ACCRA
AFRICA CLIMATE CHANGE RESILIENCE ALLIANCE

A report for the Africa Climate Change Resilience Alliance

New approaches to promoting Flexible and Forward-looking Decision Making

Insights from complexity science, climate change adaptation and 'serious gaming'

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Abbreviations

ACCRA	Africa Climate Change Resilience Alliance
CCA	Climate Change Adaptation
EWS	Early-Warning System
FFDM	Flexible and Forward-looking Decision Making
FLA	Four Loop Adaptation
INGO	International Non-Governmental Organisation
LAC	Local Adaptive Capacity framework
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organisation
ODI	Overseas Development Institute
RCRC	Red Cross/Red Crescent
UN	United Nations

Executive summary

Policy-makers are often tasked with making difficult decisions in the face of an uncertain future outlook.

Will infrastructural investments still be relevant in 25 years? What new markets are likely to emerge in the medium term? How will a gradual increase in average temperatures over the coming decades affect livelihood security? Though largely context specific, these are but three examples of the types of forward-looking questions that should be asked of many longer-term policies or plans.

Despite this need, the development and humanitarian sectors continue to face criticisms over their relative rigidity and short-termism with regards to project funding and delivery. Recent emphasis on promoting a 'resilience approach' to programming has resulted in calls for more longer-term objectives and deliverables, greater flexibility in planning processes, as well as better collaboration and coordination amongst key development actors.

Though easy to describe in abstract terms, knowing how to put these principles into practice is a considerable change. More importantly, few tools are available to help translate the conceptual arguments into tangible changes and recommendations for day-to-day programme activities. Those that do exist have so far failed to inspire the scale of change and interest needed to instigate appropriate change.

This is where this paper hopes to add some value. Drawing on insights from complexity science, it describes what processes are needed to promote Flexible and Forward-looking Decision Making (FFDM). FFDM starts from the position that to know exactly what the future will bring is not only complex, it's largely impossible. While gathering (and using) information about likely future trends and changes will be crucial, it also recognises that planning and policy deliverables will have to be flexible to deal with uncertain (or unforeseen) events and/or changing pressures.

Similar to most policy frameworks, complexity inspired FFDM is often difficult to grasp in practical terms – given its grounding in various abstract theories and concepts (something all too common in the field of adaptation and complexity science). With this in mind, the paper puts forward the use of 'serious games' as a practical means of not only, a) understanding some of the more abstract principles of FFDM, but b) offering an innovative means of communicating and inspiring the need for real policy change.

More specifically, the paper proposes a coupled game-and-reflection based approach. This looks to capitalise on the ability of serious games to encourage experiential learning, as well as ensuring that enough time is provided to reflect on how key components of the game relate to the 'real-world'. It also allows participants to identify their own routes forward for improving decision-making processes.

This paper lays the groundwork for the second phase of research under the Africa Climate Change Resilience Alliance (ACCRA). ACCRA will be researching the principles outlined within, as well as trialling three separate coupled game-and-reflection events across its core countries, namely Ethiopia, Uganda and Mozambique.

Although not all of the nuances of complexity theory, climate change adaptation or 'serious games' can be explored in the remit of a single paper, it hopes to provide an introduction to many of the key concepts. More importantly it aims to highlight the synergies between the three disciplines and lay the foundations for further elaboration and insight. All this is while maintaining the overarching goal of empowering actors in enhancing their capabilities and level of agency to deal with climate change and uncertainty.

1 Introduction

DEVELOPMENT IS CHARACTERISED by a handful of immovable principles. Chief among them is the notion that decisions are made in the context of a complex and ever-changing world. Yet an acceleration in the pace and scale of global change is increasingly apparent. The globalisation of markets, increases in the coverage and accessibility of communications and information technology, and intensification of pressures on natural resources are but a handful of these accelerators of change (Bennet & Bennet 2008). What is clear is that climate change will interact with each of these, adding an extra layer of complexity and further emphasising the need to support adaptive capacity. In order to maintain (and enhance) wellbeing, structures of governance have to contend with a myriad of realities, threats and opportunities. These evolving pressures often require a flexible, reflexive and informed approach to decision making.

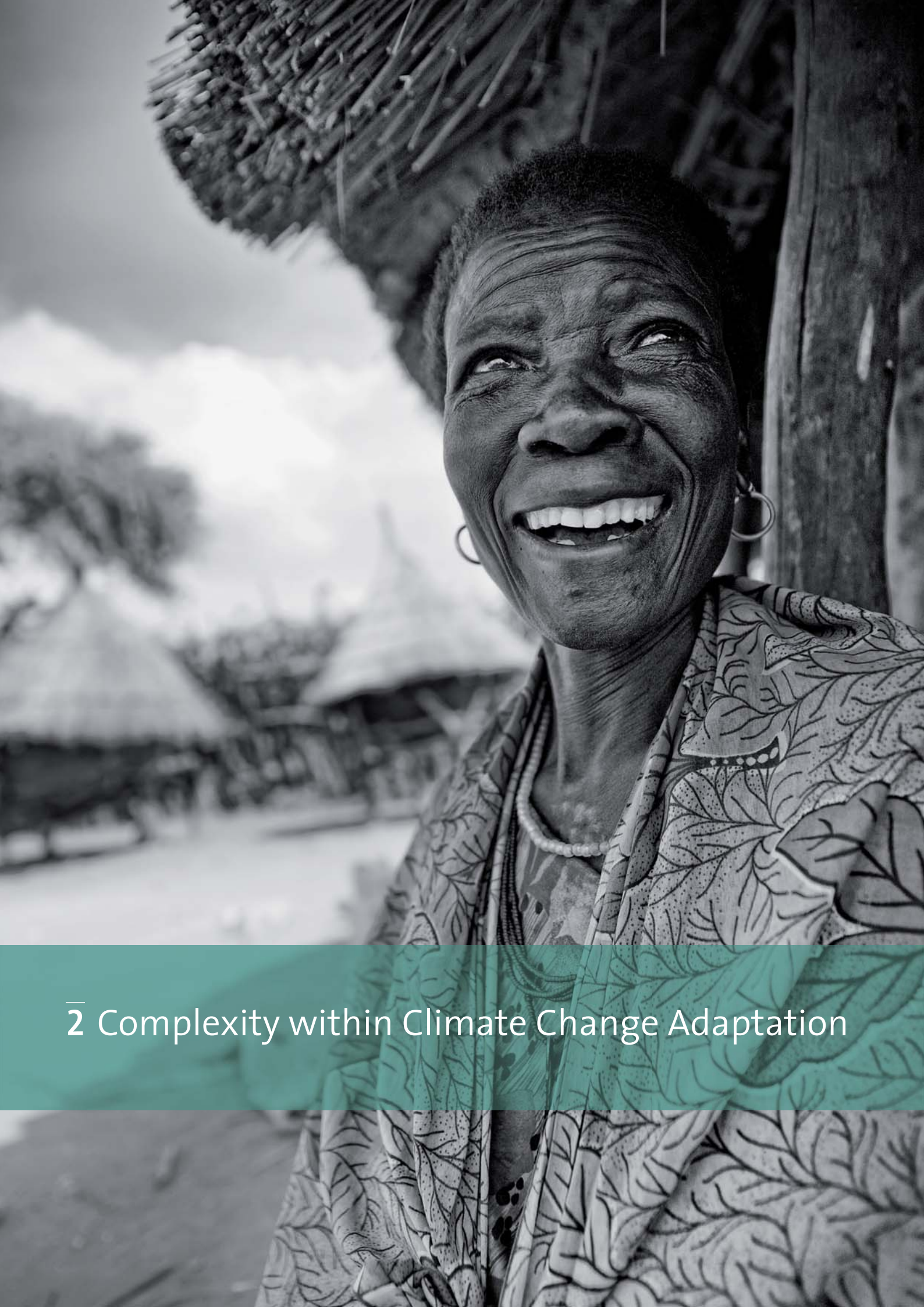
Despite the need to account for longer-term change, the wider development and humanitarian communities have predominantly focused their core programmatic activities around shorter-term timescales (typically on a 1–5 year basis). What is more, many development projects are delivered according to a stable future outlook: identifying a community's present threats, addressing current needs, and exploiting recent opportunities (Levine et al., 2011). Few development interventions (whether by NGO, government, UN or civil society) have been able to accommodate adequately for the impact of changing internal and external pressures on their operations, particularly in the medium-to-longer term (Clark, 2012). Fewer still have invested in the resources, and instigated the reforms, needed to translate centralised policies into effective and meaningful project-level activities (Ludi et al., 2012).

