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Annexure D – Case study: Climate change resilience building in the city of Semarang, Indonesia
Module1: Theory and Concepts of Climate Change and Cities

A. Project Overview

1. **Name of Practice**. Integrating climate change resilience strategies into city planning in Semarang, Indonesia

2. **Location**. Semarang, Java Province, Indonesia

3. **Focus**. Urban resilience building and climate change adaptation in the context of urban planning in the City of Semarang

4. **Partners.**

- Semarang City Government, including:
  - Mayor
  - City manager and four city assistants
- Local Development Planning Board (BAPPEDA)
- Asian Cities Climate Change Resilience Network (ACCCRN)
- Semarang City working group (CWG), comprising government officials, local NGOs and academics (in charge of leading involvement with ACCCRN)

5. **Climatic zone/geo-physical context**.

- ☐ Polar
- ☐ Temperate
- ☐ Arid/semi-arid
- **X Tropical/sub-tropical**
- ☐ Other: …

- ☐ Island
- **X Coast**
- ☐ River basin
- ☐ High plateau
- ☐ Mountain
- **X Other: Coastal hills**

6. **Weather patterns and resulting vulnerabilities**.

X **Rainfall patterns**

☐ Wind patterns
☐ Annual temperature distributions
☐ Other: …

X **Floods**

☐ Wind damage
X **Drought**

X **Health risks attributable to changing climate**

X **Landslides**

☐ Other: …

Semarang is located on the northern coast of Java. Its geography is characterized by coastal and hilly areas, making it vulnerable to climate change related risks such as inland floods, coastal storm surges and landslides. Despite being located in a tropical rainforest climatic zone, like many parts of Java it is also vulnerable to rainfall variability and periodic droughts, which occur in relation to El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) patterns. In addition, sea level rise poses an increasing threat to the coastline.

7. Stage.

X **Planning and design**

X **Implementation**

☐ Partly operational
☐ Fully operational
☐ Other: ...

8. Scale.

☐ Country
☐ Region
X **City**

☐ Town
☐ Sub-district
☐ Community/ neighborhood
☐ Other: ...

9. Duration. A range of activities since 2008.

10. Summary.

The Semarang City government worked to develop a Climate Resilience Strategy, in collaboration with the Asian Cities Climate Change Resilience Network (ACCCRN). The Climate Resilience Strategy defines prioritized actions for reducing vulnerability to climate change. A city working group comprising government officials, local NGOs and academics, leads the involvement with ACCCRN. The Local Development Planning Board (BAPPEDA) oversees the management of the city working group, responsibilities in planning, and use of public development funds. The city working group structure has enabled the integration of ACCCRN activities into city planning processes and budget cycles.

Exploring how Semarang City went about developing the Climate Resilience Strategy can point us to many lessons about how local governments translate new knowledge and concepts about climate change (in this case, 'resilience' plays a particularly important role) into local policy and operational priorities. In addition, this case study illustrates the complexity of integrating climate change considerations into existing planning and decision-making processes within a multi-layered governance regime.

Key approaches and success factors for the project have been to date:

- Active engagement with local government and NGOs from program inception: This engagement was significant in building government support and developing a platform for civil society engagement, which then eased integration of the Climate Resilience Strategy into city planning.
- Making sectoral studies relevant to city planning: This contributed significantly to legitimizing selection of local issues to be addressed.
- Regular knowledge sharing and collaboration through so-called 'Shared Learning Dialogues': Cities held a large number of iterative Shared Learning Dialogues, which facilitated identification of city needs that ACCCRN could address, and dissemination of related progress.

B. Detailed project information

Challenge

11. Issue.

The City of Semarang is the capital of Central Java Province with total administrative area of about 374 km2. The City of Semarang is divided into 16 sub-districts (kecamatan) and 177 villlages (kelurahan). It is located in Central Java's north coast at 6.93° – 7.13° latitude and 110.27° – 110.50° longitude. In 2008, the city was home to about 1.5 million people, with a population growth rate of 1.85% per annum (ISET, ACCCRN, Mercy Corps, Urban and Regional Development Institute, & CCROM Southeast Asia and Pacific, 2010).

