



Background Paper on Technologies for Adaptation

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1. Introduction

What are technologies for adaptation?

Operational definition (UNFCCC , 2005):

“the application of technology in order to reduce the vulnerability, or enhance the resilience, of a natural or human system to the impacts of climate change”.

1. Introduction

Sector	Hardware	Software	Orgware
Agriculture	Selection of crop or crop variety	Farming practices, research on new varieties	Local institutions
Water resources and hydrology	Ponds, wells, reservoirs, rainwater harvesting	Increase water use efficiency and recycling	Water user associations, water pricing
Infrastructure and settlements including coastal zones	Dykes, seawalls, tidal barriers, breakwaters	Development planning in exposed areas	Building codes, early warning systems, insurance

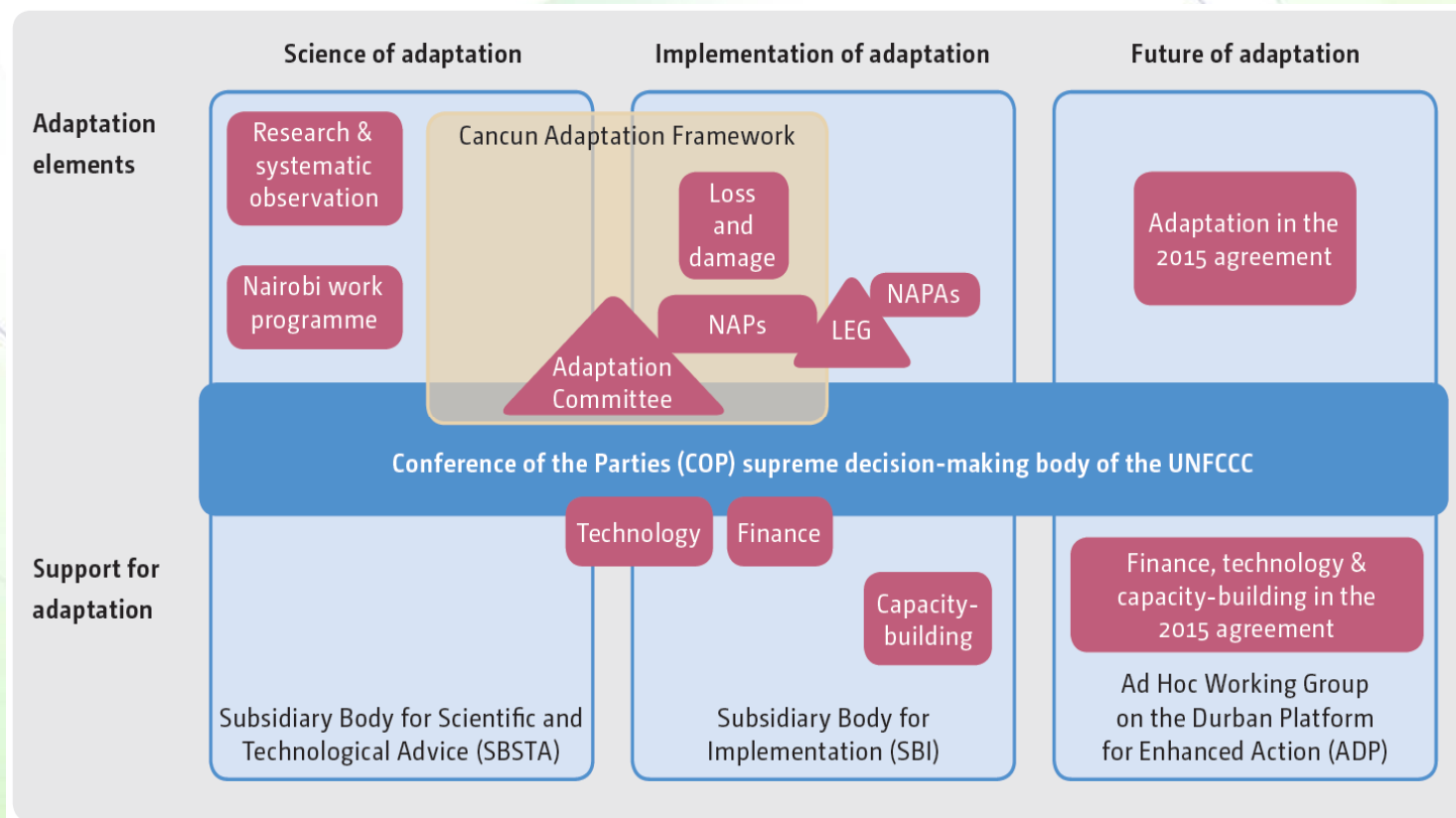
Source: Examples adapted from Christiansen *et al.*, 2011



