Planning for Climate Change Adaptation

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Session Outline

• What are the **indications** that our climate is changing?
• What are the **responses** to climate change and its impacts?
• What are the key **dimensions** of climate change adaptation?
• How is climate change adaptation different from **climate change mitigation**?
• What are the **approaches** for climate change adaptation planning?
• What are the **steps** for climate change adaptation planning?
What are the indications that our climate is changing?
Climate Change Hazards

“The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources.”

Source: Intergovernmental Panel for Climate Change
Climate Change Hazard: Increase in Temperature

Source: NASA Scientific Visualization Studio
Potential Primary Impacts

• Groundwater depletion
• Water shortages
• Drought
• Degraded air quality

Potential Secondary Impacts

• Exaggerated urban heat island effect
• Increased energy demands for cooling
• Need for higher or additional waste water treatment
• Distress migration to cities / towns due to droughts in rural areas
• Reduced food supply and higher food prices
• Potential energy price increases
• Population health impacts
Potential Primary Impacts
- Increased flooding
- Increased risk of land slide or mudslide

Potential Secondary Impacts
- Property damage
- Disruption of livelihood and economies
- Damage to infrastructure not designed to the necessary standards to withstand the occurrences being experienced
- Displacement and population movement from informal settlements built on steep slope hazard lands
- Distress migration to cities due to floods in rural areas
- Increased vector borne diseases

Source: UN Habitat (2014)
Climate Change Hazard: Sea Level Rise
Potential Primary Impacts
• Coastal flooding
• Salt water intrusion into ground water supplies in coastal areas
• Increased storm surge hazard
• Coastal erosion

Potential Secondary Impacts
• Property damage
• Disruption of livelihood and economies
• Damage to infrastructure not designed to the necessary standards to withstand the occurrences being experienced
• Displacement and population movement from coastal areas
• Reduced food supply and higher food prices
• Population health impacts
• Loss of productive / residential land due to erosion

Source: UN Habitat (2014)
Climate Change Hazard: Increased Extreme Weather Episodes

Map showing areas where tropical storms form and their typical paths.
Potential Primary Impacts

- More intense flooding
- Higher risk of landslides / mudslides on hazardous slopes
- Intense and disastrous wind speeds

Potential Secondary Impacts

- Property damage
- Population health impacts
- Damage to infrastructure not designed to standards of occurrences being experienced
- Disruption of livelihoods and economies
- Reduced food supply and higher food prices

Source: UN Habitat (2014)
What are the responses to climate change and its impacts?
Climate Change Mitigation

Activities that help to reduce the rate or magnitude of climate change by human-generated greenhouse gas emissions or land use practices that contribute to climate change, such as deforestation.

Source: UN HABITAT
Supporting sustainable energy production and distribution systems
Improve transport networks that both reduce traffic congestion and support greener modes of transport.
Urban Design

Supporting and leading more sustainable, compact urban design
Industry: Material recycling and substitution
Encouraging new technologies and development for the treatment of liquid and solid wastes
Buildings

Encouraging and facilitating new green building technologies and development
Land Use

Supporting the conservation and rehabilitation of ecosystems for the mitigation services they provide
Climate Change Adaptation

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Source: Intergovernmental Panel for Climate Change
Range of Measures

- Technical
- Institutional
- Legal
- Educational
- Behavioral

Climate Sensitive Domains

- Agriculture
- Forestry
- Water Management
- Coastal Protection
- Public Health
- Disaster Prevention
Anticipatory Adaptation

What is it?
• Taking action in preparation of climate change (i.e. before damage has occurred)
• “We can plan ahead to get where we want to go”

Advantages
• The result of a deliberative policy decision that is done based on the awareness that conditions have changed and are expected to change
• Often more effective and less costly than reactive planning
“In communities where only a handful of people out of thousands own radios or televisions and illiteracy is high, getting early warning messages about floods or cyclones can be a challenge. But as the picture shows, there are ways that messages can be spread.”

