Mainstreaming climate information into sector development plans: the case of Rwanda's tea and coffee sectors

Second edition, December 2015

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KEY MESSAGES

- The approach to assessing climate adaptation needs is changing and this is influencing the needs of end-users for climate information.
- The policy-first approach targets early interventions; mainstreaming climate adaptation in decision-making and the consideration of uncertainty in climate science. It also prioritises the programming of actions for emerging climate finance. As a result, the needs of end-users for climate information are changing.
- The use of climate and risk information now falls within a sequence of activities, which are part of a broader decision policy cycle. This starts with the identification of relevent development objectives.
- The steps in this sequence are set out in this report. They are illustrated by a real and practical case study mainstreaming climate adaptation into the sector agricultural development plan in Rwanda.

INTRODUCTION

This report demonstrates the use of climate information in assessing adaptation needs and implementation of adaptation interventions. It provides an outline of the change in thinking that is happening as adaptation moves from theory to practice, how this translates into a different approach for assessing adaptation needs, and the implications of this shift for climate information and services provision.

It provides information on the adaptation and decision policy cycle, outlining the sequence of activities associated with practical programming, and the use of climate information within this. Finally, it demonstrates this sequence using a real case study application on mainstreaming climate adaptation into the sector agriculturaldevelopment plan in Rwanda.

This report is part of a larger study conducted by the Global Climate Adaptation Programme (GCAP) to analyse and identify the types of development decisions that should be actively accounting for future (10 years +) climate in decisions taken today, and to advance quantitative and economic evidence to inform decisions made by development practitioners in Africa.

About Future Climate for Africa (FCFA)

FCFA aims to improve the use of climate information in long-term decision-making across sub-Saharan Africa, leading to improved climate risk management and the protection of lives and livelihoods.

FCFA is advancing scientific knowledge, understanding and prediction of African climate variability and climate change on 5 to 40 year timescales, together with support for better integration of science into longer-term decision-making.

For more information on FCFA and to access our other publications, please visit our website at www.futureclimateafrica.org. FCFA is advancing scientific knowledge, understanding and prediction of African climate variability and climate change on 5 to 40 year timescales, together with support for better integration of science into longer-term decision making.

Review of literature: what did we learn?

The initial phase of the project reviewed the use of climate information in adaptation policy, decision-making and implementation. This review found that the framing of adaptation has changed in recent years towards a more practical focus, based on early implementation. A number of key shifts were identified, as follows.

There has been a move away from impact assessment-driven methods towards an approach in which the primary objective is to inform adaptation decisions, particularly decisions that will be taken over the next decade. The former is sometimes referred to as 'science-first' and the latter as 'policy-first' or 'decision-first' methods (see Key concept #1).

There is a greater emphasis on integrating (mainstreaming) adaptation into current policy and development, rather than implementing adaptation as a standalone activity. In this context, climate change is only one of a number of issues and it is much more important to understand non-climatic drivers, underlying policies and broader social, political and economic contexts.

There has been a greater recognition that climate change is uncertain. In response, a different framing of risks is being adopted. This starts with current climate variability and then considers future climate change, using different decision-making and management practices to encourage action with uncertainty in mind, rather than ignoring it. This also leads to the selection of a broader range of adaptation options, which move beyond technical engineered solutions to consider "soft" (non-technical) options, such as capacity building and iterative management practices. The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report uses the term "iterative climate risk management" to describe this (IPCC, 2014).

There is also a growing interest in the costs of adaptation. There is a need to justify how climate money will be spent effectively, and also to ensure that it delivers the greatest benefit (whether in terms of number of beneficiaries, targeting the most vulnerable, or delivering the highest value for money). This requires a greater focus on prioritisation, which is challenging for adaptation. This is because the impacts of climate change primarily arise in the future and therefore so do most of the benefits of adaptation: early action to address long-term risks may incur costs in the short-term, which are difficult to justify compared to benefits that only arise in the future. This is compounded by the high uncertainty involved, making the exact choice of intervention difficult.

Key concept #1 - Science-first vs decision-first

To date, most climate risk, vulnerability and adaptation assessments have used a scientific approach (science-first). This starts with climate model projections, which are then fed into an analysis of potential impacts, and finally at the end, a consideration of adaptation responses. While this provides key information, it does not embed the analysis within the relevant developmental objectives and broader policy context or provide all the information needed by end-users. The decision-first approach therefore starts with development objectives and embeds and aligns the use of climate forecasts and impact assessments with a broader context.

As a consequence, there is a need to consider the phasing and timing of adaptation, to identify interventions that deliver effective early adaptation under future uncertainty. The focus is on options that can be justified (in economic terms) in the next decade, and which align with development. These include three types of interventions (Box 1).