2. Work and contribution from bodies under the Convention

Work and contribution from bodies under the Convention

- Institutional Structure (Source: AC, 2013)



Work and contribution from bodies under the Convention

- Subsidiary Bodies (SBSTA and SBI)
- NAPAs and NAPs
- LEG
- EGTT
- AC (Adaptation Committee)
- TT:Clear
- Technology Needs Assessments (TNAs) and Technology Action Plans (TAPs)
- Technology Mechanism
 - TEC (Technology Executive Committee)
 - CTCN (Climate Technology Centre and Network)

Work and contribution from bodies under the Convention

● Technology Action Plans (TAPs)

Box: Examples of Technology Action Plans (TAPs) for adaptation developed by Parties

Azerbaijan	Technology Action Plan for flood warning technology
Bangladesh	TAP for Monitoring sea level rise, tidal fluctuation, and salinity intrusion, sedimentation and coastal erosion
Cambodia	Technology Action Plan for the Transfer and Diffusion of Small Dams, Small Reservoirs, and Micro Catchments
Cote D'Ivoire	Technology Action Plan for the rapid multiplication of varieties of plantain and cassava varieties tolerant to water stress
Kenya	Technology Action Plan for Drought Tolerant Sorghum Varieties
Lebanon	Technology Action Plan for Water Users' Association (including cost-benefit)
Rep. Moldova	Technology Action Plan for medical emergency care and prompt rehabilitation during critical periods
Sri Lanka	Technology Action Plan for Crop Diversification and Precision Farming
Thailand	Technology Action Plan for seasonal climate prediction
Zambia	Technology Action Plan for Boreholes/Tube Wells

Work and contribution from bodies under the Convention

- Stakeholder Engagement:
 - TNA (Technology Needs Assessment) handbook – highlights the importance of identifying and engaging stakeholders
 - Adaptation Committee has civil society observers in meetings
 - Nairobi Work Programme's Private Sector Initiative
 - Green Climate Fund: Private sector and civil society observers
 - Climate Technology Centre and Network (CTCN) provides an opportunity for new partnerships with stakeholders

Work and contribution from bodies under the Convention

● Conclusions:

- Experience of NAPAs shows not all project ideas get funded/implemented – demonstrates need to scale-up adaptation finance
- Stakeholder engagement has varied
- Climate Technology Centre and Network (CTCN) provides an opportunity for new partnerships
- TNA process may be biased towards ‘hard’ technologies
- Better integration is needed, e.g. NAPs and TNA process – role for Adaptation Committee

3. Experiences of Various Stakeholders outside the Convention

- Research Institutions
- Private Sector
- Financing organisations
- NGOs
- Communities

Experiences of Various Stakeholders outside the Convention

● Research Institutions

- Designing/innovating new technologies and testing implementation
- Importance of collaboration between innovators and users
- Need for continuous M&E (e.g. CGIAR)
- Public or private
- Publicly funded research – e.g. seeds, can help ensure innovations are made available



Experiences of Various Stakeholders outside the Convention

● Private Sector

- Needs heightened awareness
- Corporate Social Responsibility (CSR) potential
- Private sector requires a return
- PPP (public-private partnership) can be mutually beneficial e.g. mobile companies sending SMS alerts in Bangladesh's early warning system



Experiences of Various Stakeholders outside the Convention

● Financing organisations

- E.g. ADB securing loans for more resilient urban infrastructure
- Micro-insurance potential e.g. Allianz in Caribbean, or HARITA index-based insurance in Ethiopia
- Micro-credit potential: lack of access to finance as a barrier to adaptation

Experiences of Various Stakeholders outside the Convention

● NGOs

- Bridge gaps between innovators at varying scales
- Well positioned to aid understanding of the local context