Recognising this shortfall, the development community is beginning to appreciate key concepts and ideas from related fields such as complexity science, adaptive social governance, and naturalistic decision-making (Ramalingam et al., 2008). Together, each provides valuable evidence of the inadequacy of current tools used in supporting policy makers to respond to a complex and uncertain future (Jones, 2011). Yet practical solutions for development planning are scarcely sought and taken, and most are tailored to specific challenges for specific contexts.

Within this wider context, the paper has three core components. Firstly, it provides a brief introduction to theories of complexity and how they relate to climate change adaptation (described in terms of adaptation's Four Loops). Secondly, building on complexity insights, it introduces the concept and principles of Flexible Forward-looking Decision Making (FFDM) as a guiding framework to support decision making in the context of a changing and uncertain future. Thirdly, it proposes a practical tool for communicating and promoting FFDM through the use of a 'serious game' and accompanying reflection sessions.[1]

By the very nature of the subject area, much of the paper's content is conceptual and academic in its approach. Care is however taken to translate abstract terms within a practicable and policy-relevant context. Thus, in addressing the overlaps between the paper's three core components it hopes to guide future elaboration of FFDM-related concepts and capacity-building activities. Finally, the paper highlights a number of routes forward in supporting local actors in planning for and dealing with uncertainty, and enhancing adaptive capacity at the local level.

1 The paper aims simply to outline the potential benefits and considerations needed in applying a coupled game-reflection approach. Full details of the proposed game rules and reflection activities will be published separately.



2 Complexity within Climate Change Adaptation

CLIMATE CHANGE ADAPTATION (CCA) is a complex issue, but what is meant by that? There are many definitions of 'complexity': there is 'natural complexity' as it exists in the real world, 'academic complexity' as scientists analyse it in the abstract, and the 'experienced complexity' that people face in their ordinary lives on the ground. This paper is also concerned with what might be called 'contextual complexity', i.e. the objective, forward-looking examination of the practicalities of achieving CCA in complex real-world contexts over time. To do this, there needs to be both an understanding of how the complex phenomena it is concerned with come about, and also how they can be influenced; both of these issues are addressed in this section.

One does not need to look at real-world challenges directly through the complexity science lens using 'scientific jargon' (such as non-linearity, far-from-equilibrium etc.) as such. Instead, it is enough to take insights from complexity science about how the world 'works' (see Appendix A for an elaboration of ten conceptual Principles of CCA) and to add understanding and value to programmatic activities (Beautement & Broenner, 2011).

At its simplest, CCA is concerned with changing the nature of these drivers of complexity and their interactions. This insight provides a starting point for talking about change and how it can be influenced in a practical way. Complexity science points to a number of universal truths about CCA, notably that it comes about when the following 'drivers of complexity' interact.

When:

- there is a suitable **environment** in which the phenomena can arise and be sustained, e.g. a city and its geographical surroundings (which includes the prevailing political/cultural milieu as well)
- there are **components**, actors (sometimes called agents) or entities in the environment with suitable attributes and properties that enable them to interact with each other in various ways, e.g. objects, villages, the people and their possessions, the communities, etc.
- there are **interactions** among the 'components' and with the 'environment', such as between people, culture and institutions, the trading of possessions, planting of trees, etc.
- there are **patterns** generated from the interactions which are persistent enough to be detectable as 'features' of interest. In a CCA example, these features include climate change itself, negotiation, coercion and incentives, human courage and initiative, etc.

2.1 Climate change: a 'super wicked problem'

So, what is the nature of the contextual complexity that CCA faces? Insights from complexity science indicate that the phenomena of concern for CCA are of a class that Rittel and Webber (1973) call 'wicked problems'. These wicked challenges are characterised as follows:

- offer a diversity (complementary, contradictory, mutually excluding) of 'solutions' based on their capabilities
- The constraints that the 'problem' is subject to, and the resources needed, change dynamically over time; the 'problem' is therefore never solved definitively as the world is 'always-on' and ever-changing.

In addition to this, Levin et al. (2009) indicate how the problems faced by climate change are an example of a 'super-wicked problem' which has the following additional features beyond the 'wicked' ones:

- time is running out and yet, for expediency, people feel driven to adopt short-term solutions which, despite their inappropriateness, are favoured over long-term ones
- there is no single central authority with the power to 'solve' it – also implying that no absolute 'objective' viewpoint exists, nor any single, decisive 'solution' can be formulated; but, nevertheless, the trajectory of CCA can be 'nudged' along iteratively when appropriately influenced
- those seeking to solve the problem are also causing it; the challenges that shape 'super wicked' problems relate to the agents trying to solve it, i.e. they inextricably 'co-evolve' with it and so no 'objective' perspective can exist.

Given that CCA challenges are 'wicked' (or even 'super wicked'), these insights indicate that for any journey of adaptation to be effective over time requires people to recognise: a) the continually changing circumstances of stakeholders, and b) their adaptive capacity to different climate events may change over time (as well as the support needed to enhance it). Key to this is aligning development

trajectories so that people engage with, shape and influence complex change in a purposeful and integrative manner at appropriate levels and (time)scales.

Yet, how can this be achieved? One key part is doing decision making 'differently', which means achieving a mindset change away from trying to define 'systems', 'end states', 'boundaries', etc.[2] (Beautement, 2012). Instead, one would need to use concepts, terms and techniques which take the realities of unknowns and uncertainties as a given, and then move on to work with the changing dynamics. In other words, away from decision making about delivering things to iterative decision making about engagement, influence and routes to change over time.

2.2 The Four Loops of Climate Change Adaptation

Practical experience, backed up by insights from complexity science (Grisogono, 2010), indicate that there are four main complementary aspects to adaptation and learning, sometimes referred to as Four Loop Adaptation (FLA): Loop One can be considered as reactive adaptation; Loop Two deliberative; Loop Three is flexible and reflective; and Loop Four is about achieving effective agency.

Note that it is plausible for people to undertake aspects of the different Loops concurrently, i.e. people's actions do not necessarily fit solely in one Loop or another. Likewise any categorisation represents a simplification of a complex range of interactions and agents. It is therefore not possible to capture all of the nuances of each respective loop.

The Four Loops can be described as follows:

Loop One adaptation (reactive) is done in relation to the current imperatives: adapting to events as they happen, mostly at the individual/household/village/ community levels, e.g. a flash flood is happening, so move to higher ground. The protocol is that people's actions are 'traditional' based on what is – and has been – usually done, much of which may be local lore or based on cultural or religious 'norms'. Given climate change, these actions may be out of place remnants, or appropriately wise, based on historical trends/institutions and robust indigenous skills.

Loop Two adaptation (deliberative) is done based on learning from the (recent) past: e.g. let's move some of our village to higher ground so that we will not be so badly affected next time. This is adjusting the adaptations so as to be better placed to work with events that are expected, based on past experience, mostly across the community/ district levels and supported by initiatives at individual/ village levels. Here the protocol is to examine what happened in the past, evaluate its 'success' and deduce from it how to improve to 'best practice' as a result. This decision making tends to be convergent and risk-averse, in an attempt to minimise the future uncertainties introduced, so it is believed, by the (cautious) innovation.

This may involve scenario-based planning that clearly is suitable for some kinds of decisions and that selects a set number of agreed outcomes and evaluates and scores them using current measures. A plan is usually then formulated for the scenario that 'wins' and structures, permissions and assets are matched to the plan – even if it is not, in the end, delivered. Forecasting may be used to consider the decisions that 'should' be made along the way to get from 'here' to the desired outcome; or risk assessment, which attaches probability figures to pre-identified known risks. Given climate change these actions may be maladapted – as the past is not necessarily a reliable indicator of the future – or adapted to short-term drivers without adequate thought to longer-term sustainability (e.g. because of the political economy).