Box 1

Categories of decision-first interventions

1. Immediate actions that address the impacts of current climate variability and extremes - often termed the current "adaptation deficit" (see Key concept #2) - and also build resilience for the future. This includes early capacity building and the introduction of low- and no-regret actions (see Key concept #3) as these provide immediate economic benefits.

2. The integration of adaptation into immediate decisions or activities with long life times, such as infrastructure or planning. This requires different approaches and options to the actions above, because of future climate change uncertainty.

3. Early planning for the future impacts of climate change, noting uncertainty. This includes a focus on adaptive management, the value of information and future options/ learning, especially when decision life-times are long or future risks are very large or irreversible.

The three categories in Box 1 can be considered together in an integrated adaptation strategy or an adaptation pathway (Figure 1).

Key concept #2 - Adaptation deficit

The IPCC's Fifth Assessment Report (2014) defines the adaptation deficit as the gap between the current state of a system and a state that maximises adverse impacts from existing climate conditions and variability. However, in this study we use a different definition, which recognises that it is not economically efficient to reduce the adaptation gap to zero (indeed, even highly developed countries have an adaptation deficit). The critical issue is that the existing adaptation gap is not optimal, i.e. that the benefits of reducing current risks outweigh the costs.

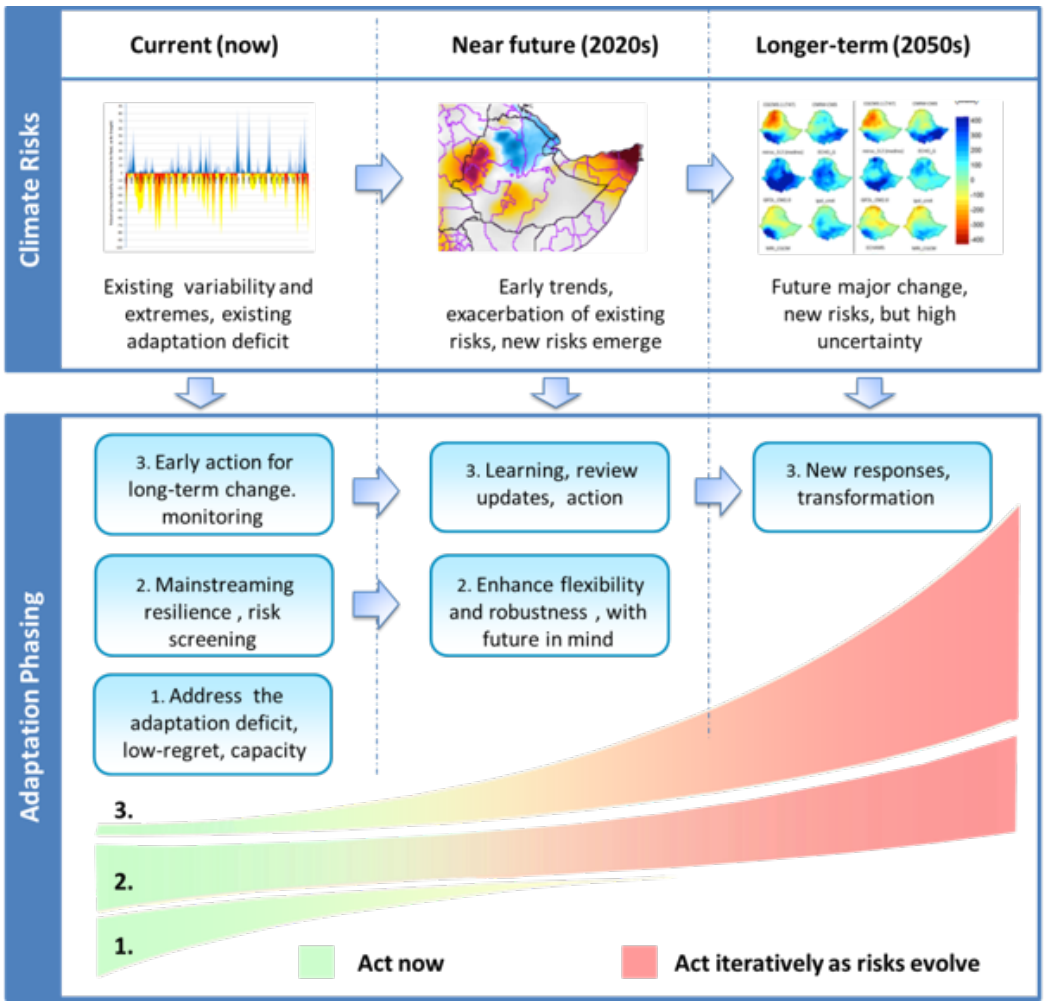

Figure 1: Categorisation of adaptation pathways. Source: Watkiss, 2014 (DFID, 2014: IDRC, 2015)