Source: IDE, treadle pumps, India

Experiences of Various Stakeholders outside the Convention

● Communities

- Community based adaptation (CBA)
- Community should play an integral role in technology adoption to ensure effective, sustainable & socially acceptable adaptation



Source: ARCAB/IIED



4. Lessons Learnt from Success and Failure: Agriculture, Water and Coastal Zones

Lessons Learnt: Agriculture

- Climate information (Forecasts and insurance)

Case Study: Micro-insurance in Ethiopia

- Meteorological services are a prerequisite for climate information (for early warnings, forecasts or index insurance)
- Need to raise farmers' awareness
- Insurance can complement group risk sharing



Source: Oxfam/IRI

Lessons Learnt: Agriculture

- Irrigation

Failure: Over-irrigation in Aral Sea

- Need to consider environmental/social implications
- Avoid groupthink



Source: NASA, 2000, 2004 and 2009

Lessons Learnt: Agriculture

- Resilient Seed Varieties

Case Study: CIMMYT Drought tolerant maize in Africa

- Partnership with governments key to success
- Need to strengthen and preserve agro-biodiversity



Source: CIMMYT

Lessons Learnt: Agriculture

- Farmer-led innovation

Case Study: Re-greening of the Sahel (FMNR)

- Farmer-led innovations have great potential to be replicated
- Strong local institutions are a critical success factor
- Requires coordination/collaboration between stakeholders



Source: Reij et al 2009

Lessons Learnt: Water

- Boreholes and tube wells
 - Borehole failure is common; need to consider geology, over-abstraction, blockages, etc.
 - Consider water for different users (humans/livestock/wildlife)
 - Need to understand governance dynamics including land tenure issues



Source: ILRI

Lessons Learnt: Water

- Rainwater harvesting

Case Study: Machakos, Kenya

- Allows farmers to diversify, e.g. into horticultural crops or dairy animals
- Using water for irrigation contributes to food security, nutrition and family income
- Success relied on community organisation



Source: UNEP 2011

Lessons Learnt: Coastal Zones

Wetland Restoration

- Vegetation provides a natural buffer against coastal climate impacts: sea level rise, flooding, storm surges (IPCC, 2007)
- Constitutes a 'no regrets' measure
- Sometimes integrated with additional protection (e.g. seawalls)

Case Study: Mangrove Restoration in Guyana

- Challenges relating to communities' long-term involvement & need for protective legislation
- Erosion was a major challenge: required engineering (breakwaters/dams) to reduce wave action



Source: Guyana Chronicle

Lessons Learnt: Coastal Zones

- Early Warning Systems (EWS)

Case Study: Bangladesh's EWS (Cyclone Preparedness Project)

- Community volunteers and effective communication (megaphones, flags)
- Increased confidence in warning when from a community member
- Now strengthening with mobile phone technology



