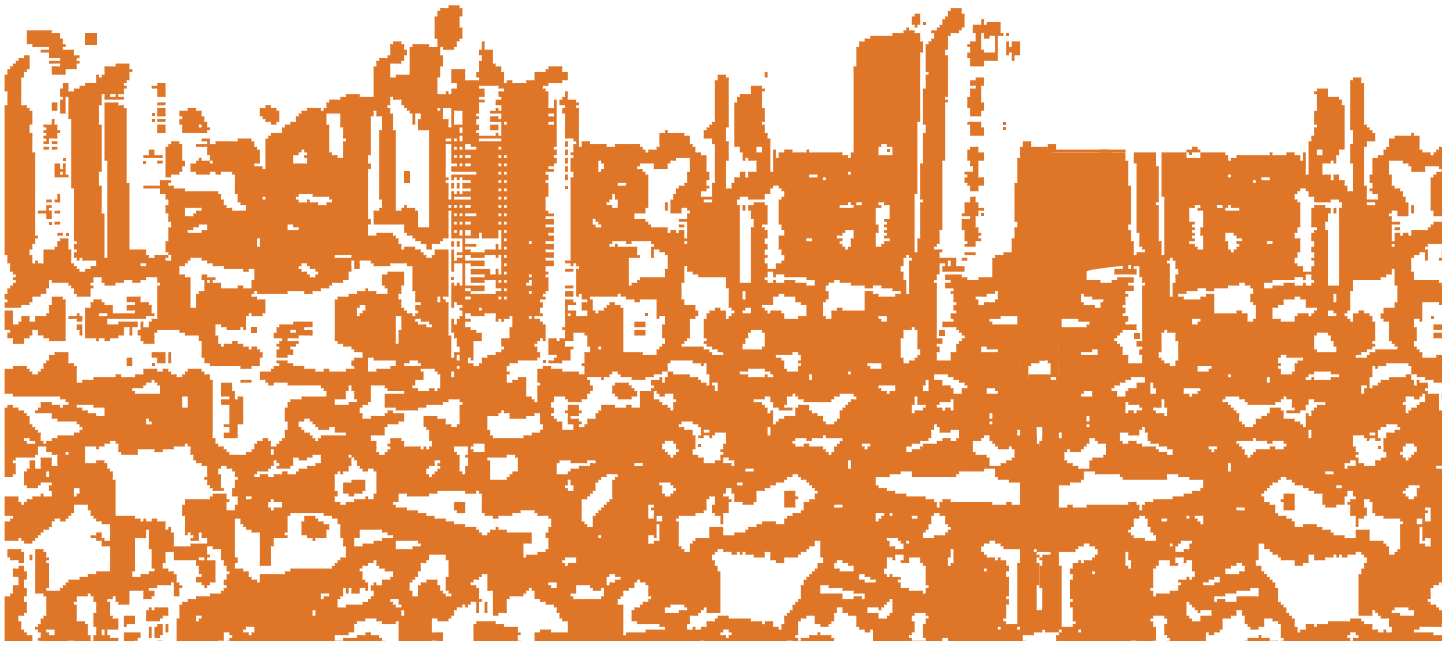
Asian Cities Climate Resilience

WORKING PAPER SERIES 39: 2016

Mainstreaming gender in climate change adaptation

A case study from Cirebon, Indonesia

NILA ARDHYARINI H. PRATIWI, YOVI DZULHIJJAH RAHMAWATI AND IVO SETIONO



About the authors

Nila Ardhyarini Hayuning Pratiwi is a researcher in Urban and Regional Development Institute (URDI), Indonesia. She is responsible to conduct research and training with more than five years experience in urban development, environmental management and climate change adaptation. She was involved in several collaboration studies and disseminations related to climate change vulnerability and adaptation between URDI and other institutions, including Mercy Corps through Asian Cities Climate Change Resilience Network (ACCCRN), Asian Institute of Technology (AIT), Abt Associates under Millenium Challenge Corporation (MCC) Compact Program, Climate and Land Use Alliance (CLUA), and United Nation Population Fund (UNFPA). Email: nila@urdi.org; nila.ahp@gmail.com

Yovi Dzulhijjah Rahmawati is a researcher in Urban and Regional Development Institute (URDI), Indonesia. She has more than three years experiences in spatial planning, urban and regional planning, and climate change issues. She was involved in guideline formulation of how to integrate spatial planning and development planning at provincial level, and lately she was involved to conduct study related to climate change with Climate and Land Use Alliance (CLUA)and United Nation Population Fund (UNFPA).Email:yovi@urdi.org; yovi.dzulhijjah.r@gmail.com

Ivo Setiono is a program director in Urban and Regional Development Institute (URDI), Indonesia. He is responsible to lead a research team to prepare a research proposal, supervise the research and program implementation, and build network with national and international stakeholders. He has more than ten years experiences in public policy and urban governance such as provide technical assistancefor local government in formulation ofthe local development plan starting from long-term, medium-term and annual plan.Ivo Setiono involved in several studies related to climate change with Mercy Corps through Asian Cities Climate Change Resilience Network (ACCCRN), Abt Associates under Millenium Challenge Corporation (MCC) Compact Program, Climate and Land Use Alliance (CLUA), and United Nation Population Fund (UNFPA).Email:i.setiono@urdi.org;i.setiono@gmail.com

Acknowledgements

The authors would like to thank International Institute for Environment and Development (IIED) that supported this research, especially to Diane Archer who provided valuable insight and guidance that greatly assisted in the writing of this report. We thank our colleagues Wahyu Mulyana as Executive Director of URDI for his advice during implementation of this research, Joihot R. Tambunan who helped to create spatial data or maps, and Dini Arias Pitaloka as a local research partner who assisted the research team to conduct field survey and focus group discussions. We would also like to show our gratitude to Agung Kemal (Development and Planning Board of Cirebon City), Yoyon Indrayana (Public Work Agency of Cirebon City), Dangi (Development and Planning Board of Cirebon District), M. Danny Fulton (Human Settlement and Spatial Planning Agency of Cirebon District), Mimin (Kesepuhan Village) and Ii Fariyani (Pegagan Lor Village) and local communities of both villages as resource persons for this research.

Abstract

Climate change is not only affecting geophysical systems through events such as floods, droughts, and sea level rise, but also human systems, including livelihoods, health, economies, and cultures. In Indonesia, climate change greatly affects many aspects of the economy, society, and environment. Cirebon is a coastal area in West Java Province that is particularly vulnerable to sea level rise, coastal flooding and long-term drought.

The vulnerability of individuals to climate change will differ depending on their adaptive capacity. In terms of gender, men and women have different needs and face different challenges in dealing with climate change impacts. Therefore, gender inequality is a critical issue with regard to climate change adaptation and it is not yet mainstreamed into local climate adaptation policy. This study seeks to analyse gender dimensions in the context of climate change vulnerability in the Cirebon coastal area and to mainstream gender sensitivity into local climate adaptation policy and strategy.

It is generally acknowledged that women are more vulnerable to the impacts of climate change than men. Accordingly, a gender analysis in the context of climate change impact is required to describe the variations in gender conditions and socio-economic aspects by investigating women's education and literacy, livelihoods, access to and control over resources, health, mobility, status in female-headed households, and their roles in decision making. In order to increase further understanding of this issue, gender mainstreaming in climate change adaptation policy and programme is therefore critical.

Contents

List of tables and figures

1 Introduction

1.1 Background

Climate change caused by human actions has led to recent increases in global temperatures which affect precipitation patterns and result in extreme weather events (WHO nd). Coastal areas have a high degree of vulnerability to climate change, with sea level rise causing significant increases in wave height and ocean temperature and a knock-on effect in the frequency and intensity of wind speed. The impacts of climate change are likely to aggravate problems that coastal areas are already facing (Zikra 2015).

These impacts are further exacerbated by an increasing amount of human activity in coastal areas. Most of the world's coastlines are now inhabited by humans (Buddemeier *et al.* 2002 in Nicholls *et al.* 2007). Coastal population growth in many of the world's deltas, barrier islands and estuaries has led to widespread conversion of natural coastal landscapes into areas for agriculture, aquaculture, silviculture, as well for industrial and residential use (Valiela 2006 in Nicholls *et al.* 2007). Increasing human activities around coastal areas have serious consequences (McGranahan *et al.* 2007). On the other hand, human activities themselves can be a trigger in the climate change process (Nicholls *et al.* 2007).

Indonesia is the world's largest archipelagic state consisting of more than 17,500 islands and over 81,000 kilometres of coastline. The coastline of Indonesia is highly populated with around 220 million residing within 100 km of the coast, and over 150 million people relying on marine resources for their livelihoods (WRI 2001 in Zikra 2015). Activities along the coast and in the ocean, such as marine transportation, offshore industries, the naval industry, resource extraction, fish cultivation and tourism, have become an important part of Indonesian economic growth (Zikra 2015). The combination of high population density and high levels of biodiversity makes Indonesia one of the most vulnerable countries to the impacts of climate change (Nicholls *et al.* 2007). Climate change greatly affects the health and livelihoods of the poor communities that live on the coast; those dependent on agriculture are greatly affected by droughts, sea level rises, floods, and landslides (World Bank 2010 in Measey 2010).

1.2 Goal and objectives of the study

Men and women have different roles, behaviour and attitudes towards mitigating and adapting to climate change. Several surveys showed that, in many countries, men consume more energy than women, particularly for private transport, while women are often responsible for most of the decision making around household consumption, including food, water and household energy.

The role of women in taking preventive measures to minimise the impact of climate change is important. Women often create opportunities to adapt to climate change because they have a strong social networking potential at the neighbourhood level and can act as agents of change at different levels. To ensure equality between men and women in adaptation processes, gender mainstreaming in policies and programmes related to climate change adaptation is critical, and is not yet an integral part of local climate adaptation policies.

This study seeks to answer the following questions:

- How can the processes of local climate change adaptation policy in Indonesia take into account gender equality, using the Cirebon area as a case study?
- How can government institutions in Indonesia, both at national and local level, help to reduce gender gaps in adaptation programmes, in particular in relation to climate change impacts?

Its specific objectives are:

- To analyse gender dimensions in the context of climate change vulnerability and gender representativeness in the process of local development planning in Cirebon coastal area.
- To review policies, plans and programmes related to climate change adaptation at national and local level.
- To analyse strategic issues on mainstreaming gender in climate change adaptation and key factors hindering the mainstreaming.
- To formulate gender-sensitive strategies and systematic steps to mainstream gender in climate change adaptation.

1.3 Structure of the paper

This working paper is divided into six chapters. Chapter 1 gives a background and purpose of the study. Chapter 2 explores literature on gender, climate change and adaptation, and briefly discusses gender-related policies – both global and local – in Indonesia. Chapter 3 outlines the approach and methodology that has been used in this study and describes the study areas. Chapter 4 outlines the results of the gender analysis in the context of vulnerability to climate change in the study areas. Chapter 5 uses socio-ecological models to discuss the capacity of women to face climate change impacts. Chapter 6 sets out policy recommendations, in particular how to integrate gender dimensions into climate change adaptation. The paper ends with some conclusions in Chapter 6.