Loop Three adaptation (flexible and reflective) is thinking ahead to imagine how to do things differently, based on what might possibly happen: e.g. perceiving that future competition for resources may lead to conflict unless (previously taboo) land rights issues are permitted to be discussed (i.e. changing how you adjust the adaptations to expose new possibilities, mostly managed at district one-up-and-down levels). The protocol here is to consider possible (not necessarily probable) futures, and discover and develop new 'degrees-of-freedom', e.g. formulate novel ideas and ways of working, challenge maladapted constraints and experiment.

Conceptually, these techniques involve people in accommodating the variety of unknowns /unknowables that may exist, understanding what the 'prediction horizon' is at any time given the circumstances, and accept that unfathomable uncertainty exists beyond it. The techniques involve considering futures as hypotheses and 'competing' them by identifying and seeking appropriate indicators of change to support or refute the hypotheses over time. It also involves so-called 'sensemaking', by reflecting on perceived and actual realities as a way of revealing challenges and opportunities. Possible futures are traded off against each other and consequences exposed, in terms of inhibitors, enablers, modifiers, blockers etc., so that capabilities, assets and contingencies can be positioned to enable as wide a range of possibilities to accommodate flexibility and robustness.

Loop Four adaptation (for appropriate and effective agency) is provisioning the capabilities necessary to make decisions in a flexible and forward-looking manner. This protocol is best thought of as assessing the characteristics

2 This is the language of what is referred to as 'supermarket-chain' thinking in some literature

of capabilities and the suitability of their properties in relation to possible CCA. For example, changing mindsets; provisioning assets for different ways of working; initiating novel education, training and capacity building with radically different curricula/contents/types of information; providing adaptive infrastructure, etc. An important part of this is the capabilities for 'imagineering', such as backcasting, which selects a possible future and works back to see how the world would have to be to make the future possible; the difference between how it really is now, and how it needs to be, giving an indication of the size of mismatch of our aspirations. Another technique is horizon scanning, which catalogues what people are saying about perceived futures to provide some ideas.

The complexity-inspired Four Loops of Adaptation capture different stages of the adaptation process. Whether at the level of an organisation, a community or a nation, the Loops ought to resonate with any actor attempting to respond to some level of external or internal change. Moving from Loop One to Loop Four is not an easy task, nor is it a state that many development and humanitarian actors can reliably proclaim to have achieved.

What are some of the things that organisations can actively do to work towards Loop Four adaptation? Much of thinking behind is encapsulated in the concept of Flexible Forward-looking Decision Making (FFDM), described in detail in the following section.

3 Flexible and Forward-looking Decision Making: a concept at the heart of adaptation

IN ITS SIMPLEST TERMS FFDM is defined as being: "able to anticipate, incorporate and respond to changes with regards to governance, structure and future planning" (Levine et al., 2011). Given the Principles in Appendix A and the discussion above, a key characteristic of complexity-inspired FFDM is that it does not base its decisions solely on evidence from the past nor just on extant capabilities and structures, but on consideration of possible futures, as the Principles derived from complexity science show.

The essence then of FFDM for adaptation is that the shared act of exploring potential future interactions and working out how the consequences, arising from a range of challenging possible futures, might be addressed does, of itself, constitute forward-looking decision making.

This means that people have to be able to appreciate the variety of levels and timescales over which adaptation has to occur, and to identify (for themselves) what their contributions/ interactions with other actors might have to be. It is not just about making plans, as we know they rarely match up to changing realities of the future; nor is it about documenting 'optimum' change processes, as we know that we will still have to deal with unexpected things and so will always be playing 'catch-up'. Instead, it is about identifying the enablers, tensions and blockers to adaptation that need to be addressed if people are to acquire the capacity to bring about change on the ground.

3.1 Transitioning from Loop One to Loop Four adaptation

How then do we transition to FFDM – what are the competencies that capacity building needs to work towards, if Loop Three and Four ways of working are to be realised?

Practically speaking, ongoing CCA is achievable when decision-making is:

- open to the possibilities of unexpected change (see Dodd et al., 2007)
- able to reason about future possibilities
- able to appreciate the necessary 'complexity-worthy' capabilities needed to bring about change
- 'objective' enough to understand what constitutes 'appropriate' change
- able to 'intervene' effectively to instigate appropriate change

These can be mapped onto the Local Adaptive Capacity framework (LAC), developed under Phase 1 of ACCRA to document the different characteristics of adaptive capacity at the local level (Jones et al., 2010, as shown in Figure 1). Note that ACCRA Phase 2 also aims to identify practical examples of these transitions being employed in-country and supported by capacity building in 2013 (it is beyond the scope of this Working Paper to include this detail). The Principles from Appendix A have been matched to the 'petals' of the LAC, and the statements in italics in the boxes indicate the outcomes that follow for CCA from adopting these 'ways of working'.

While this presents an interesting conceptual linkage, it offers little in the way of practical applications in its current form. With this in mind, we present a simplified box-matrix (Figure 2) that describes how the individual characteristics of the LAC match with the Four Loops of adaptation. Distinguishing between backward-looking (Loops One and Two) and forward-looking (Loops Three and Four) aspects of adaptation, the matrix highlights examples of the types of actions that fit into each category. To accompany this, Box 2 describes the LAC's five characteristics of adaptive capacity and some practical questions that can be asked in assessing whether decision- making processes (of an organisation, a district, a household etc.) are flexible and forward-looking.

Listed in Box 1 are examples of the type of practical questions that can be asked of any development and humanitarian intervention in understanding adherence to principles of FFDM and supporting adaptive capacity more widely. As an illustrative guide these questions are not an exhaustive; many more could, and should, be asked of a particular intervention if genuinely seeking to evaluate decision-making processes. In addition, it is just as important to understand where these checks and questions sit within the complex political and economic environment of the development sector (further explored in Section 3.2 below). However, they do provide a useful starting point in translating some of the more academic and abstract proponents of FFDM and complexity into an easy digestible framework and question guide[3]. More importantly, they also serve as a basis to ground capacity-building tools and approaches to promoting CCA (such as the 'serious game' described in Section 4).