Key concept #3 - No-regret and low-regret options

Numerous studies highlight that no- and low-regret actions are a good starting point for early adaptation. No-regret adaptation is defined (by the IPCC) as adaptation policies, plans or options that "generate net social and/or economic benefits irrespective of whether or not anthropogenic climate change occurs". This includes options that address the current adaptation deficit. There is, however, no agreed definition of low-regret options; in DFID (2014) - and here - a pragmatic definition of low-regret options is used. This focuses on promising 'early' adaptation options that have low-regret characteristics. This includes options that are effective in addressing the current adaptation deficit, but also future-orientated, low-cost options that build resilience, flexibility or robustness, as well as capacity building, research and information.

The adaptation assessment cycle: problem setting through to implementation

The new policy-first approach leads to a set of activities that are embedded within a policy decision cycle, aligned to programming implementation and climate finance. **Understanding the sequence of activities that are involved in such a process is critical to ensure climate and risk information is effectively used within the decision-making process.**

This is particularly important in the context of national, sector and local adaptation planning, and the mainstreaming of climate change more generally. In this context, the technical adaptation decision cycle, that identifies then appraises climate vulnerability and risks, and identifies adaptation options, sits within a broader political context that looks at the wider decision making as part of underlying development objectives and processes.
This sequence has been assessed as part of this research project, building on previous development of national and sector frameworks (notably Watkiss and Hunt, 2010). The steps involved are shown in Figure 2, and address the challenges and shifts in adaptation assessment identified in the review above.

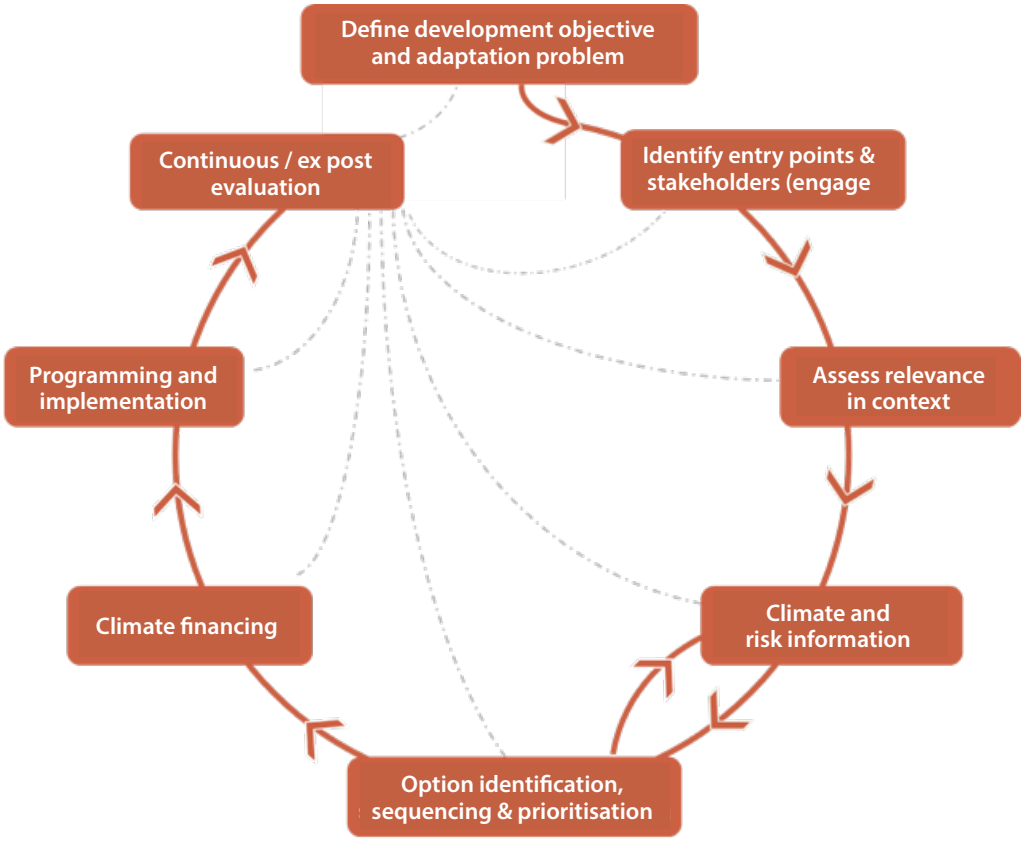

Figure 2: Sequence of activities in "decision-first" adaptation cycle

This approach has recently been applied in Rwanda, focusing on a real policy application that has gone through the entire cycle. The case study has focused on integrating climate change into the Rwanda agriculture sector development plan, piloting with a tea and coffee resilience plan. This has been followed through to successful financing of the plan and the start of implementation. The steps in the sequence are described above along with the practical examples and lessons from the Rwanda case study.