2 Gender and climate change adaptation

2.1 Climate change impacts and vulnerability

Climate change is one of the greatest challenges facing humanity, with vulnerable populations being most affected. The IPCC observed three main impacts of climate change related to population issues: (i) vulnerability and exposure arising from non-climatic factors and from multidimensional inequalities; (ii) impacts from recent climate-related extremes; and (iii) climate-related hazards which exacerbate other stressors (IPCC 2014).

Vulnerability is a central concept in climate change research as well as in natural hazards, disaster management, ecology, public health, poverty, sustainability science and land use research (Füssel 2007). It is defined as a systemic characteristic associated with a range of factors, including ecosystems, water, food security, human settlements and health (IPCC 2012). A system's vulnerability refers to the degree to which it can cope with changes and its susceptibility to change (Parry 2007). Therefore, the level of risk associated with negative impacts of climate change is dependent on the extent of climate hazards, the level of vulnerability of different elements to the hazard, and the capacity to adapt.

The IPCC defines vulnerability as "the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC 2001). Hence, vulnerability is a function of all three terms and describes the 'future (or long-term) vulnerability of any natural or social system to global climate change' (IPCC 2001). The greater the exposure or sensitivity and the lower the adaptive capacity, the greater the vulnerability.

The IPCC also observed that human populations vary in their vulnerability and exposure to the impacts of climate change. As mentioned, non-climatic and multidimensional inequalities may be factors – the vulnerability of a population depends on various structural and politically-determined characteristics. In addition, the IPCC noted that the poorest groups in the poorest countries have the least ability to cope with climate change. Due to their lack of access to material and information resources, poor populations will be put at the greatest risk from climate change impacts (IPCC 2014).

The uncertainty and severity of climate change necessitates the involvement of policy makers at national and local levels in addressing its impacts. Policy makers need to formulate strategic plans for climate change adaptation, focusing on vulnerability reduction and resilience enhancement. These plans must be included in city development plans so that policies and programmes are endorsed by the government. The involvement of a range of stakeholders is also important to ensure effective implementation of the policies and plans. Since adaptation is a multidisciplinary issue that cuts across policies and sectors, gaining political backup and managerial commitment is crucial when developing an adaptation strategy.

2.2 The gender dimensions of climate change

Gender inequality is a major factor which contributes to the increased vulnerability of women to climate change impacts. UNDP (2010) states that "women are vulnerable not because of natural weakness (ie because of their sex), but rather because of socially and culturally constructed roles (ie because of their gender)". Given extreme gender inequality, particularly in the developing world, climate change is likely to magnify existing patterns of gender disadvantage due to several factors, such as: limited access to resources, dependence on natural resources, sexual division of labour, lack of education and access to information, limited mobility, and limited roles in decision making (UNDP 2010) as illustrated in Figure 1.

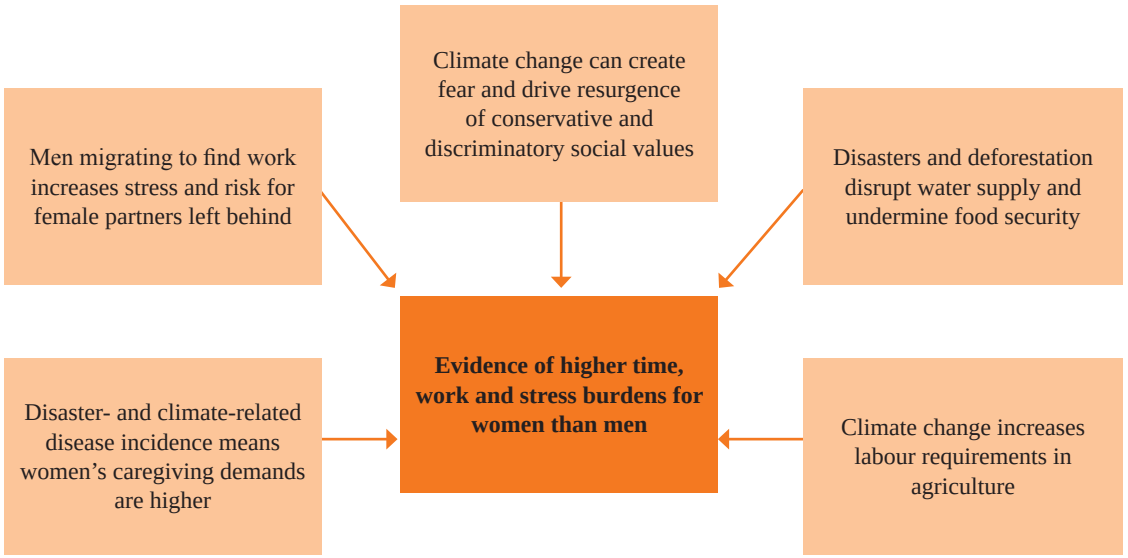
Women are often less able to adapt to climate change than men; they represent the majority of low-income earners and generally have a lower level of education when compared with men (Lambrou and Piana 2005). In rural areas, they are often denied the right to property and land, which makes it difficult for them to access credit and agricultural extension services (Lambrou and Piana 2005). Gender inequality also occurs in urban areas, where women usually suffer disproportionately. On average, they are poorer than men, and they also have difficulty in accessing resources and services to fulfil their needs and have fewer decision-making opportunities (UN Women nd).

There are some common factors accounting for the discrepancy between women's and men's differentiated exposure and vulnerability to climate change risks. Those include gender constructions, as well as differences in access to assets and credit. Differences are also related to the way men are women are treated by the market and formal institutions, including the legal and regulatory framework which constrains opportunities for women. As a result, there is a global gender gap in wage and productivity – women make between 30-80 per cent of what men earn annually (Conor 2016). In addition, two thirds of the 743 million illiterate adults in the world are women (UNESCO and UIS 2013). The cumulative effects of poverty and social, economic and political barriers often cause women to be disadvantaged when coping with the impacts of climate change (UN Women 2009).

Second, compared with men, women face huge challenges in accessing all levels of policy and decision-making processes. This renders them less able to influence policies, programmes and decisions that impact their lives. Third, socio-cultural norms can prevent women from acquiring the information and skills necessary to escape or avoid hazards (Röhr 2007). Similarly, women's roles in looking after the family can restrict their mobility in times of disaster, as they are responsible for children and the elderly. Such social influences render women disproportionately vulnerable to disasters and to the negative effects of climate change. Fourth, a lack of sex disaggregated data in all sectors (eg livelihoods, disaster preparedness, environmental protection, health and well-being) often leads to an underestimation of women's roles and contributions.

In many cases, women and men have similar levels of awareness about climate change. However, because women and men have different gender roles in their daily activities, they may feel and be impacted by these changes in different ways (UNDP 2015). For example, women may be more concerned about the health impacts of clean water shortages or about the difficulty of finding affordable household fuel, while men may be more concerned about the lack of employment caused by flooding or drought. Depending on the country, women and/or men may be impacted by higher workloads in agriculture.

Figure 1: Gender inequalities exacerbated by climate change



Source: UNDP 2015

In Indonesia, culture, history, and social constructions in general play an important role in shaping gender inequality (BAPPENAS 2012). Gender stereotypes and traditional views of women's roles disadvantage women, which makes it difficult for women to participate equally in social, economic, and political life. While Indonesian women are active in several aspects of public life and face no legal barriers, most professional areas still continue to be dominated by men (Asia Foundation 2012). In the other words, the challenges to gender equality in Indonesia are discriminatory attitudes, which tend to prevent women from gaining economic rights, property ownership and land inheritance, access to credit, wages and workplace benefits, and livelihood opportunities (UN nd).

The process of climate change adaptation is not gender neutral. There are different ways to look at gender aspects which are related to policies, strategies, and projects. Both men and women have different bodies of knowledge (including traditional knowledge), skills, and experience which can contribute to their strategies. There are many examples which show that women's participation has been crucial to community survival. In Indonesia, women have shown themselves to be important and creative agents of change in the forestry sector and play important leadership roles. Women can prove to be `the cushion' of local households and communities through their diversification of livelihood strategies in the informal sector (BAPPENAS 2012).

Accordingly, we can recognise that the roles and responsibilities of women and men in society not only determine the resources they have, but may also expose them to different types of risks. Gender is an important analytical framework because it highlights the different ways women and men manage risks and access opportunities, as well as the implications of reducing the impacts of climate change reduction resulting from these differences. Climate change adaptation should therefore be gender responsive to reduce women's vulnerability and augment their roles in the decision-making processes of planning and implementation.

Box 1: Definition of terms

Gender refers to the roles, behaviours, and activities that a given society, at a given time, considers appropriate for men and women. Gender also refers to relations between groups of women and groups of men. These roles and attributes are socially constructed and learned through socialisation processes.

Gender analysis refers to careful and critical examination of how differences in gender roles, activities, needs and opportunities affect men and women in certain situations. A key element of gender analysis is the examination of women's and men's access to and control of resources—especially economic, natural and knowledge resources and access to and control of time.

Gender equality refers to roles, responsibilities and opportunities of women and men. Equality does not mean that women and men will become the same but that their roles, responsibilities and opportunities will not depend on whether they were born male or female.

Gender mainstreaming refers to the process of assessing the implications for men and women of any planned action, including policies or programmes, in all areas and at all levels. It is a way to ensure women's and men's concerns and experiences are an integral dimension of all development efforts.

Gender responsive refers to outcomes that reflect an understanding of gender roles and inequalities and which make an effort to encourage equal participation and equal and fair distribution of benefits. Gender responsiveness is accomplished through gender analysis and gender inclusiveness.

Source: Modified from UNDP 2015

2.3 Gender mainstreaming in climate change policy processes

It is recognised that gender-sensitive priorities and processes need to be mainstreamed at all levels of negotiations and decision making around climate change mitigation and adaptation as noted in the Beijing Platform for Action in 1995, and defined by the 1997 United Nations Economic and Social Council (ECOSOC): "Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension in the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality" (ECOSOC 1997). Thus, it is believed that without adopting the principles of gender equity at all stages of the process –from scientific research, through to analysis, agenda formation, negotiation and decision-making, regime implementation, and in further development and evaluation – the process of climate change adaptation and mitigation will not be successful.

However, even though the concept of gender has been enshrined as a human rights issue in a number of declarations and conventions, it is a concept which is still rarely addressed in relation to climate change policies. It is in the remit of all governments who are part of international negotiations on climate change to ensure that gender concerns are reflected in policies and related programmes.

Although the implementation and research on linkages between gender and climate change still leaves much to be desired, gender mainstreaming is not just about involving women in the climate change prevention processes. It is necessary to look at the experience and interests of women and men in the development process, and re-imagine these realities in such a way that existing challenges in the social structures are on a level playing field. Gender mainstreaming goes beyond counting the number of women and men in a room. Rather, gender mainstreaming addresses the gender inequalities that are at the core of a project, policy or process, and leads to more gender-sensitive actions.

