



Asesoramiento  
Ambiental  
Estratégico



GREEN  
CLIMATE  
FUND

Independent  
Evaluation  
Unit



# Adaptation to climate change in low to middle income countries

*Evidence gap map*

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# Introduction

- Important to evaluate which adaptation measures, actions, and interventions have proved to be effective in increasing resilience and reducing climate risk.
- Evidence is often scattered around different websites, grey literature, and databases and there is a lack of comprehensive and systematic synthesis.



**Evidence Gap Map (EGM)**

# Evidence Gap Maps

- A systematic presentation of relevant and available empirical evidence.
- It collates, codes and configures all available evidence relevant to a question.
  - Clearly defined question (PICO)
  - Framework/Matrix of outcomes (y-axis) and interventions/areas/sectors/fields/instruments (x-axis)
  - Systematic search protocol and inclusion/exclusion criteria
- Specific map: Evidence on climate change adaptation
  - High quality evidence related to interventions and outcomes/impacts of climate change adaptation action.
  - IEU/GCF, DEval & Asesoramiento Ambiental Estratégico (AAE)
  - Question: What is the state of the evidence base regarding the ability of adaptation interventions to help people in low to middle income countries adapt to the impacts of climate change?

# Question of the EGM and PICO

What is the state of the evidence base regarding the **ability** of **adaptation interventions** to help **people in low to middle income countries** **adapt to the impacts of climate change**?

POPULATION	INTERVENTION	COMPARATOR	OUTCOME
Human individuals, groups, communities, institutions, systems and economic sectors (water, transport, infrastructure, agriculture, forestry, etc...) in low to middle income countries.	Those that aim to adjust, reduce, stop or make use of the benefits of an impact from a direct change in climate or a climatic hazard.	No adaptation intervention, different levels of intervention or comparison of different interventions.	Human adaptation to climate change, variability, extremes or other natural hazards that could be linked to climate.

# Study type and Filters

## Study type

- *Studies supported on quantitative or mixed-methods evidence* : systematic review, Correlation analyses and impact evaluations.

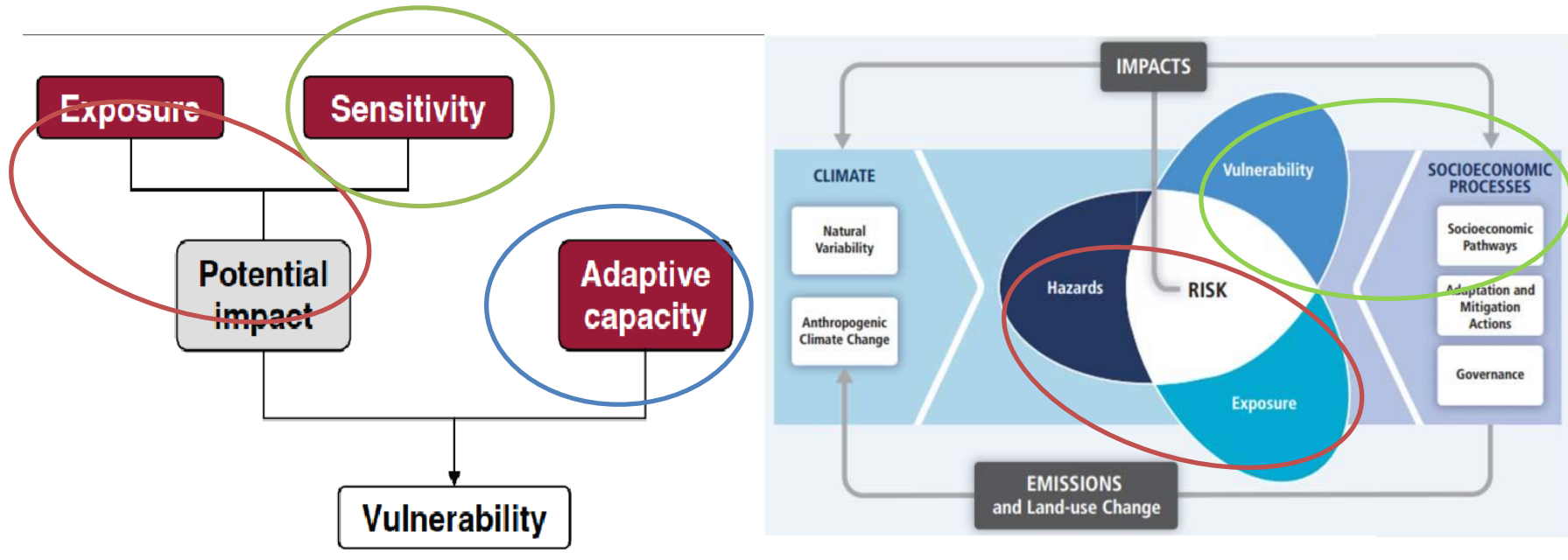
## Filters

- Countries: *low to middle income based on OECD*
- Languages: *english, french, spanish and german*
- Publication years: *2007-2018*
- Publication type: *only peer-review articles & grey literature*

# Framework: Definitions & Concept

Climate Change Adaptation (CCA) is the process of "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities"

(UNFCCC 2018)



Exposure; impact from hazards; adaptive capacity; enabling environment

# Framework

## Outcomes

Uptake	Shocks and stressors		Adaptive capacity		Enabling Environment		
Adoption	Decreased Exposure	Decreased Impacts/Risks	Social benefits	Economic benefits	Environmental systems	Socio-economic systems	Institutional systems
	Population affected by extreme weather events	Proactive and reactive risk management; climate related illness; deaths; food security	Skills acquired, access, awareness	Livelihood diversification, productivity gains, access	Area protected, ecological services improved	Social capital enhanced, overall poverty measurements	Policy changes, regulations approved, institutional reform

Sector/ Interventions

Nature-Based Options
Built Infrastructure / Structural
Technological Options
Informational/ Research
Institutional/ Planning/ Policy/ Laws/ Regulations
Financial/ Market Mechanisms
Social/ Behavioural

