

# The Climate Proofing approach: Rationale, methodology and potential benefits

**Prepared by Tom Eickhof: Advisor, GIZ Competence Centre for Climate and Environmental Policy, Germany**

***Workshop on Climate Change Adaptation in the Economic Development Sector Using Integrated Water Resources Management (IWRM) Tools  
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# Outline

- **Impacts of climate change on projects**
- **Why climate proof projects?**
- **Opportunities for climate proofing (CP) in the MENA region**
- **Scope and target groups**
- **Decision making at policy level**
- **CP needs an enabling institutional framework**
- **Conclusion**





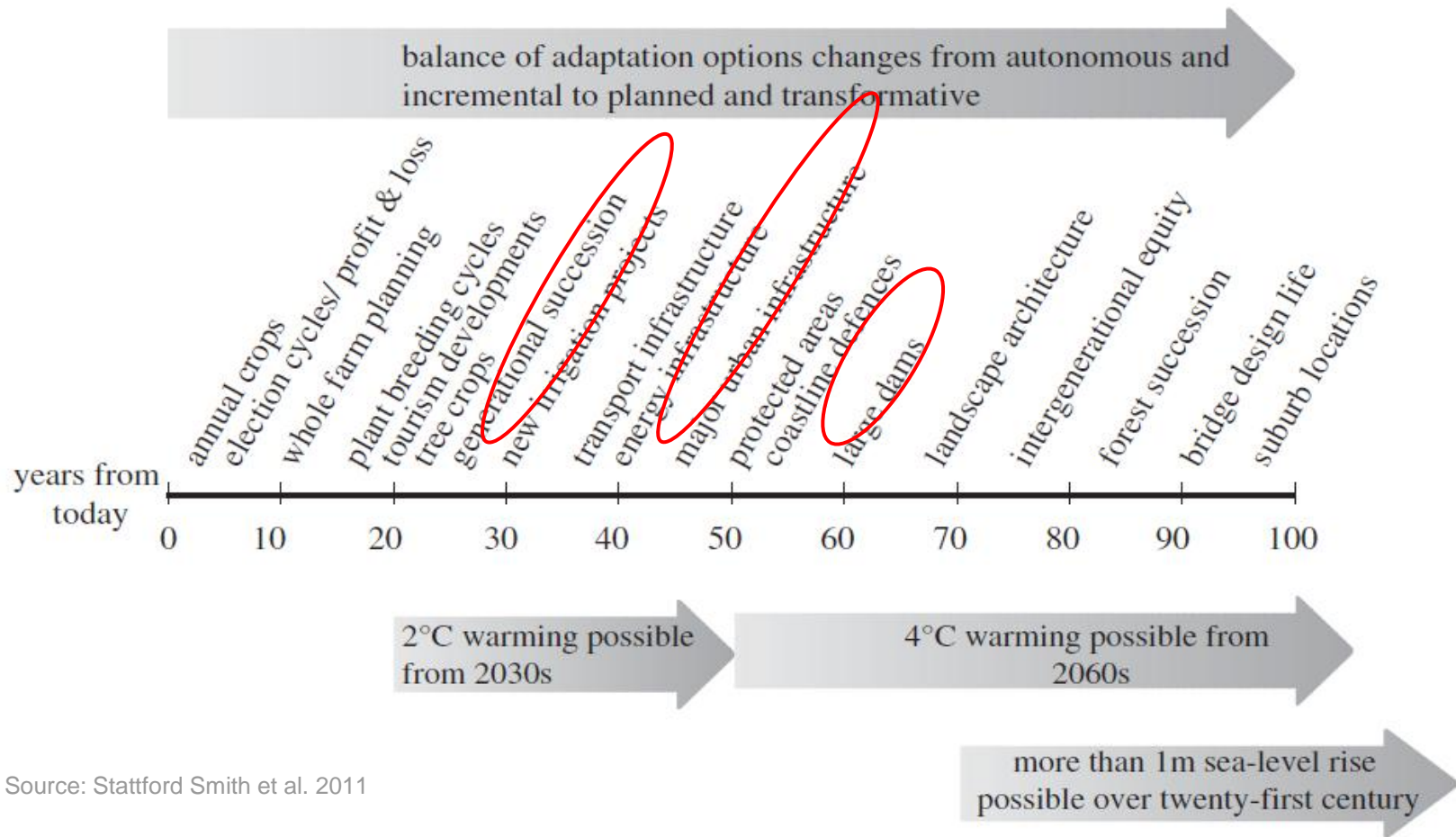
# Introduction and background

- **Need for integration of climate change** into water investments for sustainable development
- **Significant opportunities** for :
  - **Mobilizing capital** in international financial markets
  - Sparking **innovation** in the water (and energy) sector
  - Supporting **private sector development**
  - Realising **‘green’ job potentials**