In response to the challenges and opportunities posed by climate change, the Indonesian government has considered that adaptation and mitigation have to be integrated as cross-cutting priorities at the National Medium-Term Development Plan 2015-2019. Even though Indonesia is one of the countries that has not determined the target reduction in greenhouse gas emissions quantitatively, it has however voluntarily committed to reduce its emissions. This commitment is outlined in the National Action Plan to reduce greenhouse gases (RAN GRK) through Presidential Decree No. 61/2011 and 33 Regional Action Plan (RAD GRK), stipulated under the regulations of the governor. Emission reduction measures coupled with adaptation measures were finalised in the action plan in 2013. In addition, Indonesia has also committed towards creating an enabling environment during the 2015-2019 period that will lay the foundation for more ambitious goals beyond 2020. This is by supporting empowerment and capacity building through improved provision of basic services in health and education, technological innovation, and sustainable natural resource management (Republic of Indonesia INDC 2015). Furthermore, the government also supports the importance of gender equity and women's involvement in climate change issues by improving the understanding, commitment and ability of decision makers and stakeholders in relation to the importance of integrating a gender perspective, including strengthening gender mainstreaming in planning and budgeting.

Local government efforts in supporting adaptation through service provision including governance, planning and asset management (River 2006; Leiter 2011) is an important key in adaptation initiatives. Local governments are the main actors in enhancing the community's ability to adapt to climate change. This can be done for example by supporting and cooperating with associated organisations to promote community engagement, spread the knowledge required and explain the necessity of local cooperation in the design and implementation of local policy and programmes. Local governments can interface with climate change through three instruments: (i) local planning and regulations; (ii) delivering goods and services, and (iii) local fiscal revenues (UNDP, UNCDF and UNEP 2010). However, despite the increasing awareness of climate change challenges among policy makers, climate change and environmental issues are not effectively integrated at policy and programme level. The lack of coordination among local government agencies to facilitate integrated development and implementation programmes is one of the main challenges in mainstreaming climate change in local planning and budgeting.

3 Approach and method

3.1 Approach

This research employed mixed methods, combining quantitative and qualitative analyses, using statistical data processing and explanatory and comprehensive analysis respectively.

In the explanatory analysis, qualitative linkages were built between the issues and case study in Cirebon and their influences or impacts. This explanation was built based upon general academic understanding and empirical studies. This analysis showed the gender dimensions associated with the phenomena of climate change in Cirebon (leading to drought and flood), and the residents' role in carrying out adaptive activities.

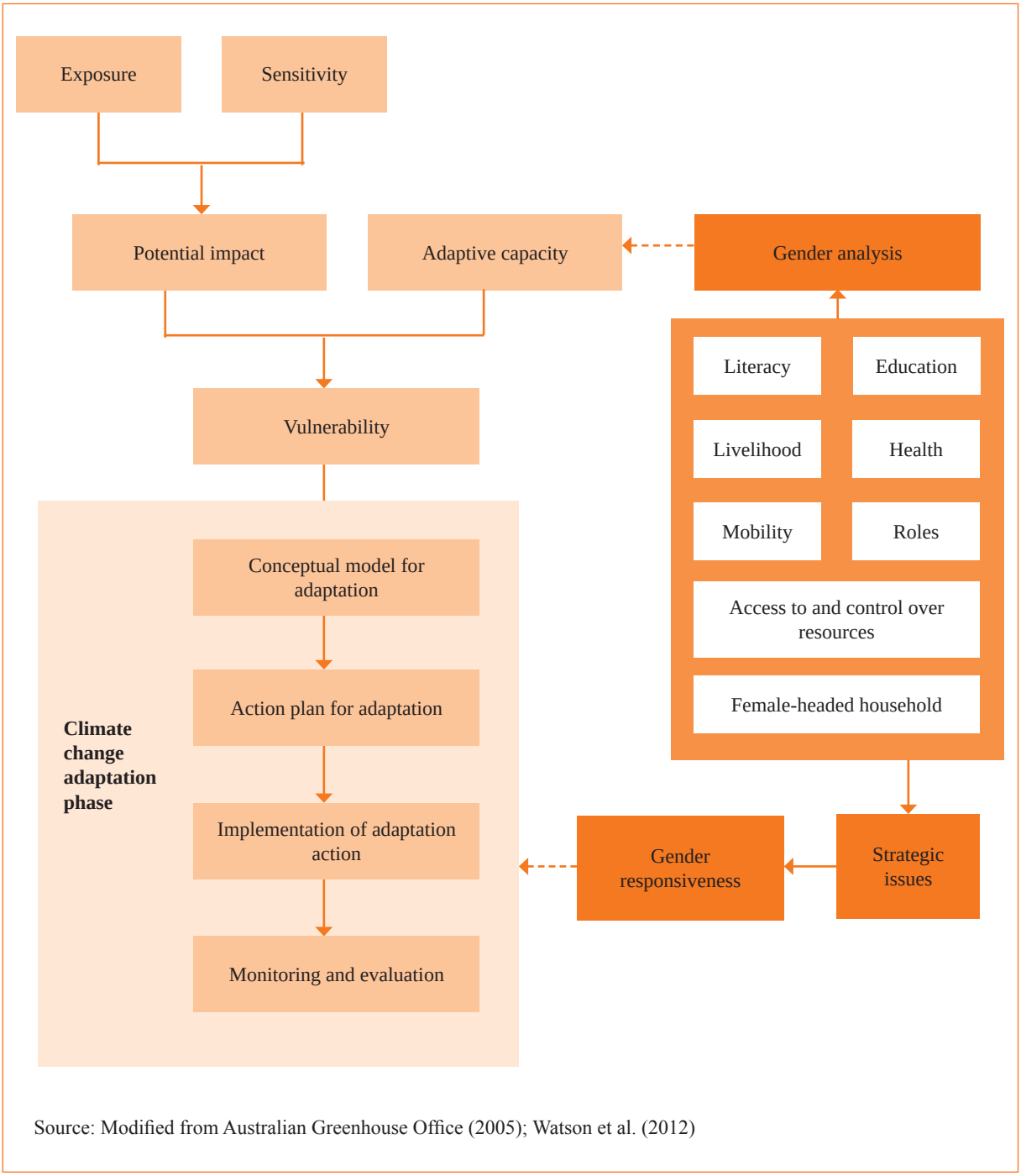
Secondly, a comprehensive analysis connected and compared the influences of adaptive capacity to climate change and the gender dimension. This comparison was based on several theoretical concepts (adaptive capacity and gender mainstreaming). The comprehensive analysis took the inputs from the sub-research questions to answer the main research questions and also provided potential solutions.

3.2 Analytical framework

An analysis of gender dimensions in the climate change vulnerability assessment was required to explain why and how the effects of climate change and gender inequality are closely linked with one another, and how both women and men face risks related to climate and vulnerability. In the climate vulnerability framework, gender dimensions can be identified as a factor influencing adaptive capacity. Adaptive capacity (in relation to climate change impacts) is defined as the ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damage, to take advantage of opportunities, or to cope with the consequences (IPCC 2007).

The gender analysis describes the socio-economic aspects by investigating women's education and literacy, livelihood and mobility, health, female-headed household conditions, access to and control over resources such as land, livestock, credit, and information (Figure 2). In addition, the differentiated roles in decision-making also need to be identified to understand community action at the village level.

Figure 2: Gender dimension and climate change adaptation framework



Source: Modified from Australian Greenhouse Office (2005); Watson et al. (2012)

Further analysis followed with the formulation of strategic issues on mainstreaming gender in climate change adaptation by using the socio-ecological model. Ecological models in the social sciences view behaviour as being affected by, and affecting the social environment (McLeroy *et al.* 1988). There are five components in the socio-ecological model, namely: individual, interpersonal, organisational, community, and public policy. In this study, the socio-ecological model was used to identify the community's challenges and/or efforts to respond to climate change by recognising the multiple factors that climate change, directly or indirectly, influences human behaviour, for both men and women. Specifically, it is used to analyse gender equality in the face of climate change impacts in the urban area, in this case represented by Kesepuhan village, and in the rural area, represented by Pegagan Lor village.

3.3 Case study areas

The impacts of climate change are already being felt in some areas along the north coast of Java. Cirebon region is a coastal city in West Java Province. The study area of this research covers two administrative regions – Cirebon City and Cirebon District, with a focus on locations along the coast. These regions are considered vulnerable to climate change impacts and it is shown by sea level rise and flooding in coastal areas and droughts in the dry season. Both study areas represent different climate change impacts due to their different characteristics.

All villages in Cirebon City are urban villages (Indonesian: *Kelurahan*), where most people work in the non-agricultural sector, while 97 per cent of the villages in Cirebon District are part of the rural area (Indonesian: *Desa*) and most people work in the agricultural sector. Both cities are affected differently by climate change impacts. The case of Cirebon City represents a flood-prone area since there are various urban settlements and other urban facilities in the coastal area, while the Cirebon district represents a drought-prone area because there is a lot of agriculture land and farmers are threatened by climate change impacts.

Cirebon City is located on the northern coast of Java Island and has a strategic position as a metropolitan hub between West Java Province and Central Java Province (Figure 3). Cirebon City is a port city and known as the economic centre of the northern coast of West Java Province. In the last decades, the city has grown rapidly, as indicated by the massive development of real estate, hotels, and other trading and service facilities.

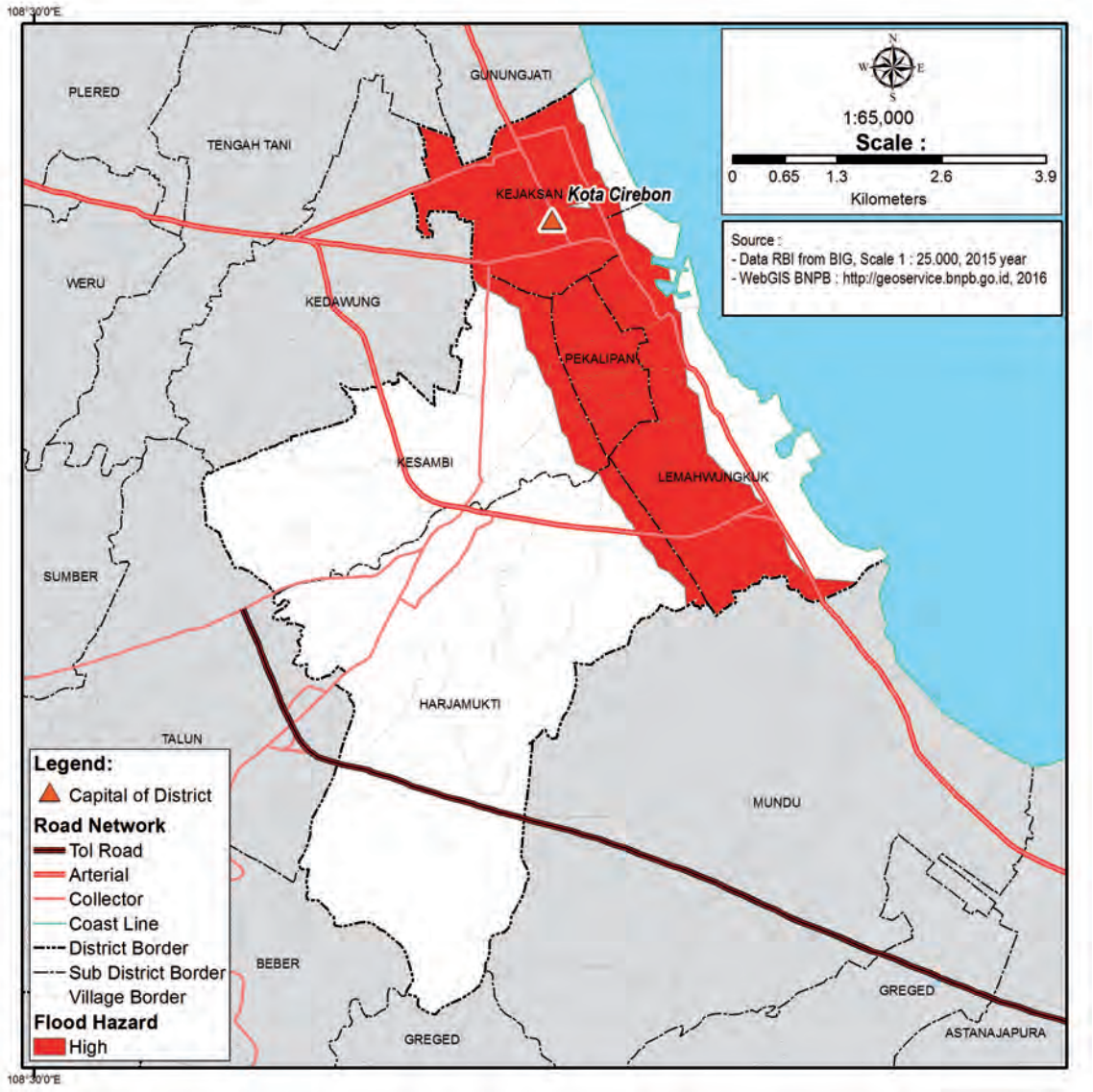
Despite its great potential in urban development, the local government has to pay attention toclimate change impacts since sea level rise, flood, and drought often occur. As a coastal city, Cirebon is at the mouth of many rivers in Cirebon area. In addition, as the slope of the land is gentle, the water flow into the city is very slow. In addition, the destruction of forests in upstream areas, such as Ciremai Mountain, and the decreasing number of green areas, have increased climate hazards, as indicated by the intensity of floods that occur in the city. This has increased sedimentation in the coastal area.

