliver solutions

The improved WCI services were piloted for a period of time at city and settlement scale. In Nairobi and Dar es Salaam, the co-designed pilot services ranged from daily weather broadcasts on local radios and TV, to training school students and community leaders

to interpret and communicate weather conditions. Local radio stations used co-produced descriptions of technical terms in their weather updates and related programming, and community leaders drafted forecast SMSs to share with the wider community. Representatives from the different stakeholder groups volunteered to support the pilot services implementation by providing feedback and insights throughout the planning and execution stages. For example, stakeholders – especially community members – provided valuable feedback on the draft template for the new daily/rolling weekly forecast. A WhatsApp group of local actors was created to facilitate this coordination and has been leading the implementation with the project consortium providing support.

*'Accessibility of weather information through the WhatsApp group created by DARAJA has enabled me to share weather information during the April/May 2019 rain season with my students at Keko mwanga Primary School. Students informed their parents – especially those who live at the valley – who used the information to protect their belongings, including school books for children, which were usually destroyed by floods. This time, the case was different as precautions were taken much earlier.'*
– Jane Brown, Keko mwanga Primary School, Dar es Salaam, 2020

### Evaluate

Stakeholders provided regular feedback and suggested improvements while the pilot services were tested. For example, *was the radio talk show on the topic of WCI clear and engaging?* Lessons emerged through ongoing monitoring and evaluation, such as small-scale weekly surveys. These lessons were periodically assessed with stakeholders through meetings, and requisite adjustments, such as trialling different radio show formats, were made to the pilot services. Finally, opportunities for scaling up these services were assessed, and learnings shared, at different fora, such as the Greater Horn of Africa Climate Outlook Forum (GHACOF) and Global Resilience Partnership (GRP).

## Lessons to learn from:

- **Solid partnership commitments are key** to effective engagement, especially with public agencies, including the NMHS. A memorandum of understanding was established between the DARAJA consortium and each NMHS. Often, multiple key persons from different levels of seniority within the same agency need to be engaged and need to work together. Establishing a solid partnership takes time and should be incorporated in project design. The amount of time required varies based on the organisational culture of the agencies involved and other factors, such as elections or any national or regional events. Support from WISER in connecting with the right people in the agencies was a useful starting point. KMD and TMA designated one person from within their respective agencies as a point of contact for DARAJA, which enabled more streamlined and effective communication. At every stage, people from the agencies engaged as a partner with the project. The consortium paid multiple visits to the agencies to meet with senior members and share updates and impact stories. This had a positive effect on the relationship. Diplomacy was important in navigating the effective implementation of the partnerships. Aligning the goals of the project to the partners' goals and being transparent in the participation process while maintaining a constant communication channel were key.
- **Scaling up solutions:** Urban users are a rapidly growing group in need of improved WCI services. Solutions are needed for making successful urban co-production tools and methodologies accessible at scale. The co-production process used in DARAJA requires multiple workshops and in-person engagements, which are costly and time-consuming. With a number of partners involved, it is not always easy to find a common schedule. The key lesson here is to allocate more time, and more budget, for this phase of the project. Also necessary is a value proposition that demonstrates the cost-benefit of investing in the DARAJA co-production process through illustrating the financial value of avoiding the damage and loss generated seasonally and annually by the system.

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# ForPAc: Co-producing Approaches to Forecast-based Early Action for Drought and Floods in Kenya


## Authors

**Olivia Taylor,** *University of Sussex (o.g.taylor@sussex.ac.uk);*
**Emmah Mwangi,**
*Kenya Red Cross Society (KRCS);*
**Emma Visman,**
*King's College London;*
**Martin Todd; Dominic Kniveton; Pedram Rowhani,**
*University of Sussex;*
**Shamton Waruru; John Mwangi,**
*National Drought Management Authority (NDMA);*
**Andrew Colman; Richard Graham,**
*Met Office;*
**Mary Kilavi; William Nedgwa,**
*Kenya Meteorological Department (KMD);*
**David MacLeod,**
*University of Oxford*


## Aim of the project

**Towards Forecast-based Preparedness and Action** (ForPAc) is a research project to support more anticipatory drought and urban flood risk management in Kenya. ForPAc was designed around a co-production approach, bringing together mandated agencies responsible for weather and climate forecasting for flood and drought risk management in Kenya with researchers in the United Kingdom. ForPAc aims to co-produce weather/climate information that meets the direct needs of decision-makers and develop approaches to integrating forecasts into drought and flood Early Warning Systems (EWS).

Mapping the county drought contingency planning process with representatives from the Kitui County Steering Group, the Kenya Met Department and King's College London (*Source: E. Mwangi, 2018*)

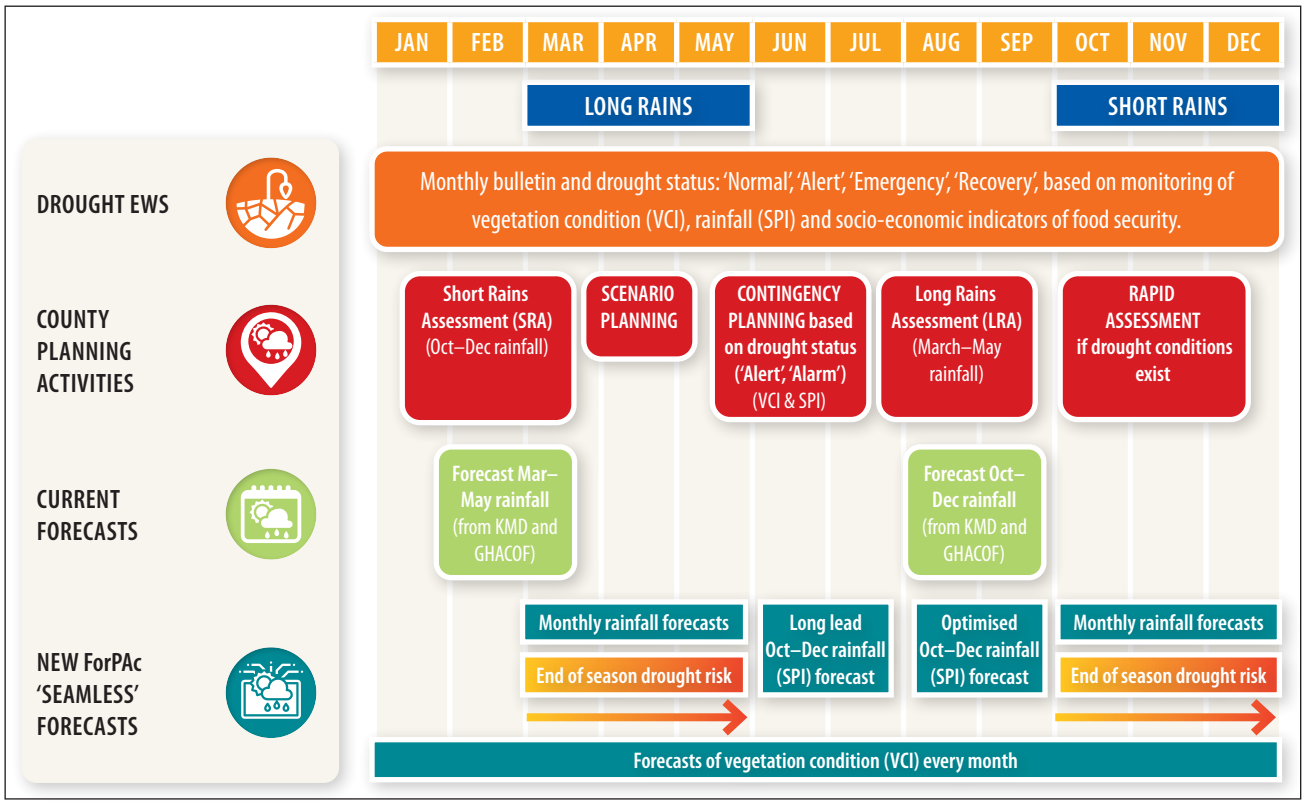
## Aim of co-production:

ForPAc brought together partners with long-standing relationships to develop climate services that support humanitarian and development planning within existing risk management processes and systems. This experience highlighted the vital importance of working closely with decision-makers to develop climate information. The project's co-production processes had these main objectives:

- Develop tailored, relevant and usable products by bringing together climate information producers and decision-makers/users.
- Strengthen decision-makers' understanding of forecast characteristics and limitations in order to build confidence in decision-making under forecast uncertainty, for example: familiarising decision-makers with the probabilistic nature of climate forecasts.
- Co-explore forecast probability triggers and levels of skill required to activate preparedness activities with acceptable levels of confidence. With forecast-based action not yet well established in the Early Warning System (EWS), building trust by using probabilistic forecasts for decision-making is essential.

## Context:

Kenya has a developed EWS for drought, but that system is based on monitoring drought conditions. Therefore, actions are responsive rather than anticipatory, and there is no EWS for flood in Nairobi. While the




Co-produced seasonal calendar of the drought early warning system, current forecasts and where new tailored forecasts could align better within existing decision-making processes in Kenya. (*Source: ICHA, 2020*)

Kenya Meteorological Department (KMD) produces relevant forecasts, these are not integrated into the drought EWS. Currently, production of climate information and risk management decision-making are siloed processes, with limited information sharing – for example, on the skill of forecasts – highlighting the need for co-production.

## Who was involved and what were their roles?

ForPAc, with coordination by the University of Sussex, brought together:

- Climate information producers: the KMD and the Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) and the Met Office
- 'Users' of climate information: the mandated agencies responsible for risk management and climate information users, including national agencies of the Kenya Red Cross Society (KRCS) and the National Drought Management Authority (NDMA), county/local level stakeholders and drought/flood risk managers
- Researchers from the University of Sussex, the University of Oxford and King's College London.

### Dates

December 2016–December 2020

### Countries

Kenya

## What was co-produced?

Outputs consisted of new, prototype forecast products, validated and piloted with users in decision-making, that fit directly into existing risk management systems.

- **Drought risk forecast:** New, more useful forecasts, tailored to support the county drought EWS and contingency planning process, that are made available at the right time (See seasonal calendar infographic, page 137).
- **Flood risk forecast:** Prototype forecasts providing seasonal (months ahead) and sub-seasonal (weeks ahead) information on the risk of heavy rainfall in Nairobi.

Crucially, ForPAc supported an embedded ForPAc staff member in each of the national Kenyan institutions involved, to lead the work, interface with leadership in each organisation, build trust and mainstream capacity. The main vehicle for co-production has been sustained engagements with stakeholder groups. In the project's drought case study, this was the Kitui County Steering Group for drought management and, in Nairobi, the project convened a group, including county government, emergency services, utility companies and community-based organisations.

## How was co-production done?

Each case study started with a **Participatory Impact Pathways Analysis** (PIPA): a method for complex projects to bring together implementers, users and other stakeholders and make explicit the users' objectives and needs. This was followed by climate training and the trialling of new products through a 'pilot programme' during the October–December 2019 short rains. ForPAc's PIPA included a range of activities which echo many of the recognised building blocks of co-production.

### Build common ground

During the first workshop in July 2018, the team mapped out the forecasting and risk management context and 'landscape', and stakeholders agreed on a common understanding of, and objectives for, the project. The workshop participants co-produced a mapping of the seasonal calendar of climate and related livelihood activities (see seasonal calendar infographic, page 137), the timing of climate information release and drought management decision-making processes. This guided the identification of 'entry points' for new decision-relevant forecast products.

### Co-explore need

Stakeholders developed 'problem trees' to identify challenges with forecast uptake and, where possible, to align forecast products with existing forecast metrics used in the drought early warning system. The 'problem trees' also identified training needs for stakeholders, and indicated that the project needed to invest in strengthening decision-makers' capacities and confidence in key climate concepts and their interpretation of existing forecasts.

### Co-develop solutions

Based on the training needs assessment, the research team developed a climate information training course designed to strengthen understanding of the fundamentals of climate prediction and existing and proposed forecast products. 'Forecast pilot' exercises were then co-led, introducing new, prototype forecast products with additional training and scenario planning for what actions could be taken based on these new forecasts. The pilot included three workshops, each issuing the most recent forecasts, from months ahead of time to shorter lead times, allowing forecast users to see the evolution of the forecasts in real time.

### Evaluate

Finally, the research team developed an extensive baseline, encompassing key informant interviews with decision-makers at national level and, within each pilot, including an ongoing process of participatory learning and review through end-of-workshop surveys and feedback sessions. For example, the final annual meeting included a learning review, based on 'round robin' discussion groups about the usefulness of particular forecast products. These activities showed that, while participants were better able to understand and use new forecasts for early action, institutional support and funding to do so remained uneven. The project has since focused on advocacy with the key agencies to embed these approaches.

## Lessons to learn from:

- **Co-production provided evidence of the potential benefits of new decision-relevant forecast products and forecast-based decision support systems:** Such evidence is necessary to justify changes to operational systems and the investments required.
- **Partnerships between forecast producers and forecast users were strengthened:** ForPAc supported full-time researchers who were embedded in each organisation. This was a necessary condition to drive the co-production process, but, in itself, is not sufficient to ensure that enhanced partnerships are sustained in the long-term.
- **Sustainability requires formalised institutional partnerships, commitment to resourcing and capacity building:** This requires buy-in from institutional leadership and may be further supported by an enabling policy environment.
- **Learning and capacity building must be accrued in the institutions and not just in the individuals involved:** This requires a commitment to sharing and training a wider body of staff.
- **It is not business as usual:** While co-production was very productive, the team acknowledged that it can disrupt normal practices and routines. In this case, it required working with the institutions involved to change processes – an intensive and lengthy exercise.

## Benefits of the co-production approach

- Identification and sustained engagement of a core group of decision-makers from project outset built trust and partnerships.
- Frequent engagements built common ground, trust and a safe open space to establish a detailed common understanding of how the existing early warning system works, what information is used, the sources of the information and the strengths and limitations of the system, as well as the nature of forecasting science.
- Forecast producers build an understanding of decision-maker systems, issues and needs, while decision-makers better understand forecast characteristics and build appropriate levels of trust in forecasts. Co-production can also make clear the benefits of the explicit provision of forecast skill, which may help overcome reluctance to provide this.
- Institutional mapping and needs assessment, facilitated by co-production, helped the project team to understand the political environment in which decisions are taken, identify possible champions for this approach and identify feasible entry points for forecast-based approaches in the system.
- Co-production-led process has increased the climate information producers' capacities to produce tailored and appropriate forecasts to support flood and drought risk management.
- Through co-exploring risk management decision-making systems/early warning systems and co-developing solutions between forecast users and decision-makers, forecast-based early action approaches were integrated into nationally owned EWS.