The topography of the northern coastal area is flat with elevation of less than 3.5 meters above mean sea level, while in the south has topography with slopes of between 2 and 40% and elevation of between 90 and 200 meters above mean sea level. The City of Semarang area includes a number of rivers, such as the Garang, Kreo and Kripik rivers. Fresh water is taken from shallow ground water at the depth of 3-18m (lowland) and 20-40m (highland), and from ground water stored in a depressed aquifer layer at the depth of 50-90 m from the surface (ISET et al., 2010)[1].

Historical climate observations for the Semarang area show that key climatic parameters, such as temperature and rainfall are changing, both in terms of short-term variability and long-term trends. This includes increasing mean surface temperatures and seasonal changes in rainfall, such as changes in the monsoon onset date and the frequency of extreme rainfall events. Global climate modeling projections show that wet season rainfall in northern Java may decrease slightly in the future, while dry season rainfall may increase.

Climate change adaptation and urban resilience building in Semarang provides a good case study for how climate change responses can be implemented within a complex governance context. Examining the climate change planning and decision-making processes that Semarang has gone through over the past few years provides an opportunity for analyzing how different theories and concepts related to climate change can be applied to urban planning, and how these are interpreted and implemented by different stakeholders involved in the process. Understanding the governance context in which the planning processes have been places is particularly useful.

Until 1999, Indonesia's governance was strongly centralized. Most urban policies were made at the national level and applied across all cities. From 1999 onwards, the country transformed its government system through rapid and broad decentralization to district levels, to provide greater budgetary and decision-making autonomy to local government.

Due to the speed and magnitude of the decentralization of planning and budget authority, there was not sufficient preparation and capacity building at the city level for decentralized management and budget development. The planning and decision-making skills and experience available in city administrations were rarely adequate to articulate a coordinated governance vision. This frequently led to disputes between sectoral agencies over planning authority and budget allocation. Nevertheless, city governments (called Kota in urban areas and Kabupaten in non-urban areas) readily accepted the new decentralized system and took on new kinds of authority and responsibilities to implement local development planning. Due to limited capacity however, actual delivery of key public services was, and largely remains, poor (Sutarto & Jarvie, n.d.).

These challenges were seen as an opportunity by the *Asian Cities Climate Change Resilience Network (*ACCCRN) to bring new perspectives and improvements to urban development planning in the context of climate change. ACCCRN is a network of ten Asian cities in India,

[1] Further details on the geographic and demographic situation in Semarang can be found in ISET et al. 2010.

Indonesia, Thailand and Vietnam that are 'experimenting with a range of activities that will collectively improve the ability of the cities to withstand, to prepare for, and to recover from the projected impacts of climate change' (ACCCRN, 2012). ACCCRN's objective is 'to create a replicable base of action that build climate change resilience in cities in Asia' (Semarang City, 2010). ACCCRN is funded by the US-based Rockefeller Foundation and supported by regional, national and local partner organizations.

12. Affected group(s).

The lack of coordinated planning for climate change impacts affected the entire population. However, residents in marginal settlements (e.g. located on flood plains) are particularly vulnerable as they mostly have limited capacity to cope with natural disasters. Considering that Greater Semarang has grown substantially over the past decades and continues to do so, it is likely that climate change will place more people at risk of suffering harm from climate related events, such as floods, droughts and landslides. Improved urban planning that takes climate change considerations into account can help reduce these risks. While most residents that participated in a vulnerability assessment were aware of climate change, they expressed that they were not provided with adequate information and early warning regarding climatic disasters (ISET et al., 2010).