3 Further elaboration of the principles and a potential framework/question guide are expected under the Phase 2 of ACCRA

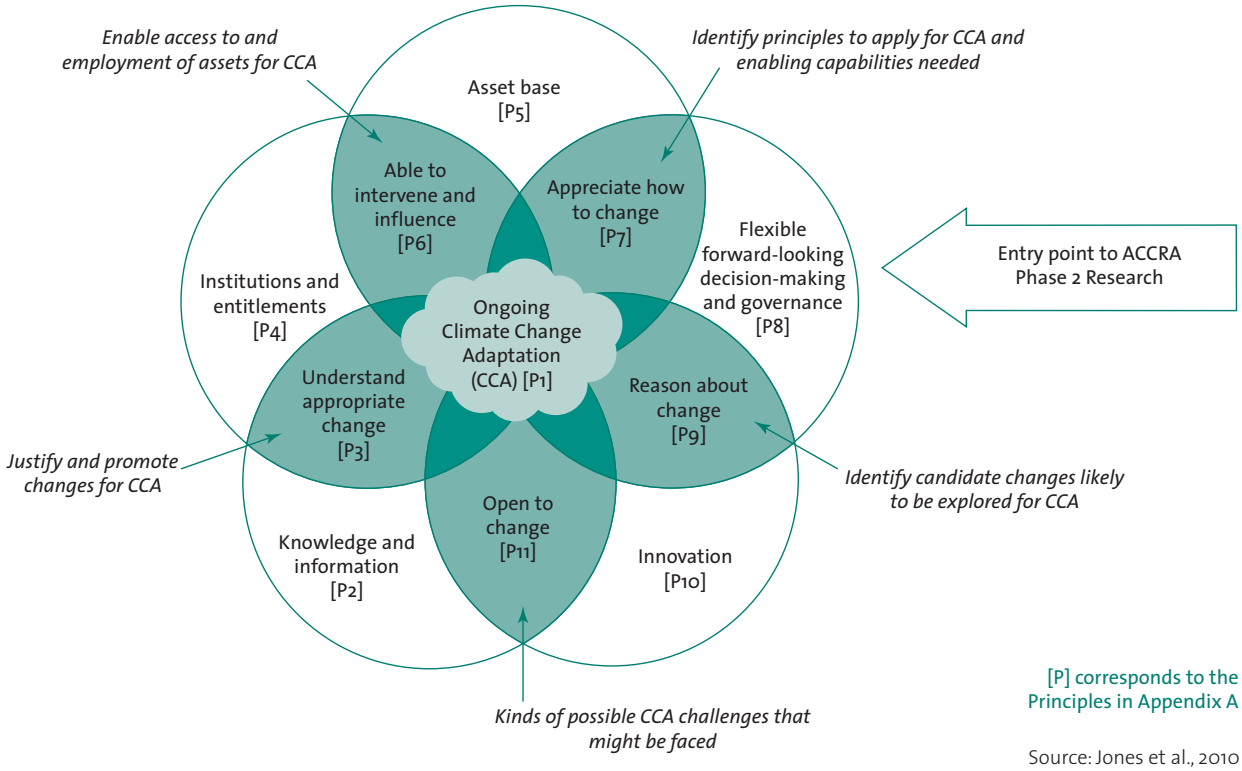


Figure 1 FFDM factors matched to the ACCRA Local Adaptive Capacity framework

ACCRA LAC Characteristics	[Backward-looking]		[Forward-looking]	
	Adaptation: Reactive	Adaptation: Deliberative	Adaptation: Flexible	Capabilities for Flexible Adaptation
FFDM and Governance	Absent [Have to deal with the now]	Deducing policy / plans based on hindsight – minimise 'risk'	Trade-off possible futures and consequences – given uncertainty	Open mindset, able to work with ongoing change / uncertainty
Innovation - Exploration	Minimal / habits, but necessity the 'mother of invention'	Converging on 'best practice' – test the wiggle-room	Explore / experiment Discover / exploit degrees of freedom / opportunities	'Imagineering', e.g. forecasting, backcasting, horizon scanning
Knowledge and Information	Use of traditional wisdom/ lore as seems fit	Generating 'facts' from historical data – 'lessons identified'	Formulate / iterate possibilities and establish 'measures' of change	Able to work with plausible narratives and relevant indicators / warnings
Institutions and Entitlements	'Fixed', based on historical / tribal precedents	Organising, in line with plan delivery	Devolve / adapt for change. Support initiative / proven resilience	Flexible mix of formal and ad-hoc communities of interests
Asset base - availability	Indigenous: use what's on hand, current skills	Matching assets (usually centrally held) to plans	Accessing what's relevant / best placed given ongoing needs	(Re)distributable for contingency, plus strategic / central for crises
Nature of outcomes	Driven by events People passive	Events dealt with only if planned for, otherwise 'crisis'	Events mitigated – as possible change is anticipated and adaptive capacity in place	

Figure 2 Comparing Backward and Forward-looking Ways of Working

3.2 The current state of play: How are development and humanitarian interventions working with change and uncertainty?

Though considerably heterogeneous, the development and humanitarian sectors have, as a whole, engaged relatively poorly with changes to their internal and external operating environments. Many actors continue to plan for and deliver their outputs in line with shorter-term agendas, seeking to address the immediate needs and priorities of their intended beneficiaries (Boyd et al., 2009). In line with this, five and/or three-year development plans and annual cyclical reviews continue to dominate the planning process at the project level, both with regards to NGO and government activities (UNDP-UNEP, 2011; Bakewell & Garbutt, 2005).

Box 1: Characteristics and practical questions for reflecting on the degree to which decision making is flexible and forward looking

1. ***Understand and employ forward-looking decision making effectively, e.g.:***
   - Have we considered possible threats and opportunities that may arise over long-term time horizons? *E.g. acknowledging that rainfall patterns may not be the same as they were in the past*[4].
   - Have we reflected and learned what did and didn't work in the past? *E.g. how we dealt with past trends like population growth, food price shocks and access to technology.*

2. ***Use knowledge and information in meaningful ways, e.g.:***
   - Have we understood what kinds of information we can get, what they tells us, and how to integrate them? *Such as being able to access and interpret information from the Meteorological Service over various timescales.*
   - Have we incorporated different sources of knowledge, interests and views of all stakeholders in planning? *Such as strengthening community outreach, awareness and participation in the design and delivery of district planning.*

3. ***Have evolving institutions and fair entitlements, e.g.:***
   - Have we addressed issues of power, hierarchy and patronage? *Such as ensuring that vulnerable and marginalised groups are empowered in planning procedures.*
   - Have we built on existing institutions that have proven capacities for adapting to change? *Such as strengthening capacities and mainstreaming FFDM into existing committees and groups.*

4. ***Foster innovation and develop enabling environments, e.g.:***
   - Have we tried to explore the 'wiggle room' to allow for greater flexibility and promote forward-looking decision-making? *Such as experimenting with new ideas and local innovations.*
   - Have we introduced appropriate incentives to allow stakeholders to change their perceptions, behaviours and actions? *Such as championing initiatives and self-organisation.*

5. ***Access and utilise assets/capabilities as necessary, e.g.:***
   - Have we collaborated with other sectors and agencies and built mutual trust? *Such as establishing a working relationship with the Meteorology Department to better access and understand weather/climate forecasts.*
   - Have we looked for opportunities to extend the working environment and relationships between key actors. *Such as lobbying and applying pressure on key central agents.*

4 Examples are used to illustrate the types of activities that may be relevant to particular programmatic activities. In practice, appropriate solutions will be context specific.

Despite this, from a higher-level planning perspective at least, there are numerous examples of medium- to long-term goals and planning structures being designed and put in place. For example, a large number of national governments, and most large INGOs, will have some form of internal strategy for long-term coordination (often in relation to particular sectors or programmatic activities). The Kenyan government's 'Vision 2030', documenting a blueprint for achieving long-term prosperity (GoK 2007), and WWF's 'Roadmap for a Living Planet' which outlines strategic objectives for tackling environmental issues up to 2050 (WWF 2008), are two such initiatives. In a collective sense, the Millennium Development Goals (and the more recent proposition of Sustainable Development Goals) can also be seen as a similar exercise to coordinate future priorities in accordance with (to some extent) future trends, needs and capacities.

However, notwithstanding these overarching objectives, the mainstay of development implementation continues to reside at the project level. It is here where the funding and delivery cycles largely remain rooted in shorter-term (3-5 year) objectives. Heavily influenced by Logistical Framework approaches to management, design and evaluation of development project activities often remain overwhelmingly rigid when considered in the context of the high levels of complexity and change faced by most development operations (Bakewell & Garbutt, 2005; ECODE, 2011). Exceptions do exist, and it is important not to paint such a diverse and complex system with one brush. But criticism of the sector's relative rigidity and short-termism persist, despite recent efforts to promote greater flexibility and longer-term strategic thinking within the sector as a whole (most notably under the banner of 'resilience') (Fox et al., 2012; Clark, 2012; UNDP-UNEP, 2011; DFID, 2011).

3.2.1 The political economy of development planning

Unpicking the barriers to FFDM within the development and humanitarian sectors quickly leads to the realisation that there is no single root-cause of the relative short-termism of many actors. Indeed, in recognising the underlying drivers behind development planning, it is important to look at the system as a whole, and the political and economic drivers that shape it[5].

For one, development implementers (whether in the form of an NGO or a district government) operate, to a large extent, according to parameters set about by the various funders. A considerable challenge lies in the rigidity of priorities and outputs of development action. These parameters are often short term, inflexible, and goal orientated (Viravaidya & Hayssen, 2001). Findings from ACCRA's Phase 1 research – assessing the impact of development interventions on adaptive capacity in three African countries – points to the fact that many development actors fail to recognise sufficiently the scope for change to affect the delivery of their operations (Levine et al., 2011). In the context of the programmes examined[6], planners typically assessed the needs of beneficiaries in the short term, and largely assumed that present state of play will largely remain the same in future – which goes against the changing realities we experience. These experiences are not limited to the research sites, and provide useful insights into the orientation and strategic prioritisation of the development community as a whole.