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# HIGHWAY: Co-produced Impact-based Early Warnings and Forecasts to Support Fishing Communities on Lake Victoria

Regional, impact-based, early warning system event in Nairobi, Kenya (*Source: Tim Donovan, November 2019*)


## Authors

**John Faragher,** *(john.faragher@metoffice.gov.uk);*
**Tim Donovan,** *Met Office*


## Aim of the project

The **High Impact Weather Lake System** (HIGHWAY) is a project under the WISER programme that addresses the need for improved, accurate, early warning systems to prevent deaths and damage due to storms and strong winds in the Lake Victoria Basin. The project provides regular weather forecasts and severe weather warnings for fishing boats and small transport vessels on Lake Victoria, and disseminates these bulletins through local radio and/or mobile phones. These bulletins provide clear, practical advice about how affected persons can protect themselves from, or mitigate the impact of, imminent threat. The key activities of HIGHWAY revolve around user engagement to understand and meet specific services needed through a co-production process.

## Aim of co-production:

The aims of the co-production were to better understand the impacts of weather – particularly severe weather events – on lake users. This understanding informed the development of relevant and actionable information and advice by the National Meteorological and Hydrological Services (NMHSs) around the lake (Kenya Meteorological Department, Uganda National Meteorological Authority, Tanzania Meteorological Authority and Rwanda Meteorological Agency).

In order to understand the most appropriate methods for reaching potential users of the service, local media and community organisations were canvassed on the timing of bulletins, dissemination methods and the language used and understood by users, taking into account appropriate lexicon, dialect and local languages.

## Context:

Whilst the NMHSs in the region did provide forecasts to the target communities, the forecasts were designed to provide basic information. Users on Lake Victoria require additional information, such as wave height, and clear messages on the impacts of weather and what action should be taken to avoid risks. Many of the communities are also remote, like island communities, for example, and are not well served by the traditional methods of communicating forecasts. This led to a low uptake of existing services in many areas.

## Who was involved and what were their roles?

The project brought together, in workshops, a range of participants with specialist knowledge and skill sets to share information and co-develop the service, facilitated by the Met Office and the NMHSs. Each country held a national workshop, and two regional workshops were held. The following role players took part:

- Senior operational forecasters from the NMHSs provided information to the group on the current and potential forecasting capability and developed new products based on the co-production process.
- Representatives from the fishing communities, such as the Beach Management Units (BMUs) and fishing cooperatives, shared information on weather impacts and the needs of their communities.
- Local government, such as Disaster Risk, Fisheries and Marine, provided context for local decision-making, and the processes that led to action being taken.
- Media – primarily local radio station operators – supported improvements to dissemination and translated forecasts, warnings and advice.
- International Development Managers and International Meteorologists from the Met Office, alongside specialist communications and marketing staff and consultants, provided training to the participants on planning communications, developing services and methodologies for co-production, and overall coordination of the co-production activities.

### Dates

2017–2021

### Countries

Kenya, Uganda, Tanzania and Rwanda

### What was co-produced?

- **Twice daily forecast:** The participants co-developed a forecast that met the specific needs of the user group. The forecast, issued twice a day at the times when day- or night-fishers are making decisions about their activities, contained clear information for different sections of the lake. It used colour-coded warnings, and a set of easily understood icons that provided relevant information on wave height, winds, rainfall, visibility and the risk of storms. Where risks were identified, information was provided on the possible impact of these risks, and advice was provided on how to mitigate these impacts.

## Benefits of the co-production approach

It was clear at the start of the project that, from the point of view of the NMHS and the user communities, there was a significant gap in perception of the current services provided. NMHSs were routinely providing high-quality forecasts through their websites and TV broadcasts and considered these to be meeting the needs of the majority of stakeholders. The user groups did not find the forecasts were meeting their needs as the forecasts did not explain the impacts of weather. Instead, they were providing weather variable information such as wind speeds, temperatures and rainfall amounts. Also, users did not have access to the internet, and the TV broadcasts were broadcast at times when decisions had been made and fishermen were already on the lake. The co-production approach allowed users and NMHSs to identify and address this gap in a meaningful and collaborative manner, leading to the current situation, where the NMHSs understand better the needs of their users and are providing a useful service.

## How was co-production done?

### Identify key actors and build partnerships

Each of the NMHSs identified representatives from the user groups (BMU Chairs, leaders of fishing cooperatives), the media and the appropriate local government stakeholders. These representatives were then encouraged to identify any additional missing stakeholder participants, accepting that, at the early stages of the project, the NMHSs may not yet have been able to identify all the necessary participants.

National workshops were held with these representatives to explain the concepts of an impact-based early warning system, to gain understanding of the needs of the users, and to develop local, national and regional networks.

### Build common ground and co-explore need

During the workshops, space was given to stakeholder representatives to share their experiences of how severe weather affected their lives and livelihoods and how they made decisions related to their work. NMHS representatives were encouraged to explore with the stakeholders what information was available to meet their needs, and how this could be best presented by providing impact information as well as meteorological variables. Use-cases for the product were developed using real-life examples of the experience of severe weather; impacts were discussed in detail and advice statements were written, suggesting practical mitigation actions.

The discussions and outputs were facilitated using a range of techniques, including traditional classroom-style training, round tables, serious games as well as guided and open plenary sessions. Early in the workshops, principles of participation were agreed, such as: everyone has an equal voice, the approach to disagreements and the mechanisms for those who felt less confident to contribute in open sessions.

These principles were introduced in the opening sessions at each workshop, and refined by the participants, if needed, and were implemented by the workshop facilitators and interlocutors. It was found that simple 'rules' and processes worked best for this, for example: not interrupting speakers, setting aside specific time for comments and questions, providing flipcharts for people to write on during breaks and breaking into smaller groups to examine any difficult choices in more detail.

### Co-develop solutions

The key outputs of the sessions were:

- clear user requirements and use cases. Innovative products were co-produced by NMHSs, scientists and users, and validated and implemented to improve early warnings in the region;
- impact tables, describing the risks associated with severe weather, and advice statements, providing recommended mitigation actions;
- communication plans to improve dissemination; and
- standard operating procedures (SOP) for the production of the service, and for response to the warnings.

Following the round of national workshops, two regional workshops were held. At the first, prototype products were shared, and discussions between the user representatives and the NMHSs helped to facilitate further refinement of these products. The second workshop followed the implementation of the forecast, and discussions took place on how to enhance the forecasts' use and increase their impact. These regional workshops were also an opportunity for cross-learning between the countries involved and sharing best practice.