# Impacts of climate change on projects

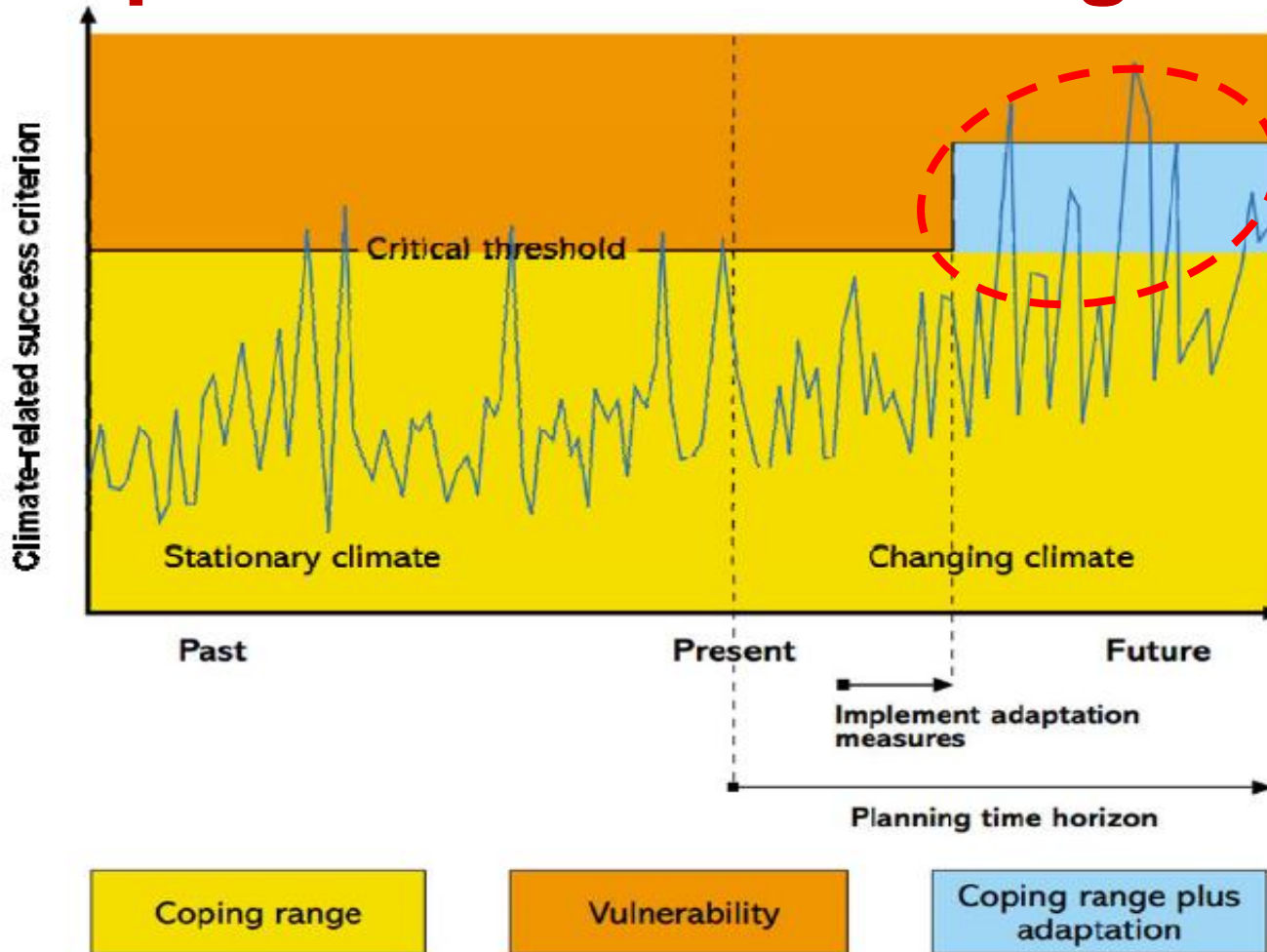


Source: Stafford Smith et al. 2011





# Impacts of climate change on projects



**Design/  
operational  
thresholds may  
be exceeded  
more frequently  
due to climate  
variability and  
change**

Source: Willows and  
Connell 2003





# Impacts of climate change on projects

## Some CC impacts on various dimensions of a project:

- **Failing assets** and **reduced design life**, risk of **damage**
- Increasing **operational costs** and need for **additional capital investment**
- **Loss of income**
- **Reputation damage** at several levels
- **Changing market demand** for goods and services
- **Increasing insurance costs** or lack of insurance availability
- ...





# Example: Amman Floods (November 2015)

A heavy rain episode that lasted for 30 minutes resulted in floods, loss of electricity, loss of lives, property and damage to rain water and sewer transfer networks

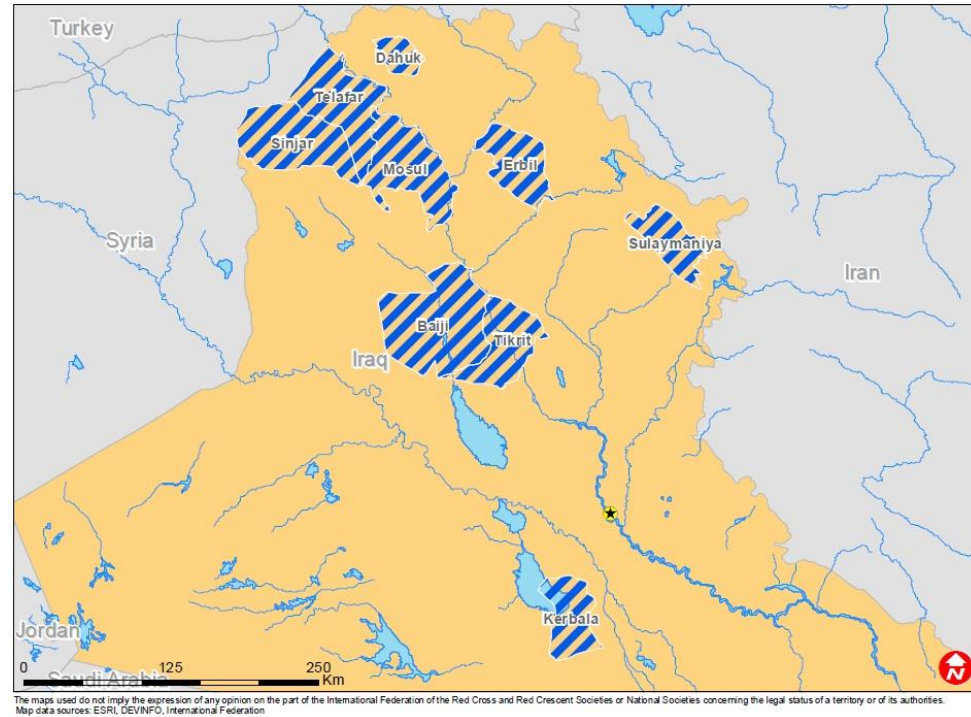






# Example: Flash floods in Iraq in 2011

- Heavy rains in various areas of the country led to massive flooding
- Most houses were destroyed due to poor infrastructure
- Power stations had to be switched off due to water intrusion
- Frequency of flash floods is expected to increase due to snow melting