## Sectors

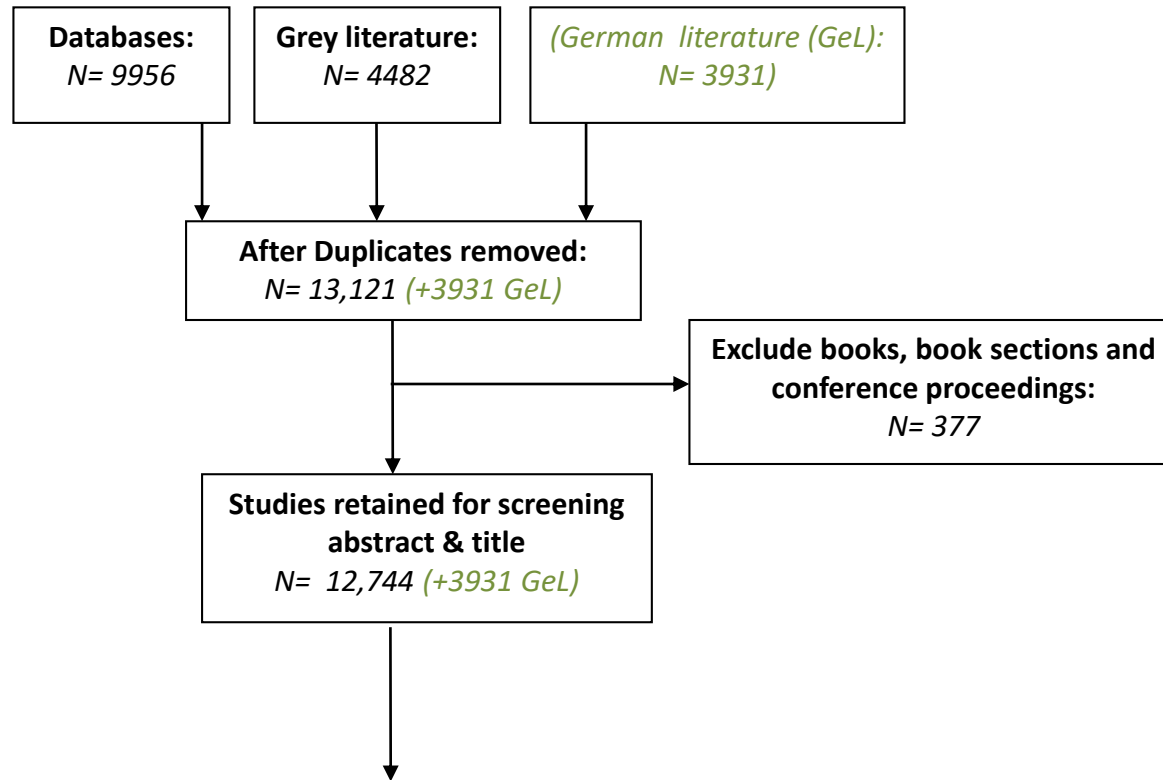
1. Water
2. Built environment & Land-use
3. Agriculture, Forestry & Fishing
4. Society, Economy and Health

# Nature based solutions

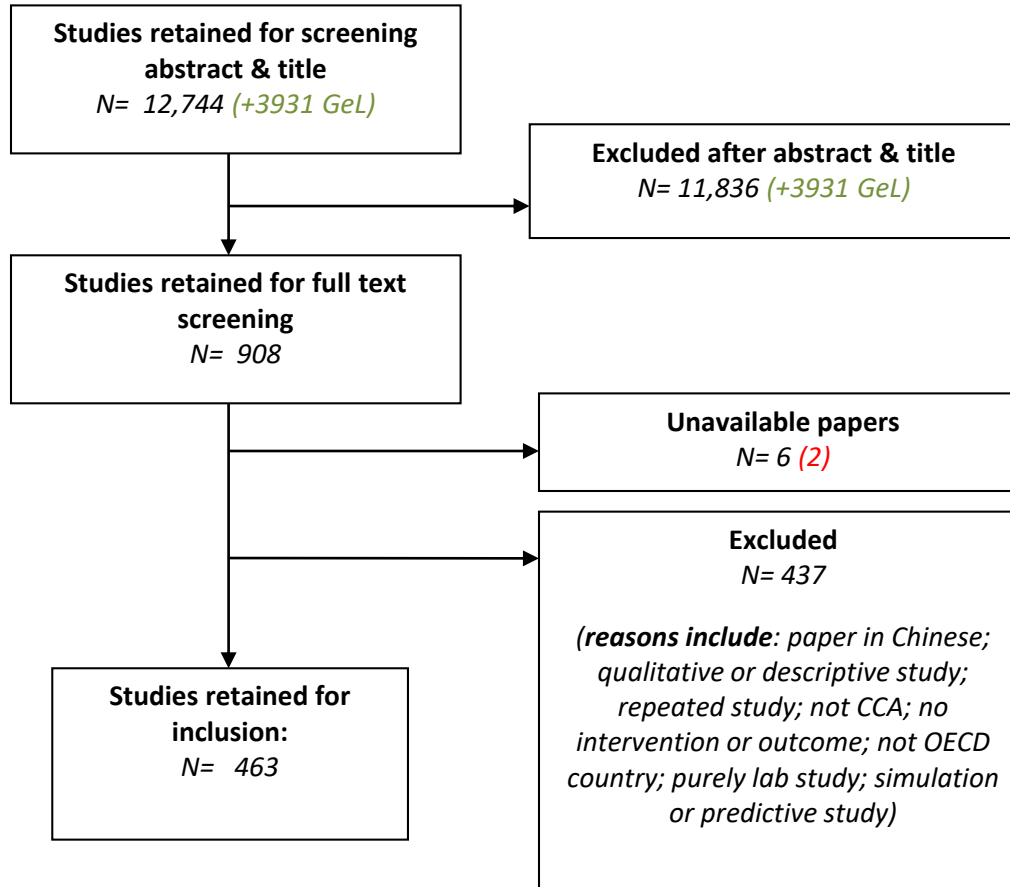
<b>Sector</b>	<b>Nature based solutions</b>
<b>Water</b>	Wetland restoration; water conservation; river restoration; nature weirs; integrated water management; watershed management
<b>Land-use and Built Environment</b>	Restoration; conservation; sustainable management; mangroves, sand dunes or marshes for coastal protection; integrated coastal zone management; green roofs/walls; green infrastructure; green and blue space in cities
<b>Forestry, Fishing and Agriculture</b>	Intercropping, conservation agriculture, changing planting dates; agroforestry; conservation tillage, bunds, traditional seeds/varieties; rain-fed irrigation; crop rotation; sustainable forestry and fishing
<b>Society, Economy and Health</b>	Nature management for vector control; nature-based/ecological livelihood diversification