Figure 3: Cirebon City and Cirebon District area

Based on a Hazard Map for Flood from the National Agency for Disaster Management (BNPB) (2015), developed by using several indicators consisting of geomorphology, a total of 1,143.78 hectares of land is at risk of flood due to increased rainfall and sea level rise (Figure 4). This area includes 16 villages in Cirebon City. Around 174,000 people, or 57 per cent of the total population in Cirebon City, live in high risk villages.

People who live in the hazard area are vulnerable to climate change impacts and need to prepare for disasters. Usually, when flooding comes to the area, people who live along the river save their valuables and go to the community centre as the evacuation point. In order to minimise greater losses, some people invest in elevating their house or build a second floor, but many cannot afford this. Therefore, measures must be taken to increase their capacity to face climate change impacts, so that they can reduce their vulnerability.

Figure 4: High level hazard area for floods in Cirebon City



Cirebon City has a strong linkage with Cirebon District, especially in relation to food consumption, since food crop yields in Cirebon District are also distributed to Cirebon City. The agricultural sector accounts for 28 per cent of the GDP of Cirebon District, indicating that it is an agrarian region that still depends on an agricultural economy. However, climate change impacts could influence the long dry season, resulting in drought events. Based on the Hazard Map for Drought from National Agency for Disaster Management (BNPB) (2015) developed by using indicators consisting of annual rainfall and land cover, Cirebon District has a medium threat to drought, whilst there is no area with a high threat to drought (Figure 5). However, 99 per cent of the total agricultural land in Cirebon District is threatened by drought, which could affect up to 185,075 farmers.

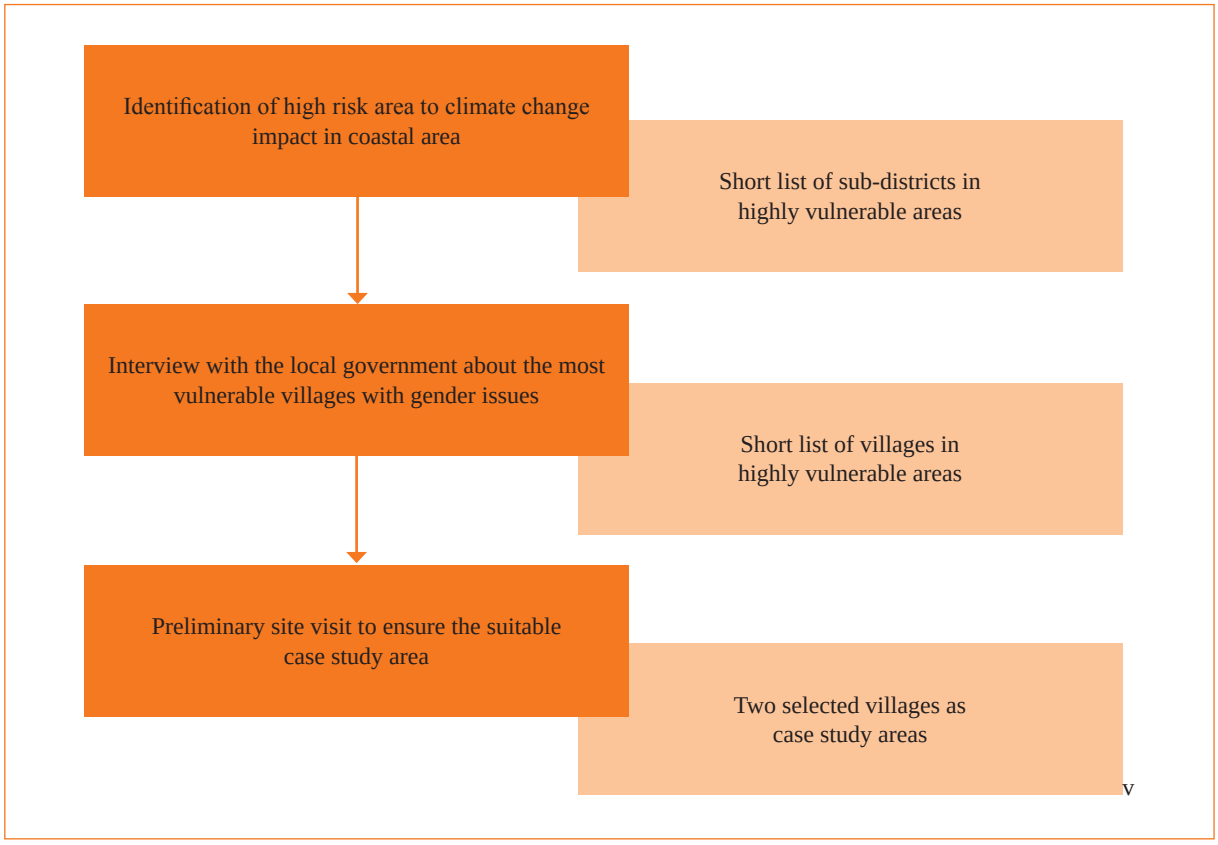
Figure 5: Medium level hazard area for drought in Cirebon District

The impacts of climate change threaten agricultural production systems and can lead to declining agricultural production due to crop failure in thousands hectares in Cirebon District. This happened in 2015 due to the El Niño phenomenon. Fourteen out of 40 sub-districts were threatened by drought. This lead to a decrease in farmers' income and forced them to seek other jobs in order to meet their daily needs. In addition, drought also causes difficulties for people to access drinking water, especially for those who rely on groundwater wells as their main source, and they have to buy water for domestic purposes, such as bathing, washing and cooking.

The difference in the capacity of the population is an important consideration for policy makers when formulating climate change adaptation policy or programmes. Accordingly, this study seeks to highlight the gender dimensions in climate change vulnerability at village level in Cirebon City and Cirebon District relating to different climate-related hazards, to understand more deeply women's roles and capacities to adapt to climate change impacts.

In general, the selection process of the case study areas involved: (i) Identification of high risk area to climate change impact based on the vulnerability assessment results under ACCCRN's programme[1] in Cirebon City, and identification of the sub-district which is the largest contributor to agricultural production in Cirebon District and which has a high annual drought event; (ii) interviews with the key stakeholders (such as local development planning board officers and village heads) pertaining to the most vulnerable villages and gender issues, and (iii) a preliminary site visit to ensure the appropriateness of the case study area (Figure 6). Based on those steps, two villages were selected, namely Kesepuhan Village in Cirebon City for flooding issues, and Pegagan Lor in Cirebon District for drought issues. The selected study areas indicated that men and women share their roles in disaster preparedness, in working to earn their livelihoods, and in taking care of domestic matters.

Figure 6: Case study area selection process



3.3.1 An overview of Kesepuhan Village

Kesepuhan is well-known for tourism in Cirebon City, since there is a heritage site, namely Kasepuhan Palace, in the area. This village is located in Lemahwungkuk sub-district (Figure 7). This village borders with the Java Sea and the North Coast Road (Indonesian: *Jalur Pantai Utara* or *Jalur Pantura*) passes through it, connecting West Java Province, Central Java Province and East Java Province. The total area of the village is 64 ha, at an altitude of two metres above sea level. The majority of land is characterised by high-density settlements with more than one household living in one house, and there are a total of 3,679 households. There are various urban facilities in this village, in particular trade and service facilities along the *Pantura* Road. At the north side of the village, there are fish ponds owned by local communities, as well as mangroves to protect the area from coastal erosion.

1 *The Asian Cities Climate Change Resilience Network (ACCCRN) programme is a multi-year initiative to build city resilience in the face of climate change, and is funded by the Rockefeller Foundation.*

The total population in Kesepuhan is 14,716 people (BPS 2015a). This village has a high population density of about 230 people per hectare. Most of the residents work in the service sector, such as commerce (about 40 per cent). They sell various products like food, handicrafts, household appliances and they also carry out car repairs. Only a few people work in the fishery sector, mostly located in the other village.

Kesepuhan is vulnerable to flooding due to its geomorphology. It is located at the downstream area of many rivers in Cirebon with Kuningan District at the upstream area of the south of Cirebon. The major problem of flooding in this area is due to the overflow of the river especially when heavy rain and high-intensity rainfall come at the same time. The condition of the village is getting worse because about 230 houses and 252 households are settled along the riverbank (BPS 2015a). This leads to a reduction in the river water velocity and disrupts river maintenance due to limited available space to clean the river. Overall, there are five locations of urban slum areas in the village with high-density settlements as well as poor water and sanitation access (Figure 8). The local statistics bureau noted that there are 840 unit houses with 866 households in the slum areas (BPS 2015a). Both riverbank settlements and slum areas are exposed to climate change impacts, which further degrade the quality of the environment in the area. The number of riverbank settlements and slum areas are increasing every year due to an influx of migrants from rural areas. In short, since this area has strong associations with poverty and poor health, local government attention is needed to reduce the vulnerability of the population, and at the same time increase their capacity to face climate change impacts.