3.2.2 Incentives for longer-term planning

Understanding how the sector prioritises its planning cycles requires an appreciation of how development interventions are incentivised and evaluated. In many ways, the landscape of 'traditional' development funding is somewhat unimodal: the terms and conditions of this support are often rigid requiring a rapid identification of local priorities; the development of a targeted plan or approach; and the delivery of a certain number of outputs and activities (Ludi et al., 2012). In turn, development funders (public ones at least) are pressured and held to account for their deliverables by civil society in their respective countries. Issues of 'value for money', 'effectiveness of delivery' and 'results' are seen as key measures of success. These often skew the agenda towards the delivery of short-term outputs (preferably visible and quantifiable) ahead of allowing a certain 'fuzziness' of outcomes that cannot be precisely predicted at the beginning of the planning cycle. It is also often the case that strengthening or creation of effective processes and institutions is needed to maintain the delivery of development objectives in the face of uncertainty or the longer-term change (Viravaidya & Hayssen, 2001).

More importantly, scarcely are aspects of long-term future change and uncertainty embedded within M&E and appraisal systems. This creates a planning and evaluation culture that largely lacks the relevant incentives and checks to ensure that flexible forward-looking decision making is put into practice. There are some exceptions to this, and the importance of longer-term non-linear thinking and risk management are gradually gaining prominence. For example, there are emerging signs of relative reform within the humanitarian sector towards planning and coordination of activities, in accordance with longer-term priorities and dealing with increased levels of uncertainty. Better distribution and uptake of information, from early warning systems (EWS) and closer links with the development sector, are two such instances. Much of this pressure has been re-emphasised by the response to delayed action regarding the 2011 crisis in the Horn of Africa (Haan et al., 2012).

Indeed, the call to embed forward-looking planning and funding streams within the development sector is not new. The Accra Agenda for Action, subscribed to in 2008 by major donors and developing countries alike, calls for flexible, rapid and long-term funding modalities to bridge humanitarian response, recovery and longer-term development (Groff, 2011). Whether the system itself is changing to accommodate for these principles on the ground is questionable. Despite the heterogeneity of development action, by and large, the coordination and actions of key actors remain overwhelmingly short term, linear and reactive in nature, despite continued calls for change (Levine et al., 2011). What is clear is that for real change to trickle down to implementation will require action from all actors within the development sector; from NGOs and district governments, to donors, central government and the public at large.

Overall, approaches based on the protocols described in the sections above will enable ongoing CCA to be sustained such that all actors/stakeholders are able to succeed in the following: innovate, adopt FFDM and governance ways of working accordingly, adapt the asset base appropriately, alter institutions and entitlements to meet changing circumstances, and employ and develop knowledge and information which embraces the givens and realities. The next section explains how it is intended to take this forward practically in ACCRA Phase 2 Research.

5 For a more detailed exploration of the political economy of planning processes in ACCRA's three research sites, see Jones et al., 2013.

6 ACRRA's research examined the operations of four large international NGOs across eight districts in three countries (Mozambique, Uganda and Ethiopia). For more, see Levine et al., 2011.

4 The case of designing a 'serious game': a practical tool for exploring complexity and promoting FFDM

WHILE COMPLEX SCIENCE provides invaluable insights in understanding the processes of adaptation and FFDM, its applicability in the context of development programming is often marred by the challenges of translating its conceptual and academic elements into practical recommendations. Tools are therefore sought to help bridge the divide between theory and practice. One that holds considerable potential is game-based activities, or 'serious' games.

4.1 Games as scaleable tools for learning and dialogue on FFDM

'Serious' games can elicit experiential knowledge of complex real-world problems in a memorable, fun and compelling way. The ability of games to simulate changing conditions, plausible decisions, and related outcomes – circumventing a potentially taxing process of trial and error in the real world – makes games effective learning tools. In a game, as players move from 'huh?' moments of confusion to 'a-ha!' moments of discovery and understanding, experiential learning can drive meaningful dialogue on what appropriate planning in development and climate change programmes may look like. In the context of CCA, a well-designed game, in partnership with necessary reflection sessions away from the game mechanics, can help players understanding the 'wiggle room'[7] available to them, its role in the development planning process, and the challenges and opportunities for collectively moving towards FFDM ways of working.

The genre of 'serious games' is not new. For example, Edney (1979) describes the use of a 'nuts game' that makes players reflect on behaviour with respect to the use and management of scarce natural resources. However, games are now expanding in the field of CCA (Mendler de Suarez et al., 2012). The Red Cross/Red Crescent Climate Centre has been designing, testing and using games for learning and dialogue processes to address diverse topics; examples include forecast-based decision making, dengue prevention strategies, gender inequality, and diversifying smallholder cropping systems. The 'scaleability' of games as learning tools for climate risk management has led to more than 80 game events in four continents. Stakeholders have ranged from Red Cross youth learning about the links between climate risks and health, to national finance ministry staff involved in an Africa-wide regional insurance pool, to subsistence farmers developing village-level flood contingency plans. Each of these groups has been able to explore and discuss a variety of practical policy options through the use of games.

4.2 Participatory game design for FFDM

In July 2012 ACCRA held a workshop in London to examine the options for introducing ideas which elements constitute FFDM into African countries involved in the Phase 2 Research. At the start of the workshop, a report was given on the 'stocktaking' of the current ways of working (see Section 2, above). The conclusion is that it is not possible to jump directly from the current state and ways of decision making to the necessary FFDM without some intermediate stages.

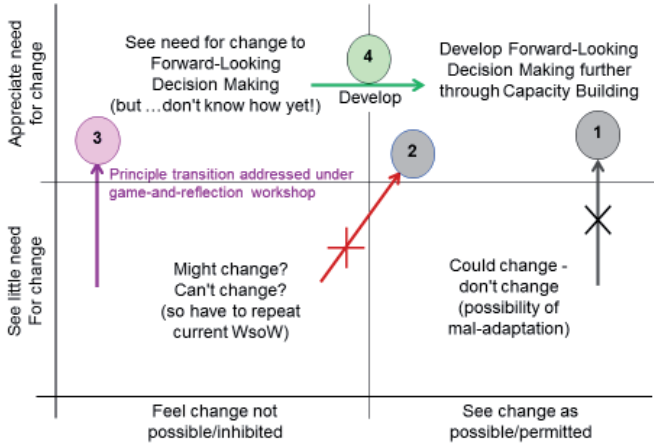


Figure 3: Transitioning to FFDM Ways of Working (WsoW)

Figure 3 indicates the various stages for developing in-country FFDM approaches. The left-hand axis of the matrix is concerned with the degree to which the need to change is perceived. The lower axis relates to the degree with which people feel they could change, or are permitted to change to FFDM. Building on a series of political economy studies conducted prior to the workshop, it was felt that ways of working in ACCRA's districts in Uganda and Ethiopia fell more into the bottom-left-hand corner, whilst Mozambique was more towards the top-left. As such, Transition 1 was not possible, and Transition 2 unlikely because of the political economy. Hence, Transition 3 had to occur first (to generate the appreciation that the change to FFDM was both needed,

7 'Wiggle room' is defined as the scope for freedom of action or thought

theoretically possible and of potential value), followed by Transition 4 (which would move from the 'theoretically' possible to the actually possible through Capacity Building).

In September 2012 a second workshop was held in London where the ACCRA team, together with the Red Cross/Red Crescent Climate Centre, laid the foundations for a game design that would capture key aspects of FFDM and support the ACCRA research component (activity 3 in Figure 3). Following six steps for game design (Bachofen et al., 2012), participants were asked to think about key communication challenges, the key elements to be represented in the game, the desired emotional triggers related to the game narrative, and general game dynamics and rules.