13. Impact.

Extreme climatic events such as flooding and drought are common in the Semarang area. In hilly areas, floods often result in landslides and soil erosion. While residents are used to responding to disasters, the increased frequency of such events occurring put additional strain on people, ecosystems and the local economy. It is difficult to estimate the total financial cost of disasters, and no specific figures are available for Semarang. However, qualitative data collected as part of a vulnerability assessment (ISET et al., 2010) suggests that past extreme climatic events have led to significant economic losses, including reduced productivity across sectors, temporarily increased commodity prices, and changes to social networks and social capital. Floods were shown to have the greatest impact on the residential sector, on transportation, health, agriculture, fisheries, drainage and infrastructure. Drought affected not only drinking water supplies, but also public health, agriculture and fisheries.

Overview

14. Design.

In Semarang, climate change provided an opportunity to connect urban planning and urban development decision-making with risk management and climate resilience building. Through becoming involved in ACCCRN, climate change impacts and risks for the first time became important considerations in the city's economic growth strategy and development plans (Sutarto & Jarvie, n.d., 2012). The cornerstone of this process was the development of a City Resilience Strategy, which had the following objectives:

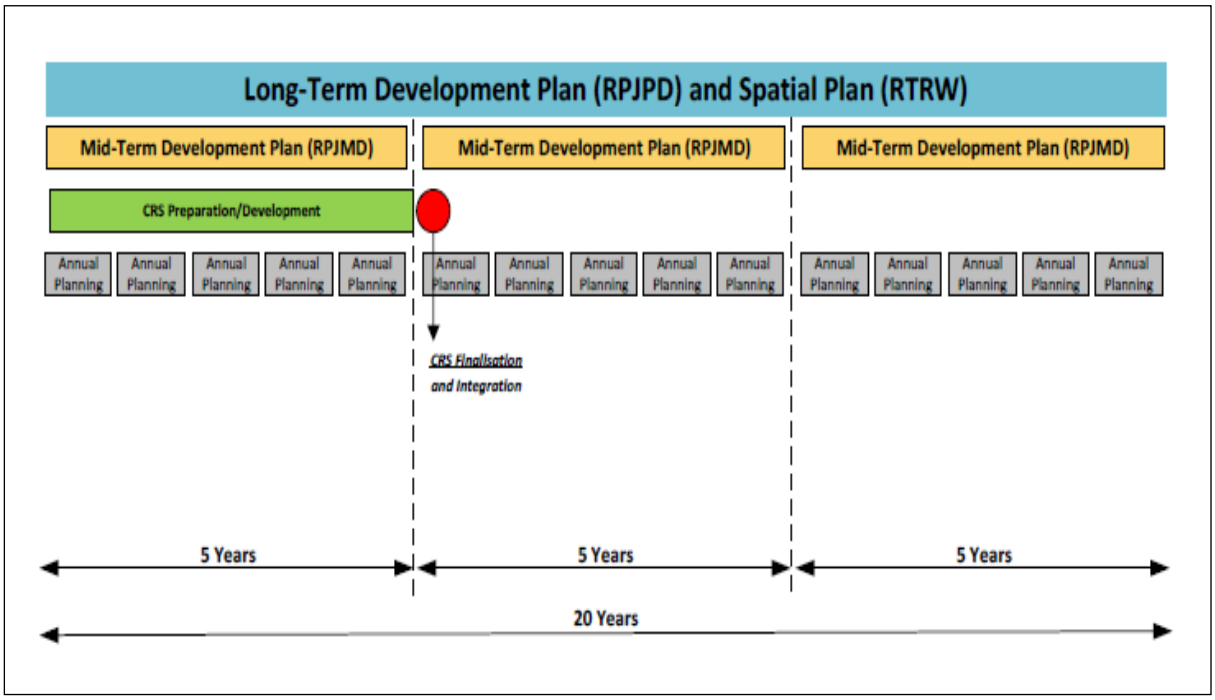
1. Identifying the existing conditions of climate change impacts, vulnerability, and vulnerable groups in Semarang City;
2. Developing urban development and climate change scenario and their consequences on the future;
3. Formulating resilience strategies at city level in a multi-dimensional perspective;
4. Translating strategies into several adaptation actions to enhance resilience;
5. Prioritizing adaptation activities and preparing draft proposal of the prioritized actions (Semarang City, 2010).