Figure 7: Kesepuhan Village area

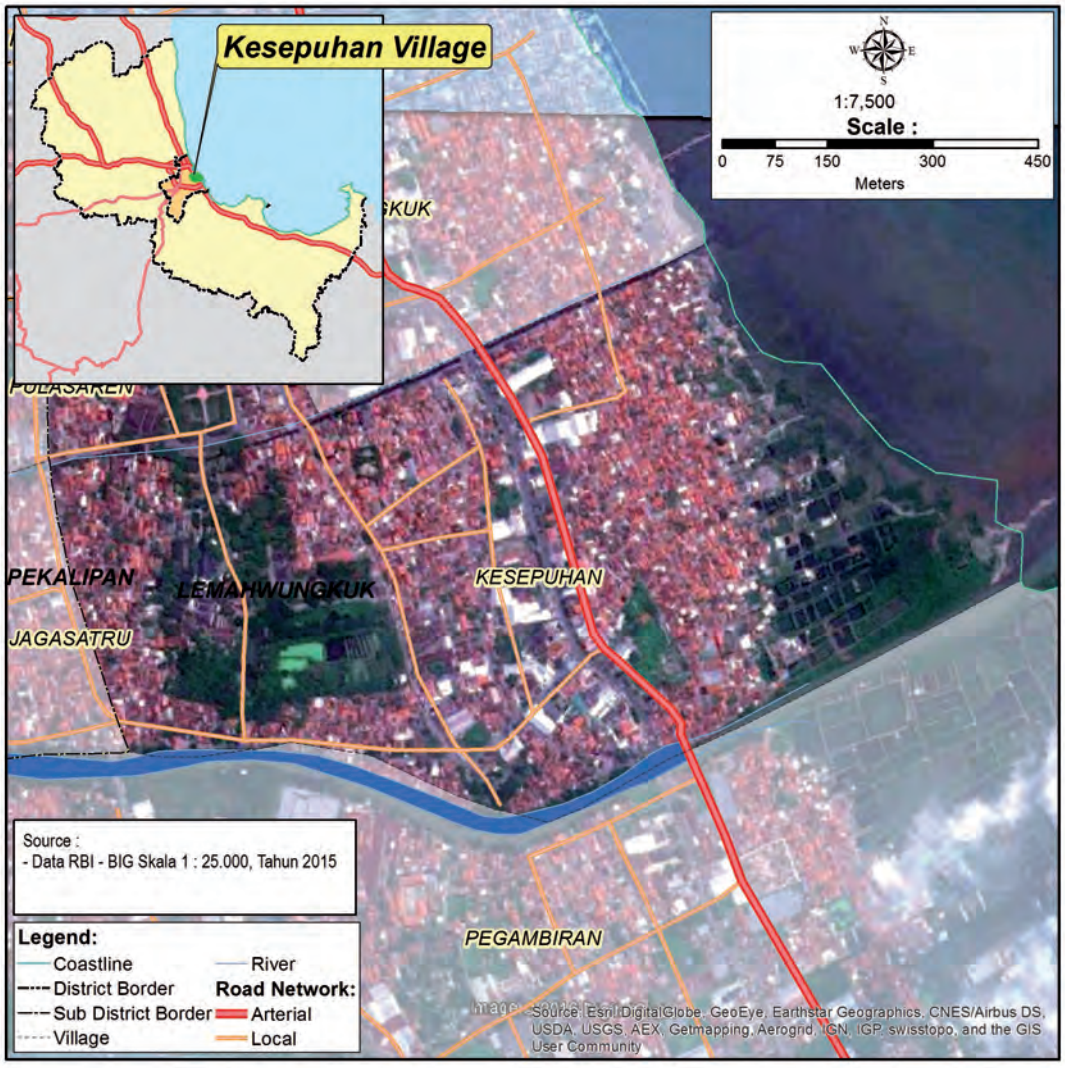


Figure 8: Settlement conditions in Kesepuhan Village

Photos by Nila Ardhyarini H. Pratiwi

3.3.2 An overview of Pegagan Lor Village

Located at Kapetakan sub-district, Cirebon District, Pegagan Lor Village borders with the Java Sea and the North Coast Road passes through it (Figure 9). The total area of Pegagan Lor is 572.90 ha, at an altitude of 2 metres above sea level. The majority of land is used for rice fields; 72.6 per cent of the total area of Pegagan Lor consists of 330 ha irrigated rice and 86 ha rain fed rice (BPS 2015b). This village is one of the largest providers of agricultural commodities in Kapetakan sub-district amounting to 5,644.96 tons. The agriculture sector in Kapetakan sub-district contributes greatly to the economic development of Cirebon District.

The population of Pegagan Lor was 9,472 in 2014 (BPS 2015b). This village has low population density – about 17 people per hectare, and the settlements are located along the North Coast Road (Figure 10). Pegagan Lor consists of 2,127 households, 349 of which are female-headed (16.4 per cent) (BPS 2015b).

Livelihoods in Pegagan Lor depend heavily on agricultural land, so any long dry seasons will disrupt the rice planting season. While the agriculture sector is the main income, farmers have to think about other options of income during the dry seasons. They usually become salt farmers, seasonal labourers, or they try to find jobs in the informal sector. At the

same time, women also help their husbands by selling food or snacks; sometimes they become housemaids in order to meet the needs of their families.

Many farmers' groups are found in Pegagan Lor, with 25 members in each group, and these aim to provide a forum of communication. In addition, there is also a women's agricultural group (Indonesian: *Kelompok Wanita Tani* (KWT)) which is a programme of the Executive Agency for Food Security and Agricultural, Fisheries and Forestry Extension (BKP5K) of Cirebon District. The KWT programme is an effort to improve food security through the diversification of local food consumption in order to minimise people dependence on rice. Nevertheless, the drought has also impacted on KWT, which could not carry out any activities because many plants could not grow in the long dry season.

It can be concluded that agriculture is an important sector for Pegagan Lor and women involved in agriculture development are vulnerable to climate change impacts. Therefore a gender analysis is needed to further understand about women's livelihoods and vulnerability.

Figure 9: Pegagan Lor Village area

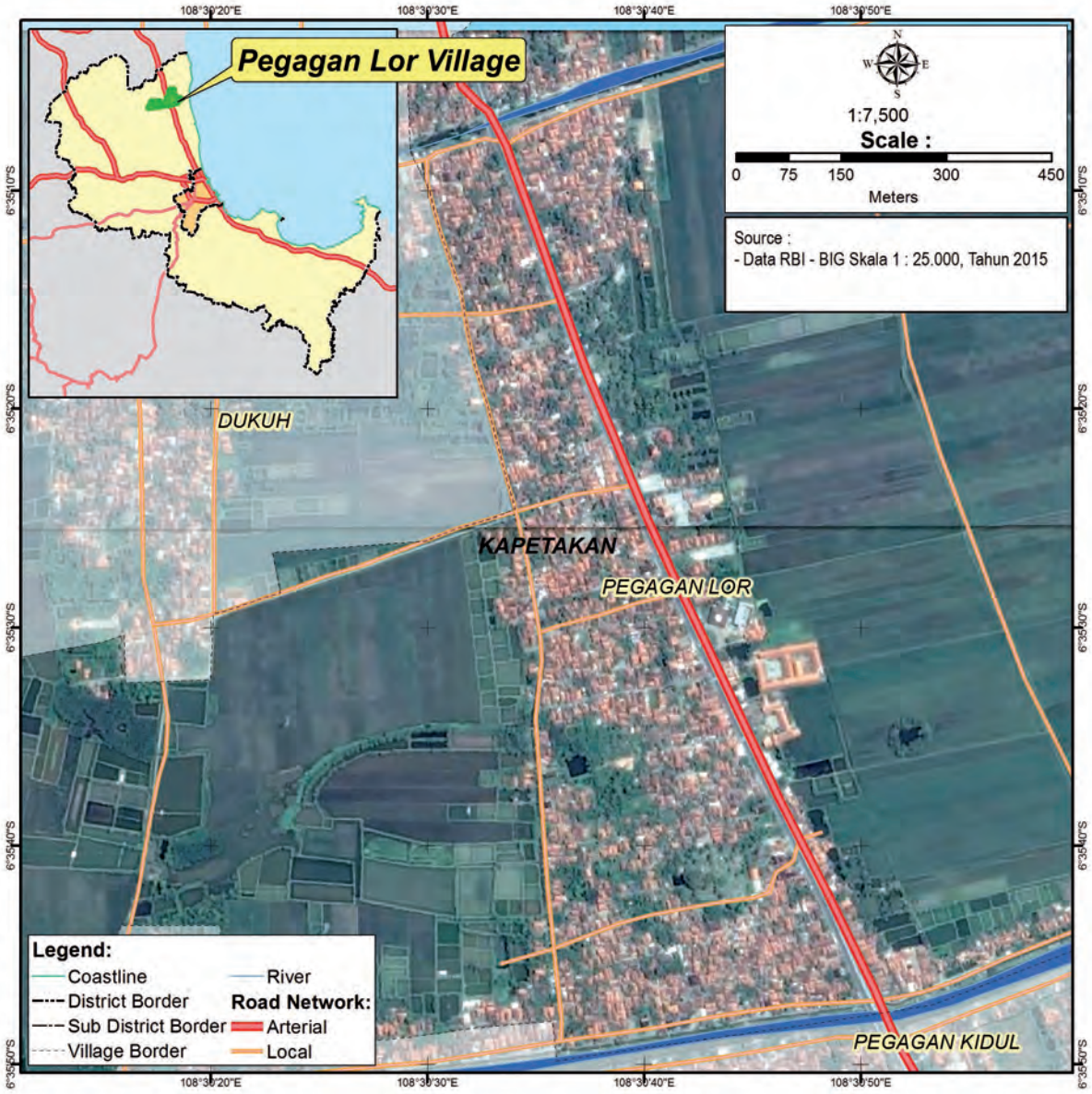


Figure 10: Settlement condition in Pegagan Lor Village

Photos by Nila Ardhyarini H. Pratiwi

3.4 Data collection

Below are the data collection techniques used to gather the required information to support the analysis of this study:

a. In-depth interviews with key stakeholders

In-depth interviews with key stakeholders at city level gathered information about policies and action that have been taken in the area. Key stakeholders included: representatives of the Local Development Planning Board (BAPPEDA), village heads, local community association that carried out adaptation action with Mercy Corps and APEKSI in Cirebon City, and community leaders.

b. Site survey

A site survey in each case study area aimed to investigate the area and interview the communities in order to gain a better understanding of gender inequality and climate change adaptation.

c. Distribution of questionnaires

Questionnaires aimed to collect detailed data and information in order to analyse the gender dimensions of climate change vulnerability. Simple random sampling was carried out in order to determine the number of respondents and divide them according to the case study area and based on a percentage of household numbers in Kesepuhan and Pegagan Lor. There were 374 respondents (Table 1); respondents were both men and women of productive ages (20 – 64 years old) as representatives of households. The number of respondents in Cirebon City was higher than in Cirebon District, therefore the results of the analysis might describe the conditions in the urban area in more detail.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{5{,}806}{1 + (5{,}806)(0.05)^2} = 374$$

where n = Number of samples
N = Total population
e = Error tolerance

Table 1: Number of respondents for questionnaires

District/City	Case study area	Number of households	Percentage of total households	Respondents
Cirebon City	KesepuhanVillage	3,679	63%	235
Cirebon District	Pegagan Lor Village	2,127	37%	138
Total		**5,806**	**100%**	**374**

d. Focus group discussions

A focus group discussion (FGD) was conducted twice in Cirebon Area. First, a FGD was carried with the local community of each study area – all participants were women including the Head of Kesepuhan Village and Pegagan Lor Village. The discussion aimed to investigate the differentiated vulnerability of women and men in the face of climate change impacts, how they respond to climate change impacts, especially when flooding and droughts occur in their area, and what kind of efforts are initiated by themselves, local governments, NGOs, universities and others to reduce climate change impacts. There were 24 participants at Kesepuhan Village and 28 participants at Pegagan Lor Village. All participants were able to give information about these issues. Then, in order to learn more, the team observed and discussed climate change issues and hazards with the local community.