Define the problem and objectives

The proposed approach starts the assessment by framing the overall development context and the key problem to be addressed, and from this the objective towards which the adaptation is aimed. Even if the problem is long-term in nature, the critical focus is around *'What do I need to do / implement in the next five years?'*

Following from this, the aim of the assessment is identify and prioritise a set of interventions that will start this process and that could be funded either through domestic budgets or international climate finance to deliver implementation. Critically, this may include immediate actions but also early interventions to start adapting to future climate change. This reframing is particularly important in aligning to the development planning process.

For the Rwanda case study, the underlying dominant sector objectives are to deliver agricultural transformation to a market-orientated, value-creating sector, to deliver economic growth, and to increase rural income and reduce poverty. To achieve this goal under a changing climate, it is necessary to make the agriculture sector more resilient to climate change. The key question was therefore how to mainstream climate adaptation into sector development planning to help safeguard these developmental objectives and to capture potential opportunities (Key concept #4).

Key concept #4 - Mainstreaming

Mainstreaming is the integration of adaptation into existing policies and decision-making, rather than through the implementation of standalone adaptation policies, plans or measures.

Identify entry points, stakeholders and engage

Mainstreaming requires additional information to that usually gathered in a science-first assessment, including non-climate drivers, relevant actors, and the decision-process itself.

A critical component of the mainstreaming process is to find relevant entry points, that is, to identify opportunities in national, sector or local planning processes where adaptation can best be integrated. Critically, these entry points vary with the specific adaptation problem (Table 1 lists a few examples). It also requires analysis of existing policies and objectives, to include adaptation in decision-making, especially as climate will be one of many challenges, and not necessarily the dominant one. Complementing the identification of entry points is the identification and engagement of stakeholders.

Planning level	Entry point
National government and cross sector ministries	• National development vision (long-term) • Poverty reduction strategy • National development plan (e.g. 5 year) • National budget allocation process or review
Sector ministries	• Sector development plans • Sector master plans • Sector budgets
Subnational authorities	• Decentralisation plans • District plans • Subnational budgets
Projects	• Environment safeguards (e.g. EIA) • Climate safeguards (e.g. AfdB) • Project design guidelines

Table 1: Examples of policy entry points, adapted from OECD (2015)

In the Rwanda case study, the high-level entry point is the national medium term development plan, the Economic Development and Poverty Reduction Strategy (EDPRS) phase II (2013-2018). A key window of opportunity exists here, because mainstreaming environmental sustainability into productive and social sectors and reducing vulnerability to climate change are cross-cutting themes of the strategy. Similar entry points exist in the sector development plans, including the Agriculture Sector Investment Plan (ASIP2). This was the key entry point for the study.

Importantly, there was also a pull factor identified; namely, the opportunity to identify activities that could be eligible for climate finance, aligned to Rwanda's national climate and environment fund (FONERWA), as well as sector support from local development partners. This pull factor provides a key target for the process. It also shapes the timing and exact analysis, to ensure interventions are prioritised that are ready for climate finance.

The case study identified and engaged a broad set of stakeholders, starting with the Ministry of Agriculture and Animal Resources (MINAGRI), and its Strategic Planning and Programme Coordination Directorate. It also included other relevant agencies, such as the National Agricultural Export Development Board (NAEB) and the Rwanda Agriculture Board (RAB), which extends from policy through to planning and extension services, as well as local planning units and district planners. It involved the lead organisation for mainstreaming in Government (Rwanda Environment Management Authority) and FONERWA, as well as development partners, and international finance institutions. Finally, alongside this national perspective, it also involved farmers, co-operatives, non-governmental organisations (NGOs) and civil society, charitable trusts and foundations, and the private sector, including trade and sector associations.

Assess the context

A key issue in informing adaptation decision-making is to understand what is important to help focus, especially given the very large number of potential intervention options. Two key issues are important here. First, to assess what the significant or relevant problems are to address, and second, to understand the context of what is important for the underlying development area itself. This therefore includes consideration of the urgency of the problem, as well as its magnitude.

For Rwanda, while it is clear that agriculture is a climate sensitive sector, there are many different risks and thus potential adaptation areas. To try and help focus, a high level screening was undertaken on the 40 sub-programmatic activities in the agriculture plan (the ASIP2). This very quickly allowed the identification of those areas that had large potential risks – from current climate variability as well as future climate change - and also where there were potential opportunities for mainstreaming.