# Inclusion/exclusion flow chart

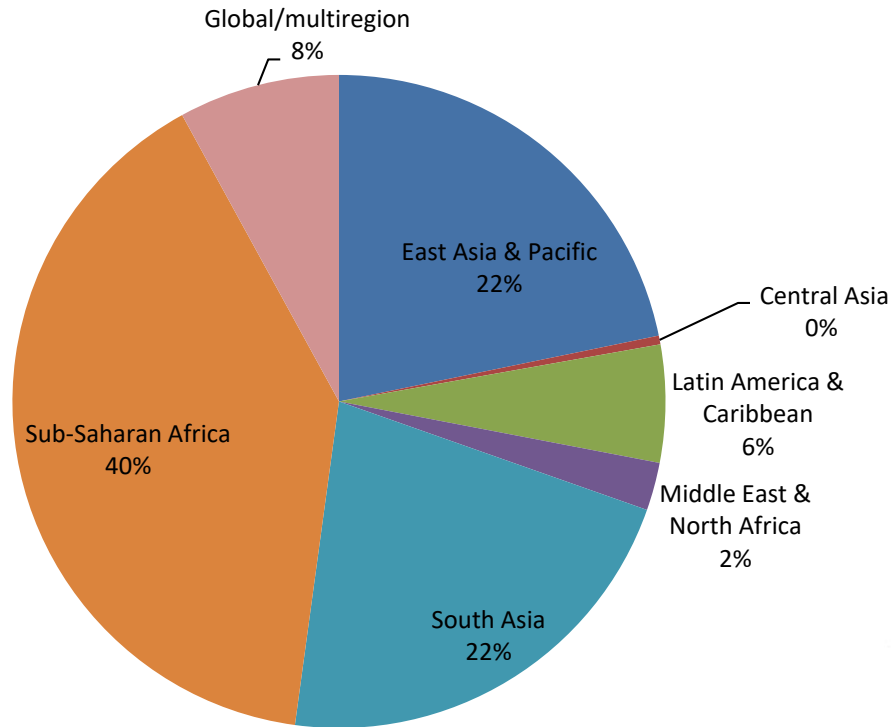


# Inclusion/exclusion flow chart



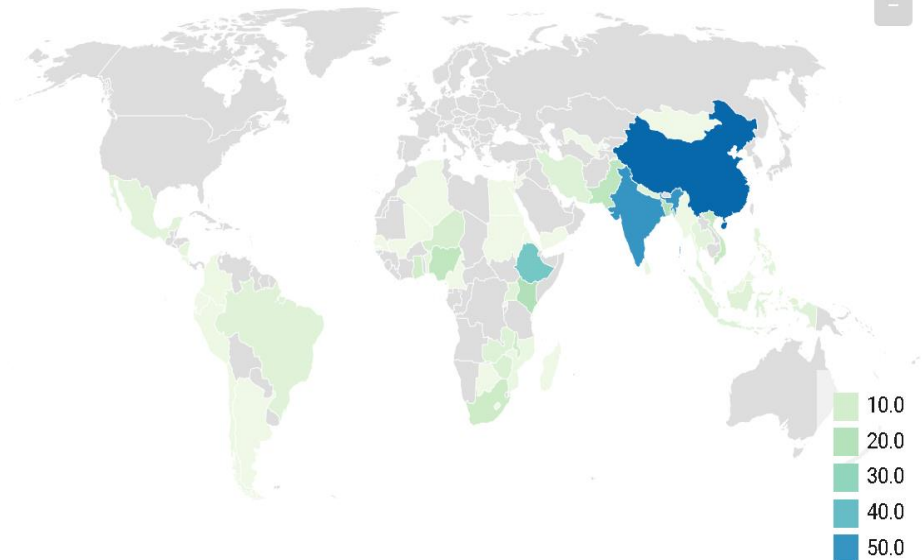
1,042 individual pieces of evidence

# Results: Region & countries

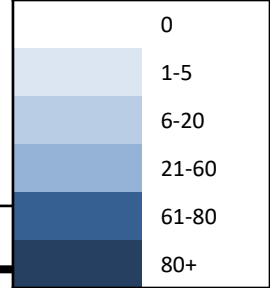


World bank region

Country	Number of single-country research papers
China	59
India	50
Ethiopia	37
Bangladesh	22
Kenya	21
Pakistan	17
Nigeria	16
Vietnam	14
Malawi	12
South Africa	12



# Gapmap



Climate change adaptation		Uptake	Shocks and stressors		Adaptive capacity		Enabling environment		
SECTORS	INTERVENTION/OUTCOMES	Adoption	Decreased Exposure	Decreased Impacts/Risks	Social benefits	Economic benefits	Environmental systems	Socioeconomic systems	Institutional systems
	Example specific outcomes indicators		Population affected by extreme weather events	Proactive and reactive risk management; climate related illness; deaths; food security	Skills acquired, access, awareness	Livelihood diversification, productivity gains, access	Area protected, ecological services improved	Social capital enhanced, overall poverty measurements	Policy changes, regulations approved, institutional reform
<b>Water</b>	Nature-Based Options				1	3	3		
	Built Infrastructure / Structural	1	1	11	2	9	3	2	
	Technological Options			1		1	1		
	Informational/ Educational	2		3		1	1		
	Institutional/ Planning/ Policy/ Laws/ Regulations	1		3	1	2			
	Financial/ Market Mechanisms	1		1			2		
	Social/Behavioural	1		1	1	1	1		
<b>Land-use and Built Environment</b>	Nature-Based Options	1	14	4	1	3	2	1	
	Built Infrastructure / Structural	3	4	4		5	3	1	
	Technological Options			1			3		
	Informational/ Educational	3		4	1		3		
	Institutional/ Planning/ Policy/ Laws/ Regulations	2	3	2	1	4	4	2	2
	Financial/ Market Mechanisms	2		2	1		2		
	Social/Behavioural	1	1	5	3	2	2	1	
<b>Forestry, Fishing and Agriculture</b>	Nature-Based Options	3	2	29	2	105	34	8	
	Built Infrastructure / Structural	1		5	1	9	1		
	Technological Options	7	2	19	2	101	16	6	
	Informational/ Educational	77	1	8	9	19	5	5	
	Institutional/ Planning/ Policy/ Laws/ Regulations	14		3	1	5		3	
	Financial/ Market Mechanisms	44	2	6	4	15	4	6	
	Social/Behavioural	36		5	3	19	4	3	
<b>Society, Economy and Health</b>	Nature-Based Options	1		3	1				
	Built Infrastructure / Structural	1		9		3			
	Technological Options			8				1	
	Informational/ Educational	9	3	11	8	2		1	
	Institutional/ Planning/ Policy/ Laws/ Regulations	2	1	14		4		2	2
	Financial/ Market Mechanisms	5	1	26	1	14	1	5	1
	Social/Behavioural	13	2	25	5	17	1	6	3