A second FGD was carried out with representatives of local government institutions in Cirebon City and District. This FGD aimed to discuss gender dimensions in climate change vulnerability and how to mainstream gender in climate change adaptation. In the discussion session, we invited two resource persons from BAPPEDA of Cirebon City and Cirebon District to present climate change issues in the area, especially relating to flood issues in Cirebon City and drought issues in Cirebon District. In this session they also discussed their challenges and efforts to address these problems. In addition, the results of the gender analysis in each case study area were presented for validation. There were 30 participants and everyone gave valuable suggestions and insights to finalise this study.

3.5 Variables

In this study, the gender analysis was used as a variable of adaptive capacity related to socio-economic aspects, and the disaggregated data for men and women were presented. We used eight variables to describe people's knowledge, capacity, and opportunity to cope with or adapt to climate change impacts (Table 2).

Table 2: Variables of gender analysis

No.	Variable	Essential Value	Indicators
1.	Literacy	Literacy is a way to determine people's knowledge and livelihood. In addition, people who are able to read can be proactive, and follow rules and evacuation procedures during hazards or disasters.	■ Ability to read and write
2.	Education	The level of people's education represents their level of understanding to the risks of climate change and its impacts, and also influences their livelihood as well as income.	■ Educational attainment
3.	Livelihood	The type of livelihood indicates people's economic condition that can contribute to adapt to climate change impacts. It also can determine vulnerable groups, especially those whose livelihood depends on climatic conditions.	■ Type of livelihood ■ Average monthly income
4.	Access to and control over resources	People who can access resources indicate they have some assets to support their life which can increase their income or saving.	■ Type of asset ■ Access to financial resources (credit)
5.	Health	Disease is an indirect impact of climate change. The risk of disease outbreaks may increase due to climate changes that affect the dynamics of vector, infectious agents, and human interaction. People who have a weak immune system or have other underlying health conditions are very sensitive to diseases outbreaks such as dengue fever, malaria, tuberculosis, and diarrhoea. In addition, drinking water supply resources, sanitation, and waste management may also influence health conditions.	■ Type of disease ■ Health insurance ■ Access to health facilities ■ Access to water ■ Access to sanitation ■ Waste management
6.	Female-headed household	As the family heads, women have a great responsibility to family life as well as being preoccupied with domestic matters. They are also responsible for taking care of children and the elderly.	■ Number of female-headed households ■ Livelihood of female-headed household ■ Average monthly income of female-headed household
7.	Mobility	Climate change is a driver of human mobility that is indicated by migration as an adaptation strategy, and planned relocation as an adaptation measure of the last resort (UNHCR 2015). This study looked at displacement and migration issues based on empirical findings, and local policy in the Local Medium-term Development Plan (RPJMD) for planned relocation issues.	■ Displacement ■ Migration ■ Planned relocation
8.	Roles in decision making	People who always participate in decision-making process have a better awareness of the environment and of social relationships. They also have potential to be involved in the planning process and programme implementation of climate change adaptation.	■ Participation in social organisation ■ Participation in community discussion

Source: Author's analysis 2016

4 Gender analysis in climate change vulnerability assessments

4.1 Literacy and education

People with high quality literacy and education will be more likely to have a higher adaptive capacity to face climate change impacts because they are able to access multiple sources of information on climate change globally and locally. They can increase their knowledge about climate change and its impact through many references, and they will understand how climate change influences the occurrence of climate-related hazards, environmental degradation, epidemic diseases, etc. Accordingly, they are capable of minimising the impact of climate change on their life. People with lower levels of literacy and education may have a lack of knowledge on these issues. As a consequence, they may have less understanding on how to reduce the impacts of climate change on their life.

The surveyed population had a good literacy rate (more than 80 per cent of the total respondents). The majority of people who could not read and write are the elderly who are regarded as a vulnerable group. Furthermore, the majority of men (around 47 per cent of respondents) in Kesepuhan graduated from senior high school and the majority of women (37 per cent of female respondents) graduated from elementary school. The majority of the population in Pegagan Lor graduated from elementary school. The survey also indicated that the percentage of literacy between men and women there was slightly different. Compared to Kesepuhan, the educational attainment of the population in Pegagan Lor was lower. It means that the communities may need a different approach to increase their awareness on climate change impacts.

4.2 Livelihoods

Livelihoods become a determining factor in understanding the adaptive capacity in terms of the community's economic aspects. The community effort to respond to climate change impacts depends on their economic capacity and their income is determined by their livelihood. If their income is high, their adaptive capacity will be greater, and vice versa. In addition, the type of livelihood also describes how much people are exposed to the impacts of climate change. For instance, people who work in the agricultural sector will be more exposed because they depend on climate conditions, and drought or flood could damage agricultural lands and eventually lead to a decline in farmers' income.

Based on the sample survey, livelihoods both in Kesepuhan and Pegagan Lor are quite different. In Kesepuhan, 68 per cent of working male and 83 per cent of working female respondents work in the informal sector. Most of them sell a variety of products; they are drivers, public transport drivers, construction workers, and housemaids. These kind of jobs are the most accessible considering their background, as many only reach primary and secondary school level. Other livelihoods

include working in private companies or local government, or in factories or in the port area, or small and medium entrepreneurs.

Conversely, the majority of people in Pegagan Lor are farmers, accounting for 48 per cent of working men and 42 per cent of working women respondents. They can be divided into two types. There are farmers who cultivate their own agricultural land and farm labourers who work on land owned by other farmers. As only a few people own rice fields, the majority of people in this area work as labourers on farms due to economic reasons and skills.

However, climate change will increase risks in the agriculture sector, which is highly dependent on specific climate conditions. The changes of frequency of the dry season bring challenges to farmers since it changes the rice cultivation cycle (Figure 11). Normally, the period of paddy cultivation in Pegagan Lor is twice a year, with the highest production in September. However, in 2015, the farmers experienced only one harvest in March because of the drought that occurred from the middle until the end of 2015. The loss of the second harvest due to crop failure significantly reduced their income.

Figure 11: Impacted agricultural land in Pegagan Lor

Photos by Nila Ardhyarini H. Pratiwi

The sample survey showed that the unemployment rate for men differs slightly; 11 per cent in Kesepuhan and 16 per cent in Pegagan Lor. For women, 63 per cent are not working in Kesepuhan, and 69 per cent in Pegagan Lor. The high rate of unemployment among women is due to the fact that married women usually become housewives in accordance with Indonesian traditions.

The number of working days in Kesepuhan and Pegagan Lor is six to seven days per week and eight to twelve hours per day. This applies to both men and women. In fact, it is tougher for women because they spend half a day at work, but they also have to take care of domestic affairs and their children. Even though the working days and hours for women are almost equal to men, women get lower wages than men. The average monthly income for women is less than USD 75, while for men it can amount to USD 185. Regarding the type of work, women mostly work in the informal sector, such as commerce and housekeeping, because of the flexible time and low expenses. Despite women's limited time and skills, they still need to work in order to help their family economically. Overall, the living costs in the two villages are about USD 185 per month. Therefore, women's contributions are significant to support the economy of their family, especially for daily needs.

The low economic ability of women compared to men indicates that it would be more difficult for women to take action independently as regards certain types of climate change adaptation measures. At the same time, women have a bigger role at home since they have to manage domestic affairs and are responsible for their children, whereas men must go out to work. Therefore, women need to further their knowledge about climate change and its impacts, as well as increase their capacity to deal with climate-related hazards.

4.3 Access to and control over resources

Gender inequality can be identified as access to and control over resources (natural or otherwise) which are related to their livelihoods. The resources identified in this study are associated with the assets owned by the community such as: a) a home since it is needed for shelter from the effects of climate change; b) land such as a rice field or used for other activities as well as livestock which can increase income; c) motor vehicles which may be used for mobilisation and also a mode of transportation that can increase income; d) gold and savings as valuables for future needs. These assets have economic value that can also increase a person's capacity to respond to climate change impacts. Assets can improve people's lives because they allow them to be more resilient to the impacts of climate change. For example, people can elevate or construct the second floor of their house or they can buy more water during drought. If the community's economy improves, then quality of life will also improve so that people will be more resilient to climate-related diseases. Motor vehicles are also useful to escape to a safe area when climate-related hazards occur. In addition, this study also identified access to credit and financial services to increase income, access to information, including about climate change as well as climate-related hazards and diseases to anticipate action to address the problem.

Several researchers conclude that women tend to have less access to and control over resources, such as land, financial services, agricultural resources, extension services and technologies that could help them to overcome existing vulnerabilities. However, this study has found different results. Women in Cirebon area tend to have more access to and control over resources. The majority of family assets such as home, land, livestock, motor vehicles, gold and savings are owned by women. The assets largely derive from the legacy of their parents prior to their marriage and also from their husbands. There are also some women who acquire assets through their own efforts. Culturally, however, after getting married, the asset becomes a family asset even though properties are mostly managed by women since they have a great role to take care of domestic affairs. So it is normal for certificates of assets to be owned by women.

Due to low incomes, credit and financial services are not widely accessible in Kesepuhan and Pegagan Lor. Financial institutions such as banks and informal institutions do not want to take the risk of giving loans to the community in either area.

Beside access to economic resources, access to information is also important so as to know the latest news at local, national and global level. Almost all respondents, both men and women, obtain news or information via local television. Newspapers and radio are also used to find out information about education, jobs, entertainment and news. They also often follow news about disaster events, including natural disasters and disease outbreaks that need to be considered at times of extreme climate events.

Some people in Kesepuhan and Pegagan Lor know about the existence of global climate change, even though they do not fully understand the causes and effects. The sample survey found that men have more knowledge of climate change than women. People learn about climate change through different sources of information on climate change. In Kesepuhan, people know about these issues from television as well as from talking to people, while people in Pegagan Lor tend to understand from natural conditions especially from the sea and weather observation. For example, high waves make it difficult for fishermen to go to fish in the sea. Extreme droughts are also evident. Understanding climate change may increase community awareness to be more resilient in responding to its impacts.

4.4 Health

Health is an aspect of human welfare that is highly affected by the impacts of climate change. According to the World Health Organization, "climate change [is] projected to increase threats to human health" (WHO nd). Costello *et al.* (2009) state that the effects of climate change on health will put the lives and well-being of billions of people at increasing risk. In the case of Cirebon, climate change affects human health indirectly through the fluctuating weather changes that cause flooding and drought in several areas, which have led to the emergence of various diseases. The impact of these diseases on human health varies depending on the adaptive capacities of the individual.