An iterative game design process which engaged professional game designers ensued. This resulted in a game prototype whereby players represented district level decision makers seeking to make clear investment decisions for the following outcomes: to develop their districts; be resilient in the face of climate and non-climate related events; and excel in performance-based evaluations of their work. As the game dynamic reveals after several rounds of play, those who make decisions based on a subset of FFDM principles are more likely to find ways to achieve their goals. To bolster this game-infused learning experience, the design team has strategically woven in elements intended to trigger theatrics, player-to-player competition, fast-paced interaction, and 'time-out' for reflection into the game. Furthermore, during key moments of the research workshop, players have the opportunity to create actions and new choices that may be employed in the game as **tangible** game materials that, in essence, will reflect their **abstract** conceptualisation of an FFDM option given their very specific context.

The game's rules[8] are designed in a way that seek to integrate analytical thinking and allow a player to get a feel for how issues interact – an attractive alternative to engaging in strenuous quantitative activities that often feature complex graphs and charts (Macklin et al., 2009).

The added value of engaging decision makers in a participatory game design has three main benefits:

- a better game can result by contributions from those most familiar with the context
- greater ownership and enthusiasm about the game can emerge,
- perhaps most importantly, better insights can be generated among the participants regarding the system dynamics that the game mimics (Bachofen et al., 2012). This can contribute more deeply than game play alone to the higher objective of learning about FFDM.

In turn, ACCRA and the Climate Centre will test the effectiveness of this game and added method of participatory game design for learning and policy impact, analysing the challenges and opportunities for taking the participatory game design process onto a larger scale.

4.3 Limitations of games for influencing policy and planning

Games as learning tools and the participatory game design process are limited in their impact on people's understanding of, and decision-making on, development issues. Based on experience with designing and facilitating numerous game sessions on climate risk management, the Climate Centre has generated limited anecdotal evidence of games' ability to strengthen learning and dialogue processes so that they impact policy and practice.

The following challenges are related to the use of games to enhance learning and dialogue, leading to changed policy and/or practice:

- The availability of experienced game facilitators and a willing set of participants is essential to engage in game play. The Climate Centre together with ACCRA is developing capacity-building materials for coaching aspiring game facilitators. Methods are being tested to find the most effective ways of doing this, with a view to scaling up game play and building capacity for further rollout of the ACCRA game on FFDM awareness raising. Skilled facilitators are required to ensure that any game play experience is rooted in reality. A skilled facilitator will be able to encourage cognitive and emotional engagement, as well as critical thinking to achieve the learning objectives. It is dangerous to assume that the game itself is the only knowledge vehicle and is self-contained. Learning and dialogue are enhanced through a variety of facilitation techniques: setting the stage, explaining rules, relinquishing control of interactions, sharing power, and guiding debriefing when participants generate knowledge and act on new understanding (Mendler de Suarez et al., 2012).
- ACCRA is in the privileged position of being able to gather a distinguished group of stakeholders to partake in gameplay in each of the case study countries. Such a gathering may be difficult to replicate in the future, as time is valuable and not everyone will be immediately willing to experiment with this innovative approach. Questions will be raised concerning the justification for allocating human and financial resources and time to games. Some may equate what are in fact serious purposive games with children's play, and be reluctant to carve out time in busy schedules, or even see the initial suggestion that games be played as patronising. But senior people do need to experience games for

8 Full details of the ACCRA game rules and procedures will be published separately.

themselves to discover their value as a serious approach to learning for all ages (Mendler de Suarez et al., 2012).
- Significantly, a game will never reflect the countless complexities present in the real world; it must, however, be rooted in reality. As a simplified version of reality, a game model will be imperfect and sometimes wrong. Participants in the game design process need to decide which elements or relationships between decisions and consequences they wish to emphasise, while recognizing that not all aspects of reality will be reflected in the game. Again, time for reflection on the limitations of a game and how to improve the model is a crucial element of the learning process, so as not to draw incorrect conclusions and then take its results as 'the solution' to real-world problems.
- While scaling up the use of games with a skilled facilitator and willing audience can be relatively simple and straightforward, scaling up the participatory game design process is much more complex. Further evidence is required to determine how best this may be achieved.

4.4 Reflections on the use of a 'game' for influencing policy

There is no doubt that gaming is a great motivator and a useful educational tool. The basic fact is that for flexible forward-looking decision making and problem solving, games or exercises must be able to co-evolve along with the players as they learn. This means both of the following:

- players must be able to change the rules of the game, during the game, as it evolves and as they reflect on, and adapt, their strategies and options (given real-world, not game-specific realities)
- as the players develop, access and employ new capabilities in innovative ways, they must be able to influence any underlying maths and probabilities (such as changing a six-sided dice for an eight-sided one) that determine the outcomes of the game, during the game, so that new possibilities can emerge.

If this co-adaptation cannot happen, then the players' repertoire will become constrained to a number of linear pathways, reinforcing behaviour which could be maladapted in reality (see below). Most games only involve Loop One (reactive) and Two (deliberative) adaptation, as the underlying rules and logic/probabilities are pre-determined and cannot be changed at 'run-time', as follows:

- **Loop One adaptation:** i.e. adapting to events as they happen. This means playing the game as designed by the game masters; the players work within the defined 'wiggle room'.
- **Loop Two adaptation:** i.e. based on learning from the recent past. This can be thought of as changing the way you are playing the game: players can wiggle the current 'wiggle room' by refining techniques, such as changing strategies next time they play the game, and learning from past mistakes; however the game itself remains fixed.

For promoting FFDM, the range of possibilities needs to be explored. Its aim is to stimulate real-world learning and innovation, and then designing and trialling those new ways of working through exercises which the players have, in effect, designed/adapted for themselves, i.e. learning and building capacity on the way. This Loop Three (flexibility) and Four (capability) adaptation and change would then be as follows:

- **Loop Three adaptation:** i.e. FFDM means thinking ahead to work out how to do things differently, based on what might possibly happen. This can be thought of as changing to a different game/changing rules of the game and the 'board' (environment/context) you are playing on. I.e. the players discover, develop and explore new degrees of freedom iteratively, and the ways of working are co-evolved with the players, the aim being the journey rather than the outcome.
- **Loop Four adaptation:** provisioning the capabilities necessary to do FFDM, i.e. how to adapt Loop One and Two adaptation in different, more appropriate ways. This is best thought of as changing the pieces of the game and their properties – i.e. retraining and provisioning players/assets for different games and experimenting with things to see if they are viable. The consequence may be that, e.g., the next round of experimentation cannot be initiating until radical education and training has been carried out, different ways of working have been developed, and adapted enabling infrastructure put in place.

Some other background issues that arise for gaming from applying the complexity science- inspired principles are as follows:
- Games that achieve only single and double-loop adaptation (e.g. what shall we do? how did we do?) risk players making spurious correlations between choice and outcome (a leader is fired because of the dice roll, not the quality of their strategy). This can encourage short-termism, belief in the limited set of 'solutions', known or found and (as individually perceived) risk-averse behaviour. These types of games lead the players' behaviour to converge around the games' 'attractors'; people start to play to win this game, incentives become skewed – and the wider external validity can be lost. In addition, the fact that an external agency determines rules, outcomes, success and failure etc., can seem rather 'imposed' and disempowering.

- For CCA there needs to be triple-loop adaptation, i.e. the game must be able to co-evolve along with the players (as described above), where the changes are embedded within the game structure in some form. However, this co-adaptation is not usually built into gaming because game masters lose control of the game and statistical analysis becomes almost impossible, leading to the 'results' of the game declared invalid. However, it is not about outcomes in terms of winning or losing and so it is acceptable that it may not be possible to derive statistically robust results – e.g. what was best/worst, and by what percentage 'better', etc. Alternative criteria are used based on judging adaptive competence in relation to FFDM tasks
- These criteria are at the 'meta-level', i.e. the level of the wider real-world context in which the game is being used. Hence, players should not only reflect on the relevance of the game experience to their life and work, but also feel motivated to change what they do as a result of that reflection. If there is too much emphasis on the play within the constructs of the game, then players can reject discomforting insights as coming from 'just a game' and carry on as before. Indeed, cheating within the game framework is often seen in gaming because there are no real-world consequences. However on the positive side, where players may innovate behaviour outside the game framework, these need to be encouraged as they are the seeds of change needed for successful FFDM. Strong facilitation of real-world reflection which challenges those not taking insights seriously, and which encourages those wishing to change, is essential if transition to Loop Three and Four adaptation is to take place
- Hard won, expensive experience can be drawn upon to justify the value of open-ended, judgement-based exercises, rather than numerically-based analytical and modelling techniques. As we know for climate change, there can be no single 'right information, right place, right time, right decision, right effect, right outcome' technique. Context-dependant and judgement-based approaches must be employed.