# Observations

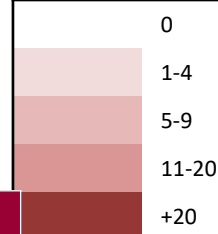
## Gaps in EGM

- Latin American Studies
- **Sectors:** Water or built environment sector
- **Interventions:** depends on sector – fairly equal overall
- **Outcomes:** exposure and enabling environment

## Concentration of studies in EGM

- Sub-saharan African Studies
- **Sectors:** Agriculture
- **Interventions:** Conservation agriculture, irrigation and fertiliser, types of crops, extension services
- **Outcomes:** Adoption and economic benefits (yield, income)

# Gapmap (Africa)



EVIDENCE GAP MAP		Uptake	Shocks and stressors		Adaptive capacity		Enabling environment		
SECTORS	INTERVENTION/OUTCOMES	Adoption	Decreased exposure	Decreased Impacts/Risks	Social benefits	Economic benefits	Environmental systems	Socioeconomic systems	Institutional systems
	Example specific outcomes indicators	Uptake	Population affected by extreme weather events	Proactive and reactive risk management; climate related illness; deaths; food security	Skills acquired, access, awareness	Livelihood diversification, productivity gains, access	Area protected, ecological services improved	Social capital enhanced, overall poverty measurements	Policy changes, regulations approved, institutional reform
<b>Water</b>	Nature-Based Options				1	1			
	Built Infrastructure / Structural			2	1	2	1	2	
	Technological Options						1		
	Informational/ Educational	2		1					
	Institutional/ Planning/ Policy/ Laws/ Regulations			1	1	1			
	Financial/ Market Mechanisms		1						
	Social/Behavioural								
<b>Land-use and Built Environment</b>	Nature-Based Options		1			2	1	1	
	Built Infrastructure / Structural						1		
	Technological Options								
	Informational/ Educational						1		
	Institutional/ Planning/ Policy/ Laws/ Regulations	1	1		1		2	1	1
	Financial/ Market Mechanisms	1					1		
	Social/Behavioural			1			1		
<b>Forestry, Fishing and Agriculture</b>	Nature-Based Options	1	2	17	1	52	17	5	
	Built Infrastructure / Structural	4		3		4			
	Technological Options	4	1	10		45	6	4	
	Informational/ Educational	47	1	4	3	6	1	3	
	Institutional/ Planning/ Policy/ Laws/ Regulations	8		2	1	1			
	Financial/ Market Mechanisms	27	2	4	1	6	1	4	
	Social/Behavioural	19		4		7	2	1	
<b>Society, Economy and Health</b>	Nature-Based Options				1				
	Built Infrastructure / Structural			3					
	Technological Options			2				1	
	Informational/ Educational	3		2	1	1		1	
	Institutional/ Planning/ Policy/ Laws/ Regulations	1		4		1			1
	Financial/ Market Mechanisms	1		10		5		1	
	Social/Behavioural	6	1	5	3	10		5	2

