

Economic appraisal in NAPs

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Overview

- Reflections on NAP guidance and the changing landscape
- Challenges of adaptation for economics and how to address these
- What needed to take opportunities of increasing climate finance
- w/ case studies (NAP and others)
- Session this afternoon (4pm)



NAP technical guidance

- The existing guidance outlines key areas for costs and benefits

Step	Key Questions	Indicative activities
B3 Reviewing adaptation options	<ul style="list-style-type: none">• What are the costs and benefits of each adaptation option?• How best can the adaptation options be implemented, and what are the conditions for success?• Is it possible to identify co-benefits between the adaptation options and development?	a. Appraise individual adaptation options, including economic, ecosystem and social costs and benefits, and possibilities for unintended (positive and negative) impacts of adaptation measures
C1 Prioritising climate change adaptation in national planning	<ul style="list-style-type: none">• How can adaptation work best be prioritized for implementation at the national level considering development needs, climate vulnerabilities and risks as well as existing plans?• What criteria can be used to define priority actions?	<p>a. Define national criteria for prioritizing implementation based, inter alia, on: development needs, climate vulnerability and risk and existing plans</p> <p>b. Identify opportunities for building on and complementing existing adaptation activities</p>

State of knowledge on costs and benefits

- Estimating costs and benefits one of more difficult aspects of NAPs
- Previous reviews – including IPCC 5th AR - report a low evidence base on the costs and benefits of adaptation
- But over the last few years, information base grown
- ECONADAPT undertaken comprehensive review – identified >1000 relevant studies

Costs and benefit estimates by sector

ECONADAPT



Funded by
the European Union

Risk / Sector	Coverage/ Discussion	Cost estimates	Benefit estimates
Coastal zones and coastal storms	Comprehensive coverage at global, national and local level in impact assessment and policy studies + low regret options decision making under uncertainty.	✓✓✓	✓✓✓
Floods including infrastructure	Growing cost and benefit estimates in a number of countries and local areas, particularly river flooding. Some evidence on low regret options and non-technical options. Some applications of decision making under uncertainty.	✓✓	✓✓
Water management	Emerging supply-demand studies at the national level. Focus on supply, engineering measures. Some examples of decision making under uncertainty.	✓✓	✓
Other infrastructure	Several studies on road and rail infrastructure. Examples of wind storm and permafrost.	✓	✓
Agriculture	Benefits of farm level adaptation, and some benefits and costs at global and national level. Evidence emerging on low regret adaptation, including climate smart agriculture.	✓✓	✓✓
Over-heating (built environment, energy and health)	Good cost information on heat-alert schemes. Increasing coverage of autonomous costs* associated with cooling. Growing evidence base on low-regret options (e.g. passive cooling).	✓✓	✓
Other health risks	Increasing studies of preventative costs for future disease burden (e.g. water, food and vector borne disease), but partial.	✓	✓
Biodiversity / ecosystem services	Low evidence base, with a limited number of studies on restoration costs and costs for management of protected areas for terrestrial ecosystems.	✓	
Business, services and industry	Very few quantitative studies available, except for tourism,.	✓	

But

- Focus on engineering options (e.g. irrigation, dikes) not capacity, non-technical options that are mainstay of NAP activities
- Focused on future (typically mid century)
- If-then approach to climate change, not consider uncertainty
- Do not include implementation costs
- So can provide some benchmarks/inputs, but not sufficient for practical implementation
- And at same time, landscape for NAPs is evolving

Changing needs and opportunities

- NAPAs were project level
 - Included simple project cost estimates for grants
- NAP guidance focuses on costs and benefits of options, BUT evolving
- NAPs are programme level + the scale of finance is magnitude higher
- NAPs integrated in development planning (mainstreamed)
- Opportunities for NAPs / sector plans and climate finance (GCF/other)#
 - Probably greater need for economic and financial appraisal

Green Climate Fund Form

B1 Please provide.an integrated financial model ...a description of how the choice of financial instrument(s) will overcome barriers and achieve objectives

E.6.1. Cost-effectiveness and efficiency. Please describe the efficiency and effectiveness, taking into account the total project financing and the impact that the project/programme aims to achieve,

E.6.3. Financial viability. Please specify the expected economic and financial rate of return with and without the Fund's support

F1 Please provide the narrative and rationale for the detailed economic and financial analysis (including the financial model). Based on the above analysis, please provide economic and financial justification (both qualitative and quantitative) for the concessionality that GCF provides