### Co-deliver solutions

Following the co-development of the products, the NMHSs began the production of the services, based on the user requirements. These were then disseminated to key stakeholders for ongoing delivery to the end users, using methods that had been established as suitable at the national and regional workshops. Communication methods were determined based on the shared understanding of how communities were best able to receive information, and on how the quality and authoritative voice of the NMHSs could be maintained. Consideration was also given to the resources required to ensure that the communications methods would be sustainable after the project end. WhatsApp messages with the forecast were sent to the BMUs and community leaders, who used these to hold discussions with the fishermen, post notices or raise flags at the landing sites, as appropriate. Local radio stations received messages or emails and translated the forecast and advice into local languages, broadcasting them in news and current affairs programming.

### Evaluate

Using the WhatsApp groups, BMUs and community leaders were able to provide immediate feedback on the forecasts to the NMHS. This feedback forms part of the evaluation of the effectiveness of the project, alongside more formal evaluation and monitoring. The users were involved in the need analysis, the way products and services are packaged and distributed and they proffered feedback for improvement.

## Lessons to learn from:

- **Co-production needs to be adequately resourced:** This resourcing needs to be both in the form of committed time from the participants, and financing for the costs of those attending meetings and workshops. For example, the user representatives are often giving up days of work to participate, which can result in lost earnings. The presumption is often that participants will be glad to be involved, as the co-production will result in positive outcomes for them and their communities. However, this can conflict with their short-term economic needs. Understanding this, and compensating for it when possible, increases the likelihood of participation.
- **Participants need to be able to participate fully:** Establishing principles for participation ensures that all voices are heard, and that those involved feel able to challenge constructively and effectively. For many participants in co-production – and especially so for users – this may be the first time that they have been engaged in formal processes of this kind. Being clear that all contributions are valued and welcomed, actively challenging established hierarchies and encouraging contribution from all helps to develop the confidence of all to engage.
- **Co-development is a continual process:** Building mechanisms for feedback into the co-development and co-production process that continue beyond delivery ensures ongoing improvement and stakeholder buy-in for the services that are co-developed.

# HyCRISTAL: Using Video to Initiate Farmer Dialogue with Local Government in Mukono, Uganda


## Authors

**Grady Walker,**
*University of Reading*
*(g.walker@reading.ac.uk);*
**Miriam Talwisa;**
**Colline Saabwe,**
*Climate Action Network – Uganda (CAN-U)*


## Aim of the project

The aim of the **Integrating Hydro-Climate Science into Policy Decisions for Climate-Resilient Infrastructure and Livelihoods** (HyCRISTAL) project is to develop a new understanding of climate change and its impacts in the East African region, working with decision-makers to ensure a more climate-resilient future. The project is designed to understand, quantify and reduce the uncertainty in the regional climate projections and, in collaboration with a range of stakeholders, co-develop climate-change coping options that meet the region's societal needs in both urban and rural areas.

Participants developing a storyboard (*Source: G. Walker, 2019*)

## Aim of co-production:

The primary objective of the project was to engage influential members of the farming community ('farmer champions') in a knowledge exchange process with local government leaders in Mukono, Uganda, the project's rural pilot focal district.
The activity had two other objectives:

1. To create shareable visual resources from which other farmers could learn adaptation strategies; and
2. To establish the foundation of an exchange with local government officials, in hopes of initiating a dialogue.

The project was developed around the principles of participation and action-research. The goal was for the participants to take complete ownership of the process and its outputs, targeted to a specific action – in this case, engagement with local government. Co-production was a means of creating local ownership, as it was an inclusive process designed to assign responsibility and opportunity to those involved. Using video production as the medium, participatory action-research provided a platform for marginal voices. The video lent credibility to the farmer champions, who would not have otherwise been able to gain access to government officials. The production and horizontal sharing of locally developed demonstration videos with other farmers helped the farmer champions fill the gap left by the reduction of extension services in Mukono.

## Context:

The methods of engagement and the outputs required a co-production approach because the facilitator possesses technical skills related to video production and the crafting of narratives, while the participants possess contextual knowledge about farming and fishing in Mukono and the relationships and power dynamics between farmers and local government. As local 'influencers' from the farming and fishing community, the participants also have agency that outsiders do not possess. After the collapse of the National Agricultural Advisory Services (NAADS) programme in Uganda, the army ostensibly inherited the responsibility to provide rural advisory services. Farmers in Mukono were already dissatisfied with NAADS, having had little-to-no interaction with government agriculture advisors from the army or anywhere else. The participants identified the need to establish a link with local government as a priority. An outcome of this disconnect with local government is that neighbouring farmers have a higher level of trust for their peers than for outsiders, so the choice of messenger in delivering the adaptation narratives was important. This motivated the participants to develop videos that could be used as shareable resources from which other farmers could learn adaptation strategies.

## Who was involved and what were their roles?

Eight farmer champions were identified by the local partner organisation, Climate Action Network – Uganda (CAN-U). They participated in a week-long video production training course to develop the technical competencies that would enable them to co-produce two short films. Many had never used a camera before. They were trained by a facilitator from the University of Reading's Walker Institute, who also helped with the editing. Two officers from CAN-U were also involved with translation and facilitation. As the participants' technical skills improved, their reliance on the facilitator reduced. The facilitator presented and discussed HyCRISTAL's Climate Risk Narratives (Burgin et al., 2019) with the participants. The outcomes of the discussion became the basis for the films' topical themes of agriculture and climate change challenges, which the farmer champions contextualised to Mukono District. Working in groups of four, with the support of the facilitator who provided input on the general topical theme and the technical dimensions

### Dates

June 2015–June 2019

### Countries

Uganda

### What was co-produced?

Two films were co-produced:

- *Climate Challenges and Solutions at Farm Level: A Case of Farmers at Nakasuku Village*, focused on agriculture.
- *Climate Change Challenges and Possible Solutions in the Fisheries Sector*, focused on fisheries.

The videos were screened for the Mukono District leadership at an event at the district headquarters, after which a reflection and discussion session was held. Over 20 people attended the exchange, including key officials such as the District Principal Administrative Secretary and the Director of Natural Resources and Environment.

of the production, the participants storyboarded the films in advance to ensure that the stories they shot in the field remained true to the original concept. Because storyboarding mitigates power dynamics that invariably arise during the production process, stories were not improvised at the shooting location and participants were discouraged from making on-the-spot changes to the production without group consensus.

## How was co-production done?

In this activity, co-production followed the guiding principles of participatory action-research – a methodology, or research design framework, which merges theory with action and participation while challenging institutionalised methods of collecting and curating knowledge. Participatory action-research relies on the accumulation of knowledge through participant action and seeks to advance the interests of under-represented groups and classes (Fals-Borda, 1987).

### Identify key actors and build partnerships

The HyCRISTAL farmer champions are influential farmers and fishers in Mukono District, who have filled the gap created by weakened extension services. Leveraging the existing trust between the local partner, CAN-U, and the farmer champions was essential to the programme's success, enabling the facilitators from the University of Reading to rapidly establish trust with the community members. In consultation with the farmer champions and CAN-U, the HyCRISTAL rural team identified the key actors who should receive the messages from the farmer champions. Partners from CAN-U had a direct link with a key government official at the Mukono District Headquarters. That official was able to mobilise the district leaders who the farmer champions had identified during their consultations about the invitation list, and secured their commitment to attend the screening.