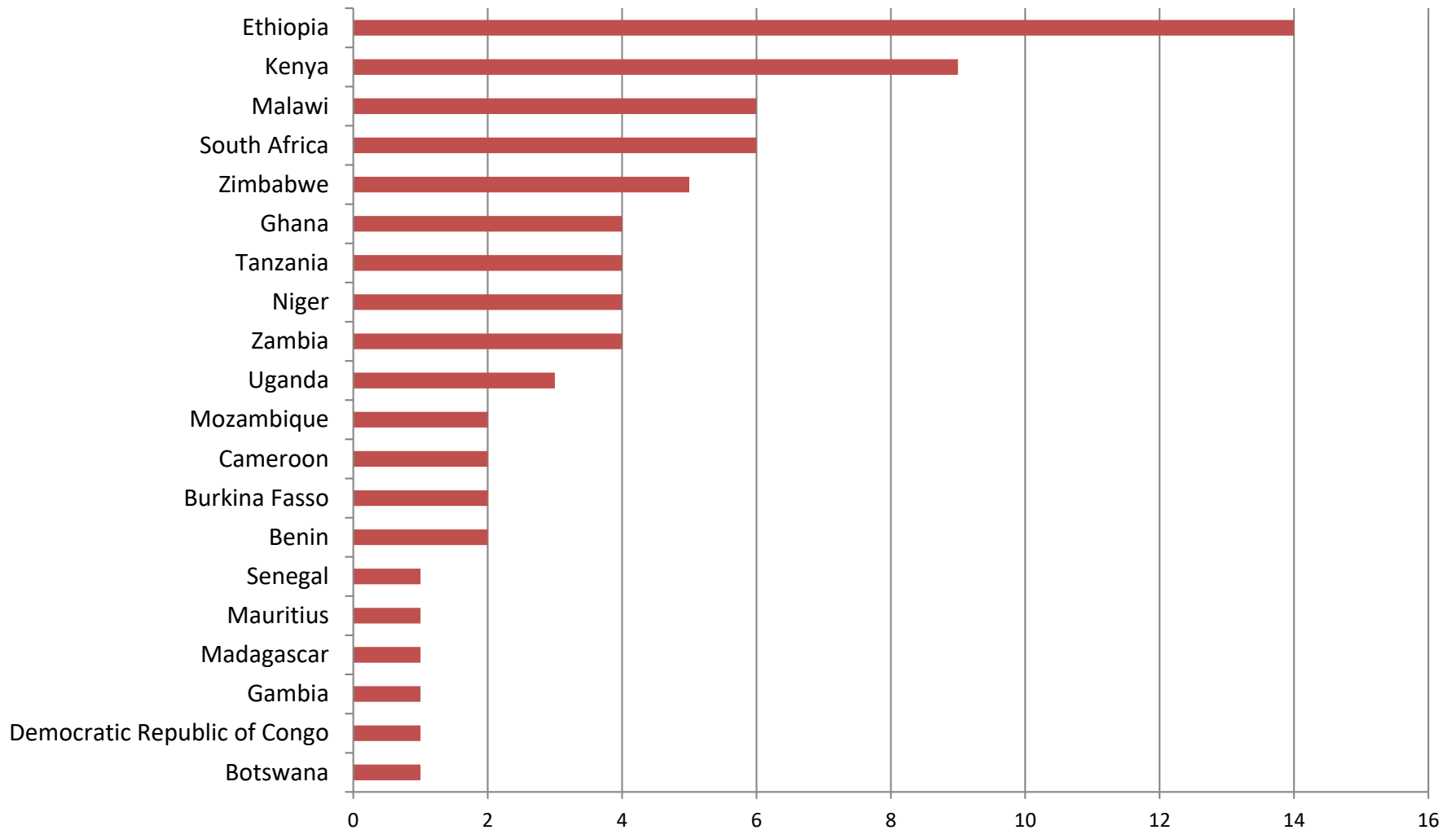
**184 Papers**

**438 Evidences**

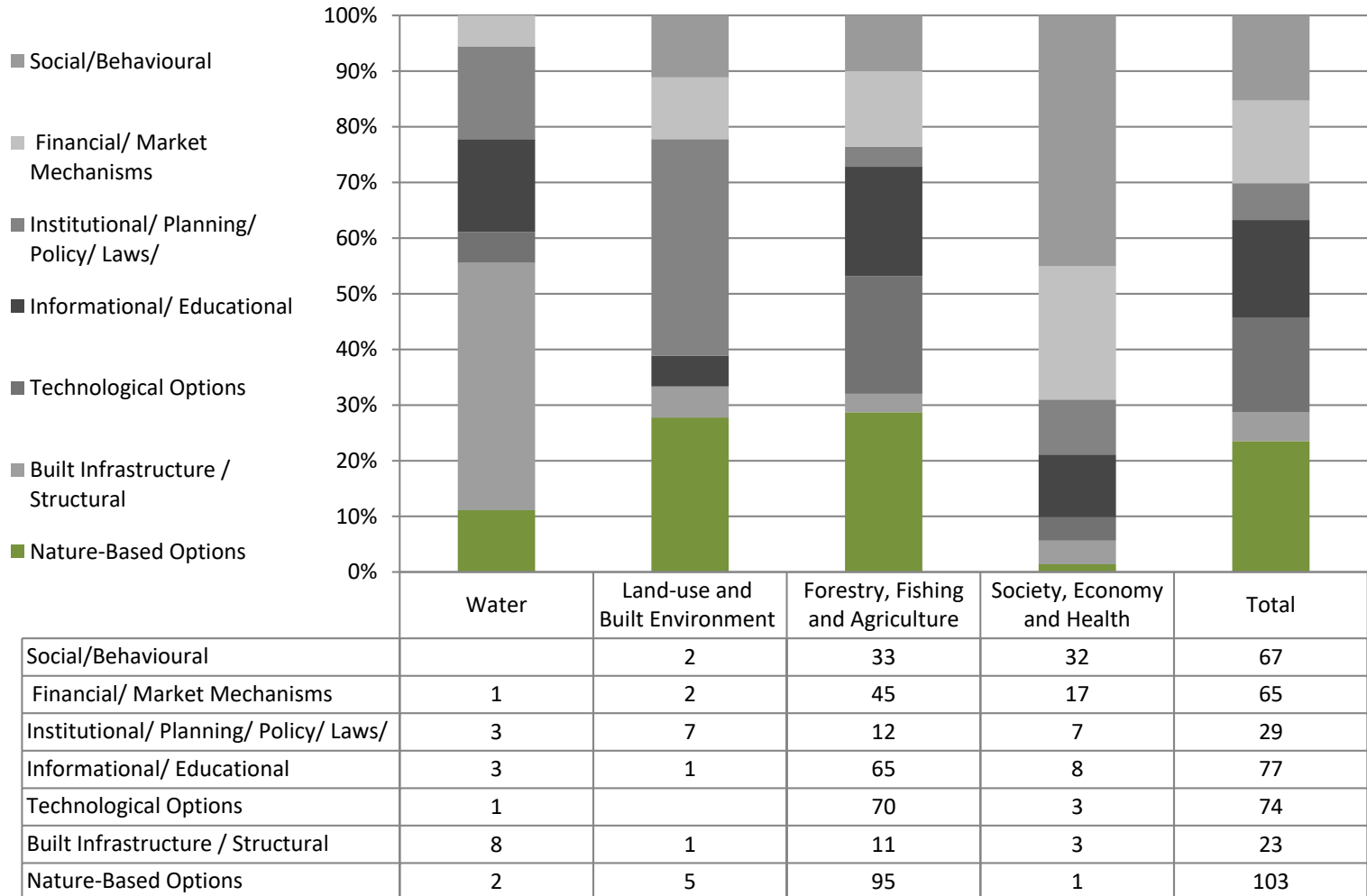
**62 Papers on NBO**

**103 Evidences on NBO**

# Results for Africa: number of papers addressing NBO

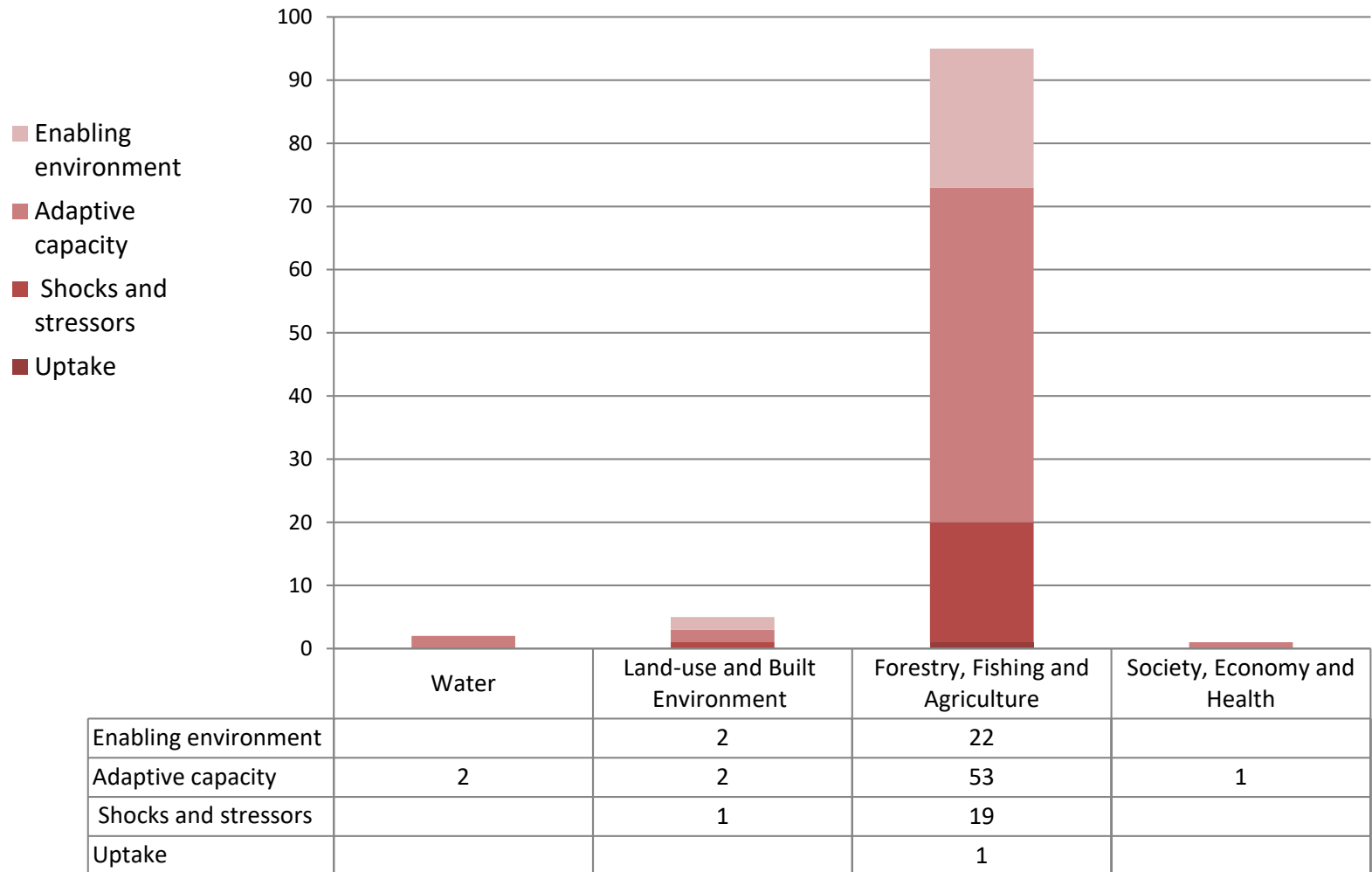


# Results for Africa: the weight of NBO

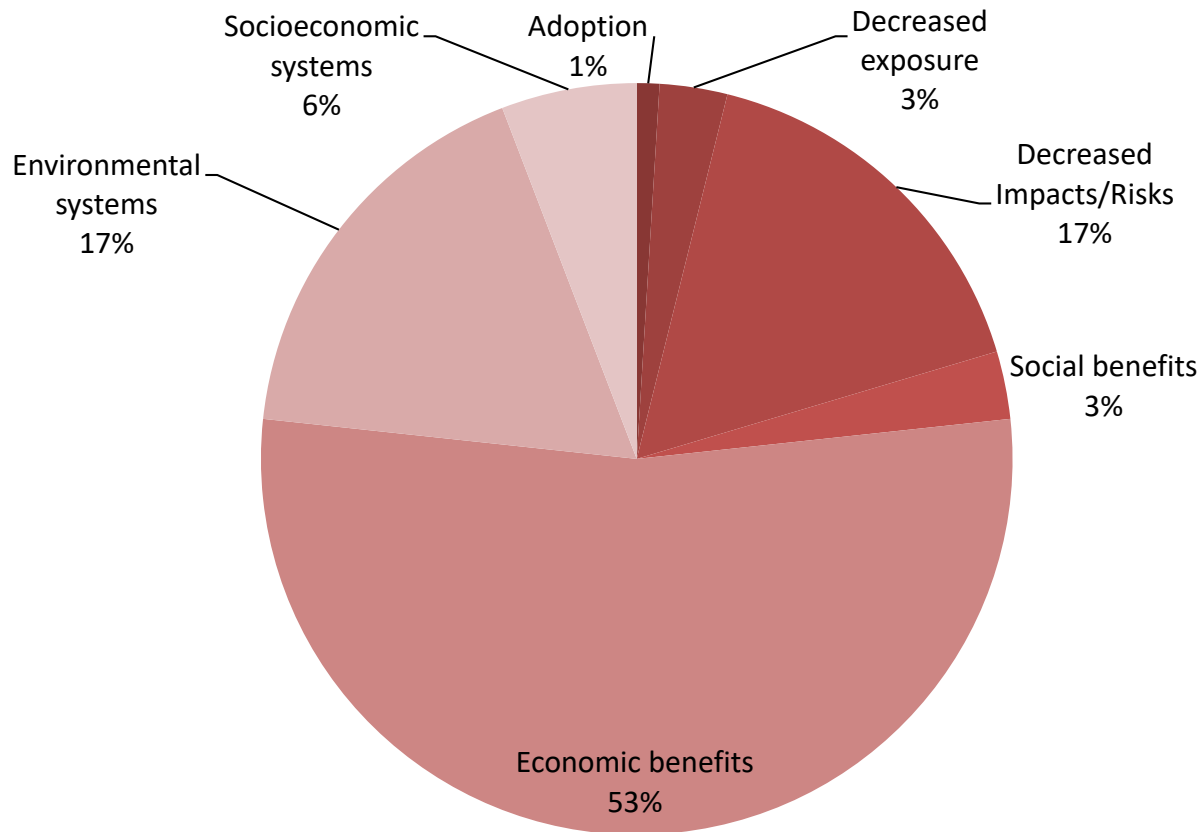




# NBO: Sectors and outcomes (Africa)



# NBO: Outcome sub-groups (Africa)



# Common outcome indicators for NBO

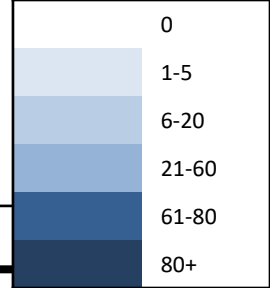
Adoption	Decreased exposure	Decreased Impacts/Risks	Social benefits	Economic benefits	Environmental systems	Socioeconomic systems
<ul style="list-style-type: none"> <li>• Crop choice</li> </ul>	<ul style="list-style-type: none"> <li>• Exposure to climate change</li> <li>• Wave attenuation</li> </ul>	<ul style="list-style-type: none"> <li>• Climate vulnerability index</li> <li>• Food Security (Different measures and indexes)</li> <li>• Hazard related economic damage</li> <li>• Livelihood resilience to droghts and floods</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrition indexes and measures</li> <li>• Perceived effectiveness by population</li> <li>• Access to water</li> </ul>	<ul style="list-style-type: none"> <li>• Agricultural return of investment</li> <li>• Agricultural yield</li> <li>• Agricultural income</li> <li>• Crop productivity</li> <li>• Economic sustainability</li> <li>• Farm productivity, household wealth</li> </ul>	<ul style="list-style-type: none"> <li>• Biodiversity conservation (number of native varieties)</li> <li>• Control of pests</li> <li>• Environmental quality indexes</li> <li>• Shoreline response, ecosystem services</li> <li>• Soil and nutrient characteristics</li> <li>• Water productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Poverty indexes</li> <li>• Resilience indexes</li> <li>• Social Capital/Sustainability</li> <li>• Wealth Index</li> </ul>

# Effectiveness vs Adoption

- ❖ An Evidence Gap Map does not tell us whether measures are being effective or not
- ❖ But only in which areas there is research available
- ❖ Even if we know that certain measures are effective, how do we know people have access to them?