Delivering this goes beyond the current NAP guidance

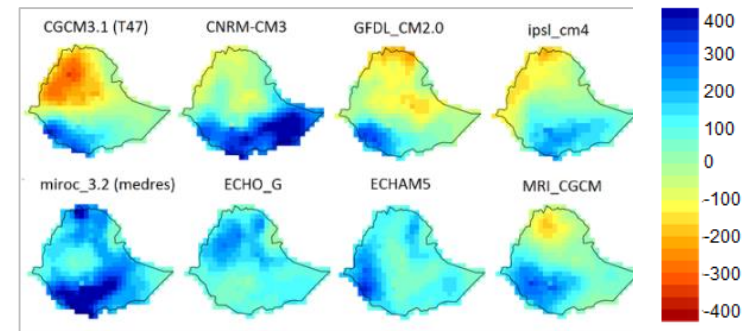
So what does this involve?

- Moving from input on costs and benefits to economics and finance
- Finance = costs, project rate of return (viability), finance structure (grant, concessionary loans)...
... keep accountants happy
- Economics = environmental, social, economic costs and benefits – societal perspective....
.... keep people happy
 - Cost-benefit analysis / efficiency, effectiveness, value for money
- Maximise number of beneficiaries / outputs with available resources
- There are standard approaches for economic and financial appraisal in public policy and international development assistancebut

Challenges for benefits/economics

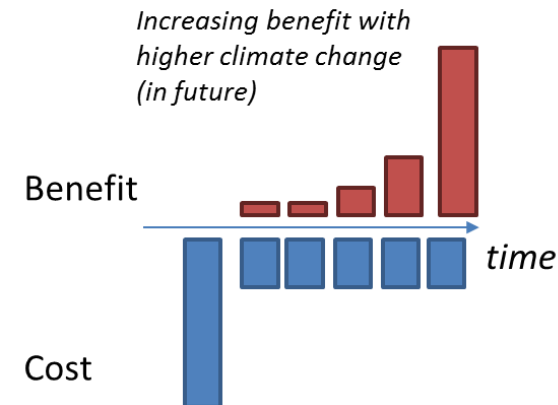
Difficult to estimate the benefits (and even costs) of adaptation and justify

- 1) Climate change involves uncertainty –
 - 2 or 4°C –
 - as well different climate models



- 2) Adaptation is site and context specific - no simple common metrics (e.g. like CO₂, and £/tCO₂) – difficult to estimate the benefits

- 3) For medium to long term adaptation (NAPs)
 - benefits mostly in future under climate change
 - more difficult to justify early costs



What does this mean for the NAPs

Addressing these challenges requires slight extension to standard IVA and requires thinking about economics earlier in the NAP process