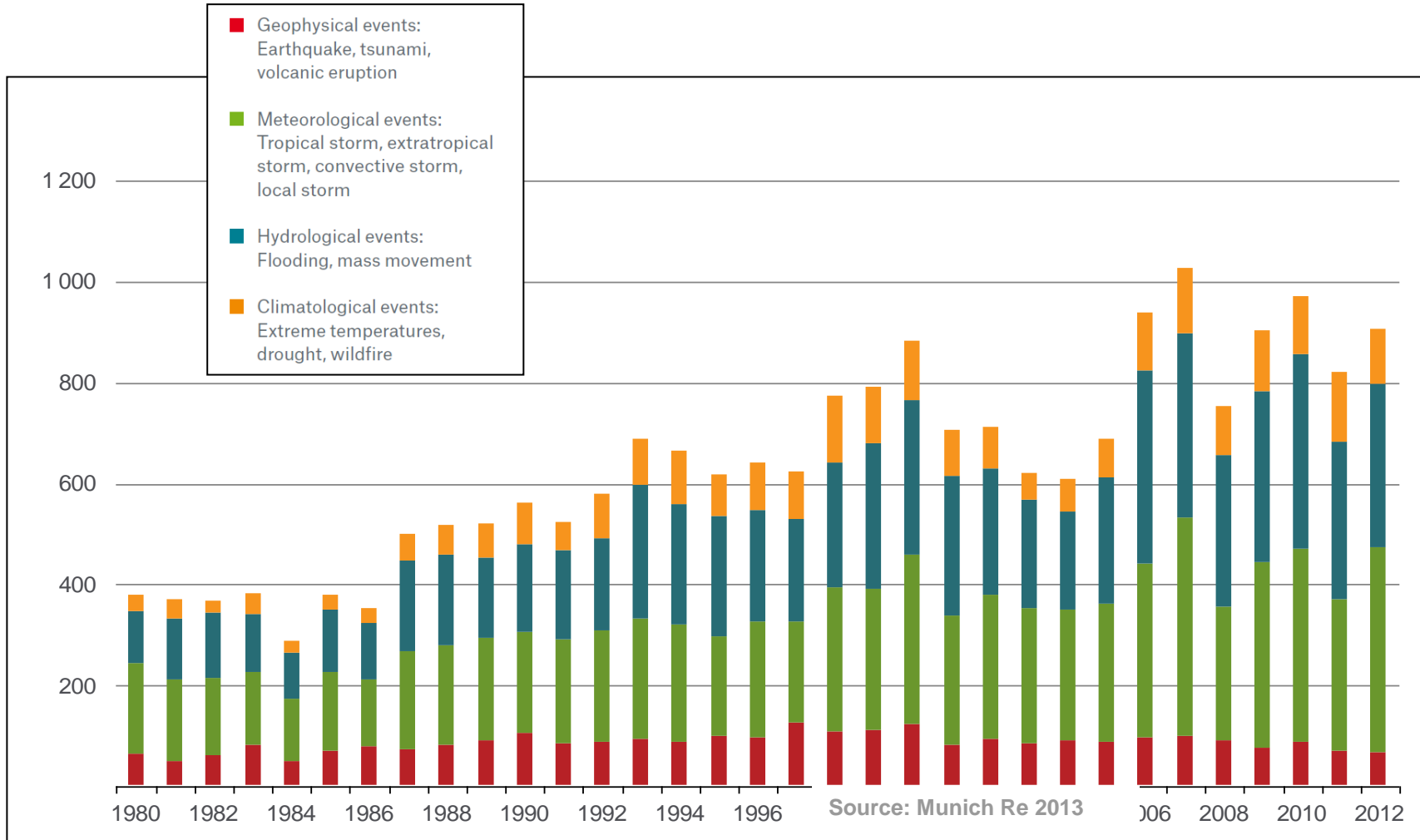
Source: reliefweb.int







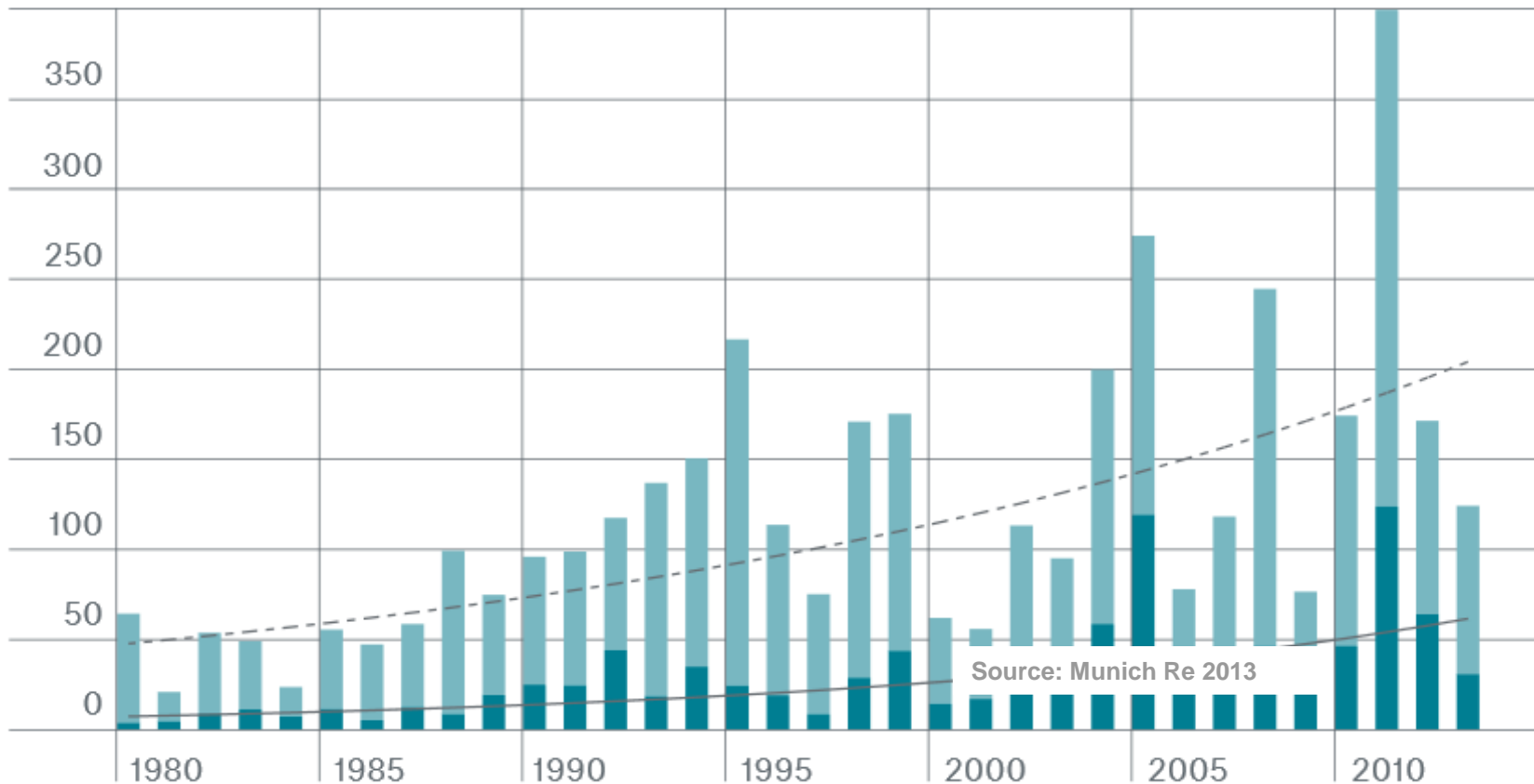
# Global natural disasters 1980-2012



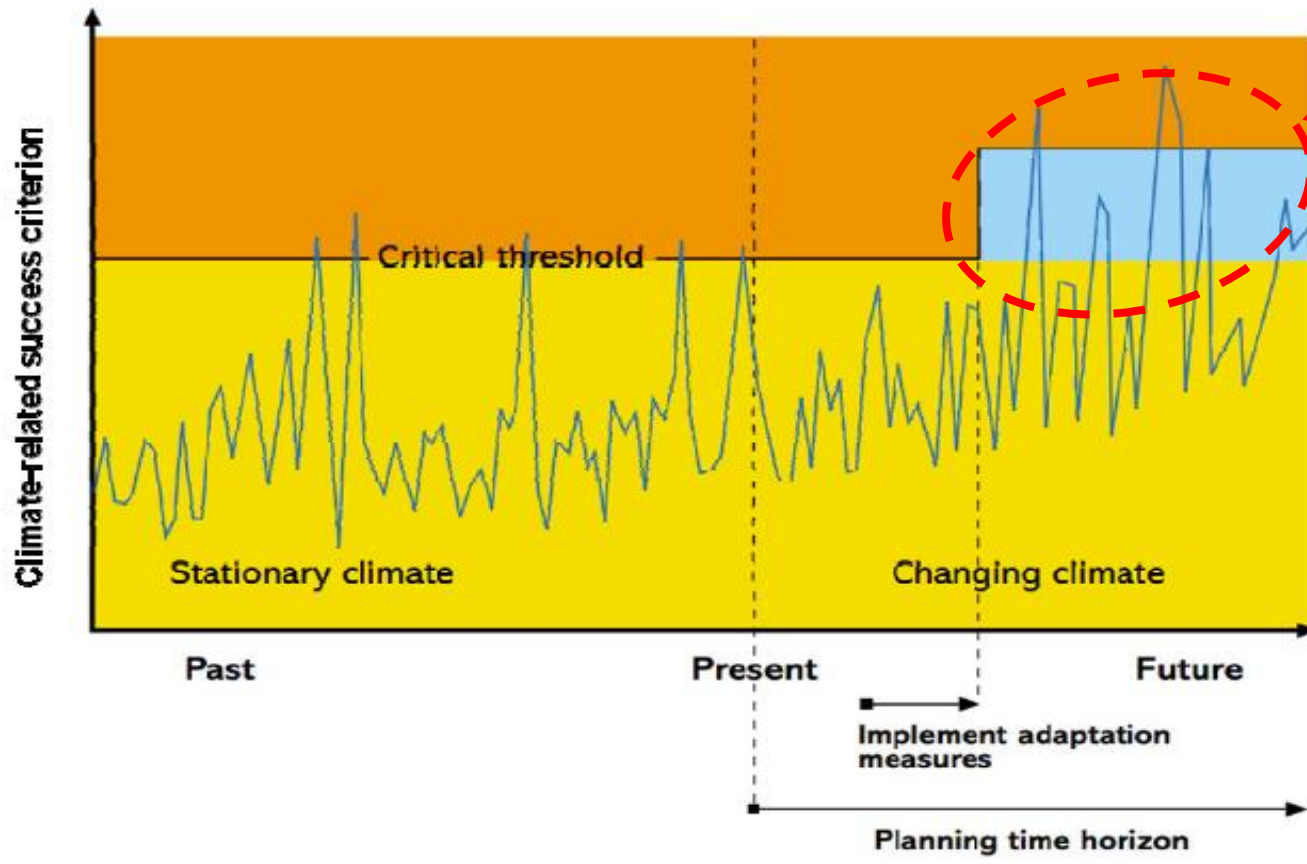


# Insurance losses & costs are increasing

Overall losses and insured losses 1980-2013 (in US\$ bn)



# Why climate proof projects?



**Design/operational thresholds may be exceeded more frequently due to climate variability and change**  
**Climate proofing extends the coping range**

Coping range

Vulnerability

Coping range plus adaptation

Source: Willows and Connell 2003



# Why climate proof projects?

**Objective of climate proofing:** Develop, implement and monitor robust water investments that are resilient to climate variability and to ensure long-term sustainability.