We are currently investigating the role of credit in helping people adopt adaptation measures (meta-analysis)

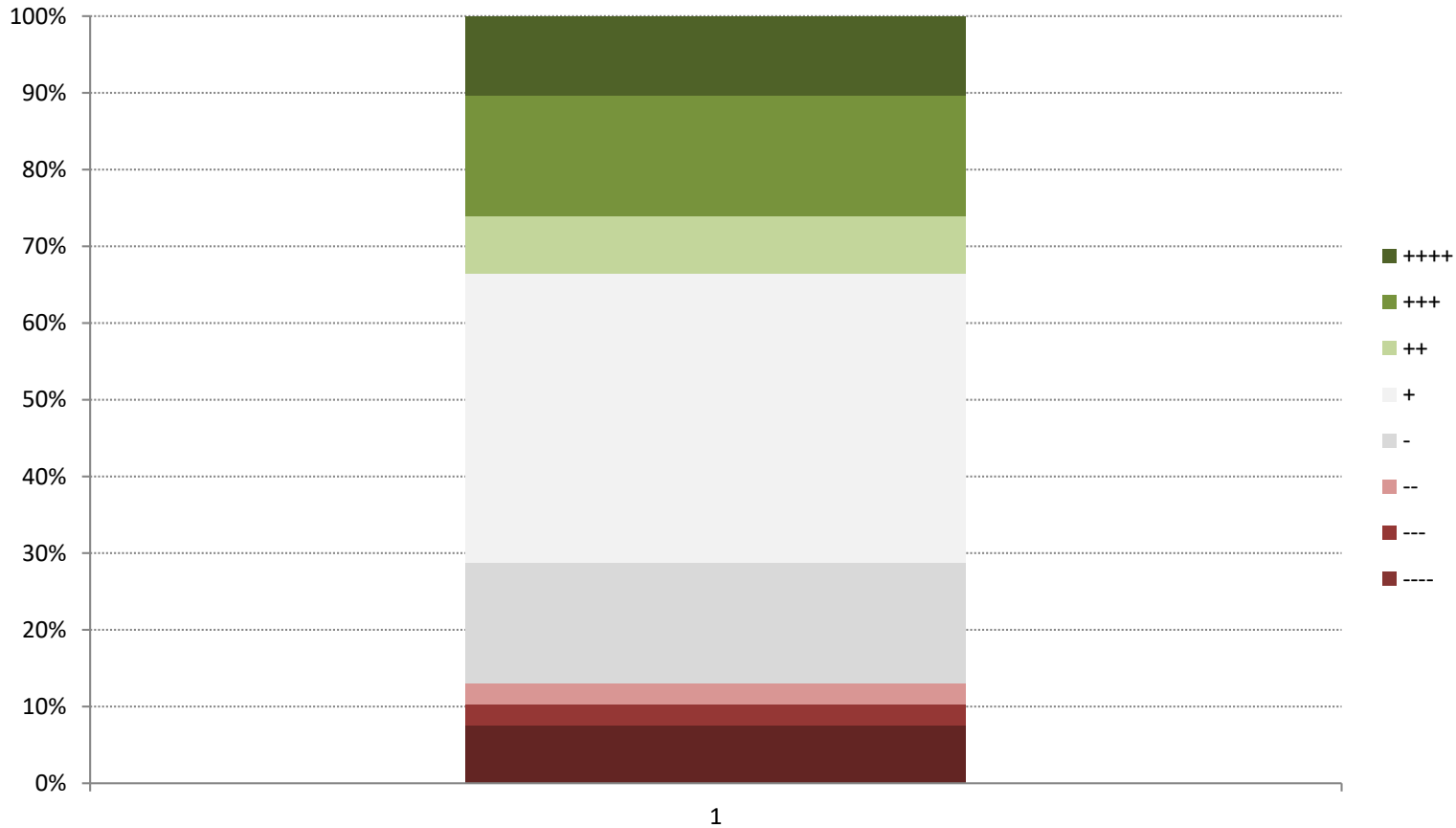
# Gapmap



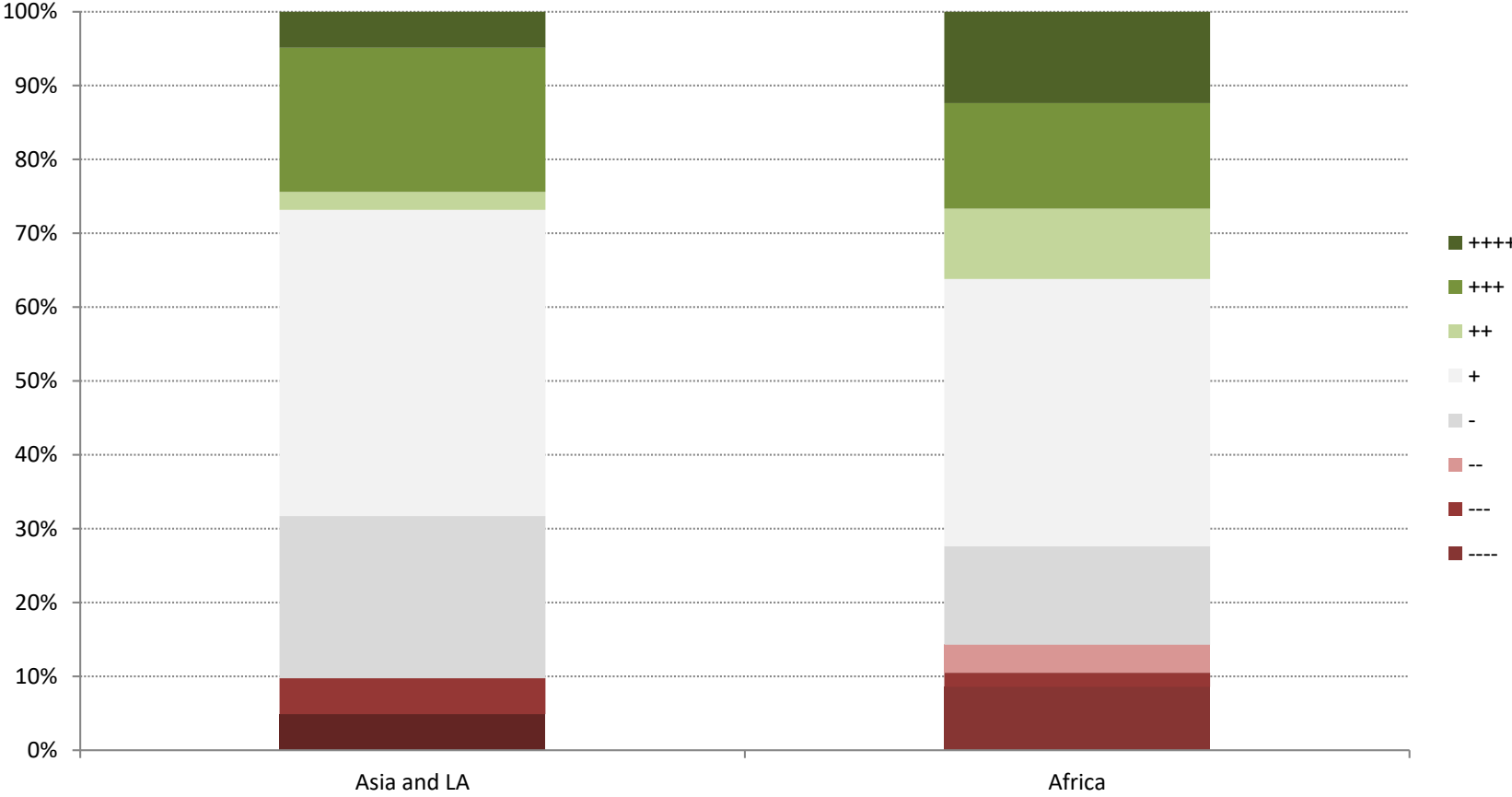
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	Institutional/ Planning/ Policy/ Laws/ Regulations	1		3	1	2			
	Financial/ Market Mechanisms	1		1			2		
	Social/Behavioural	1		1	1	1	1		
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	Technological Options			1			3		
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	Institutional/ Planning/ Policy/ Laws/ Regulations	2	3	2	1	4	4	2	2
	Financial/ Market Mechanisms	2		2	1		2		
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36 papers  
146 regressions