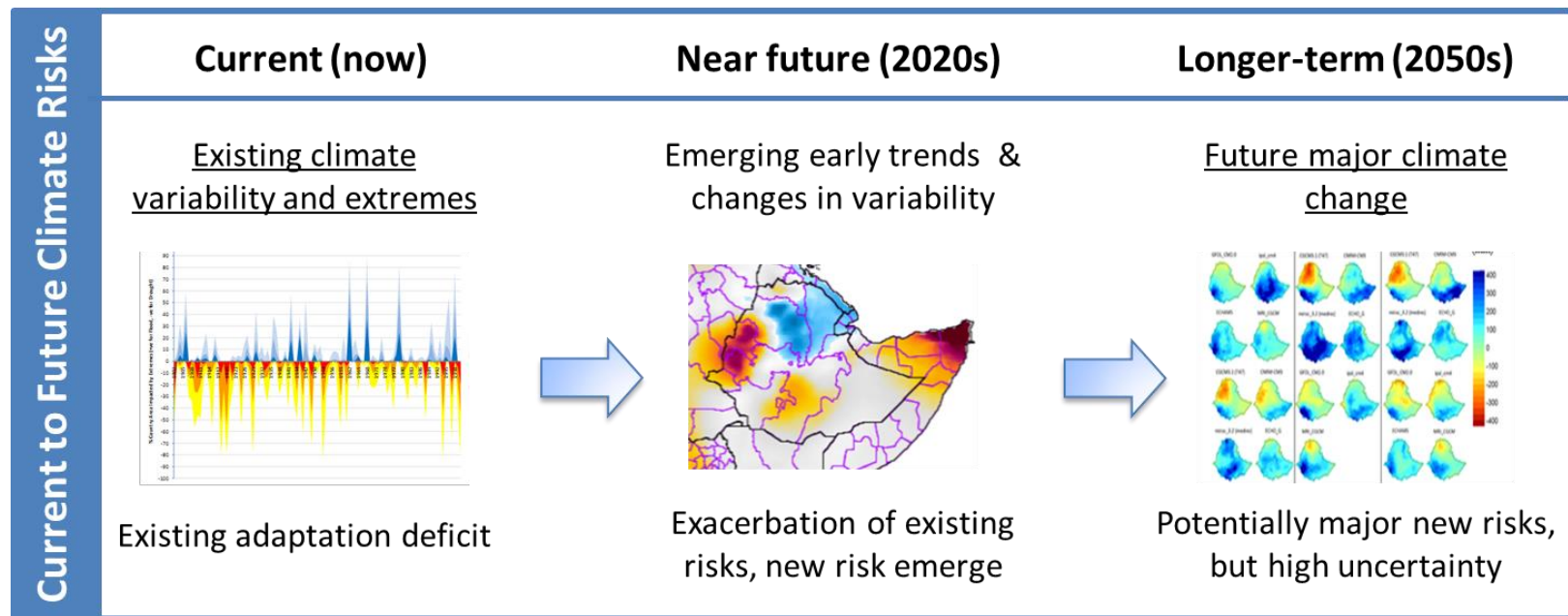
- Greater focus on implementation, and on mainstreaming into existing development (economic growth and planning) and identifying entry points
- Focus on where to act now (next 5 yrs) for current and future risks, and costs and benefits for programmes
- Prioritisation of options using iterative climate risk management to identify timing and phasing of adaptation, demonstrate the economic case
- Detailed economic and financial appraisal of promising options * though useful to consider finance from the start and throughout

Materiality and prioritisation of options

- National /sector plans often produce very long lists of options (00s)
- Difficult to estimate costs and benefits for all of these
- Not sufficient resources to implement them all, so need prioritisation
- Important to identify what is material, i.e. what matters (\$/people)
- But also to think about the timing of adaptation – build up economic justification for options for medium – long term action (additionality)
- To do this use iterative climate risk management (recommended IPCC AR5)