5 Ways ahead and ongoing issues

5.1 A need for innovation and experimentation in transferring knowledge and overcoming barriers to change

The development sector's efforts to build capacity and support good governance at all levels of decision making have a long history, particularly in Africa. One of the strongest learning points is that attempts to impose external ideals and ways of working on 'weak' systems, with the assumption that these will lead to better governance, often falls short of delivering positive change (see Crook & Booth, 2012). Failure to fully appreciate the complex institutional and political context goes a long way in explaining this failure[9]. Moreover, the fact that development support is delivered through many of the same channels, presents real challenges to ensuring uptake. Capacity-building workshops remain the mainstay of NGO and donor support, with presentations, lectures and group exercises the norm. Though effective in delivering key messages, these forms of knowledge exchange rarely engage intended beneficiaries, nor do they tend to provide a sufficient vehicle for learning and behavioural change. Together, these also contribute to a tangible 'workshop fatigue' effect.

Other factors which might be barriers to change, if not addressed in the transition to FFDM, include the following:

- facing up to issues of power, hierarchy and patronage, including how authorities, responsibilities and entitlements are handled
- adopting cross-establishment/sector/agency ways-of-working, as part of everyday collaboration which is built on mutual trust;
- seeking out and employing cross-disciplinary techniques which leverage complementary skills
- using information effectively, i.e. knowing what is there, seeing its value, having the means and knowledge to decide whether the information is trustworthy or not, and knowing its utility
- appreciating what did and did not work before and why, and being prepared to learn and change
- understanding the benefits of forward-looking, longer time-horizons ways of working which consider possible futures, not just hindsight
- considering how incentives need to change to sustain a FFDM world, whether national, institutional, community or personal
- perceiving, releasing and acting upon the 'wiggle-room' for change, which is already available in current ways of working
- examining the artefacts already in use, e.g. policy and planning documents, and finding more effective ways of employing them now
- building on existing and historical institutions which already have the required 'requisite variety' to influence real-world change
- developing purposefully, and becoming adept at using, more adaptive ways of working across the four Loops as discussed above
- accessing and employing a wider range of physical assets (to change 'infrastructure') and features of the geography as part of sustained adaptation – e.g. viable tree planting for carbon capture.

What is clear is that to inspire effective and sustainable action on FFDM, new and innovative methods of communicating the need to change and for capacity building are required. These are alongside more traditional forms of governance support, usually presented in the form of unidirectional learning workshops.

The use of games is one such technique for awareness raising that is gaining momentum, and will be trialled by the ACCRA consortium during its second phase of research. Games offer a unique opportunity to promote experiential learning, improve communication and understanding, and allow participants to reflect on circumstances outside their own immediate context (Suarez et al., 2012). Games should be designed with parameters that do not reinforce the kind of 'short-termism' and skewed measures of 'success', as discussed in Section 2 and highlighted in previous reports.

Of course games are not the only example of innovative tools and approaches that can be used and trialled. Simulations, role-play, team activities and other experiential activities are just some examples of innovative approaches that may assist in the transfer of key skills and knowledge (for other examples see Sutcliffe, 2002).

9 Crook and Booth (2012) argue that in an African context, a development form of neo-patrimonialism, and not 'good governance', may be the most likely to succeed in the governance and provision of public goods.

Trialling and documentation are important components in understanding whether they offer entry points in unblocking some of the key institutional and political barriers. These, in turn, would lead to opportunities for implementing FFDM – such as stakeholders' perceptions as to their degree, or not, of freedom of action. Monitoring and evaluation, adapted appropriately to track indicators of FFDM over longer timeframes, will also be crucial in determining the extent to which these new approaches are of relevance and use in the context of adaptation.

5.2 Understanding the institutional and sociopolitical context and identifying the right entry points

Putting the principles of FFDM into practice is far from straightforward. Not only does embedding it into decision-making processes require a large degree of buy-in from all actors at all scales, but implementing it effectively will often necessitate an overhaul of existing structures of governance (Levine et al., 2011). More importantly, any attempt at supporting FFDM must have a strong appreciation of the institutional and sociopolitical drivers that influence decision making. Challenges such as hegemony, personal or collective incentives, and corruption are each common political economy issues that can act as significant barriers to change. These apply at the local level just as much as they do at the national level.

Challenges such as these often mean that for any FFDM tool or approach – such as the game described in section 5 – to be successful, it must identify appropriate entry points for delivering incremental or transformative action. Examples of entry points can be seen in the form of identifying 'champ—ions of change' that can drive forward and allow wider buy-in for political change, or through building on, and working with, existing institutions that offer less of a challenge to existing sociopolitical structures. Practices such as Political Economy Analysis (PEA) and governance assessments can be useful tools in identifying suitable entry points.

What is clear is that effective FFDM can only occur within a permissive institutional environment that supports initiative and delegated working. In most cases, the rigidity of governance structures and underlying issues of political economy will mean that rapidly transitioning from a state of unwillingness and inability to act on FFDM, to one of willingness and empowerment (depicted as Transition 3 in Figure 3), is unlikely, if not impossible. This does not mean that support for the principles for FFDM should not be encouraged – far from it. Helping to ensure buy-in of the need for FFDM (transition 3) and providing people with the capacity and knowledge of how to implement it (transition 4) are crucial first steps.

It also means that often the best way of bringing about change, particularly in a rural African context, is achieved through 'working with the grain' of local institutions and governance processes, rather than trying to overhaul existing structures (Booth, 2012). The degree to which principles of FFDM can be adopted, therefore, depends entirely on the context and the interactions between local, national and international levels. It may have to be accepted as an 'inconvenient truth' (e.g. by donors and implementing agencies) that certain classes of transition will be blocked until the enabling conditions are achievable. What works for one district government (or NGO programme) may not work for another; certain aspects of FFDM might be adopted wholeheartedly, while others rejected completely. What is important is that care is taken to identify where actors are in the transition framework (Figure 3), and how support can be tailored accordingly.

5.3 Documenting and reflecting on the process of delivering FFDM Transition through a coupled game-reflection based approach

ACCRA's activities in Phase 2 will be two-fold. Firstly, the game as developed has been trialled in Uganda (November 2012). Following this first round, and depending on experiences – by the district officers themselves, the ACCRA team and the game developers – modifications will be discussed and made to the structure of the game, its rules, mechanics or metrics, as well as how the game and the reflection sessions fit together. In each country a group of game facilitators will be trained with a view of using the game not just for research purposes – e.g. what constitute the elements of FFDM in each context, what is the 'wiggle room' that decision makers can explore and expand, what are the barriers to more effective FFDM, etc. – but equally as a capacity-building tool moving beyond the traditional repertoire of such workshop tools.

This latter part constitutes the important second main activity of ACCRA's Phase 2, and involves the use of posters to support reflection. These express in detail the practical behaviours to adopt in order to realise FFDM. Both activities are required to support the transitions as depicted in Figure 4 – including both Transition 3, generating the appreciation that the change to FFDM is both needed, theoretically possible and of potential value, followed by Transition 4 – moving from the 'theoretically' possible to the actually and practically possible through Capacity Building.

An important part of the game evaluation and trialling period will be to design the game and the accompanying FFDM reflection sessions in such a way that they, together, can be employed as capacity-building tools to enable more district officers and other development planners and implementers, to experience first-hand what FFDM might entail, and realise that they have more opportunities and 'wiggle room' to adopt principles of FFDM than they previously thought.