## Reasons for climate proofing:

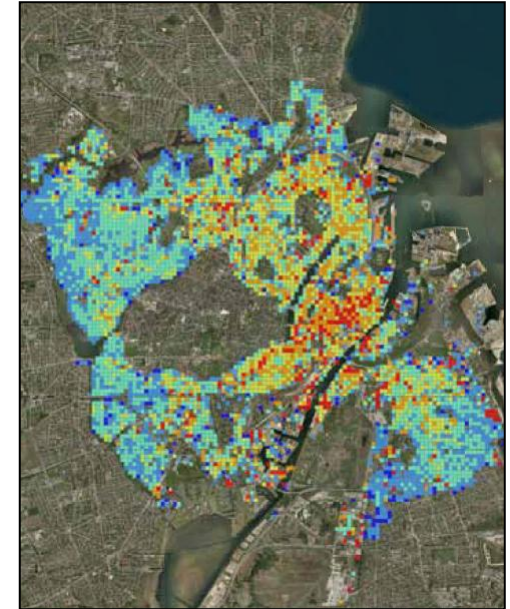
- **Increase performance and sustainability**, e.g. reducing structural failure or disruption of operations/services, secure inputs (water supply), meet future demand...
- **Avoid lock-in situations & path-dependencies** causing adverse socio-economic impacts, limited flexibility, high costs for re-active adaptation measures
- Will increasingly become **prerequisite for funding** from public financial institutions, commercial banks and for **insurers**





# The added value of adaptation – Example: Flood protection for the city of Copenhagen

- **More frequent and heavier rainfalls** in the near future → sewer system needs to be expanded
- **Sea-level & frequency of storm surges** expected to rise → dikes need to be established & building levels raised
- **Copenhagen Climate Change Adaption Plan (2011)**
- **Risk assessment & cost-benefit-analysis** have shown net benefit of € 2.4-3.4 billion DK (100 year-period):
  - **Expected damages:** € 4-4.7 billion
  - **Adaptation measures:** € 1.3-1.6 billion



Vulnerability to flooding in  
Copenhagen from extreme  
rainfall events

Source: European Commission 2013





# The added value of adaptation – Example: Copenhagen

Table 13: Net present values for rising sea levels (1 meter in 100 years) in million DKK

Table 14: Net present values for extreme rainfall in million DKK

Alternative scenarios	NPV
Damage cost without measures	15,552
Damage cost with cheapest measure (non-return valves)	4,316
Damage cost with most expensive measure (increased sewer network capacity)	5,458
Cost of cheapest measures (non-return valves)	3,001
Cost of most expensive measure (increased sewer network capacity)	10,372
Net gain - cheapest measure	8,235
Net gain - most expensive measure	-278

Source: European Commission 2010





# Opportunities for climate proofing

- **Rising awareness** and growing **political will** to achieve **climate resilient development**
- Realize **green growth potentials** and **job opportunities**
- Significant, **climate-smart investment opportunities** for PPP and private sector
- Existence of **mandatory EIA** in several MENA countries
- **International climate finance opportunities** for “climate proofing pilots”







# Climate proofing is increasingly applied...





# ...and included in national legislation. Example: EU guideline

[www.acclimatise.uk.com/network/article/new-eu-directive-requires-climate-change-to-be-considered-in-environmental-impact-assessments](http://www.acclimatise.uk.com/network/article/new-eu-directive-requires-climate-change-to-be-considered-in-environmental-impact-assessments)

**27** NEWS / New EU Directive requires climate change to be considered in  
MAY environmental impact assessments  
2014 Category: Defence & Security, Energy, Financial Services, Government & Policy, Health &  
Pharmaceuticals, Manufacturing, Oil, Gas & Extractives, Retail & Supply Chains, Transport &  
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Review of the EU  
Directive  
on **Environmental  
Impact  
Assessment (EIA)**:  
Climate risks are  
**now to be included  
in member states'  
national EIAs by  
2016.**





# Example: Asian cities to introduce climate-proofing

- Asian Cities Climate Change Resilience Network (ACCCRN) set up in 2008 as a response to **urbanization and related climate risks**
- New project in 2012: **10 cities in India, Vietnam, Thailand and Indonesia assessed their own resilience**
- **Indicators:** broad mix of **scientific and socioeconomic factors**, both qualitative (e.g. existence of a coordinating body for city planning) and quantitative (e.g. leakage rates in water supplies)

The screenshot shows a SciDev.Net article page. At the top, there is a search bar and social media icons. Below that is a navigation menu with categories like Agriculture, Environment, Health, Governance, Enterprise, and Communication. The article title is "Ten Asian cities leading the way in climate-proofing" by T.V. Padma, dated 27/03/12. The article text discusses the Asian Cities Climate Change Resilience Network (ACCCRN) and its indicators. The article has 4 shares and 0 tweets. The source is cited as www.sci-dev.net.

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Source: www.sci-dev.net

[LONDON] Ten cities in South and South-East Asia will be the first in the world to use indicators to assess how resilient they are to climate change, a speaker at the Planet Under Pressure conference has told *SciDev.Net*.

The indicators are the work of the Asian Cities Climate Change Resilience Network (ACCCRN), set up in 2008 as a response to projections that the number of people living in cities will increase from today's 50 per cent of the world population to 70 per cent by 2050.

Asian cities will account for the majority of this increase (60 per cent), and nearly half of future urban growth is expected in smaller cities and towns, mostly those with fewer than half a million people now.