This high level analysis identified around ten high priority areas. Of these, one was chosen to demonstrate the mainstreaming approach: the export crop sector. The analysis focused on tea and coffee, as these represent over 20% of total exports by value in Rwanda (NISR, 2014) and the development of these cash crops is a key part of the future agricultural development strategy. These crops are also highly sensitive to changes in climate.

Related to the earlier identification of entry points, there are often unique, context-specific windows of opportunity to introduce climate change adaptation, and especially to induce changes in policies and practice. This might be, for example, the revision of a policy or finalisation of new sector guidance. Importantly, this can mean that the time available for analysis is constrained, compared to a science-first assessment that may extend over several years. This calls for pragmatism, but most importantly the timely delivery of information to meet policy needs.

For the Rwanda case study, the key window of opportunity was the Government's major expansion plan to double tea production, related to the new national tea policy. This expansion will lock in new land use patterns for several decades to come. Importantly, while some other sectors of the ASIP were already thinking about climate risks, there had been no consideration for this sub-sector, thus the urgency for consideration was very high. This area was thus chosen for a detailed analysis, with the specific aim of building adaptation into Rwanda's tea and coffee sectors, through mainstreaming into sector development plans.

Assess climate information and risks

The next step in the sequence is to develop the climate and risk information. It is stressed that this should be seen an iterative process (see Key concept #5), linked to the adaptation decision analysis in the next step, as the inputs and outputs need to flow backwards and forwards between these two to provide the relevant information for decision making.

As set out in Figure 1, the climate information needs starts with an analysis of current climate variability and then looks at future climate change projections, with a strong emphasis on capturing uncertainty. A key difference to a standard assessment is the need for greater interpretation from climate modelling experts, as well as their inclusion in the decision-making analysis itself.

Key concept #5 - Iterative approach

The flow of information from climate models to adaptation decisions should not be seen as a one-way process. Within practical frameworks, the type of problem, and the methods used to assess decisions, will alter the type of climate information that is needed. The interplay between climate information and adaptation assessment should therefore be seen as an iterative and integrated process, which will flow back and forth. A more collaborative climate and adaptation assessment partnership will lead to a more user-orientated and relevant analysis, and will improve the decision-support that results.

For the Rwanda case study, the information and risk analysis started by capturing existing crop production and climate information. In Rwanda, tea and coffee are grown only in certain areas of the country, where the soil, temperature and rainfall are suitable. The main production areas are at an elevation of 1600 to 2100 metres above sea level, where it is slightly cooler). Tea is harvested year round but with peak tea production coinciding with rainy seasons. However, rainfall variability does affect the industry: production dips in dry years and rainfall variability can affect new planting and fertiliser application – when there is too much or too little rain. Coffee is also a highly climate sensitive crop, especially Arabica which is the dominant variety in Rwanda. Again, there is a temperature suitability range and most production is between 1000 and 1700 metres above sea level. Coffee is also vulnerable to rainfall variability, especially in key phases of the maturation cycle. There are also important impacts from the climate on pests and diseases, many of which are temperature sensitive. Coffee (leaf) rust is found in Rwanda, and while this used to be constrained to the drier, lower areas, it has been spreading upwards. This existing vulnerability also has to be seen in the context of recent trends in the climate: there are observations of increasing temperature over recent decades in Rwanda, and while changes in average precipitation are more uncertain, there is increasing rainfall variability.

The analysis then looked at the risks of future climate change. These effects are particularly important because tea and coffee are long-lived crops. Tea plants take several years before they are ready for harvesting, and the payback period for a new plantation is around 15 years, although the tea bushes will be harvested for many decades. Coffee trees also take three to five years before they bear fruit and are typically harvested for decades (the average lifespan of a coffee plantation is about 30 years). Given these long life times, and the high climate sensitivity, future climate change is a real risk to tea and coffee production in Rwanda, from shifting climate suitability zones and changes in pests and diseases.

Future climate information was taken from the latest global climate model projections – the CMIP5 database (by the Met Office) for a range of scenarios and models, to capture uncertainty. The projections show that future temperatures will rise in Rwanda, with typically a median increase of around 1°C by the years 2020 to 2050, relative to a 1970-1999 baseline, though there is a large range around these values (shown in Figure 4). The projected changes in average rainfall are more complex, and there may be little change. There is, however, greater confidence that there will be an increase in heavy precipitation events.