### Build common ground

At the outset of the overall activity, common ground was established by an equal sharing of power, with a planned reduction of facilitator power and an expansion of participant power as the activity progressed. Initially, participants relied heavily on facilitation because the emphasis was the transfer of technical video production skills. After the facilitator explored the Climate Risk Narratives in an open discussion and participants decided upon their general topical themes, the facilitators relied on the participants to provide the narrative material, embedded in their lived experiences, for the video stories.

### Co-develop solutions

While horizontal video sharing could happen at any time after the activity concluded – depending on the individual initiative of the famer champions – the government exchange required the participation of the entire cohort and the networking reach of CAN-U. Thus, participants were focused on leveraging the momentum of the activity by engaging with local government as soon as they completed production of their first video. They hoped to secure commitments to increase financial and technical support for agriculture and fisheries advisory services from district government officials. CAN-U was instrumental in the co-development of the format and agenda of the knowledge exchange day, which was seen as the initial solution to the problem of disconnection between farmers/fishers and their local government representatives.

### Co-deliver solutions

Once the knowledge exchange event was confirmed, the planning and facilitation of the event was entirely in the hands of the farmer champions and based on their own agenda. The event began with remarks from CAN-U, followed by the farmer champions.

> *'Now I know one or two pictures can tell and deliver the intended message the way you want it.'*
> – Farmer champion, Wali Christopher

Responses from local government officials followed the screening of the videos. The event concluded with a lengthy open discussion about climate change adaptation and the needs of farmers and fishers in the district. A communication link between the farmer champions and the district leadership was established, with informal commitments from the latter to continue engagement and provide resources for producing more videos. Notably, the farmer champions, disappointed with the level of response from local government – as no follow-up activity had occurred – also held a successful meeting, a month later, with officials of the National Planning Authority (Uganda) in order to highlight the needs of smallholder farmers in the context of climate change.

### Evaluate

Ultimately, Mukono District Local Government increased funding for targeted agriculture extension services in that financial year.

## Lessons to learn from:

- **Local voices resonate best:** The activity was successful as it drew from established theories of critical education and participatory action-research, which both have established and rigorous track records of challenging action and knowledge monopolies. The video narratives told local stories about adaptation, communicated in the local idiomatic dialect of Mukono. Their content, pace and message format were determined through group consultation based on thematic investigations, an element drawn from action-research.
- **Determine what climate information is appropriate to district scale:** Climate change information about Uganda was provided through Climate Risk Narratives in order to initiate discussions about what the climate in Mukono might look like in the future. The Climate Risk Narratives information was generalised to Uganda and the entire Lake Victoria region as a whole. The lack of contextual specificity of the climate change information was initially frustrating for the farmer champions. By voting for one specific climate future, and crafting the video stories to address that climate future, the farmer champions were able to navigate the uncertainty generated by competing and contradictory risk narratives, such as wetter versus drier.
- **Create ownership of the process:** Ensuring that the farmer champions planned the government exchange day meant that they felt they were hosting the event, and the activity facilitators and government officials were their guests. This feeling of ownership gave the farmer champions the confidence to organise a meeting at the national level.

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*'Building the capacity of the farmer champions into actors that could, in the future, engage their leadership through well documented lived experiences of the effects of climatic changes on their crops and livestock was not only rewarding as a way of ensuring communities sustainably address their challenges, but also one that is communally owned and drawing from the very resources that are available at community level'.* – Miriam Talwisa, National Coordinator for CAN-U

## Benefits of the co-production approach

- The target audiences for the videos were neighbouring farmers, fisherfolk and other community members who did not have access to rural advisory services. Local government officials were also targeted because the exchange was predicated upon a screening of the videos. Through the aforementioned process of ensuring narrative control remained in the hands of the farmer champions, the co-production approach ensured that the voices and stories in the videos were authentic to the district and would therefore resonate in peer-to-peer exchanges, or in the exchange with local government officials.
- The participants had ownership of the activity, its outcomes and its future direction. For example, the farmer champions meeting with the National Planning Authority happened as a result of their own initiative.
- The facilitators also gained a deeper understanding of the issues in the district that would inform future activities and engagements as part of the HyCRISTAL rural pilot in Uganda, and in new project proposals.

# SCIPEA: Co-produced Seasonal Forecasts for More Effective Management of Hydropower Supply in Kenya


## Authors

**Richard Graham,**
*(richard.graham@metoffice.gov.uk);*
**Hayley Jones,**
*Met Office;*
**Willis Ochieng,**
*Kenya Electricity Generating Company (KenGen);*
**Chris Kiptum; James Muhindi,**
*Kenya Meteorological Department (KMD)*


## Aim of the project

The aim of the WISER **Strengthening Climate Information Partnerships – East Africa** (SCIPEA) project was to strengthen national and regional resilience to seasonal climate variability by enhancing partnerships between global, regional and national climate organisations to increase access to, and use of, the best available information on seasonal prospects for East Africa; and between providers and users of seasonal forecasts to aid translation of the best forecast information into improved, co-developed services for decision-making.

## Dates

2016–2019

## Countries

Kenya, Tanzania, Uganda and Ethiopia
(This case study focuses on Kenya)

Service Development Team meeting between the Kenya Electricity Generating Company, the Kenya Meteorological Department and the Met Office; one of several over 2016–2019 to build common ground and co-explore and co-develop a customised seasonal forecast service to assist hydropower management (*Source: R. Graham, 2018*)

## Aim of co-production:

The three key aims of the co-production were as follows:

1. For the Kenya Meteorological Department (KMD) to develop a better understanding of:
   - how seasonal predictions could assist Kenya Electricity Generating Company (KenGen) in its operational decision-making for hydropower reservoir management;
   - how forecasts are currently used; and
   - how they might be improved to better inform decisions.
2. To assist KenGen in improving their understanding of the potential benefits and challenges of seasonal forecasting to be better equipped to fully appreciate and interpret the forecasts in decision-making.
3. To use the new knowledge acquired to develop new, prototype prediction services that supplement the publicly available national forecast with more detailed information specific to KenGen's requirements; to jointly trial and refine those prototypes and bring them to operational status.

## Context:

KenGen already made good use of KMD's public national seasonal rainfall forecast product, which is designed to give generalised information. However, KenGen's key needs are for specific information relating to reservoir inflow. The relationship between rainfall, reservoir levels and capacity for hydropower is complex, and the potential for new, reliable, more detailed forecasts was not obvious. Sustained co-production activities were needed to build common ground, develop mutual understanding of potential options and co-explore solutions.

## Who was involved and what were their roles?

The core participants formed a Service Development Team (SDT) which comprised:

- senior forecasters from KMD and, later, deputy directors of Forecasting and Business Support;
- energy planners/engineers from KenGen;
- a climate researcher from KMD's Institute for Meteorological Training and Research (IMTR);
- climate scientists from the IGAD Climate Prediction and Applications Centre (ICPAC); and
- a climate scientist from the Met Office, United Kingdom.

KenGen shared details of their responsibilities for predicting energy production, and the decision process this involves, focusing on hydropower, and their need for forecast information. KMD and IMTR shared detailed information on the national seasonal rainfall forecasts produced and suggested reservoir inflow and other products for trial to meet KenGen's needs. ICPAC used lessons learnt to help build a regional information hub for fostering co-production. All partners participated in trials and reviews of the developing service. Later, KMD deputy directors joined meetings to help steer the new services to operational status. The KMD director reviewed and signed off the issued forecast bulletin. The Met Office advised on forecasting methodology and facilitated all meetings, including meeting reports and actions agreed.

