Iterative Risk Management / Adaptive Management

Summary

- Iterative Risk Management, or Adaptive Management, is a well-established practice of combining monitoring, research, evaluation and learning as a means of improving future management strategies.
- IRM/AM is well suited for decision contexts characterised by high uncertainties. It can help decision makers avoid taking irreversible decisions and develop plans where decisions can be adjusted appropriately.
- IRM/AM encourages decision makers to consider alternative adaptation strategies and options, and phased implementation. It supports the design of flexible strategies, where decisions are made over time, and these plans adjusted as the evidence emerges.
- IRM/AM can be complex when multiple risks must be considered or when suitable risk threshold must be identified to trigger future responses.
- The methodology is relatively simple, producing results that can be easily understood. IRM/AM can be seen as a general decision-making framework, which accommodates well other methods such as multi-criteria analysis or cost-benefit analysis.

What does Iterative Risk Management / Adaptive Management do?

Iterative risk management – also known as adaptive management - is a long established approach that uses a monitoring, research, evaluation and learning process to improve future management strategies. IRM/AM is based on the idea that current decisions are essentially constrained by imperfect knowledge and cognitive bias, and cycles of revisions are necessary to improve the performance of strategies and actions. Thus, IRM/AM incorporates learning at the core of its methodology.

IRM/AM has a focus on starting with current climate variability (and the adaptation deficit) and then looking at future climate change within a framework of decision making under uncertainty. Early steps within IRM/AM has a strong focus on building adaptive capacity, implementing low and no-regret options, and identifying areas of long-term concern that warrant early investigation or action. By encouraging the “what if?” question, IRM/AM promotes the development of flexible approaches where decisions are taken at the right time, and can be adjusted later on.

When should I use Iterative Risk Management / Adaptive Management?

IRM/AM is a widely applied approach to a wide variety of decision-making contexts. Since IRM/AM encourages flexibility, it is especially useful in helping decision makers to develop plans where decisions can be made over time, at the right time, and adjusted appropriately. IRM/AM can help policy makers avoid taking irreversible decisions which may not be needed down the road depending on the progression of climate change impacts. As a result, it allows for application in adaptation situations of high uncertainty where probabilistic information may be lacking.

Because it is not limited by a strict formal methodology, IRM/AM is a methodology that fits especially well in conjunction with other support tools, such as cost-benefit analysis, cost-effectiveness analysis and multi-criteria analysis. It is also to combine e.g. CBA to identify low regret measures for the near future, then PA to look at the portfolios of long-term options in an IRM/AM framework.

What are the key strengths and limitations of Iterative Risk Management / Adaptive Management?

Key strengths

- Helps develop a flexible, dynamic approach to adaptation where decisions are adjusted over time to reduce the risk of maladaptation.
- Can be applied where uncertainty is high, e.g. where probabilistic information is low or missing
- Relatively simple approach to apply and provides easily understandable ranking and outputs.

Potential weaknesses

- The identification of suitable risk thresholds can be difficult
- Does not offer an effective approach to reduce complexity of treating multiple risks acting together

What does it involve?

IRM/AM is less of a formal methodology than the other techniques (e.g. CBA). Broadly IRM/AM involves the following steps:

- Understanding current vulnerability through analysis of current climate variability and the adaptation deficit.
- Identify the major risks of concern, which would materially affect plans, growth, people or natural resources, either from the exacerbation of current risks from climate change, or new risks that will emerge.
- Build up possible future sensitivities/scenarios to climate change for these risks, looking at how these risks could evolve over time. These include multiple scenarios of future changes, often including sensitivity analysis with extreme (upper bound) scenarios.
- Investigate and identify key vulnerability/impact thresholds between now and various scenarios/sensitivities, especially where these trigger risks or go beyond current coping capacity, and to look for suitable indicators to measure and assess these risks. This can include multiple thresholds along one risk pathway.
- Identify possible adaptation responses/options – or portfolios of options - to cope with different threshold or risk levels. This often checks major interactions with other key non-adaptation issues, e.g. other environmental issues, social policies (e.g. poverty alleviation), sectoral developments, etc.
- Develop adaptation pathways or route maps of response options to the thresholds/risks.
- Assess the costs and benefits of these options and set against the various scenarios and thresholds (noting that this assessment has to include how the costs and benefits vary under different baselines and rates of change). Note that the method of appraisal can vary e.g. CBA, CEA, MCA.
- Recommend an initial preferred route or pathway, along with key variables which should be monitored to assess if a switch of route will be needed in the future.
- Implement and monitor, and change the strategy as evidence improves or with learning.

In Econadapt, the IRM/AM has been further developed into an operational decision-making framework for guiding adaptation and policy decisions. Guidance has also been developed to guide the linking of climate information (e.g. scenarios) with the types of assessments mentioned here (e.g. impact and vulnerability assessments, economic analysis) (LINK TO WP1 INSIGHT).