Source: UN ISDR
“Risk mapping is a visual method of showing local perceptions of areas or people in a community (such as settlements, infrastructure, and resources) that face different levels and types of risk.”

Source: World Bank
Local Adaptation Plans

Rotterdam
Climate Change Adaptation Strategy

The city and its inhabitants are protected from the rivers and the sea.

It is vital that Rotterdam and its inhabitants remain protected from flooding and that investors retain their confidence in the city and region.

The city and its inhabitants experience minimal disruption from too much or too little rainfall.

Rotterdam needs to be able to cope with extreme weather situations such as prolonged downpours, heatwaves and periods of drought. To this end, we are already working together with the partners of the Rotterdam water plan and will continue to do so.

The Port of Rotterdam remains safe and accessible.

Rotterdam needs to remain accessible to people, goods and services. It is crucial that the essential urban (public utilities) networks are robust and that weather conditions, no matter how extreme, do not lead to uncontrollable situations.

The inhabitants of Rotterdam are aware of the effects of climate change and know what they themselves can do.

The inhabitants and businesses in Rotterdam need to be aware of the consequences of climate change, to become conscious of their own responsibilities and to know what action they themselves can take. The City of Rotterdam provides the framework within which they can assume their own responsibilities.

Climate change adaptation contributes to a comfortable, pleasant and attractive city in which to live and work.

Climate change adaptation strengthens the economy of Rotterdam and its image.

Inhabitants and businesses in Rotterdam must continue to be a city in which it is pleasant to live and work and where climate change does not adversely affect the health and welfare of its inhabitants. The measures used to guarantee this will directly contribute to making the city more attractive and to improving the environment.

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Making the city climate proof will benefit the economy of Rotterdam. Climate change adaptation will create new, economic impulses in the city and strengthen the international image of Rotterdam as an ambitious and progressive delta city. In this way Rotterdam will confirm its ability to take charge of a situation and promote itself as a role model for other cities.
Timing of Climate Change Adaptation: Reactive Adaptation

What is it?
- Taking action when climate change effects are experienced (i.e. after some impacts have been experienced)
- “We can incur damages, clean up the mess, and live with the consequences”

Disadvantages
- Reactive adaptation may be too little too late
- Reactive adaptation may cost more than anticipatory adaptation
- Reactive adaptation runs the risk of being short-sighted
Building sea walls and beach reinforcement
Emergency Disaster Responses
Retreat
Forced Relocation
How is climate change adaptation different from climate change mitigation?
<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Adaptation</th>
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<tbody>
<tr>
<td><strong>Causes of Climate Change</strong></td>
<td><strong>Objectives</strong></td>
</tr>
<tr>
<td>All systems</td>
<td><strong>Target Systems</strong></td>
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<tr>
<td>Global</td>
<td><strong>Scale of effect</strong></td>
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<td>Centuries</td>
<td><strong>Lifetime</strong></td>
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<td>Decades</td>
<td><strong>Lead time</strong></td>
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<td>Certain</td>
<td><strong>Effectiveness</strong></td>
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<tr>
<td>Sometimes</td>
<td><strong>Ancillary benefits</strong></td>
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<td><strong>Effects of Climate Change</strong></td>
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<td><strong>Selected systems</strong></td>
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<td><strong>Local to regional</strong></td>
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<td><strong>Years to centuries</strong></td>
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<td><strong>Immediate to decades</strong></td>
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<td><strong>Generally less certain</strong></td>
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<td><strong>Often</strong></td>
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Source: Fussel (2007)
More adaptation required

Greater impacts on humans and natural environment

More serious climate change effects

More greenhouse gases produced

Less serious climate change effects

Less greenhouse gases produced

Lesser impacts on humans and natural environment

Less adaptation required

Less mitigation

More mitigation
Entry Points: Climate Change Adaptation

- Community-level
- City / Municipality level
- Sub-National level
- National Level
- Transnational Level
Focus of Climate Change Planning and Action

Source: Aylett (2015)
Integration of climate change planning within local government plans

Source: Aylett (2015)
**Focus of Climate Change Planning and Action**

Source: Aylett (2015)
What are the approaches for climate change adaptation planning?
Ad hoc  Strategic  Mainstreaming
What are Ad hoc Approaches?