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# Climate proofing scope and target groups

## Scope:

- For newly planned or already existing projects
- For ‘regular’ water sector projects and explicit ‘adaptation projects’
- Broad and generic approach → *needs modification to respective national context!*
- Presents **flexible, dynamic tool** that will be regularly updated and become more specific





# Climate proofing scope and target groups

**Main target group:** Project developers, planners, and managers of ...

- national **public water sector institutions**
- other, closely linked sectors (**agriculture, energy, infrastructure etc.**)
- **private sector**



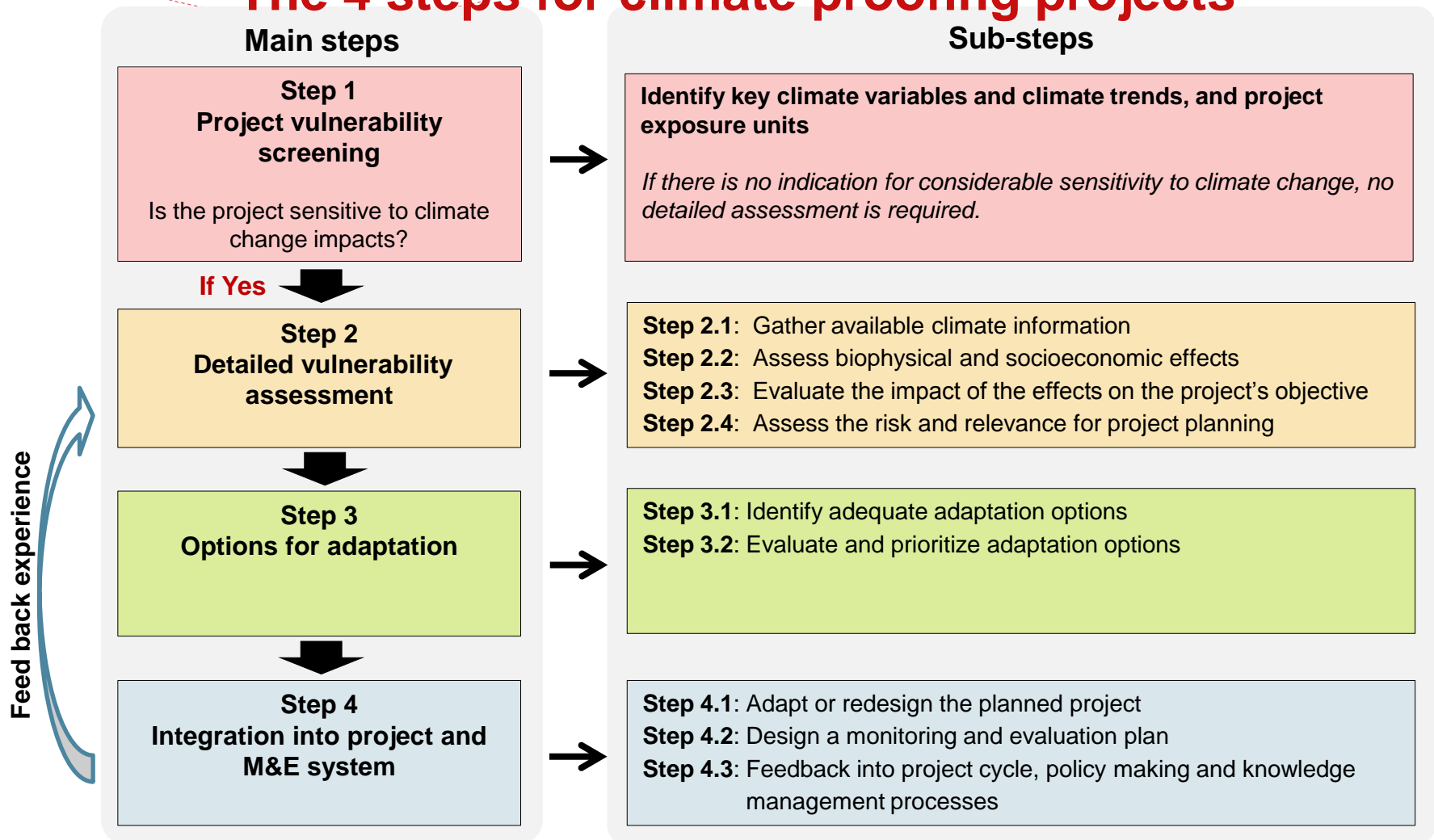
Source: [www.seda.sk.ca](http://www.seda.sk.ca)



Source: [www.juwi.com](http://www.juwi.com)