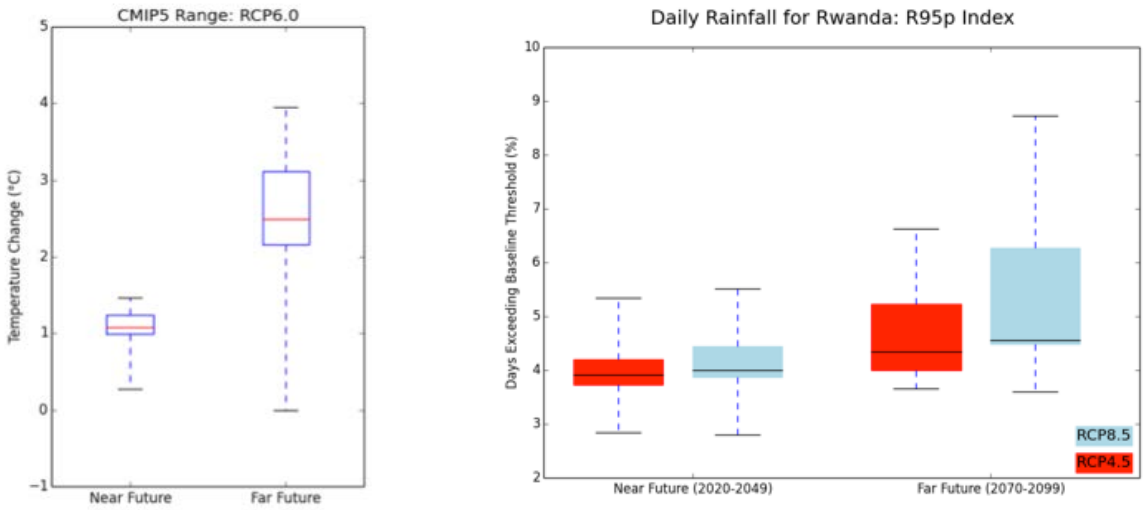

Figure 4: Increase in Average Annual Temperature and Heavy Precipitation in Rwanda for the near (2020-2049) and long term (2079-2099) from climate change.

These changes will alter the areas suitable for tea and coffee in Rwanda in the future. For example, with the increase in temperatures projected over the next few decades, the low lying areas of current production of tea (around 1700 metres) will become less suitable for optimal production of high quality tea. At the same time, areas towards the higher end of the current growing range will become more optimal, and new areas for cultivation (that are currently too cold) will open up. These provide opportunities for Rwanda. At the same time, the prevalence and range of pest and disease will change, especially for coffee. All of these impacts could impact on production and exports but also the numerous people who rely on these sectors for their livelihood, potentially increasing poverty. Addressing these risks is therefore an early priority.

This issue is particularly critical for tea, because Rwanda is currently expanding the area under tea cultivation. A further ten new tea production zones are planned, doubling the total national area under cultivation. However, the location of these areas has been based on the suitability of soil and the current climate, and not the future one under climate change. A new analysis was made, using the climate projections, and overlaying this with elevation maps of current production areas, using this as a proxy for the level of future risk (Figure 5). The expansion areas (shown in red) were compared to the elevation data to identify which areas where unsuitable for future expansion (those which were too low-lying) as well as areas that could be more suitable for the future, especially useful given the phased nature of the tea expansion plan.