## What was co-produced?

The agreed aim of the co-production was to co-develop and implement an additional, operational, seasonal forecast bulletin for the October–December (short rains) season, issued annually in August and conveying forecast information specific to the needs of KenGen's hydropower planning. The bulletin is issued by KMD as a supplement to the national forecast designed for public consumption. It includes explicit predictions of inflow into two reservoirs selected by KenGen, which are of primary importance in the hydropower network. Conventional rainfall prediction maps are also provided, with river basins overlaid to aid interpretation of implications for hydropower. The first co-produced bulletin was issued ahead of the October–December 2019 season.

## Benefits of the co-production approach

- The resulting strengthened partnership between KenGen and KMD has resulted in new customised services, which add significant value to the public national service, and forms a firm basis for continued iterative service improvement.
- Co-production led to a clearer understanding of KenGen's use of the 'analogue year' approach to predict seasonal inflows. This is where the estimated inflow for the season is simply the inflow observed in a previous year when climate factors such as El Niño were similar. The analogue method is imprecise and untested and has now been supplemented with a new, fully evaluated method more firmly based in climate science.
- Knowledge sharing during co-production means KenGen now has increased understanding of, and confidence in, the forecast, and KMD better understands KenGen's decision-making processes and need for forecasts.
- The frequent engagement in co-production has led to increased contact and consultation between KenGen and KMD on weather and climate issues, including high-level reflection on how the service might be expanded.

## How was co-production done?

### Identify key actors

Ahead of project start, KMD identified KenGen as one of a number of potential partners already using climate information in their operations. Climate service development is known to be challenging, and prior selection of 'climate-sensitised' partners helped in making quick progress. Next, a SDT was established from personnel in KenGen and the other partners, with KMD as the SDT leader. The key output of the SDT was defined as implementation of a new co-produced climate service for KenGen, and participation in the SDT was built into formal project contracts.

### Build partnerships and co-explore needs

The following introductory 'scene setting' activities were conducted:

- The Paying for Predictions game, developed by the Red Cross Climate Centre (RCCC), introduces, in a simplified way, the challenges of making decisions under uncertainty and the benefit of forecasts.
- The experiences of the water and energy sectors of other East African countries in the use of forecasts were shared to aid learning.
- Envisioning exercises courtesy of the Walker Institute: To help focus on the desired main impact of the climate service, KenGen, KMD and other SCIPEA users were asked to imagine a best-case national newspaper headline after the launch of the planned service, then to construct a roadmap of activities needed to achieve the impact. The headline was: 'Cushioning Kenyans against power rationing despite weather fluctuations – thanks to close collaboration between the Kenya Meteorological Department and KenGen'.

KenGen's specific needs were then further explored, refined, prioritised and tabulated through a mixture of chaired discussions and questionnaires designed to establish the key operational decisions made, thereby illuminating the type of forecast information that could best inform those decisions.

### Co-develop solutions

To respond to the tabulated needs identified and develop potential forecast solutions, KMD, IMTR and ICPAC undertook a one-month science 'retreat' at the Met Office. Solutions were later shared with KenGen, and the products to be included in a prototype bulletin were agreed. For example, it was decided that, in addition to predictions of reservoir inflow, predictions of season onset timing were also required, but that suggested predictions of rain-day frequency were not needed. The prototype, trialled and refined in 2017 and 2018,

became a focus for capacity building of KenGen staff, providing the opportunity to increase understanding of the methods used, as well as helping to reduce jargon and improve the content, design and understandability.

### Co-deliver solutions

To assist operational delivery, KMD senior management joined later SDT meetings. The delivery of the first operational bulletin in September 2019 was led by the KMD focal point, using guidance from a Standard Operating Procedure (SOP) document, jointly prepared by the Met Office and KMD, that describes the production procedure. The process is owned by KMD, with the final version of the bulletin signed off by the KMD director. A SOP document guiding KenGen's use of the forecast information was also updated to refer to the new service.

### Evaluate

Improvement of the bulletin, based on user evaluation and feedback, will be a continuous process and has started following the October–December 2019 bulletin. In feedback to the KMD director, the CEO of KenGen wrote: *'The supplement guided KenGen on making the hydropower projections effectively based on the forecasted weather of above normal that translated to above normal inflows into Masinga and Turkwel, as contained in the supplement. The supplement forecast, therefore, was accurate, and our request is to extend the supplement forecast to March–May season…'*

## Lessons to learn from:

- **Co-production takes time:** It takes time to unravel the decision-making context and to co-develop solutions. For example, operational practices were documented but not in close detail – so it took time to appreciate KenGen's use of the analogue approach. Planning to have adequate time for substantive engagement and mutual reflection is important.
- **Continuity of personnel:** Continuity of personnel throughout the co-production process allows continuous building of mutual understanding and trust and maintains momentum in service development. In the project, a key SDT member moved roles and was not available in the build-up to service implementation. This slowed implementation until a new member was appointed. It was necessary to divert resources from further service improvement to meet the implementation deadline.
- **Willingness to share data:** KenGen were ready to share the historical series of inflows into reservoirs, and co-production helped to confirm the importance and benefits of data sharing in developing the forecast method. The historical inflow data were requested ahead of the science 'retreat' so they could be 'blended' with climate prediction parameters to generate new inflow predictions. The data were also needed to evaluate the success of the predictions over past years.
- **Early prototype development:** It was found that development of a prototype bulletin, which served as a tangible benchmark for discussion and improvement, helped to focus the service development, set realistic targets for progress and – through enhanced discussion of the bulletin products – deepened mutual understanding of KMD and KenGen perspectives.
- **Nominated team with mandated task:** The use of a formal SDT within the project, tasked with service development, helped to identify evolving needs, such as the need to co-opt senior management to the team ahead of operationalisation. In particular, deputy directors of Forecasting and Business Support were needed to advise the SDT on protocols for implementation and procedures for making changes to the KMD's suite of operational products.

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# Weather Wise: Co-producing Weather and Climate Radio Content for Farmers, Fishermen and Pastoralists in East Africa


## Authors

**Diana Njeru,**
*(Diana.Njeru@ke.bbcmediaaction.org);*
**David Njuguna,**
*BBC Media Action;*
**Albert Mwanyasi,**
*Sifa FM*


## Aim of the project

**Weather Wise** is a project under the WISER programme that aims to strengthen the capacity of media professionals and technical experts to respond to the climate and weather information needs of farmers, fishermen and pastoralists living in northern Kenya (Turkana and Marsabit), coastal Kenya (Kwale) and the Lake Victoria regions of Uganda, Tanzania and Kenya (Homa Bay) through the production and broadcast of weather and climate radio content.

## Dates

July 2018–October 2020

## Countries

Kenya, Uganda and Tanzania

Albert Mwanyasi interviews an elderly female pastoralist, who reported that her entire village had moved south from Kargi to Kambinye (about 30 kilometres away) in Marsabit County, northern Kenya, in search of water and suitable pastures for their families and animals. (*Source: D. Njeru, 2019*)

## Aim of co-production:

The aim of the co-production is to provide a platform for journalists to work with scientists to pass on weather and climate information through radio programming that is contextually relevant, accurate, timely and that can be used by farmers, fishermen and pastoralists for decision-making.