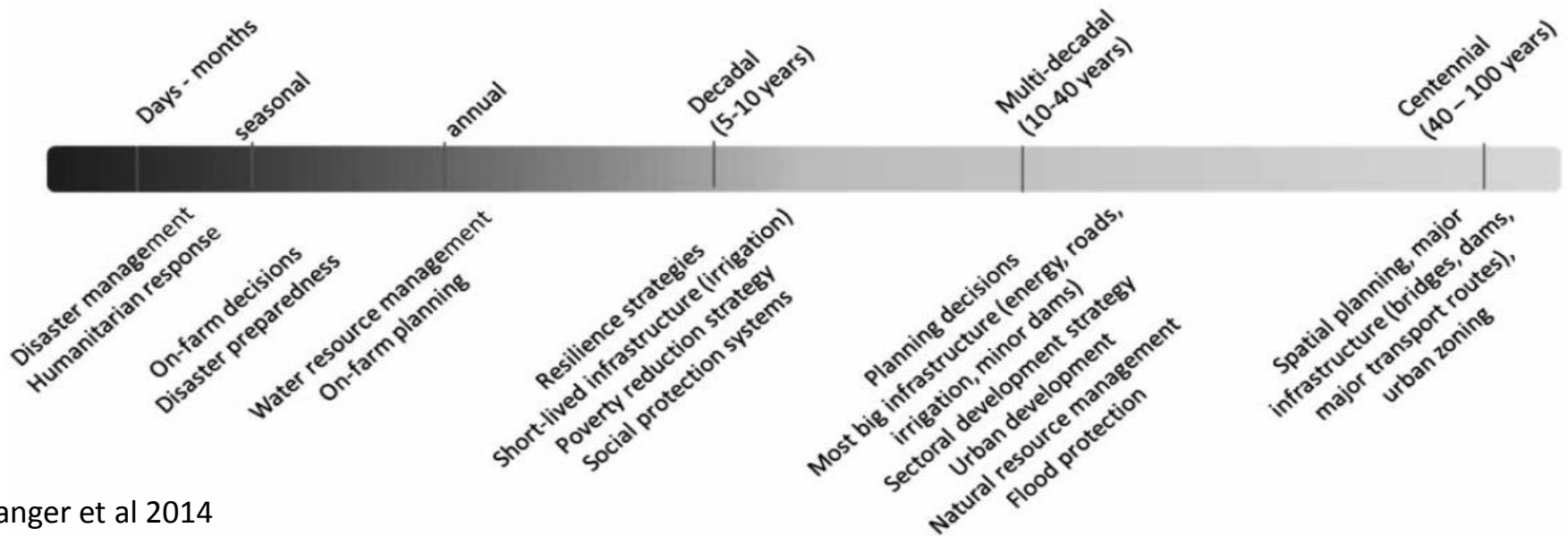
Iterative climate risk management

- NAP guidance identifies need to look at current risks as well as future CC
- Iterative climate risk management (adaptive management) - starts with current climate and moves to future, looking at uncertainty



But also think about decision life-time

- Decision have different life-times, which influence where we need to act now and where we can wait, learn and act in the future
- New infrastructure or land-use plans (next 5 years) will be exposed to future climate change and will lock in patterns for decades



The timing and phasing of adaptation

- Combing risks and decisions can be used to help prioritise (timing and phasing) for early adaptation. Three types of actions (building blocks)
 - Action to address current climate variability and extremes now, that also build resilience for future, so called 'low regret'. Early economic benefit*
 - Decisions which have a long life time (e.g. infrastructure, planning) – incorporating risk screening, flexibility, robustness (climate smart)
 - Start preparing for future long-term risks, taking account of future uncertainty – focusing on learning and the value of information
- For NAP, will have a portfolio of all three of these – not individual options
- Once this framework applied, easier to consider costs and benefits as already strong justification

Example from Zanzibar

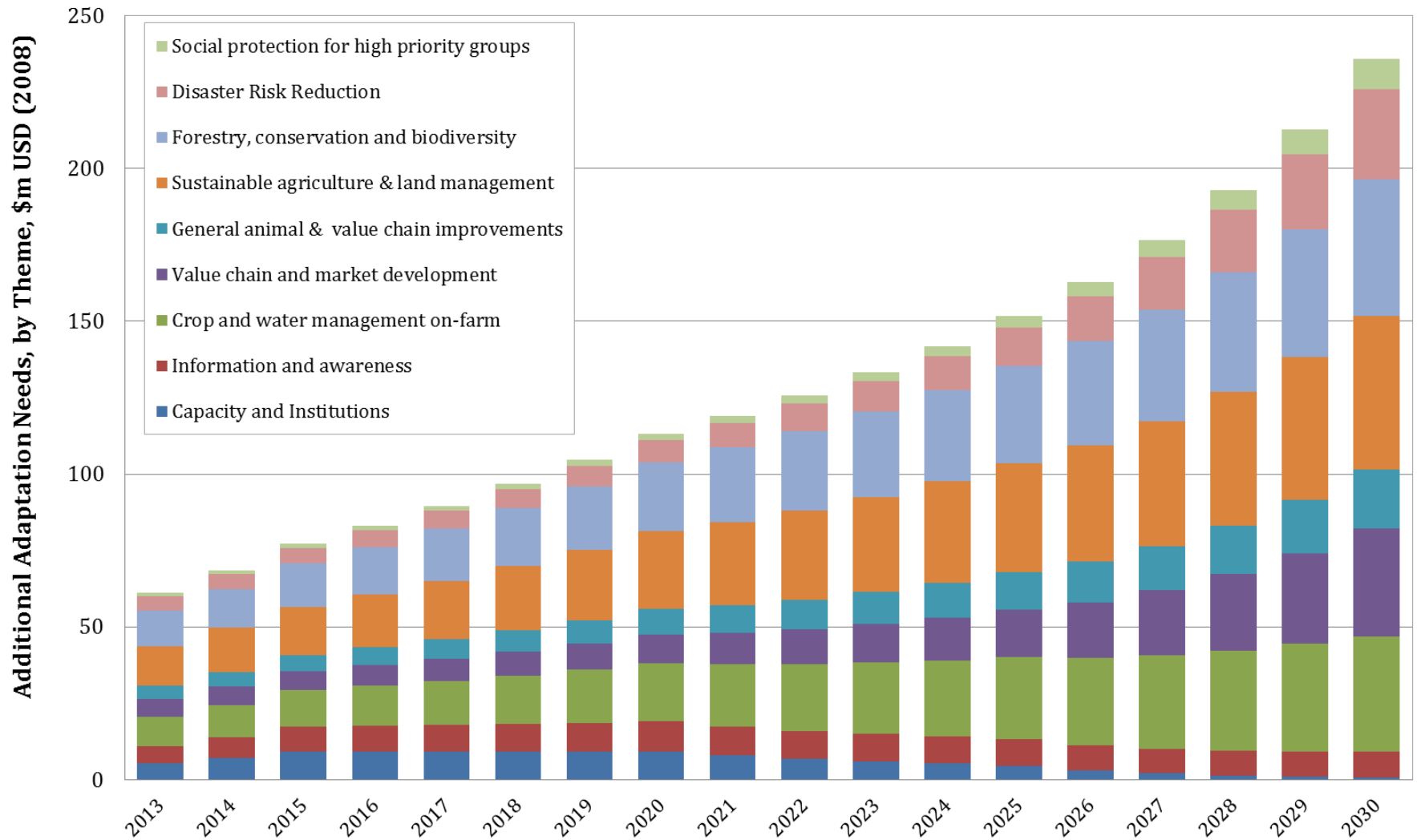
Theme / priority area	Early low-regret options and capacity building	Climate smart planning	Early action for future climate challenges