To understand how this was achieved, it is important to get an overview of the city-level governance arrangements in which the ACCCRN activities were placed. Semarang, as other Indonesian cities, has several planning systems relating to various sectors. The ACCCRN work focuses on one of these, namely the development and spatial planning system. This includes three main planning cycles (Figure 1):

1. Long term development planning (called RPJPD) with a 20 year strategic time horizon;
2. Mid-term development planning (RPJMD), reviewed every 2-years and revised every 5-years and encompassing the Mayor's vision and mission; and
3. Annual planning, which provides the yearly implementation direction for the RPJMD.

Spatial planning is a major part of the 5-year RPJMD and encompasses the Mayor's vision and mandate. It legitimizes land use planning decisions and forms the basis of infrastructure planning, implemented by Public Works and other urban relevant agencies.

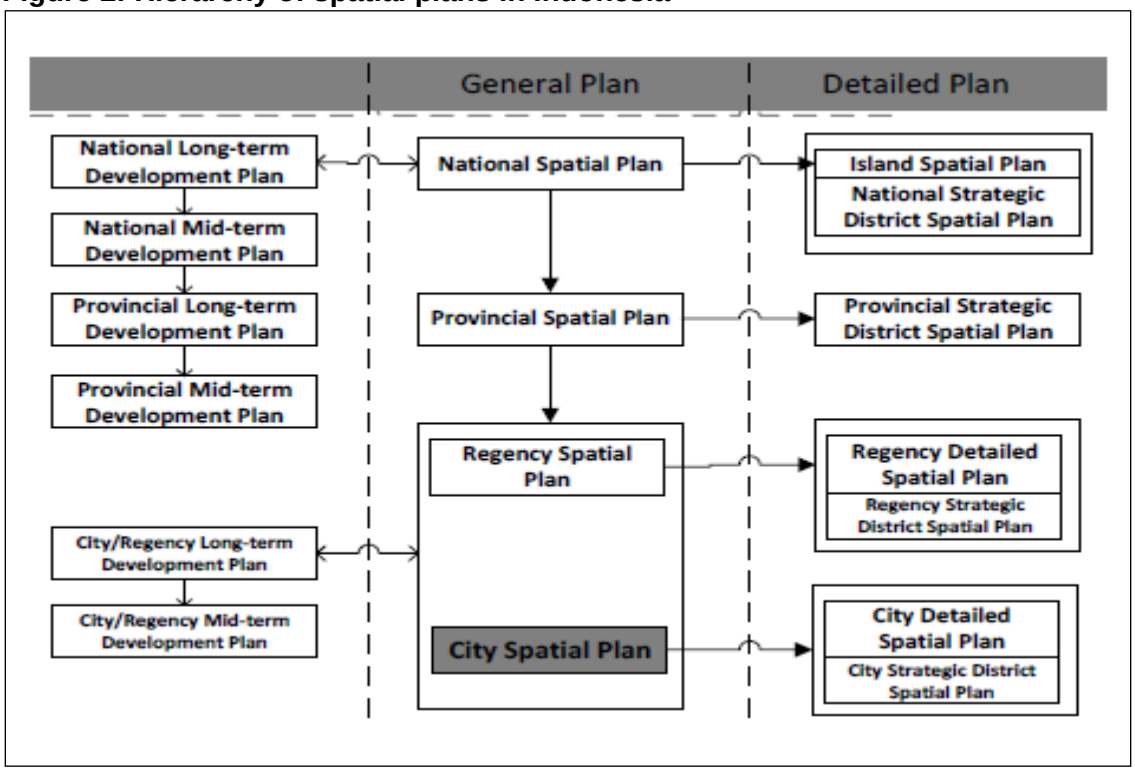
Figure 1: Planning time spans in Semarang



Source: Sutarto and Jarvie 2012.