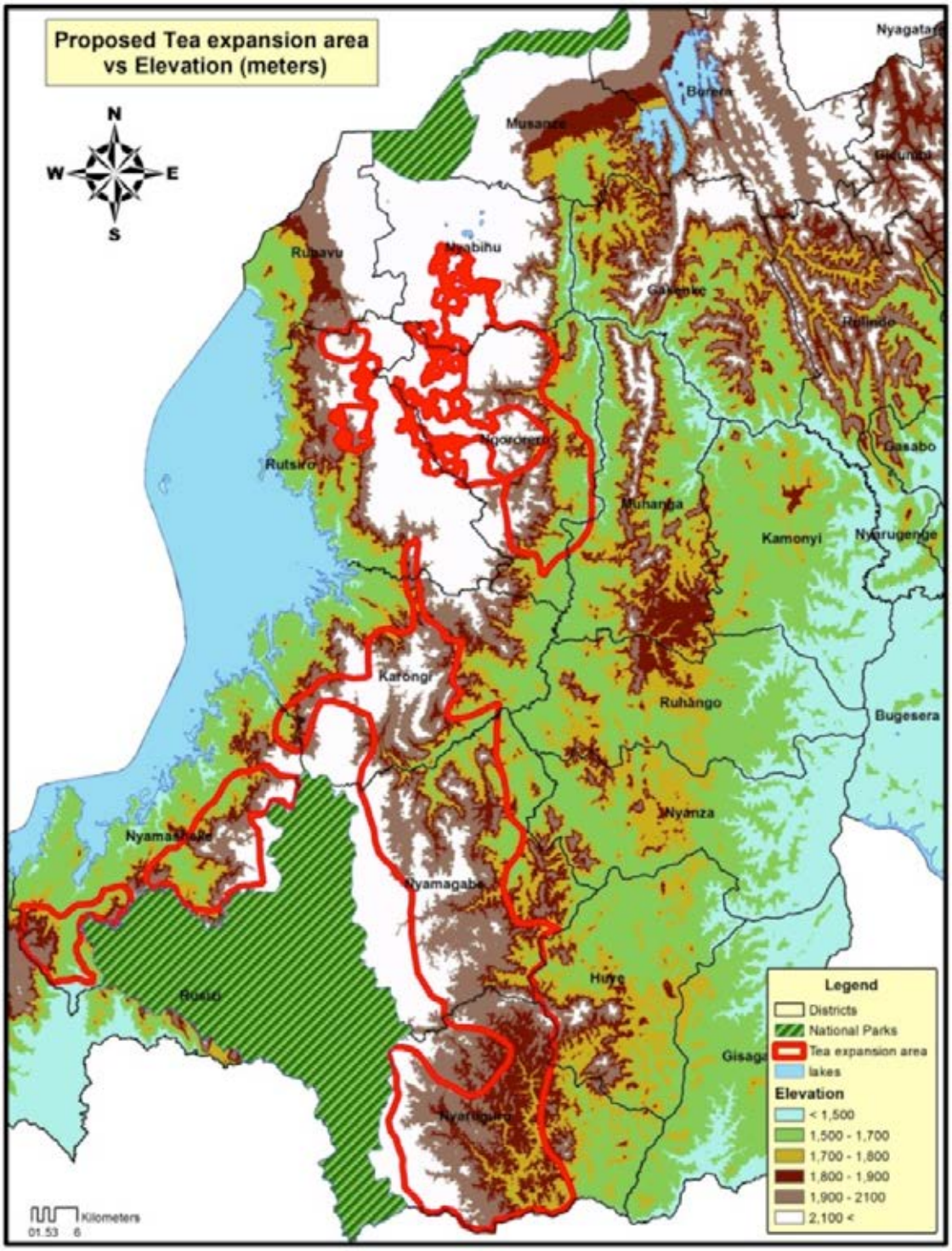

Figure 5: Overlay of future tea expansion areas (red lines) and elevation (colour) in Rwanda to identify lower lying more vulnerable areas.

Identify, sequence and prioritise adaptation

The next step in the process is identifying and prioritising adaptation options, noting this should be undertaken iteratively with the climate and risk information (See Key concept #5).

The decision-first approach involves a greater focus on the timing and sequencing of adaptation – and the prioritisation of a set of linked adaptation options that cover the three areas outlined in Box 1. Together this forms a portfolio of options, which include capacity building and information provision, as well as actual practical on-the-ground adaptation.

An important part of this step is the economic analysis of options, to ensure these can be justified, to maximise the potential use of available resources, and to build the cost analysis for project implementation. This includes analysis of the costs and benefits of early low regret options, but also the value of information for capacity building and research. It also includes options that can be introduced during the design or planning phase, to and reduce the risk of lock-in. It is noted, however, that for activities which provide future benefits, there is an important trade-off between early action – and the associated early costs – versus longer-term benefits, due to the importance of discounting (Key concept #6). This means that the choice of these future orientated options has to be made carefully, rather than simply overdesigning to avoid any future risks.

Key concept #6 - Discounting

Discounting is a standard economic technique that is used to compare costs and benefits that occur at different points in time. It is a different concept from inflation, and is based on the principle that people generally prefer to receive goods and services now rather than later – known as 'time preference'. For individuals or the private sector, this time preference can be measured by the interest rate on money lent or borrowed. However, society as a whole also prefers to receive goods and services sooner rather than later, known as 'social time preference', and this is therefore factored into public policy appraisal. Different approaches can be used to derive these values, and to derive a discount rate, which is then used to convert all costs and benefits to 'present values'. While the use of discount rates is standard practice, it has major implications for adaptation, especially for interventions that incur early costs, but provide benefits in the future, as (higher) discount rates reduce the importance of longer term benefits when expressed in current prices.

Finally, there is a separate set of longer-term (future orientated) interventions associated with early decisions for addressing future climate challenges. This is where early action or investing in information can help inform future decisions and can help keep future options open.

A critical issue here – and the link back to the climate projections – is that the assessment of these options under uncertainty requires specific information, whether this is to allow testing of robustness, or critical thresholds for future risks.