Risk information for coastal flooding and sea level rise	Use of information in DRR and early warning. Enhanced climate services, e.g. island specific seasonal forecasting, centralised enhanced early warning system and cooperation/emergency centre, EWS communication.	High resolution risk maps for elevation and possible risks from sea-level rise and storm surge. Integrate information for land-use plan and use in development planning and application.	Coastal and marine monitoring programme, New tide gauge monitoring programme. Additional sea surface loggers. Enhanced wind and wave height monitoring programme, acidification, etc. Research study on WIO tropical cyclone and CC.
Sea-weed farming resilience programme	Resilience programme, with scale-up of low-regret options to improve production and quality, awareness raising, plus diversification	Possible consideration of sites of current or future development of the industry (e.g. district to national planning).	Monitoring and research on new varieties and changing practice, moving to pilots. Research on algal blooms on seaweed and other disease (recent die-off and future risks).
Clove resilience programme	Seedling production, pilot low regret options (e.g. drip irrigation, shade trees for seedlings, water conservation, inter-cropping, tree belts,), capacity building, awareness (especially on survival rates seedlings). Analysis of carbon business potential assessment and performance assessment. Private sector support	Analysis of varietal suitability, siting and management practices for future planting.	Research into climate risks and variety/management. Investigation (monitoring?) of future risks, notably wind/cyclone