Despite its emphasis on learning, one key issue in current applications of IRM/AM is the lack of consideration of the capacity of society to adapt through learning and changing values and

behaviours, and the possibility of system-wide transformations. Instead, past applications have emphasised technical approaches to adaptation which tend to focus on physical and engineering measures. In ECONADAPT, approaches have been developed for assessing systemic change. In addition, modelling approaches have improved the representation of autonomous as opposed to planned adaptation of seal level rise and the use of irrigation.

Case Study: London Thames Estuary 2100 project

The London Thames Estuary 2100 project is the most documented case study of iterative risk management at project level. This project led to the development of a tidal flood risk management plan for London, developing a short-, medium- and long-term programme to address sea level rise, leaving major irreversible decisions as far as possible into the future to make best use of available information. Four future SLR scenarios were considered, including an extreme scenario.

A series of defence options were appraised using Cost-Benefit Analysis, complemented by Multi-Criteria Analysis to capture indirect/ancillary impacts, nested within this iterative framework. The plan recommended maintenance of existing flood defence system initially, followed by a programme of renewal and improvement, with a decision on the 'end-of-century' option by 2050 (including a new downstream Thames Barrier), noting this decision will depend on conditions at that time.

The project included a monitoring and evaluation strategy, with established decision points. If monitoring reveals SLR is happening more quickly (or slowly), these major investment options can be brought forward (or put back). However, the application to sea-level rise is relatively simple, because of the slow-onset nature and clear attribution of climate change, as well as the presence of clear indicators and monitoring metrics. The approach is more complicated when applied to other areas, especially when there are high levels of variability, thresholds levels are more uncertain and there is more complex and multi-dimensional change.

Further information: Environment Agency (2011). TE2100 Strategic Outline Programme. Published by Environment Agency, UK.

Case Study: Iterative risk management for coffee and tea production in Rwanda

In Rwanda, tea and coffee are grown in certain areas of the country, where the soil, temperature and rainfall are suitable. The main production areas (especially for tea) are at higher elevations, where there is a cooler climate. Production and quality of both crops is affected by annual rainfall variability, and the climate also has a role in the incidence and severity of pests and diseases. Future climate change has the potential to have a large impact on these sectors, which are critical for exports. It can affect productivity and quality of existing plantations, the suitability of areas for growing these crops, as well as the range and prevalence of pests and disease. These effects are particularly important because tea and coffee are long-lived crops and new plantations and are managed over decades. Importantly there are current plans to expand the areas of tea and coffee under production, thus there is a need to plan these areas with the future as well as the current climate in mind.

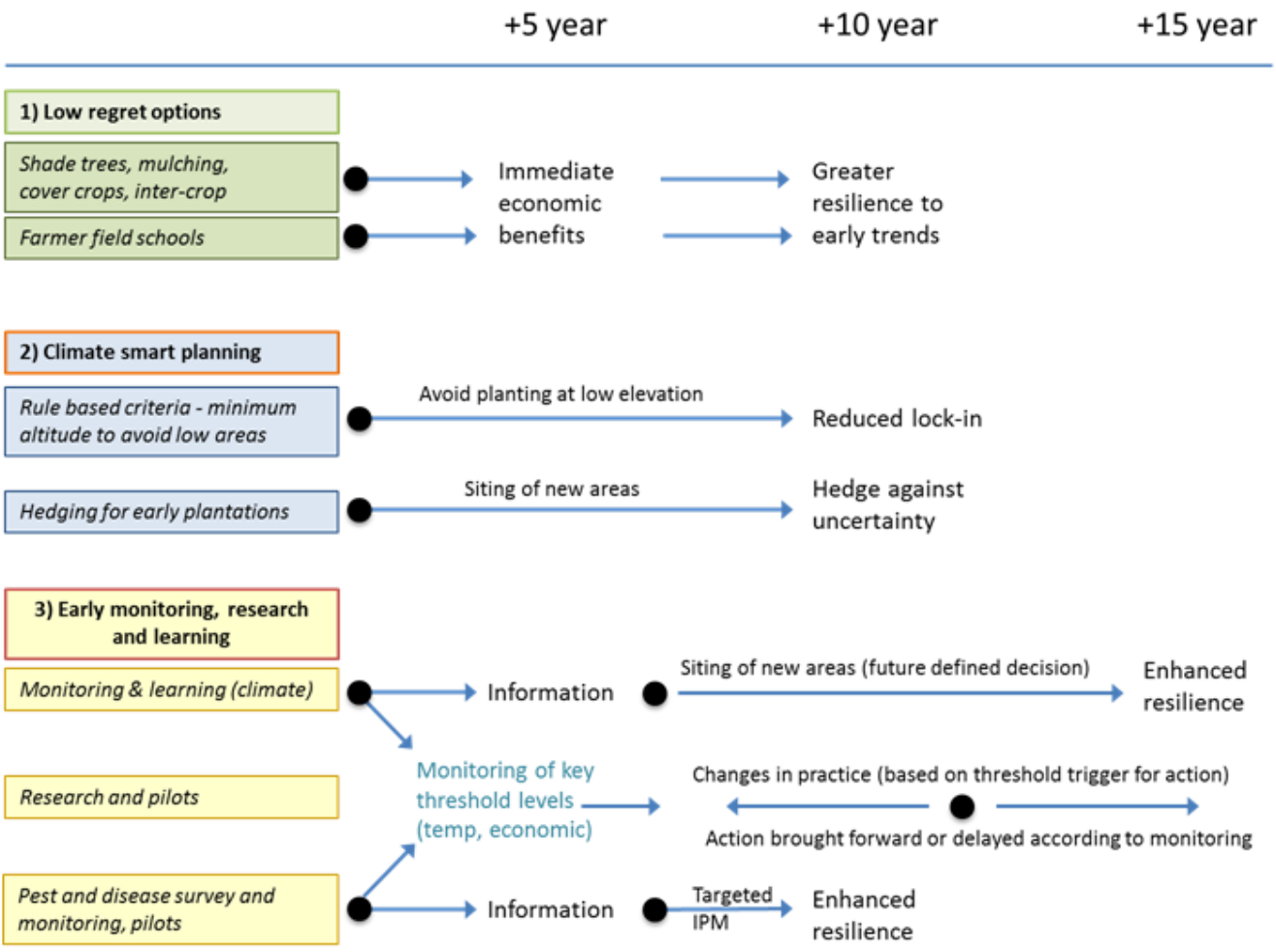
The case study applied a policy-orientated iterative climate risk management (ICRM) approach, with an economic and financial analysis to analyse options. It first identified the current and future climate risks and the types of early policy decisions, and from this identified three areas of adaptation to consider in the overall plan. This included:

1. Immediate actions that addressed the current risks of weather and climate extremes (the adaptation deficit) and also build resilience to future climate change. This included the

introduction of low- and no-regret actions (climate smart agriculture) and capacity-building, to address current climate variability impacts on tea and coffee.These provide immediate economic benefits as well as future benefits under a changing climate.

2. The integration of adaptation into immediate decisions or activities with long life-times, in this case focused on the expansion of tea plantations that is currently planned. This involves a focus on climate risk screening and climate smart planning for future expansion areas, noting this involves high uncertainty and requires decision making under uncertainty.
3. Early monitoring, research and learning to start planning for the future impacts of climate change. This includes a more explicit application of adaptive management, looking at possible key impacts and thresholds, and monitoring, thus providing economic benefits through the value of information and future options / learning.

The case study showed that the application of a policy-orientated ICRM framework was extremely useful in developing the timing and phasing of adaptation, and translating this through to practical interventions that could form the basis for the adaptation strategy. It showed that a portfolio of interventions is needed, to address the different (temporal) risks and different types of decisions, with a combination of methodological approaches. The portfolio is summarised below.



The study found high economic benefits from investing in early low-regret options that address current weather risks, especially climate-smart options whose benefits increase with climate change. These options had high benefit to cost ratios and high internal rates of return, and are an immediate priority for early adaptation.

In relation to future orientated risks, the study found economic benefits from some options - but importantly not all. A robust finding was that planting new production areas at very low altitudes today (e.g. towards the lower end of current production ranges) would not make economic sense.

The analysis also showed that planting at higher altitudes, which will become better suited in the future, involves a more complex trade-off, and the choice of strategy is important. Early indicative analysis suggests a portfolio approach, which looks to hedge against uncertainty, would be a more robust strategy.

However, a further finding is that given the long planting periods, there is time to learn, and investing in early monitoring and risk information to help to improve future siting decisions. This highlights a key finding of the study, i.e. with the application of an adaptive management framework and investments in early monitoring, research and learning.

FURTHER INFORMATION: xxx

Tool: Adaptation decision-making under uncertainty – an economic investment model

River flooding in Europe has triggered debates among scientists and policy-makers on future projections of flood frequency and the need for flood protection measures. Because there exists uncertainty about the impact of climate change on flood risk, such investments require a careful analysis of expected benefits and costs. The objective of the **economic investment model** is to show how climate change **uncertainty affects the decision to invest in flood protection measures**. The model simulates optimal decision making in flood protection, and incorporates flexible timing of investment decisions and scientific uncertainty on the extent of climate change impacts. This model allows decision-makers to cope with the uncertain impacts of climate change on the frequency and damage of river flood events and minimises the risk of under- or over-investment. One of the innovative elements is the **explicit distinction between structural and non-structural flood protection measures**.

Here more information on the tool.
Econadapt insights
Framing adaptation economics in decision-making: a policy-led framework
Assessing systemic risks in adaptation
Assessing flood risk management: the Netherlands
Private adaptation of adaptation goods: potential and policy instruments
Integrated uncertainties and risk management for robust decision making
Uncertainties and causes of uncertainties in climate change adaptation
Uncertainties and risk analysis in climate change adaption
Sourcing and using climate information for economic assessments of adaptation