By law, urban planning at the city level must be in line with national spatial planning (see Figure 2). This requires the provincial government to wait for the national spatial plan to be approved before it can start to develop complementary provincial plans. This cascades down to district governments; they need to wait for the approval of their province's spatial plan prior to developing their own. This causes large delays in developing city spatial plans, as even national spatial plans are rarely prepared in a timely manner.

Figure 2: Hierarchy of spatial plans in Indonesia



Source: Sutarto and Jarvie, n.d.

The development of spatial planning is the responsibility of city Spatial Planning and Housing Agency, which is then reviewed and approved by the local development planning board (BAPPEDA) as the key institution planning city economic development on behalf of the city mayor. Once approved by the Mayor, funding will be provided through city annual funding processes (Sutarto & Jarvie, n.d.).

15. Selection.

Mercy Corps, a locally active NGO with significant experience in facilitating climate change related activities in Indonesia was chosen to be a key facilitator for the ACCCRN process in Semarang. Mercy Corps liaised with BAPPEDA, and gradually built a city team for developing the City Resilience Strategy from amongst Semarang city staff. This included city agencies, such as the local environmental agency and the education agency, which showed interest in the work, as well as being able to generate support and buy-in from other departments. Other important members of the team in Semarang were local universities and local NGOs.

16. Pro-poor.

The vulnerability assessment conducted as part of the development of the City Resilience Strategy showed that 44% of the residential areas of Semarang city have a high vulnerability index. 10 out of 77 villages/suburbs (called *kelurahans*) showed low adaptive capacity, while the remaining 67 were assessed as having high adaptive capacity. It can be expected that the impact of climate hazards in kelurahans with high vulnerability and low adaptive capacity will be most severe. The Climate Resilience Strategy not only allowed to identify these socio-economic and geographic differences across Semarang; the priority resilience actions identified also show that disadvantaged residents were given special consideration in the city's response to climate change impacts (ISET et al., 2010).

17. Impact.

The City Resilience Strategy provides a roadmap to prepare Semarang City for addressing and responding to current and future climate change impacts. The Strategy is a fundamental climate change response framework for the city and is now the key strategic document for guiding resilience building (see Figure 3). The process of developing the Strategy, through the engagement of various stakeholders from the city government, the central government and other organizations, has led to improved awareness and knowledge of climate change issues among government bureaucrats operating at city level.

Figure 3: Relationships between City Resilience Strategy and other planning documents

Source: Sutarto and Jarvie, 2012.

The overarching purpose of the Climate Resilience Strategy is 'to provide a number of strategies to cope with climate change impacts that will be integrated into urban development

policy' (Semarang City, 2010: 3). Beyond that, the main functions of the City Resilience Strategy are (Semarang City, 2010; Sutarto & Jarvie, n.d.):

- To provide broad guidance, prepared by local stakeholders and government on climate change resilience building;
- To provide context, evidence and analysis justifying adaptation interventions;
- To set priorities for resilience actions;
- To ensure consistency with existing planning documents and processes that can easily be used by local government agencies;
- To provide guidance for the private sector and civil society groups to design and implement their own adaptation actions;
- To link and coordinate with complementary activities for donor funding (Sutarto & Jarvie, 2012).

The Climate Resilience Strategy consists of three main components (Sutarto & Jarvie, n.d.):

1. Climate impacts and vulnerability assessment: Explaining city vulnerability with a focus on vulnerable communities and the areas they live within, climate-related hazards in the context of downscaled climate change projections.
2. Proposed resilience actions, including:
a. Activities building climate resilience
b. Contributions that activities make to overall resilience
c. Benefits to vulnerable groups
d. Roles of government and other stakeholders
e. Links to other plans or projects
3. Prioritized resilience actions.