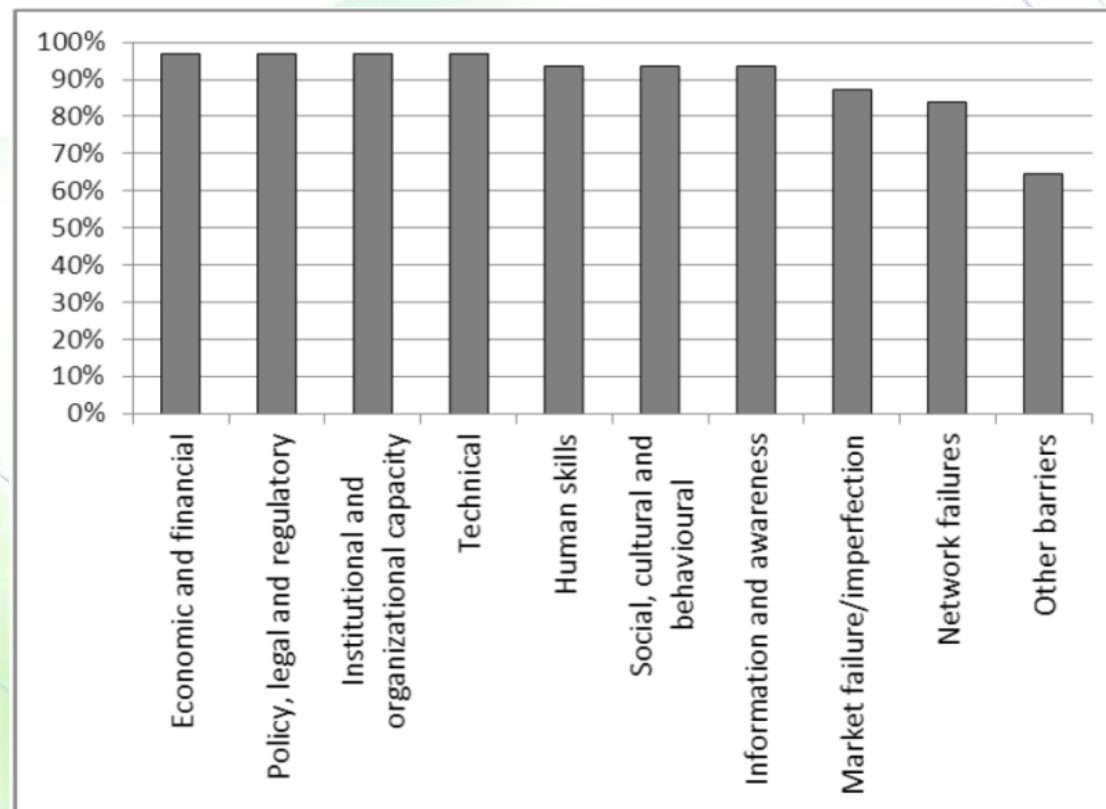
Source: Red Cross



5. Enablers and Barriers to Successful Implementation

Enablers and Barriers to Successful Implementation

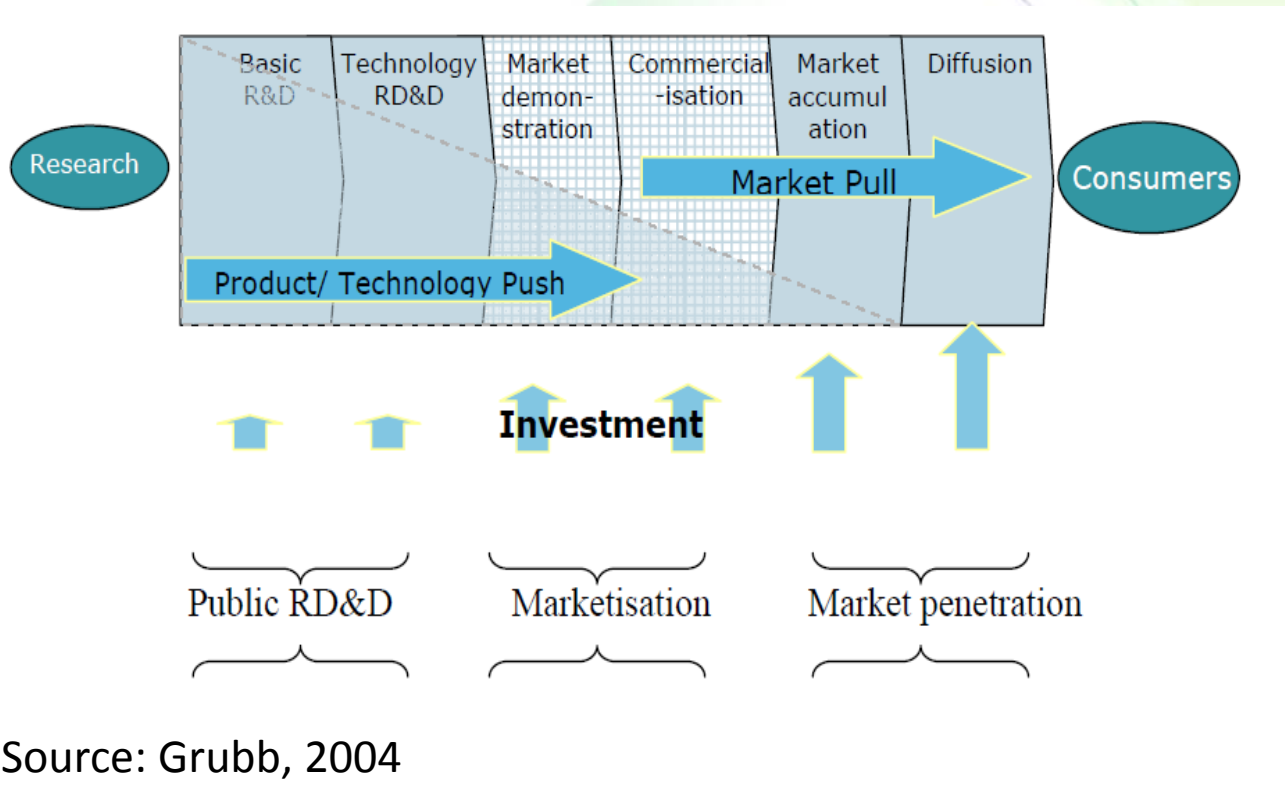
- Overview of barriers identified in TNA process (UNFCCC, 2013)