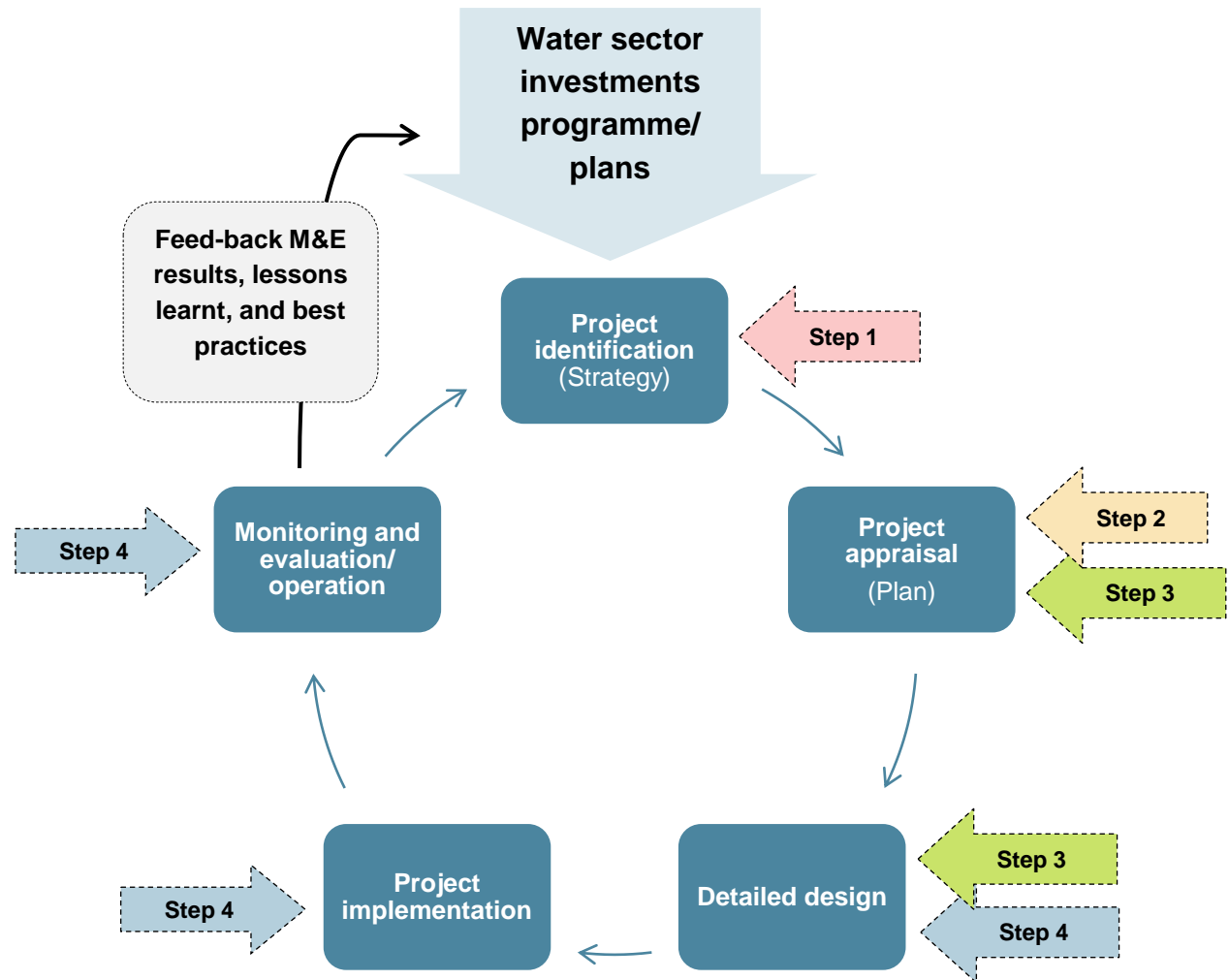


# The 4 steps for climate proofing projects



# Entry points for CP within a general project cycle

*“Consideration of climate change impacts at the **planning stage** is key to boosting adaptive capacity” (IPCC 2007)*



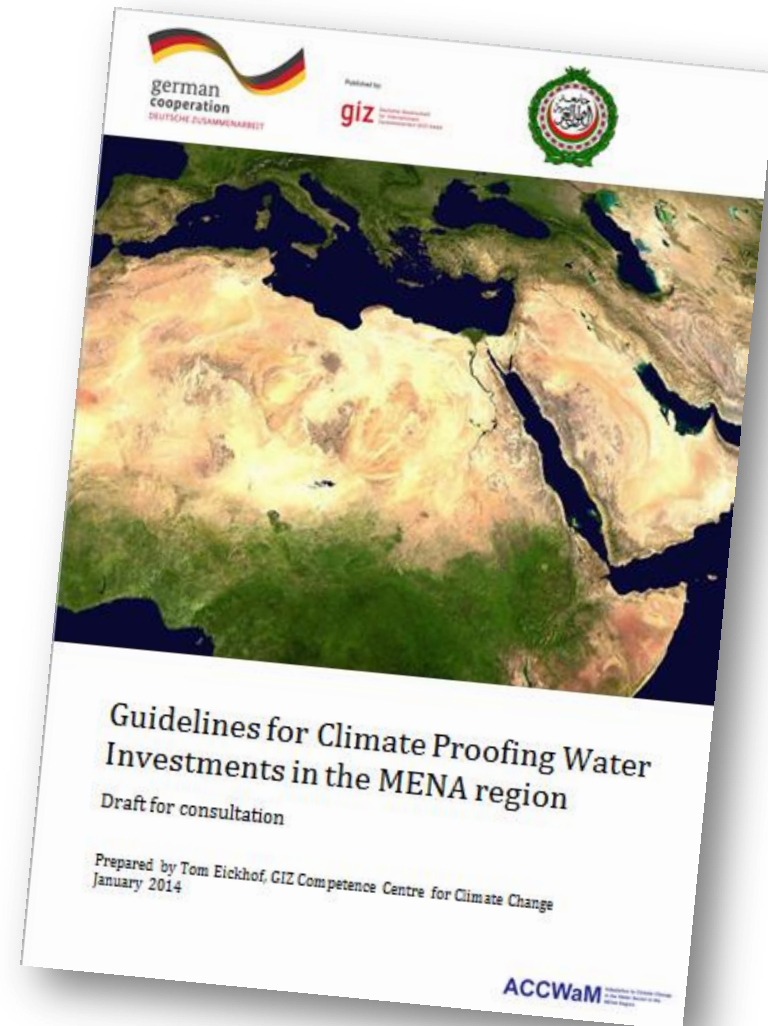




# Climate Proofing Guidelines

The tool presented is based on the *Guideline for climate proofing water investments in the MENA region* (draft version)

Each step (Steps 1 – 4) of the proofing tool suggested includes multiple sub-steps





# Step 1

## Project vulnerability screening

**Goal:** Assess whether (a) the project is vulnerable to climate variability and change and (b) the project's operations may adversely affect the human or natural system's sensitivity to climate change.