As Sutarto and Jarvie (n.d.) point out, since designing the Strategy and integrating it gradually it into RPJMD planning process, the members of the Semarang city team involved in the development of the Strategy have been able to increase their understanding of effective long-term planning. City team members also are said to have gained an understanding of the importance of current and future vulnerability, as well as improved technical capacity in relation to climate change impacts. As one of the next steps upon completion of the Strategy in 2010, a climate change expert team was to be established within the city administration. This expert team was to be part of a research division in the BAPPEDA, consisting of current city team members and other experts (Sutarto & Jarvie, n.d.).

Stakeholders

17. Who were the main stakeholders in the practice and what were their roles?

1. Name of organization: **Semarang City Government**
   Type of organization: Local government

   Role of organization: City administration, budgeting and decision-making

   Brief description: Like other local governments in Indonesia, the Semarang City Government consist of the Mayor, the City Manager as the chief executive and four city assistants, which are responsible for the four key areas of city administration: government administration (overseeing governance departments); economy, development and welfare, information and networking, general administration (operations). For the engagement with ACCCRN, a city working group was set up, comprising local government officials, local NGOs and academics.

2. Name of organization: **Asian Cities Climate Change Resilience Network (ACCCRN)**
   Type of organization: International research and development network

   Role of organization: Facilitate urban resilience planning and implementation at city level

   Brief description: ACCCRN is a network of ten cities in India, Indonesia, Thailand and Vietnam, experimenting with a range of activities that will collectively improve the ability of the cities to withstand, to prepare for, and to recover from the projected impacts of climate change. Funded by the Rockefeller Foundation (U.S.A.).

3. Name of organization: **Development Planning Board (BAPPEDA)**
   Type of organization: Indonesian Government Spatial Planning Agency

   Role of organization: Formulating and implementing local policy on development planning through: formulating technical policy, coordinating planning formulation, supervision and other tasks

Brief description:	BAPPEDA sits as a central government agency within the Economy, Development and Welfare department of the Semarang City Government.

Actions

18. Initiation.

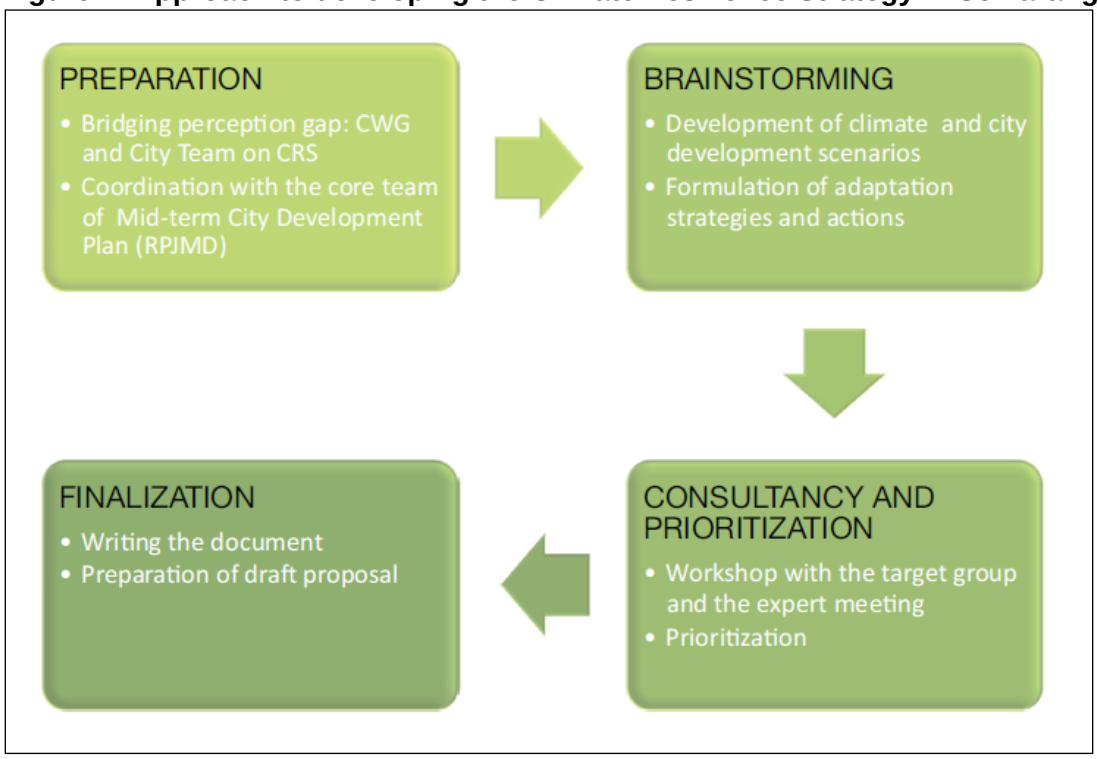
ACCCRN went through a selection process for Indonesian cities to participate in its network activities to build urban climate change resilience. According to Sutarto and Jarvie, making sure the timing for completing the Climate Resilience Strategy coincides with the mid-term RPJMD development was crucial for success. The city team was aware of the significant opportunity to use the Strategy as input into the 5-year RJMD revisions, and thus worked towards finalizing the Strategy before the RPJMD revision process began. Once the Climate Resilience Strategy was prepared and finalized, its content could be used by the government as published data, information and input to improve the next mid-term development plan (Sutarto & Jarvie, n.d.).