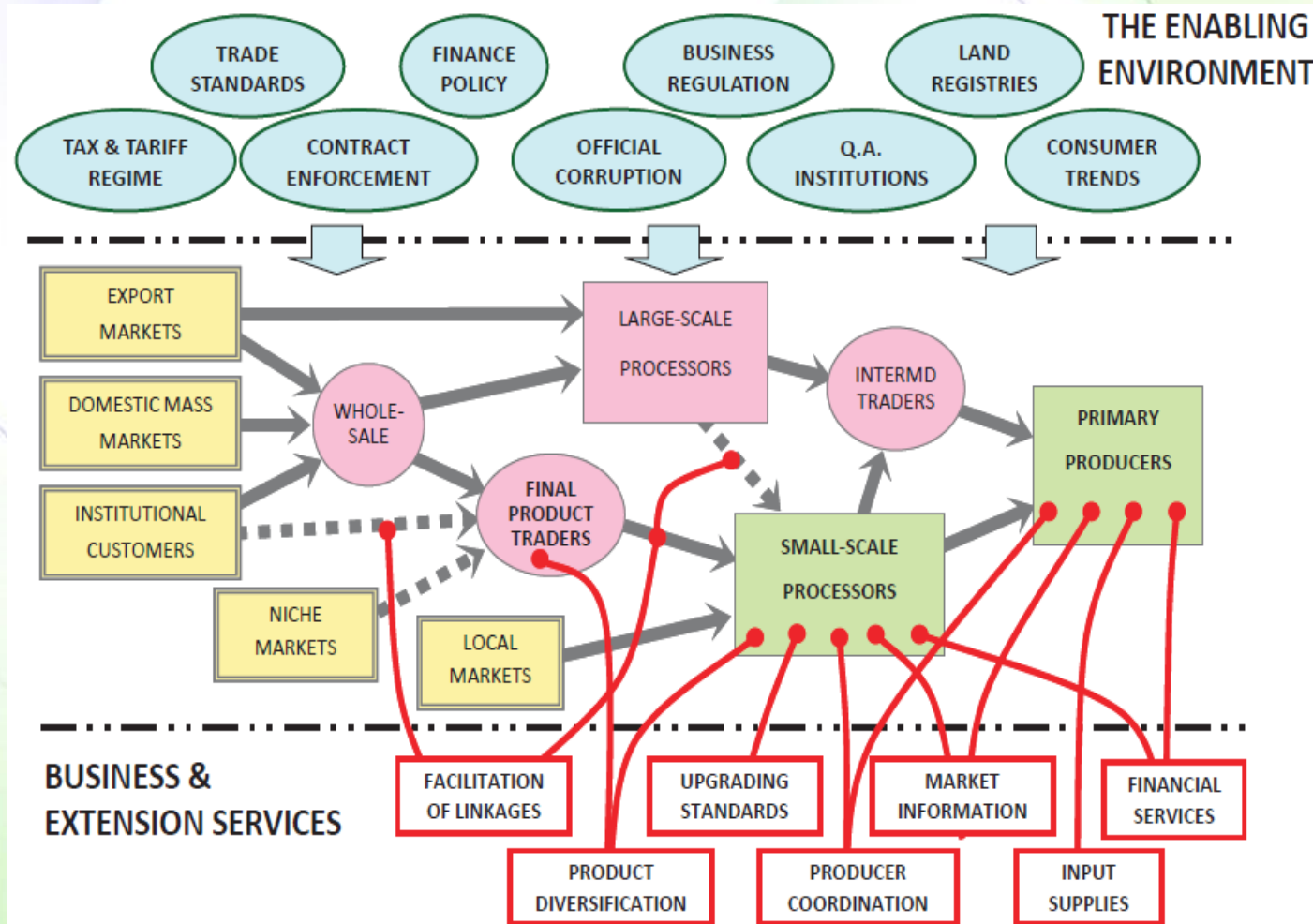
Barriers at different scales

Scale	Examples of barriers to transfer and implementation of technologies for adaptation
Local	<ul style="list-style-type: none">• Lack of or inadequate access to financial resources• Poor infrastructure• Limited capacity of local government• Limited awareness and trust• Literacy barriers• Caste or class inequalities
National	<ul style="list-style-type: none">• Lack of or inadequate access to financial resources• National macroeconomic conditions• Lack of specialised government agencies• Poor infrastructure• Insufficient legal and regulatory framework• Limited institutional capacity
Global	<ul style="list-style-type: none">• WTO regulations, e.g. pertaining to IPRs• Distorting or perverse subsidies• Lack of supportive international agreements• Insufficient regional or international cooperation• Lack of progress in related areas e.g. development goals or mitigation

Enablers in the innovation chain



Enabling Environment



Participatory
Market Chain
Approach (PCMA)
Source: UNEP 2012

Enablers and Barriers to Successful Implementation

- Agriculture sector

- Need to strengthen meteorological services for climate information or seasonal forecasts
- Literacy can be a barrier for seasonal forecasts (e.g. ALP, Ghana/Kenya): need for communication/trust and consideration of uncertainty
- Avoid maladaptation (e.g. irrigation)
- Need for coordination and collaboration among stakeholders (e.g. in Sahel)
- Importance of creating an enabling environment (e.g. land tenure security, market access, food price volatility)

Enablers and Barriers to Successful Implementation

- Water sector

- Rehabilitate and repair water resources
- Consider multiple users of water (e.g. livestock, people, wildlife) and governance issues
- Technical issues, e.g. borehole failure
- Consider supply and demand (abstraction, distribution, utilisation)
- Water management has cross-border implications; need for cooperation e.g. IWRM

Enablers and Barriers to Successful Implementation

● Coastal sector