## Context:

In the early stages of the project, audience research found that the target audiences of farmers, fishermen and pastoralists did not trust scientific forecasting, because it was not well understood, and, instead, mostly relied on their indigenous knowledge of weather and climate. They recognised that their environment is changing but did not fully understand why. Audiences did, however, acknowledge that some forms of traditional forecasting are becoming less reliable, but they were cautious of the scientific approach to weather predictions. Journalists had little knowledge of how to communicate weather and climate information and felt that scientists were not willing to engage with them. Scientists, on the other hand, were also reluctant to work with journalists, saying that they tended to distort and politicise their message. BBC Media Action partnered with eight local radio stations and built their capacity to produce weekly weather and climate radio content in local languages.

## Who was involved and what were their roles?

Senior Broadcast Mentor David Njuguna provides remote and on-the-job training in the production of weekly weather and climate radio content to eleven journalists working at the eight partner radio stations. These journalists also attended several workshops to build their radio production skills, increase their knowledge of climate change and foster good relationships with scientists and technical experts. While a large part of the capacity development was facilitated by the Senior Broadcast Mentor, experiential learning contributed to their capacity development at workshops such as the Greater Horn of Africa Climate Outlook Forum (GHACOF), led by IGAD Climate Prediction and Applications Centre (ICPAC), the project's residential workshops, led by BBC Media Action, and Africa Climate Week, led by the Met Office.

Albert Mwanyasi is a radio producer at Sifa FM, one of the partner stations located in Marsabit County, northern Kenya. David Njuguna has been mentoring Albert in identifying audience needs, researching content, writing scripts, interviewing skills, editing and packaging stories and capturing audience feedback. Albert works closely with experts, including the local meteorological agency, agricultural extension officers, veterinary and livestock experts, as well as community health volunteers. He interviews these experts and has them break down technical information and scientific jargon that audiences struggle to understand. The experts also explain how weather is forecast, provide accurate weather forecasts and give intelligible advice that listeners can use to make practical decisions that improve their livelihoods.

## How was co-production done?

The Weather Wise project provides opportunities for journalists and scientists to work together in the production of weather and climate content for rural audiences whose livelihoods are most affected by climate change.

### Identify key actors and build partnerships

At the initial phase of the project, formative research was carried out to identify populations living in the target areas most affected by climate change. The research revealed that farmers, fishermen and pastoralists are the most vulnerable as their livelihoods are heavily dependent on the weather. These groups became the project's target audiences.

## What was co-produced?

The eight radio partners have produced and broadcast over 250 programmes to date. They produce different content based on the information needs of their respective audiences, including radio features, dramatised public service announcements (PSAs) and short magazines, while others produce and present live programmes. For example:

- Albert produces a three-minute, weekly, radio feature called *Hali ya Hewa na Mifugo* (Climate Change and Pastoralism) that educates farmers and pastoralists in northern Kenya on the impact of climate change on their livelihoods and what they can do to adapt.
- Vivian from Maata Radio (Turkana, Kenya) produces a one-hour interactive radio programme called *Nee Nkosi* (Our Home) that targets pastoralists living in northern Kenya.
- Jeremiah from Gulf Radio (Homa Bay, Kenya) produces a programme called *Tich Tiyore* (Let's Work) that targets farmers and fishermen around Lake Victoria in Kenya.
- Elias from Radio Kwizera (Tanzania) produces a programme called *Hali ya Hewa* (The Weather) that targets farmers and fishermen around Lake Victoria in Tanzania.

## Benefits of the co-production approach

- Scientists' and journalists' co-production of radio content ensures that the information passed on to audiences is accurate, contextually relevant and can be easily applied in their lives. During interviews, journalists help scientists/technical experts to simplify scientific jargon to aid audiences' understanding.
- Through building common ground, journalists and scientists were able to rebuild trust based on a mutual acceptance that they are all trying to pass on lifesaving information to affected communities. Scientists now feel confident that the journalists are not politicising forecasts, and journalists feel they can seek guidance from the scientists to help them better understand the technical information so that it can be communicated in simple language to the audience.
- Co-production helped challenge social norms. An improved understanding of how and why weather patterns are changing, as well as an increased trust in the scientific forecast, means that community members can make decisions informed by multiple knowledge sources, including traditional forecasts.

The research also sought to understand why scientists were so reluctant to work with journalists and why journalists avoided engaging scientists in their programmes. It was evident that building trust between scientists and journalists was imperative to the success of the project.

### Build common ground and co-explore need

BBC Media Action held three residential workshops that brought together journalists from eight partner stations, scientists from local meteorological agencies and technical experts from the agriculture, fisheries and livestock sector to build the journalists' capacity to communicate weather and climate information to farmers, fishermen and pastoralists in their respective counties. The aim of these workshops was to:

- improve journalists' understanding of issues related to climate change and build their production skills;
- help journalists and scientists understand audiences' knowledge, attitude and perceptions around scientific forecasting based on the findings of the formative research;
- build scientists' understanding of how media content is produced and how to have maximum impact with audiences when delivering interviews; and
- improve relationships between journalists and scientists in order to allow for the continuous co-production of weather and climate media content.

For the scientists, understanding the needs of audiences and how media content is produced, helped build trust between journalists and scientists. The scientist recognised that the purpose of the programme is not political, but is aimed at providing what could be lifesaving information to the communities they serve.

### Co-deliver solutions

During the residential workshops, scientists and journalists co-produced a mock programme together and mapped different experts that the journalists could interview for their future programmes. This helped both parties understand how each sector works and how relationships and contacts established during the training would work moving forward. If a climate scientist felt that the topic of discussion was not his/her area of specialisation, he/she would refer the journalists to a more relevant expert in that field.

Journalists and scientists have since developed a rapport that allows them to reach out to each other to co-produce radio content for the target audience. Journalists find scientists more receptive to participating in co-production of the weather and climate radio content. Scientists have also been reaching out to journalists when they have important and urgent information that they would like to share with audiences.

### Evaluate

Audiences regularly call into the station to provide feedback on the programmes, request information and suggest topics to be addressed in future programmes. This feedback is used to improve the quality of the radio programmes, meet the needs of the audience and understand the impact the programmes are having on their livelihoods. Audiences report increased knowledge and access to contextually relevant weather and climate radio content, with some reporting having used it to improve their livelihood.

## Lessons to learn from:

- **Understand how both media and science sectors work:** Each sector should know the protocols to follow. A scientist may, for example, have all the relevant information about upcoming heavy rains that the journalist needs, but they are not allowed to be interviewed by the media without a written request to the meteorological office, which may take weeks. Similarly, journalists have different roles in their stations, and they are not the final authority on what is aired when scientists want to share information. Having a good relationship between them will help manage each other's expectations.
- **Create networks between journalists and scientists:** Journalists are not experts in climate science, and they need experts on their programmes to ensure that the information being passed on is accurate. Scientists, on the other hand, are not communication experts. They need to work with journalists to ensure that the information they are passing on to audiences can be easily understood.
- **Understand radio audience's weather and climate information needs:** An awareness of media consumption patterns/ preferences and knowledge, attitudes and perceptions around climate change enables journalists to put themselves into the shoes of the audience and provide information that is relevant to the context in which they live. For example, fishermen need wind speed information. Farmers need rain forecasts. Reliable, accurate, timely information in a user-friendly format can be used by farmers, fishermen and pastoralists to make practical decisions that can improve their livelihoods.
- **Target audiences have some deeply rooted social norms that prevent the uptake of scientific forecasts:** Developing content that addresses these norms and encourages behaviour change requires a long-term, more targeted approach. There is also a need to link indigenous knowledge with scientific forecasting by including indigenous weather knowledge experts in the co-production process.