19. Planning and design.

The development of the City Resilience Strategy was conducted in four stages (Figure 4):

1. **Preparation:** This stage involved 'planning for planning', i.e. garnering support from across the city administration, bridging perception and knowledge gaps, and discussing how the process can best be synchronized with the city's mid-term development plan. A workshop was conducted to conduct a comprehensive review of the vulnerability assessment outcomes, sector studies and pilot projects. Participants included the city working group that was created for the purpose of working on the Climate Resilience Strategy and a technical team (city team).
2. **Brainstorming:** The focus of this second stage was to brainstorm and develop possible city resilience strategies, based on climate scenarios. It consisted of a series of brainstorming workshops.
3. **Consultation and prioritization:** During the third stage, the adaptation and resilience strategies developed in the second phase were verified, using methods such as cost benefit analysis. Additional input from experts and target groups was sought during this stage.
4. **Finalization:** This involved writing up the strategy document and ensuring all resilience actions proposed can be integrated with the mid-term development planning process and documents (RPJMD).

Figure 4: Approach to developing the Climate Resilience Strategy in Semarang City



Source: Semarang City, 2010: 7.

The scope of the development of a City Resilience Strategy included (Table 1):

- A review on the results of studies of climate change impacts and vulnerability of Semarang (vulnerability assessment)
- Formulating a series of resilience actions and intervention strategies. Each proposed action/strategy was to be assessed against the following criteria:
    - Contribution (quantitative or qualitative) towards creating a resilient city
    - Benefits for vulnerable groups
    - Role of government stakeholders to support the action/strategy
    - Association of the action or strategy with other activities
- Prioritizing intervention strategies and resilience actions.
- Developing draft proposals, including monitoring and evaluation mechanisms, for each of the prioritized actions/strategies.

Table 1: Scope for the City Resilience Strategy Semarang

Scope 1:	Scope 2:	Scope 3:	Scope 4:
Review of Climate Impacts Assessment and Vulnerability	Strategy Formulation & Proposed Action Plans	Prioritization of Action plans	Annex Draft Proposal
Synthesis document's ACCCRN (VA, CBVA, Sector Studies, Pilot) Additional issues of SLDs The actual and dynamic issues in urban development Supporting studies	Development of climate and city scenarios Produce the series of activities to create resilience Assess the contribution the proposed activities Identify benefits for vulnerable groups Role of stakeholders	Development of prioritization criteria Comparative analysis of the proposed activities Identify of complementary activities and actors Development of M &E mechanisms	Outline budget of the prioritized activities Preparation of timeline Establishment of a leading agency /sector

Source: Rockefeller Foundation and ISET (2010), cited in City Working Group of Semarang City (2011).