Then costed (\$) five year action plans for each area, building climate finance proposals

Ethiopia – CRGE Agriculture Strategy

- Initial vulnerability and risk analysis
- Identified major risks – now and in the future – including economic costs
- Used iterative approach to build up a list of options to address risk
- Assessed the cost, benefits, ancillary benefits of options in each category
 - As part of multi-attribute analysis and consultation for prioritisation
- For prioritised options, built up sector costed plans, aligned to existing sector development plans and budgets (investment and financial flow)
- Often lots of relevant cost information in existing development plans

Additional adaptation costs



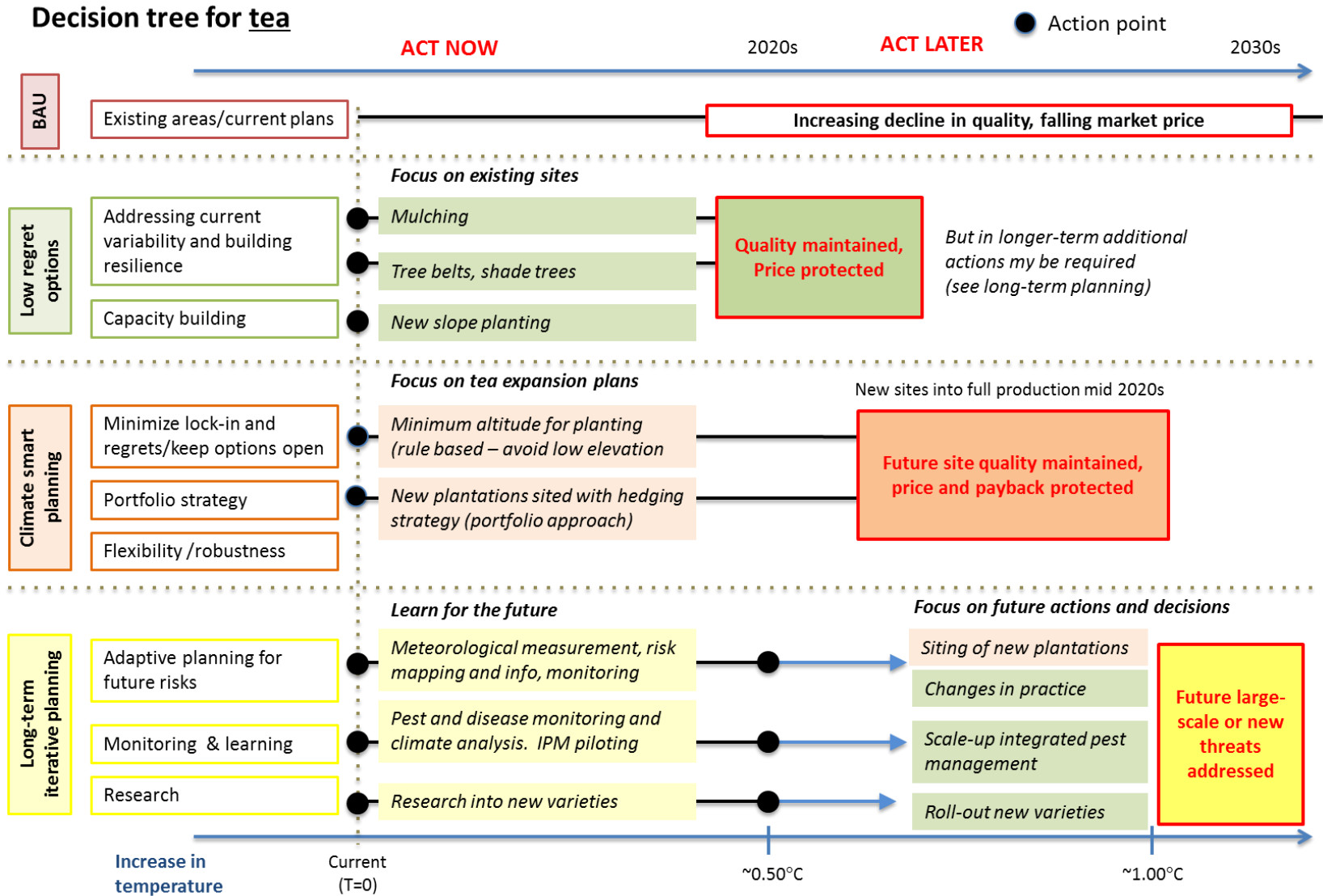
Economic and financial appraisal

- Additional step is to focus down and identify fast track or priority areas for early implementation (i.e. for a GCF proposal or sector programme)
- Build up the case for climate finance
- This is concerned with here and now, i.e. investment over next 5 years
- For these priorities, undertake detailed economic and financial analysis
 - Requires more complex analysis – in line with level of funding – and extended economic analysis
- Translating NAPs into pipeline of ‘good projects’

Rwanda

- GCF proposal / national climate fund / bilateral funding for tea and coffee sector resilience
- Iterative economic and financial analysis (appraisal)
 - Low regret, climate smart agriculture and capacity building – standard approach for costs and benefits (CBA) to compare options
 - Long lived decisions - tea expansion plans – greater consideration of uncertainty, with extended CBA for climate smart decisions (RDM. ROA)
 - Planning & monitoring, value of information, learning , future options
- Use different economic analysis for each of the different elements – reflecting level of uncertainty and ‘benefits’ providing

Found it useful to build up decisions trees to show how implement medium to long term adaptation - adaptation pathways



Build underlying financial model for the sectors for economic and financial appraisal then look at adaptation benefits and costs in detail

Revenues			
Production green beans Kg/ha under ideal conditions	700		
Could be much higher in 2020 (133 tons according to literature, e.g. Van Asten)			
Commercialisation			
Start commercialisation year		4	
Coffee green bean price	USD	RWF	
Low quality (1500 ml/kg)	4.7	3,413	
High quality (2000 ml/kg)	5.2	3,797	

CLIMATE CHANGE: Unsuitable areas/IPM			
REDUCTION in production/revenues			
If production increases, enter negative value			
from year		6	
to year		35	
by (%) per year		-10%	
and from year		0	
to year		6	
by		50%	