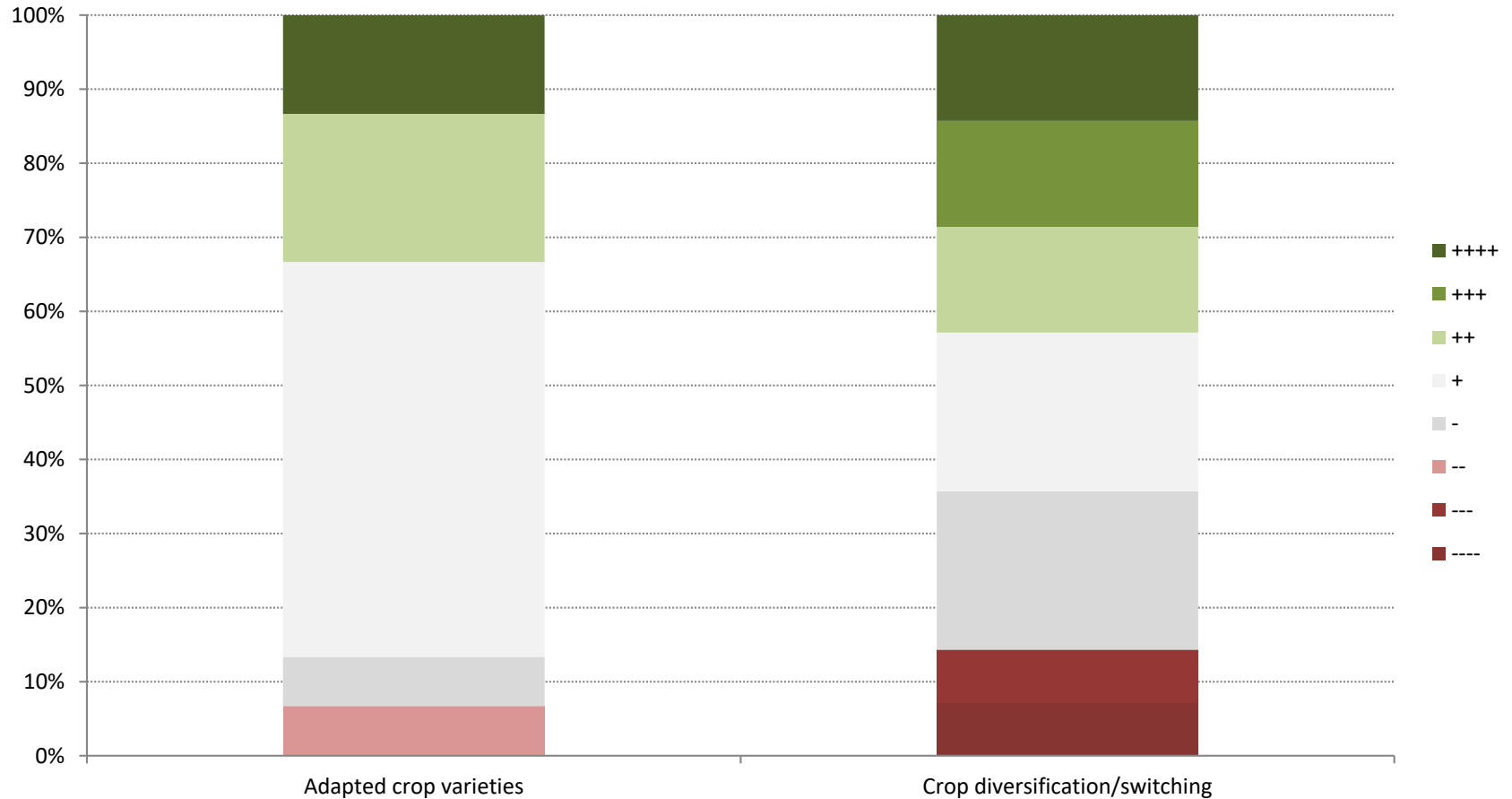
# Does access to credit help farmers adopt adaptation measures?



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# Does access to credit help farmers adopt adaptation measures?





# Some take-home messages

- 1) There are significant research efforts on the effectiveness of climate change adaptation measures
- 2) NBO in the agricultural sector take a large share of the quantitative evidence (also technological options)
- 3) A significant share of the evidence was collected in Africa
- 4) Much of the available evidence on NBO inspects on its economic benefits in the agricultural sector (income, profitability, yield, productivity, etc.)
- 5) NBO in the agricultural sector include agroforestry, conservation agriculture, crop diversification, etc.
- 6) Meta-analysis is needed to determine whether evidence is conclusive or not
- 7) There are mixed results when testing on the effect of access to credit in the encouragement of adaptation measures uptake

Thank you!