20. Implementation.

The following is an overview of the steps that led to the development of the Climate Resilience Strategy. Details on each of these steps is available in ISET et al., 2010; and Semarang City, 2010.

1. Identifying the existing conditions of climate change impacts, vulnerability and vulnerable groups in Semarang City
2. Developing urban development and climate change scenarios and their consequences on the future
3. Formulating resilience strategies at city level in a multi-dimensional perspective
4. Translating strategies into several adaptation actions to enhance resilience
5. Prioritizing adaptation activities and preparing draft proposal of the prioritized actions

21. Monitoring and evaluation.

According to Sutarto and Jarvie (n.d.), a monitoring system still needs to be developed by Semarang city to measure the success of the activities to build urban climate resilience. They suggest that this be developed in partnership with, and for adoption by, the city government to ensure the sustainability of such a system. Since all monitoring activities generally are assigned to the responsibilities of the city government's monitoring department it would be appropriate to assign responsibilities for assessing climate-related interventions that are now part of the RPJMD to the same department. However, to date, the monitoring department has not been engaged by in the ACCCRN program, and it does not have any climate-related monitoring and

evaluation tools. The authors urge that this gap in monitoring be addressed as a matter of priority, to avoid derailing progress with resilience building and the development and implementation of unintended maladaptive actions (Sutarto & Jarvie, 2012).

22. Timeline.
The whole process, from initial engagement with ACCCRN, to the completion and publication of the Climate Resilience Strategy took close to three years.

Funding

23. Source.
Funding for the development of the City Resilience Strategy was provided by The Rockefeller Foundation, with technical assistance from Mercy Corps Indonesia and the Institute for Social and Environmental Transition (ISET), Boulder, USA.

24. Management.
Because climate change actions have been integrated into the mid-term development plan for the city, financing of these actions will be ensured through the annual city funding cycle.

Results

25. Effectiveness and efficiency.
One of the biggest concern regarding the effectiveness and sustainability of the Climate Resilience Strategy development process is government staff rotation, including that of staff in key roles. This makes it very difficult to build and further develop 'champions' for climate change resilience. As Sutarto and Jarvie point out, 'unless "champions" are in place, there is always a possibility of program interventions being cancelled and climate-related policies dropped. The risk is especially acute after 2014, when Rockefeller Foundation funding ends. An exit strategy is therefore in development to ensure ACCCRN sustainability under a city climate program.' (Sutarto & Jarvie, n.d.)

C. Looking to the future

26. Sustainability.
In Indonesia it is not clear how city adaptation plans can qualify for the national Climate Change Trust Fund. Semarang will need to identify what it can do by using its own resources (financial, human, and other) at an early stage, to ensure financial sustainability of climate change resilience work in the long run.

27. Replication.
The aspiration of the ACCCRN pilot work is to create replicable examples of urban resilience planning processes that have proven to work. Until the end of ACCCRN's current funding in 2014, much of the network's activities are focused on replication and dissemination. It needs to be acknowledged that the Indonesian government system, like all government systems, has significant intricacies and unique policy processes in place. This puts limitations on the extent to which the exact integration process used for Semarang can be replicated in cities outside of Indonesia. However, the Semarang example shows that it is possible to integrate climate change considerations into existing and ongoing urban planning and development processes.

28. Scaling.
The ACCCRN process focuses specifically on the city level. Upscaling this process, e.g. to higher levels of government, would entail a new set of governance arrangements that would need to be considered.

D. Additional information

29. Sources.

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