- Community involvement is critical to ensure widespread adoption and ensure long-term sustainability
- Legislative gaps represent a barrier e.g. in Guyana: need for supportive legislation and policies
- Consider maintenance costs e.g. for seawalls
- Adaptation as a process; options must be flexible e.g. for seawalls, and M&E crucial to ensure continuous adaptation to changing climate
- Need for policies to support implementation e.g. coastal zone planning

6. Conclusions

- Experience under Convention shows need to scale up finance for adaptation and need for better integration between processes (e.g. NAPs/TNAs) as well as mainstreaming into development
- Structured approach to TNAs may have left out important cross-cutting issues
- Need to consider broader enabling environment e.g. policies, trade regulations, IPR issues, regional cooperation (e.g. building capacity of meteorological departments)
- Lessons learnt from three sectors show the need for a people-centred approach, collaborative learning, considering systemic approach (including considering socio-political issues)
- Adaptation as a learning process; the need for flexibility and adaptive management
- Need for technology assessment to avoid maladaptation



7. Recommended Policies and Actions

Recommended Policies and Actions

- **Research:** Collaborative R&D, piloting, adaptation to local context, and ongoing M&E needed
- **Stakeholder engagement:** People-centred or community-based focus for appropriateness and sustainability
- **Financing:** Need to scale up adaptation finance, access to finance
- **Policies and regulations:** Enabling environment includes laws/policies, depending on stage of innovation
- **Planning:** Potential for coastal zone planning, integrated water resources management, land use planning
- **Institutions/infrastructure:** Need to develop local institutions, meteorological services, market infrastructure
- **International/regional cooperation:** Overcome cross-cutting trade barriers, and need for international cooperation
- **Mainstreaming/integration:** Wider impact through scaling up/integration in broader programmes e.g. DRR