A clean water supply system, a supply of drinking water, a sanitation system, a wastewater disposal system and waste management system are essential for climate change adaptation. People's ability to access the clean water and sanitation, and manage the waste disposal can indirectly demonstrate their ability to maintain their health.

a. Types of disease and treatment

Disasters and climate change will have an impact on environmental conditions, such as the quality and quantity of water, air, and soil. Based on the primary data from the survey in Kesepuhan and Pegagan Lor, we found that diarrhoea is the main disease occurring in those areas and it affects most of the people – about 11 per cent of men and 12 per cent of women respondents in Kesepuhan have been affected by this type of disease. In Pegagan Lor, 17 per cent of women and 17 per cent of men respondents were affected. Diarrhoea is a common disease after flooding and droughts, caused by water contaminated by bacteria from human and animal waste. According to the survey data in Kesepuhan and Pegagan Lor, diarrhoea generally occurs in densely populated areas.

In order to recover from the disease, people in Kesepuhan and Pegagan Lor make an effort by accessing health facilities. Their effort can be considered as their adaptive capacity to indirect climate change impacts. Based on the survey data, people in Kesepuhan and Pegagan Lor access health facilities in several ways: (1) doctor, (2) midwife, (3) community clinic (*Puskemas*), (4) clinic, (5) hospital, (6) buy medicine in drugstore, or (7) do nothing. Most people in both Kesepuhan and Pegagan Lor generally prefer to attend the community health centre (*Puskesmas*). This preference is mainly due to two factors: (1) people's economic state, and (2) the availability of other health facilities around their area. According to the survey data, most people in Kesepuhan and Pegagan Lor only have government insurance (ie BPJS) as the compulsory insurance provided by the government or they have their own finance. Generally, most of people who access this insurance are categorised as medium to low income. The BPJS medical service is mediocre because it is a subsidized facility from the government. The medical expense rate insured usually ranges below USD 75. People with BPJS are usually directed to community health centers (*Puskesmas*).

b. Access to water

Water is vital for human survival and to carry out essential activities, such as producing food, clothing, and even computers. According to the UN, the use of water has been growing more than twice the rate of the population increase in the last century. By 2025, there will be about 1.8 billion people who live in areas plagued by water scarcity, with two-third of the world's population living in water-stressed regions as a result of use, growth, and climate change (National Geographic nd).

Clean Water Supply System

Cirebon is one of the districts in West Java Province where its main clean water supply is from several large rivers. Clean water from the rivers is distributed to the people through pipelines coordinated by PDAM (local water enterprise), and the service is paid on a monthly basis. Based on the primary data in this study, people in both Kesepuhan and Pegagan Lor villages access clean water to fulfil their domestic needs through four sources: (1) bought water (in jerrycans), (2) water pipes (personal property), (3) water pipes (neighbour's property), and (4) well. Wells are usually for communal use by several households.

Some people need to buy clean water because they have no access to PDAM pipelines. The lack of accessibility to the pipelines is usually due to two reasons: (a) the economic condition of the people, (b) the lack of PDAM supplies in the area. The economic condition means that people do have no enough money to pay the monthly charge to PDAM. The lack of PDAM supply in the area means that PDAM has not yet completed the building of pipelines in that specific area.

Most of the people who access the clean water supply through wells do not have enough money to pay the PDAM charge, or they prefer to access ground water in order to minimise the costs to the PDAM. However, people who have enough money and live in areas with access to PDAM, meet their domestic needs of water through this enterprise.

The supply of clean water for domestic use in Kesepuhan and Pegagan Lor villages is through water pipes (personal property) and wells. Most people (73 per cent) in Kesepuhan access clean water through water pipes, meaning that the economic condition of the people in Kesepuhan is quite good. It also indicates that most areas in Kesepuhan have been covered by the PDAM pipeline service. On the other hand, about 54 per cent of people in Pegagan Lor still use wells to access clean water supply for domestic use. This indicates that: (1) the economic condition of the people in Pegagan Lor is low, or (2) most areas in Pegagan Lor are not yet covered by the PDAM pipeline service. Moreover, this is one of the areas which is most affected by drought disasters. People in Pegagan Lor also buy clean water in jerrycans for domestic needs, with the cost of one jerrycan amounting to about USD 0.37.

Based on those conditions, it can be seen that people in Kesepuhan and Pegagan Lor realise the importance of clean water for their health and this awareness can minimise the level of impact of diseases.

Drinking water supply

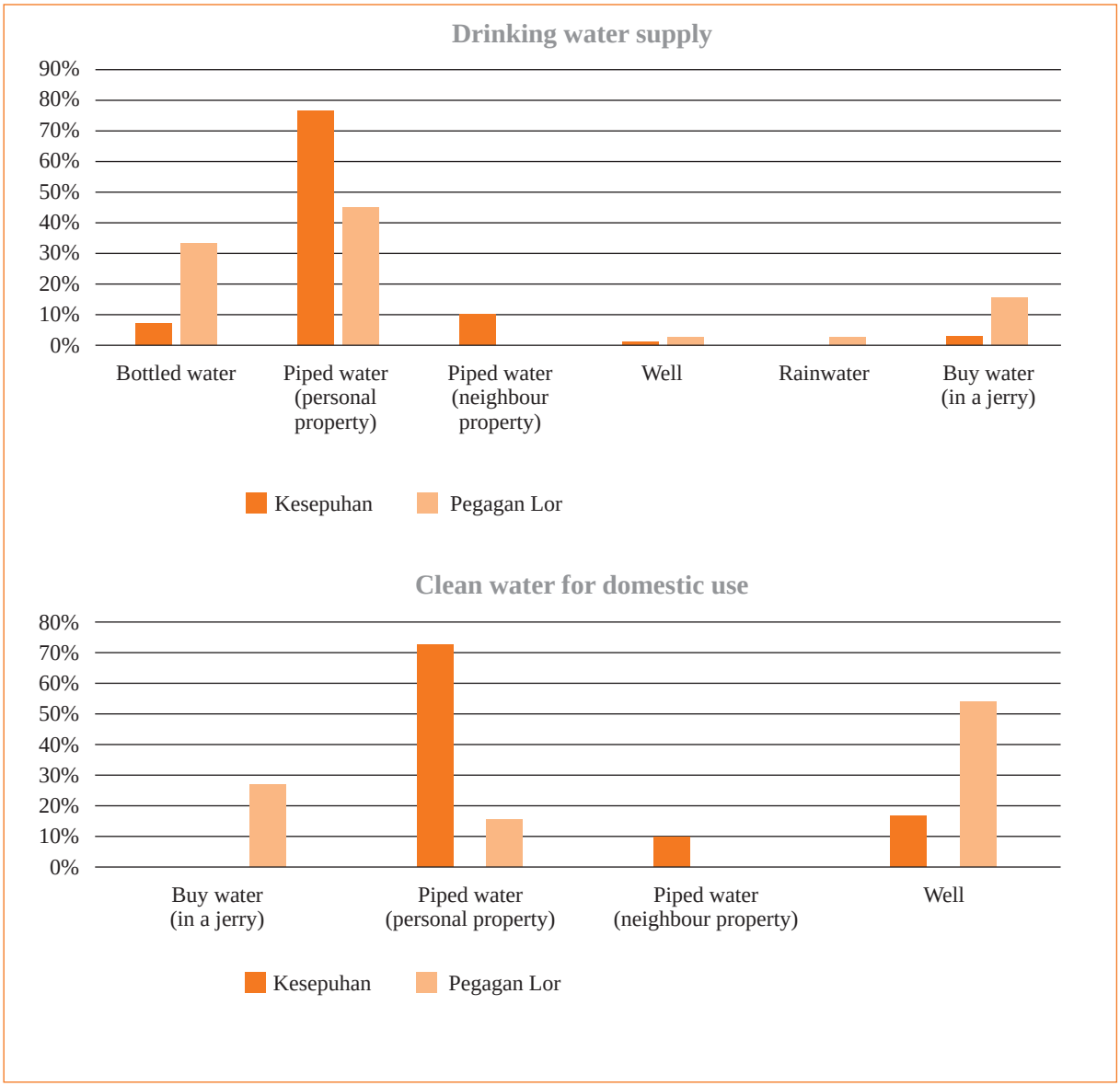
The supply of drinking water supply is related to the clean water supply. This study found that there are six sources of drinking water in Kesepuhan and Pegagan Lor villages which include: (1) bottled water, (2) piped water (personal property), (3) piped water (neighbour property), (4) wells, (5) rainwater, and (6) bought water (in a jerrycan).

As shown in Figure 12, the supply of drinking water in Kesepuhan and Pegagan Lor villages is dominated by bottled and piped water. Most people in Kesepuhan usually access clean water through piped water (ie 77 per cent for personal piped water and 11 per cent for communal piped water) to meet their drinking needs. In addition, the study also found that most areas in Kesepuhan are served by the PDAM pipeline service, which indicates good economic conditions.

On the other hand, most of the people in Pegagan Lor prefer to use personal piped water and bottled water for drinking water. About 45 per cent of the people in Pegagan Lor use personal piped water, and 33 per cent use bottled water. This situation indicates that some areas in Pegagan Lor have been covered by the PDAM pipeline service, even though the scale of the service area is not as wide as in Kesepuhan.

It is agreed that households who access drinking water sources from unsafe water supplies are more at risk from diseases. Since most of the people in Kesepuhan and Pegagan Lor prefer to have access to clean and drinking water, it can be concluded that people in the study area are aware that they need to consume hygienic water for their health. This situation could minimise levels of diseases due to flood and drought disasters.

Figure 12: Percentage of households with access to clean water for domestic use and drinking



c. Access to sanitation

A sanitation system is basically a water management system, consisting of a clean water supply and a sewerage system. The context of the sanitation system in this study will focus on the sewerage system, with access to toilets and septic tanks. Households that only have access to unimproved sanitation facilities are more sensitive to disease as they use the river or seafront as a toilet (Indonesian: *jamban*).

Access to toilets

Toilets are important facilities in the sewerage system. Ideally, each house should have a toilet. The numbers and cleanliness of toilets influences environmental health. A healthy environment creates healthy people. Based on the primary data, about 79 per cent of the sample survey respondents in Kesepuhan and 54 per cent in Pegagan Lor use private toilets. About 5 per cent people in Kesepuhan and 20 per cent people in Pegagan Lor use public or communal toilets.

This condition can be categorised as good because the environment is kept free from sewage contamination. However, there are still several people who do not use toilets, especially in Pegagan Lor. This is mainly due to two main factors: (1) lack of awareness about the importance of using toilets, and (2) difficulty to access toilets due to economic conditions or distance.

The use of septic tanks

Septic tanks are an inseparable part of toilets. Their main function is to protect the underground water from sewerage contamination through the permeation process. Most of the people in Kesepuhan and Pegagan Lor use septic tanks (83 per cent in Kesepuhan and 62 per cent in Pegagan Lor). This high percentage is in proportion to the high percentage of people who use toilets. It is important to take care of the maintenance of septic tanks and to check the quality of the septic tank material. Contamination through the permeation process can easily occur when the septic tank is not well maintained or when the material is built by using low-quality material.