<table>
<thead>
<tr>
<th>Address one, specific opportunity</th>
<th>Case-by-case basis</th>
<th>Only the most affected organizations are involved</th>
</tr>
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<tbody>
<tr>
<td>Quick to undertake, but mostly reactive</td>
<td>Difficult to comprehensively address issues</td>
<td>Rarely use public participation</td>
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Examples of Ad Hoc Approaches

- Upgrading of public infrastructure to withstand water level rise
- Utilizing larger sewer pipes to manage expected flood waters
- Creation of water storage facilities
During dry weather, the **Benthempien** square is a sports and recreation venue among kids and young adults. It also acts as a water storage facility.
What are Strategic Plans?

- Comprehensive nature of the process
- Identifies where policies will support each other
- May end up as another silo
- Provides clear path for implementation
- Extensive stakeholder engagement possible
- Opportunity to change planning approach
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Rotterdam has 100,000 m² of green rooftops – and more!

The roof park lies on one of the dikes of the Delfland District Water Board.
Mainstreaming Approaches

Mainstreaming is the process and method of integrating climate change and disaster risk concerns in decision making, planning and implementing policies and programs. Mainstreaming assumes that other projects can be enhanced – e.g. poverty reduction, urban sustainability – and their benefits increased by integrating climate planning with existing plans and policy instruments (plans, strategies, programmes, and guidelines) (UN Habitat, 2014).

Climate is not the main goal. The main idea is to apply a climate lens.
What are Mainstreaming Approaches?

- Can fit into set planning cycles, budgets, and hierarchies
- Many opportunities to be included in existing plans and policies
- Climate change may be overshadowed by other issues
- Clear responsibilities, institutionally anchored
- Existing planning framework may not work (not aligned with investment plans and budgeting)
- May not necessarily lend itself for multi-sectoral coordination
What are the steps for climate change adaptation planning?
Climate Change Planning Process

Mitigation
- GHG Emissions Assessment
- Setting targets
- Assessment and selection of measures
- Implementation of measures
- Monitoring and Evaluation of Measures

Adaptation
- Vulnerability Assessment
- Setting objectives
- Assessment and selection of measures
- Implementation of measures
- Monitoring and Evaluation of measures

Source: UN Habitat
Which sectors are the largest emitters of GHGs?

How is your city exposed to climate change today and in the future?

How sensitive are your city’s people, places and institutions to this exposure?

Who is most vulnerable at least able to adapt?

What sectors are most important?
Mitigation

GHG Emissions Assessment

Setting targets

Adaptation

Vulnerability Assessment

Setting objectives

Key Questions

How much GHG emissions reduction would you target?

Would the objective be to increase adaptive capacity – or reduce sensitivity or exposure?

Is this target for the city or municipality level or for a specific sector?
Mitigation
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- Setting targets
- Assessment and Selection of Measures

Adaptation
- Vulnerability Assessment
- Setting objectives
- Assessment and Selection of Measures

Key Questions

Which actions (policies, measures, initiatives) can you identify to achieve the set targets or objectives?

After identifying the actions, how do you select which ones to implement first?
Decision Support Methods

- Cost Benefit Analysis
- Cost Effectiveness Analysis
- Multiple Criteria Analysis
Mitigation
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- Setting targets
- Assessment and Selection of Measures
- Implementation of measures

Adaptation
- Vulnerability Assessment
- Setting objectives
- Assessment and Selection of Measures
- Implementation of measures

Key Questions
- Who will be responsible for the implementation?
- What is the timeline for the implementation?
- What is the budget?
Mitigation

- GHG Emissions Assessment
- Setting targets
- Assessment and Selection of Measures
- Implementation of measures
- Monitoring and evaluation of measures

Adaptation

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- Setting objectives
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Key Questions

Did you achieve the target objectives?

What potential amendments can you consider from the assessment?
Climate Change Planning Process

**Mitigation**
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