QUALITY (CHANGE F60)			
	High	Low	
first decade (year 5- year 15)	70%	30%	
second decade (year 16- year 25)	70%	30%	
third decade (year 26- year 35)	70%	30%	

INCREASE in LABOUR COSTS (pesticides, pruning etc.)			
Increases positive, reduction-negative value			
from year		4	
to year		35	
by (%) per year		-10%	

Shade trees / Intercropping SWITCH ABOVE			
Banana mat/ha	800		
Coffee trees per ha	switch reduces C20 by ~ 13%		
Additional management costs/ha/yr			
From year	4		
to year	35		
New Cost/ha	193	RWF	140,939
Start harvest and sale year	6		
Production of bananas Kg/yr/ha			20,000
Price of bananas per KG	USD	RWF	
	0.1		73.03

Results summary			
NPV@ 3.5%	NPV@ 10%	NPV @ 13%	
51,744,370,466	16,787,874,115	10,368,133,473	
IRR	27.2%		
Banana shade trees (switch)	1		

NOTE: this is net present value on year 0

Corresponding value of sale	Total per year (RWF)	Total per year (USD)	Total per day (USD)
2,581,441	2,581,440,820	3,579,735.61	9807.5
2,581,441	2,581,440,820	3,579,735.61	9807.5
2,581,441	2,581,440,820	3,579,735.61	9807.5

ERROR
OK

No shade tree	2500	0
With shade tree(-13%)	2175	1

1 RWF =	0.00138672	USD
1 USD =	730.252	RWF

Shade trees	NAEB establishment costs	USD per ha per y	
year 1	90000	124.8	
year 1-4	60000	83.2	
	4 years	332.8	
	total (USD)	457.6	
	Total (RWF)	334,176.2	
Nurseries	1 plantlet	USD	RWF
1000 plantlets	1000	0.30	219
		300	219075
		757.6	
Total establishment costs (USD)		8758	553251

P.J.A. van Asten, L.W.J. Wairegi, D. Mukasa, N.O. Uringi (2011)
Agronomic and economic benefits of coffee-banana intercropping in Uganda's smallholder farming systems
Agricultural Systems 104 (2011) 326-334

NOTE: this is net present value on year 0															INTERCROPPING	
Financial Model						O&M	Total costs excluding cc	Increase in costs Change in O&M (e.g. pesticides)	Revenues from coffee sales	Reduction revenues	Total cc impacts (costs)	NCFs coffee	New O&M costs	Rubber revenues	NCFs (with rubber)	
Year	c1-c4	c1-c4	c1-c4	c1-c4	c5, c7,c8											
0																
1	4,348,782,082						4,348,782,082	-	-	-	-	#####	-	-	4,348,782,082	
2		703,479,454					703,479,454	-	-	-	-	#####	-	-	703,479,454	
3			1,151,148,198				1,151,148,198	-	-	-	-	#####	-	-	1,151,148,198	
4					191,858,033		191,858,033	-	-	-	-	#####	140,938,636	-	332,796,669	
5					730,252,000	730,252,000	-	2,581,440,820	-	-	-	#####	140,938,636	-	1,710,250,184	
6					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
7					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
8					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
9					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
10					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
11					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
12					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
13					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
14					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
15					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
16					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
17					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
18					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
19					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
20					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
21					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
22					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
23					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
24					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
25					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
26					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
27					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
28					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
29					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
30					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
31					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
32					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
33					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
34					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		
35					730,252,000	730,252,000	-	2,581,440,820	258,144,082	477,219,682	#####	140,938,636	1,460,504,000	3,647,973,866		

Supporting evidence and knowledge

- Countries need information for NAP process
 - Building inventory on studies on costs and benefits adaptation and guidance to help (>1000 relevant studies)
 - But can't do economic and financial appraisal with simple off the shelf 'tools' alone
- Developing some guidance and lessons on how move to practical aspects, apply iterative risk management and derive costs and benefits
- But also looking to help build technical assistance support, build communities of practice, encourage country to country learning

Summary

- Estimating the costs and benefits of adaptation is challenging
- Changing landscape implies some extension to existing approaches, especially to take advantage of opportunities
- Greater focus on economics and finance
- Useful to think about timing and phasing of adaptation first, then look towards costs and benefits (iterative risk management)
- Extending to detailed appraisal to build climate finance proposal
- Building community of practice and learning between countries.
- Session this afternoon at 4 pm to explore further

Thank you

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