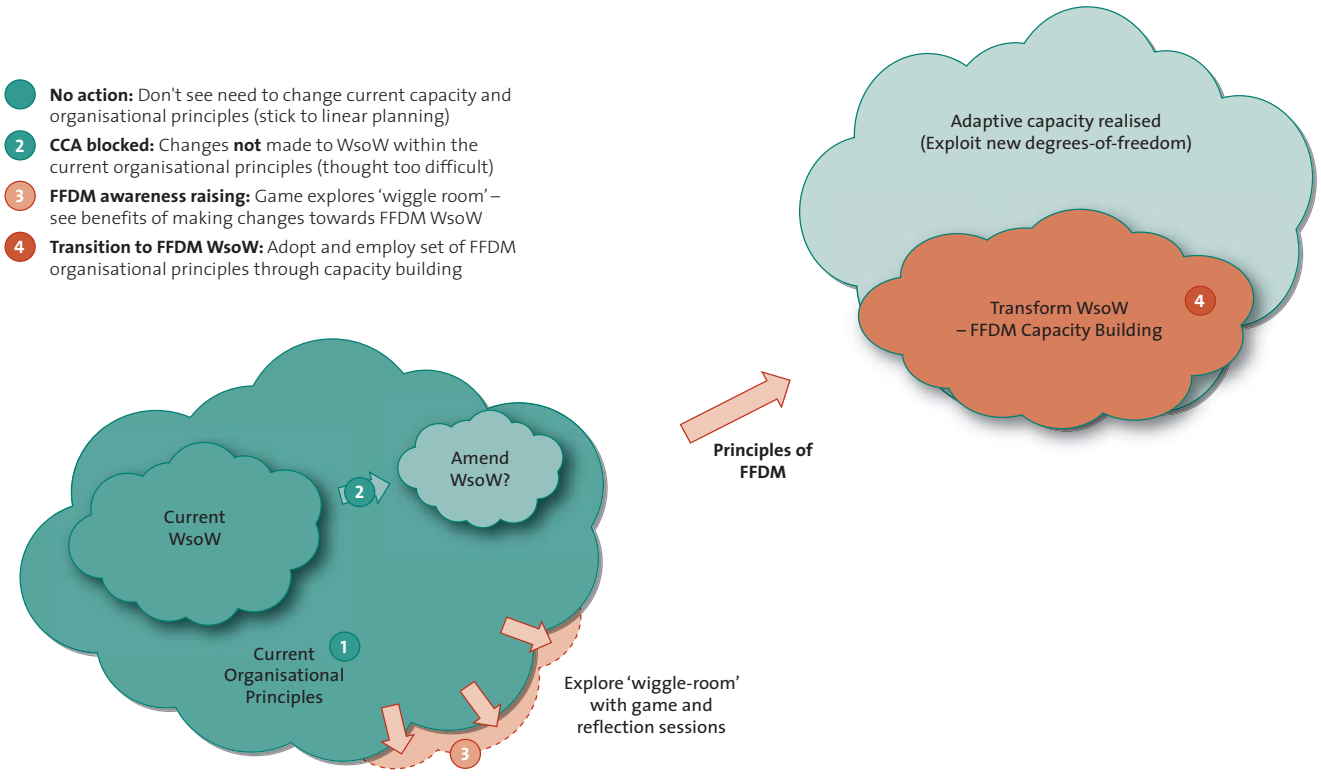


Figure 4 Options for transformations towards FFDM

ACCRA is well aware that it is – both with the theme of FFDM as well as the game and posters used as tools to bring about transition towards FFDM – in unchartered territory for the development community with hardly any experiences to build on. Many of the activities are highly experimental, and positive outcomes not at all guaranteed. Much effort will therefore still be needed to identify what worked well and what not, why and for whom. This will require a strong research component that goes alongside the game and FFDM reflection sessions.

Related to the above, as all this is highly experimental, ACCRA is unsure whether it manages to achieve Transition 3, i.e. generating the appreciation among district officials and partners that FFDM is needed, possible and of value. This research is in the lucky position of not having to achieve a pre-defined outcome with ACCRA in terms of demonstrating that 'x' number of districts have adopted FFDM principles which lead to 'y' outcomes.

In case it is discovered that albeit is was not possible to achieve Transition 3, it will be necessary to focus the research on understanding why this was the case, which is an equally important lesson to learn than if that approach proves to be successful. In any case, the findings from the research accompanying the game and reflection sessions will shed invaluable light on what is possible and what not, and where specific barriers to FFDM might exist. It will then be important to identify partnerships, approaches, methods and tools that are appropriate to tackle those barriers in view of achieving FFDM.

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Appendix A

11 Principles that underpin climate change adaptation

The following principles, as they are derived from complexity science insights, reflect the integrative and iterative manner in which ongoing effective CCA can be maximised:

- *Principle 1: Dynamic, ongoing 'complex' CCA can be influenced purposefully:* This is because: a) the underlying 'drivers of complexity' have been identified, and b) practical techniques are available to purposefully engage with and shape the underlying drivers, and to influence the behaviour of emergent phenomena.
- *Principle 2: Context understanding is diverse – there is no 'single view of the truth'*:
  The 'experienced complexities' of stakeholders are necessarily different, as are their knowledge and information needs.
- *Principle 3: Change is ongoing, dynamic and multi-level – there is no 'end-state'*: This means that trends, flows, gradients, potentials and other 'energy metrics' are appropriate dynamic indicators of the progress of CCA.
- *Principle 4: There are many qualities of power and influence to accommodate*: These affect people's ability to adapt and may arise from individuals, their beliefs and vulnerabilities, or from community values, from gender issues, institutional structures and the political economy, and from the changing environment, etc.
- *Principle 5: It is necessary to appreciate who is/what are best placed to bring about change*: Given the inevitable contextual complexity of CCA, those tasked with achieving change may not be the ones best placed in a context to be drivers of change. Part of FFDM is, given the time horizon, realising the need to work adaptively through those who are.
- *Principle 6: CCA requires that 'interventions' have the necessary Requisite Variety, i.e. have appropriate 'Complexity-Worthiness' given the desired changes*: This insight arises from 'Ashby's Law of Requisite Variety' (1957) which states, in essence, that to influence something your practical 'behaviours' must be equivalent to, and preferably exceed, the 'repertoire of behaviours' of that which you are trying to influence.
- *Principle 7: CCA is not just about adapting, but is also about being able to adapt the adapting and learn*: This is because people are in continual co-evolution with the environment and, as there will never be a 'steady-state' balance or equilibrium, forward-looking innovation will always be required. One cannot adapt once and then stop.
- *Principle 8: Different decision-making and problem-solving styles are required for different situations*: Because CCA involves inevitable novelty and change over time, there can never be a 'one-size-fits-all' solution, nor can 'optimised' processes be developed (Beautement, 2012) and used as 'best practice' in all situations.
- *Principle 9: When reasoning about change, past evidence does not guarantee future prediction*: A key insight from complexity science is that, even if you could turn back the clock and reinstate 'everything' as it was and start again, the flow of events would be different every time. This means that, though we may have evidence of a past train of events, there is no guarantee that we can extrapolate from this into the future a reliable prediction. Another reality is that there are limits to what we can know and observe, which means that there will always be uncertainties and unknowns, and that we must accept this as a given. A key skill for CCA is envisioning, and being prepared to act on, possible futures.
- *Principle 10: When innovating, transformation may be the only valid option*: Because of the inevitable novelty already mentioned, the transformation from non-CCA capabilities to being appropriately complexity-worthy will require purposeful, ongoing, innovation and adaptation. Gradual, incremental transition is just not an option in some unsettling circumstances.
- *Principle 11: Change will be impeded unless appropriate degrees of freedom and 'wiggle room' are available*: Complexity science insights indicate that being open to change means appreciating where the 'spaces of possibilities' are, and how to maximise and exploit them – as well as understanding that a drive for control, repeatability and certainty will clamp down on the space that is needed for adaptive behaviour to flourish.