### Identify key climate variables and trends, and project exposure elements:

- **Climate variable trends:** temperature, precipitation, extreme weather events (droughts, floods), sea-level rise, ...
- **Exposure elements** (inputs, infrastructure, operations, outputs, distribution networks,...) particularly vulnerable to changing climate variables

### Options for rapid vulnerability assessment (based on expert opinion)

- **Rapid risk screening tools** developed by various organizations
- **Simple checklists**





# Step 2

## Detailed vulnerability assessment

**Goal:** *Based on the initial vulnerability screening, conduct a detailed climate vulnerability assessment to evaluate the potential impacts of climate change on the project's objective as a basis for identifying specific adaptation options.*

### **Step 2.1: Gather available climate information**

- Up-to-date regional climate information on present climate variability and future climate change trends
- Ideally provided by **specialised, central unit/department** of a relevant national or regional institution responsible for **climate data generation, collection, preparation, and dissemination**





## Step 2 cont.

### Detailed vulnerability assessment

#### *Step 2.4: Assess the risk and relevance for project planning*



- Qualitative assessment of the **project's risk to the climate change impacts** and **evaluation of the relevance** for planning
- Assigning different **risk levels** through estimation and scoring (e.g. **high**, **moderate**, **low risk**) to each one of the impacts identified by estimating and scoring



## Step 2: Detailed vulnerability assessment – Risk matrix

### Assign risk scores:

- magnitude of the consequence of climate impact
- likelihood of occurrence of climate impact are then combined and visualized

		Magnitude of consequence of climate impact on project 					
		Likelihood of occurrence of climate impact on project 	1- <i>Insignificant</i> Impact can be absorbed through normal activity	2- <i>Minor</i> Adverse event, but can be absorbed	3- <i>Moderate</i> Serious event requiring additional actions	4- <i>Major</i> Critical event requiring extraordinary actions	5- <i>Catastrophic</i> Disaster with potential to lead to closure/collapse
Incident is very likely to occur, possibly several times	<b>5- Almost certain</b>				<b>Impact No. 1, 2</b>		
Incident is likely to occur	<b>4- Likely</b>				<b>Impact No. 4</b>		
Incident has already occurred in same region /setting	<b>3- Moderate</b>					<b>Impact No. 3</b>	
Given current practices and procedures, incident is unlikely to occur	<b>2- Unlikely</b>						
Highly unlikely to occur	<b>1- Rare</b>						



# Step 3

## Options for adaptation

**Goal:** Identify options for adaptation measures responding to the most significant impacts according to the risk assessment, making use of the opportunities presented by climate change.

### ***Step 3.1: Identification of adaptation options***

- Qualitative assessment of different adaptation options based on selection criteria: effectiveness, no-regret, flexibility, economic aspects, robustness, equity, political and social acceptance etc.

### ***Step 3.2: Evaluation and prioritisation of specific adaptation options***

- Quantitative evaluation (economic assessment) & prioritization of the shortlisted adaptation options for the project





# Step 4, condensed

## Integration of adaptation measures into project and M&E system

**Goal:** *Integrate selected adaptation options into project design and implementation stage of the project cycle. Set-up a monitoring and evaluation plan/system and feed back experiences into the project cycle.*

### **Step 4.1: Adapt or redesign the planned project**

- Modification of original technical project design & management options
- Identification of additional technical support & capacity development measures
- Development of communication and stakeholder consultation plans
- Elaboration of a financing plan integrating climate risks and uncertainties

### **Step 4.2: Design a monitoring and evaluation plan**

- For implementation process of selected adaptation options
- For the progress and success of the adaptation options

**Step 4.3: Feedback M&E results, lessons learnt and good practices into policy-making & knowledge management processes**







# Adaptive decision points for each project cycle step

Scope for building in resilience

Life cycle phase	Example adaptive decision points
Policy and planning	Location of asset Capacity of asset Design life of asset Funding mechanisms and risk sharing Design codes and construction standards
Conceptual design	Conceptual design parameters Conceptual modeling Investment plans
Detailed design	Detailed design parameters Modeling Environmental impact assessment Financial evaluation Cost-benefit analysis
Construction and establishment	Construction methods/materials
Asset management	Maintenance program
Monitoring and adaptation	Retrofitting

Source: UNDP 2011

Costs for adaptation





# Decision-making under uncertainty

## General principals to guide development of adaptation options:

- **No-regret/ low-regret approach:** delivering net socio-economic benefits irrespective of the nature of future climate
  - concentrate on win-win opportunities and synergies with closely interlinked sectors for simultaneous adaptation and mitigation options (**water-energy nexus**)
- **Robust adaptation:** targeting today's climate variability **that also offer** major co-benefits under predicted future climate change projections
- **Soft adaptation:** flexible reaction to changing circumstances, **including** options focusing on institutional systems and knowledge
- **Adaptive management:** flexible management approaches that evolve and adjust as (climatic) circumstances and scientific knowledge change





## And under policy certainty...

- Paris Climate Agreement-  
Countries need to develop NAPs
- Preparation of NAPs
- Climate Proofing a key component  
of NAPs





# CP needs an enabling institutional frameworks

Climate proofing requires strong political leadership and commitment:

- **Institutional structures** for the preparation of **climate information** (e.g. climate research, data generation, monitoring, capacity development)
- **Cross-sectoral coordination**
- **Additional financial resources** for risk assessment and adaptation  
(→ climate finance)
- Implementation of Strategic Environmental Assessments (SEA) and **Environmental Impact Assessments (EIA)**





# CP needs an enabling institutional frameworks



Source: Verner et al. 2012





# Conclusions

- **High vulnerability** to climate change accounting for **significant economic losses** already today
- Need for considerable **climate resilient future water investments** for closing the water gap and reducing CC impacts
- **Significant opportunities** for technological, socioeconomic and institutional **innovation and sustainable development**



**CLIMATE PROOF!**



**Thank you  
for your attention**