For the Rwanda case study, a set of early interventions was identified using this process, for each of the three types of adaptation activities.

i) Low-regret options. This included options for improving the productivity of tea and coffee today in Rwanda, helping farmers to cope with current climate variability and the near-term impacts of climate change. As an example, for coffee this included shade trees which provide cooler temperatures that increase quality, as well as co-benefits from additional income or livelihood streams, and reduced greenhouse gas emissions. A cost-benefit analysis was undertaken to justify this option.

ii) Planning. The second area focused on short-term decisions on land-use planning, notably on the tea expansion areas. This used geographical and climate information to look at the siting of new areas for tea, especially for surrounding small-holder farmers. A key early focus was to ensure that low lying areas, which would be affected by rising temperatures first, were avoided. The consideration of these plans is particularly important now, as decisions are being made over the next few years that will last for decades, thus there is a critical window of opportunity, as well as a risk of lock-in. For this work-stream, it was important to capture future climate projections and uncertainty, to capture the range and envelope of future change.

iii) Early planning for the future. The final element considered future major risks, and identified early initiatives that are needed today to help make future decisions. An example is for pests and diseases, which could start to significantly impact on coffee production under a changing climate. However, there is a lack of monitoring data on current impacts and no information on which areas of Rwanda might be affected by changing pests and disease in the future. The provision of better monitoring and information thus provides the initial steps for planning future responses under climate change. A key element here was to identify key climatic and economic thresholds levels for the potential pests and diseases, and to use the climate models to provide information on possible changes in these metrics under climate change. These can then align back to monitoring data to track how quickly future risks are emerging and to allow early response planning. Critically this requires information on bespoke climate parameters that are not routinely generated in standard model projection outputs, and thus requires close interaction with the climate modelling teams.

Climate financing

In many assessments, the production of a prioritised plan marks the end of the analysis. However, within a policy-first approach, there are additional activities that need to be considered as part of the integrated analysis. Critically this includes the financing of the options themselves.

Unless a source of finance is identified, a prioritised plan will remain 'on the shelf', reducing the relevance and impact that the detailed analysis has sought to inform. There is therefore a need to identify and develop a costed proposal and a source of finance, which for adaptation, can be linked to emerging climate funds, bilateral development partners, or domestic budgeting. An important issue here is that different sources of finance will have different requirements. This will always include the intervention costs, but may also include certain economic information (such as benefit to cost ratio or value for money), key indicators, and consideration of social factors (such as environment and social safeguards, and gender). As a consequence, it is important to widen the analysis of adaptation to consider these aspects as the information and prioritisation steps are undertaken. Ideally these aspects should be considered from the very start of the project, and thus in the design of information and analysis framework.

In the Rwanda case study, the financing of the plan was ensured by looking for a suitable source of finance from the very start, recognising that the existing agriculture investment plan did not have a budget for these mainstreaming activities. The development of the finance was therefore aligned to a project proposal, targeting the climate fund, FONERWA, which has a funding window sector for mainstreaming. It was also aligned to a capacity building and support programme funded by the British Department for International Development (DFID).

Programme, implement and address the barriers

Alongside the identification of finance, a related issue is to explore the programming of the options, i.e. how they will be implemented. This includes identification of the responsible organisation, the project implementation approach (who will do what), the flow of finance, the project management and the monitoring and evaluation process. This is likely to involve a series of actors and organisations, and must be accompanied by timed plans, logframes, and milestones.

One important element in the real-world programming of adaptation is the need to consider and address potential barriers, including market failures, policy failures, governance failures, and behavioural barriers. These barriers may be strongly context or culturally specific, and will vary with the sector and intervention, but addressing these is absolutely critical to the process and the successful delivery of adaptation.

For the Rwanda case study, a detailed plan was drawn up on how much it would cost to introduce the various options in the coffee and tea resilience plan. The implementation plan included the analysis of how the climate finance would be programmed through the MINAGRI budget, who the responsible unit was, the flow of activities and finance to the relevant organisations (e.g. NAEB and RAB) and the involvement of other actors for actual implementation on-the-ground, identifying organisations and co-operatives that were able to work with large numbers of farmers through existing networks. To get the project off the ground, all of these actors need to be brought together, to buy into and accept the plan formally.

Evaluate and learn

The final step is the evaluation and learning activities. These need to be put in place during the project design, rather than later in the process.

Indeed, the focus on iterative climate risk management puts a much greater emphasis on these activities, and these should be seen as part of a continuous activity. Furthermore, it is often useful to add a specific learning component to ensure lessons flow through into subsequent policy and plan revision, i.e. to advance a cycle to act then learn, then act again.

In the Rwanda case study, this was addressed by adding an additional component to the overall programme design, specifically focused on capacity building, learning and evaluation. This included activities to disseminate lessons across MINAGRI and other parts of Government (who are also starting to mainstream). There are also activities included to sustain the initiative after the initial phase, with capacity building and training in government, and through partner organisations downwards (through extension services, farmer to farmer and farmer field schools). Finally, the programme also includes a dedicated M&E plan to assess the performance of the project. This includes an analysis of the low-regret options with a detailed evaluation.

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