*'I believe the programme is having an impact on the audience because many listeners call the station and me directly saying how they are learning and benefiting from it. For example, after receiving a weather forecast that the amount of rains would be lower that season, I advised farmers to plant immediately the rains began. Those who took my advice called me later to report that they harvested, unlike their counterparts who delayed.'*
– Agricultural expert in Tanzania

*'This time round the rains did not affect us as negatively as previous seasons, and this is because we got information from the programme in time. I have also learnt from your programme better farming techniques like digging terraces that help prevent the topsoil/crops from being carried off by the rain water.'*
– SMS feedback from a Maata Radio listener

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# List of acronyms

| | |
|---|---|
| **ACPC** | African Climate Policy Center |
| **ALP** | Adaptation Learning Programme |
| **AMA** | Anti-Malaria Association |
| **AMMA-2050** | African Monsoon Multidisciplinary Analysis 2050 |
| **ANAM** | *Agence National de la Météorologie* (Burkina Faso) |
| **ASAL** | Arid and Semi-Arid Land |
| **ASDSP** | Agricultural Sector Development Support Programme |
| **BMU** | Beach Management Unit |
| **BRACED** | Building Resilience and Adaptation to Climate Extremes and Disasters |
| **CAN-U** | Climate Action Network – Uganda |
| **CARIAA** | Collaborative Adaptation Research Initiative in Africa and Asia |
| **CBA** | Community-based Adaptation |
| **CCAFS** | CGIAR Research Program on Climate Change, Agriculture and Food Security |
| **CDKN** | Climate and Development Knowledge Network |
| **CEH** | Centre for Ecology and Hydrology CHWG Climate and Health Working Group |
| **CIAT** | Center for Tropical Agriculture |
| **CIRAD** | *Centre de Coopération Internationale en Recherche Agronomique pour le Développement* |
| **CNRST** | *Centre National de la Recherche Scientifique et Technologique* |
| **CONASUR** | *Conseil National de Secours d'Urgence et de Réhabilitation* |
| **CSAG** | Climate System Analysis Group |
| **DCCMS** | Department of Climate Change and Meteorological Services |
| **DFID** | UK Government's Department for International Development |
| **DRM** | Disaster Risk Management |
| **ECMWF** | European Centre for Medium Range Weather Forecasts |
| **EIAR** | Ethiopian Institute of Agriculture Research |
| **EPHI** | Ethiopian Public Health Institute |
| **ENACTS** | Enhancing National Climate Services |
| **ESOKO** | Digital solutions for agriculture |
| **EWS** | Early Warning System |
| **FATHUM** | Forecast for Anticipatory Humanitarian Action |
| **FbF** | Forecast-based Financing |
| **FCDO** | UK Government's Foreign, Commonwealth and Development Office |
| **FCFA** | Future Climate for Africa |
| **FONERWA** | Fund for Environment and Natural Resources for Rwanda |
| **FRACTAL** | Future Resilience for African Cities and Lands |
| **FSNWG** | Food Security and Nutrition Working Group |
| **GFCS** | Global Framework for Climate Services |
| **GHACOF** | Greater Horn of Africa Climate Outlook Forum |
| **GRP** | Global Resilience Partnership |
| **HyCRISTAL** | Integrating Hydro-Climate Science into Policy Decisions for Climate-Resilient Infrastructure and Livelihoods in East Africa |
| **ICPAC** | IGAD Climate Prediction and Applications Centre |
| **IGAD** | Intergovernmental Authority on Development |
| **IHI** | Ifakara Health Institute |
| **IMPALA** | Improving Model Processes for African Climate |
| **IMTR** | Institute for Meteorological Training and Research |
| **IRD** | *Institut de Recherche pour le Développement* |
| **IRI** | International Research Institute for Climate and Society |
| **IRRP** | Integrated Resource and Resilience Planning |
| **ISRA** | *Institut Sénégalaise de Recherches Agricoles* |
| **JADF** | Joint Action Development Forums |
| **KenGen** | Kenya Electricity Generating Company |
| **KCL** | King's College London |
| **KMD** | Kenya Meteorological Department |
| **KRCS** | Kenya Red Cross Society |
| **MECSS** | Malaria Elimination Climate Surveillance Suite |
| **MHEWS** | Multi-Hazard Early Warning System |
| **MoAIWD** | Ministry of Agriculture, Irrigation and Water Development |
| **NAADS** | National Agricultural Advisory Services |
| **NDMA** | National Drought Management Authority |
| **NMA** | National Meteorological Agency in Ethiopia |
| **NMCP** | National Malaria Control Programme |
| **NMHS** | National Meteorological and Hydrological Services |
| **ODI** | Overseas Development Institute |
| **PICSA** | Participatory Integrated Climate Services |
| **PIPA** | Participatory Impact Pathways Analysis |
| **PMI** | President's Malaria Initiative |
| **PRISE** | Pathways to Resilience in Semi-arid Economies |
| **PSA** | Public Service Announcement |
| **PSP** | Participatory Scenario Planning |
| **RAB** | Rwanda Agriculture Board |
| **RCCC** | Red Cross Climate Centre |
| **REACH** | Improving Water Security for the Poor |
| **RRA** | Raising Risk Awareness |
| **RTB** | *Radiodiffusion Télévision du Burkina* |
| **SCIPEA** | Strengthening Climate Information Partnerships-East Africa |
| **SDT** | Service Development Team |
| **SEI** | Stockholm Environment Institute |
| **SHEAR** | Science for Humanitarian Emergencies and Resilience |
| **SPI** | Standardised Precipitation Index |
| **TANESCO** | Tanzania Electric Supply Company |
| **TMA** | Tanzania Meteorological Agency |
| **UCT** | University of Cape Town |
| **UMFULA** | Uncertainty Reduction in Models for Understanding Development Applications |
| **UNFCCC** | United Nations Framework Convention of Climate Change |
| **USAID** | US Agency for International Development |
| **VCI** | Vegetation Condition Index |
| **WASCAL** | West African Science Service Centre on Climate Change and Adapted Land Use |
| **WCI** | Weather and Climate Information |
| **WCIS** | Weather and Climate Information Services |
| **WFP** | World Food Programme |
| **WHO** | World Health Organisation |
| **WISER** | Weather and Climate Services for Africa |
| **WMO** | World Meteorological Organisation |
| **WWA** | World Weather Attribution |

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This manual provides practical guidance on how to undertake co-production to improve weather and climate services, drawing on learning from case studies across the African continent to address a range of problems in different sectors.


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KING'S College LONDON

CEH Centre for Ecology & Hydrology
NATURAL ENVIRONMENT RESEARCH COUNCIL

UKRI Natural Environment Research Council