It can be concluded that most of the people in Kesepuhan and Pegagan Lor have access to toilets and septic tanks, which means that most people are aware of sanitation systems. Awareness is necessary for good health and it can also minimise the impact level of diseases due to flood and drought disasters. However, the other important thing that must be analysed further is the quality of material as well as the maintenance system of toilets and septic tanks.

d. Waste management

Waste management is an explicit interrelated aspect to environmental health. Environmental health awareness of people in an area of study is indicated through the way they manage waste, as this safeguards their health against diseases. Since diseases can occur as an indirect impact of climate change, we can assume that waste management systems are one of people's indirect adaptive capacities to climate change.

As a part of the waste management system, waste disposal is commonly implemented by everyone. Waste disposal mechanisms in Kesepuhan and Pegagan Lor consist of: (1) trash bins, (2) plastic bags, (3) throwing waste into vacant land, (4) throwing waste into the sea/river, and (5) burning waste. Kesepuhan and Pegagan Lor also have a garbage or waste bank for each area (Indonesian: *Bank Sampah*). The garbage bank is a community organisation operated by several local people to control and manage waste disposal. However, due to the lack of government attention and dissemination, the level of participation is low, resulting in minimum effectiveness. Based on the sample survey, only about 15 per cent of households in Kesepuhan and 12 per cent of households in Pegagan Lor participate as members of the garbage bank.

Based on the field survey, most of the people in Kesepuhan use plastic bags and bins which are then thrown away. About 43 per cent of households use plastic bags and 35 per cent use trash bins in Kesepuhan. In Pegagan Lor, most of households prefer to use plastic bags and throw them onto vacant lands or into river banks. These habits can cause negative impacts for their health, since abandoned garbage produces bacteria and germs which transmit diseases to people.

To summarise, people in Kesepuhan are more aware about the importance of waste disposal mechanism than those in Pegagan Lor, suggesting that people in Kesepuhan have realised that by managing their waste, they can keep themselves and their environment healthy.

4.5 Female-headed households

Men and women perform different roles within the household and community (WHO 2012). Generally, men have better physical resistance and endurance than women due to biological factors, which may make women more sensitive to certain climatic hazards, both directly and indirectly. This means that some women may have a lower physical adaptive capacity to certain types of hazards, which may be exacerbated by other factors such as ill-health; however other types of climate change adaptation are dependent less on physical capacity and more on socio-economic and cultural factors.

Female-headed households are ones where women are responsible for the family's needs because they do not have a husband or a father, and all members of the family are women or children. As family heads, women have a great responsibility for their family as well as being preoccupied with domestic matters. They are also responsible of caring for children, the elderly and the disabled. Female-headed households may have a lower adaptive capacity due to existing underlying burdens and in certain situations a lower household income.

Based on the survey data, about 18 per cent of women in Kesepuhan and 16 per cent of women in Pegagan Lor are household heads. There are various types of jobs generally carried out by female household heads in Kesepuhan and Pegagan Lor, including in farming and in the informal sector. The survey found that most of the females who are household heads in Kesepuhan and Pegagan Lor work in the informal sector, with about 71 per cent in Kesepuhan and 41 per cent in Pegagan Lor. In addition, their income is uncertain. The average rate of monthly income is of maximum of USD 75, but mostly of the time is lower than USD 75. Income is also a crucial aspect for the adaptive capacity. Lower income indicates low levels of adaptive capacity of females in the area.

4.6 Mobility

Generally, the concept of mobility in the context of climate change is about a response by people, through the migration process, in order to deal with its impact. As UNHCR (2015) states, climate change drives human mobility and it can potentially increase the displacement of populations. There are three main concepts of human mobility that are related to climate change (UNHCR 2015):

1) Displacement: a situation where people are forced to move from their place or home of habitual residence.
2) Migration: a process of movement which is predominantly through voluntary action.
3) Planned relocation: an organised relocation that is supervised and carried out by the state with the consent of or upon the request of the community.

According to the survey data, both males and females in Kesepuhan and Pegagan Lor prefer to stay in their homes when climate-related disasters occur. They think that disaster comes annually and can be prepared for through their daily actions. This situation familiarises people with the threats, showing that people in both Kesepuhan and Pegagan Lor have their own ways of dealing with floods and drought.

According to the focus group discussion data, people in Kesepuhan usually prepare for the flood by moving their valuables to higher places (ie on the top of a cupboard or to the second floor). To prevent the flood entering their homes, people usually use sandbags in front of their homes. If the water levels get high, some people temporarily migrate to safer places (ie relatives' homes) until the water recedes. In Pegagan Lor, drought causes a lack of clean water supply and a delay in harvest. The lack of clean water encourages people to buy clean water, while the delay causes most of the people in Pegagan Lor (who work as farmers) to search for second jobs (such as labouring work in the city). These adaptive actions show the level of preparedness of the people of Pegagan Lor at times of drought.

Most of the people in Kesepuhan and Pegagan Lor carry out their main livelihood activities in their hometown, indicating that the threat and impact of disasters caused by climate change are not high enough for them to mobilise as part of their adaptation actions. Local governments in Cirebon City or District are also not planning relocation processes since local planning documents do not include a relocation plan for residents who live in vulnerable areas. The local planning documents only include disaster evacuation routes to temporary shelters (ie open public spaces).

Based on these findings, the mobilisation process related to climate change impacts in Kesepuhan and Pegagan Lor still focuses on temporary mobility. Neither people nor local governments have set up a mobilisation plan; this is because it is assumed that climate change impacts can be overcome. However, in the future, more concrete action may need to be taken in the event that the severity of climate change impacts in Kesepuhan and Pegagan Lor worsens.

4.7 Roles in decision making

Climate change impacts must be addressed at community level. Awareness of the impacts of climate change can be communicated at regular community meetings to many people at once. Their solutions or even just the process of seeking solutions can be described as an adaptive capacity to climate change.

The important aspect of community discussions is the exchange of ideas and decision making among participants. Communities collaborate in order to maintain a healthy environment and to respond to disaster impacts. Every city, district, or even village holds community meetings at various levels. Due to a strong sense of togetherness, community discussions at the village level are often more active than at the city or district level. These can be good opportunities to search for solutions in response to climate change.

As a village, Kesepuhan and Pegagan Lor also have several community meetings. Community groups vary based on their purposes and functions. Generally, the divisions in community discussions are based on gender. Men and women residents in a village have their own community discussions, often related to security, whereas community discussions for females are related to health.

According to the survey data, 49 per cent of men and 32 per cent of women in Kesepuhan actively participate in community discussions, and 42 per cent of males and 25 per cent of females in Pegagan Lor. They participate in different kinds of community discussions or organisations, such as*:* the Family Welfare Movement *(Indonesian: Pembinaan Kesejahteraan Keluarga/* PKK*),* the Youth Organisation *(Indonesian: Karang Taruna),* the Women's Association of Civil Servants *(Indonesian: Dharma Wanita),* the Self-Awareness Forum *(Indonesian: Forum Kesadaran Diri),* the Women's Agricultural Group *(Indonesian: Kelompok Wanita Tani),* and also Religious Group *(Indonesian: Majelis Ta'lim).* Men generally join the Youth Organisation, Self-Awareness Forum, and Religious Group. Meanwhile women participate in the Family Welfare Movement, Women's Association of Civil Servants, the Self-Awareness Forum, and the Women's Agricultural Group.

Even though the rates of participation rate for males in Kesepuhan and Pegagan Lor are higher than for females, women in both areas still have high levels of participation in community discussions, and these are good opportunities to determine what actions to take when facing climate change impacts. The Self-Awareness Forum and the Women's Agricultural Group are two crucial forums which facilitate women's participation and share ideas about innovations and solutions to overcome various problems that are caused by climate change impacts (ie health, environmental, and economic).

4.8 Strategic issues and recommendations for gender equality in response to climate change impacts at local level

Strategic issues are divided into two types in accordance with the characteristics of the region and the population: rural and urban. The analysis of strategic issues in the rural areas is represented by Pegagan Lor Village in Cirebon District, where the agriculture sector has become the main activity among the population. The gender analysis in Kesepuhan Village, Cirebon City, represents the urban area where the population and their activities are varied.

There are various experiences pertaining to the roles of women and men when dealing with floods in Kesepuhan and drought in Pegagan Lor. We analysed them from a gender equality angle in response to climate change impacts. This section includes some recommendations to increase capacity to respond to the impacts climate change impacts by considering gender equality. The detailed strategic issues and recommendations for gender equality in response to climate change impact are outlined in Table 3 below.

Table 3: Strategic issues and gender equality in response to climate change impacts

Level	Action areas		Recommendations for gender equality in response to climate change impacts
	Rural area	Urban area	
Individual	■ Due to drought, farmers are forced to search for alternative jobs since there is no time certainty for rice cultivation. ■ Women create alternative products to be sold on the market as income generating activities.	■ People become more creative in preparing their home to minimise the impact of floods, for example electronics and other valuable items are placed at the second floor or on top of wardrobes. They also create small dykes or put sandbags in front of the door. ■ People become aware of not throwing garbage in the river because it can cause floods.	■ Implementation of community development (ie through workshops, community discussions, etc.) to increase people's knowledge about climate change, how to reduce climate change impacts, as well as to encourage people's awareness to environmental and climatic changes.
Interpersonal	■ Declining paddy production during long dry seasons resulting in the reduction of family income. This forces women to work in the informal sector (ie in commerce or as a housemaid) in order to help support the family income. ■ There is a rotating process between men and women in a family to supply clean water during the dry season. ■ Lack of awareness to keep the environment tidy has reduced the quality of environment.	■ Flood often comes at night, so people who live along the river must prepare to evacuate to the community shelters. During the evacuation process, women have a role to save children and elderly people, while men have a role to carry goods (ie blankets and clothing). After the floods recede, all families work together to clean the house. ■ There is a routine activity where people in the area clean the environment together. Men and women have different roles. Usually men clean the environment, while women prepare food.	■ Activities to clean up the environment on a regular basis is a good opportunity to disseminate and promote awareness, knowledge, and action involving both men and women in the process of climate change adaptation action. This activity indicates that basically there is a strong base of cooperation between inhabitants.

Level	Action areas		Recommendations for gender equality in response to climate change impacts
	Rural area	Urban area	
Organisational	■ Women join community organisations for women empowerment in relation to agricultural activities, the so-called KWT (how to successfully take care of seeds and vegetables). In addition, they also cook together to sell various snacks with the basic ingredients of fish and vegetables which can increase the family's income, especially during drought events. ■ Farmers cannot do anything when drought comes. Usually they look for another job, for example in the informal sectors.	■ The local government institutions have disseminated information about dengue fever being transmitted through mosquitoes, especially during the rainy season. They give information on how to prevent mosquitoes from breeding. This socialisation encourages people to live in a clean environment, by covering water containers, and draining bathtubs routinely. ■ Social organisations disseminate information about flood disaster. This activity gives knowledge about early warning system in the area. Currently someone warns from loudspeakers in mosques when river nearly overflows, hence people who live along the river can evacuate with their family to the shelters. ■ The self-awareness forum in the village can potentially change behaviour to become more concerned about the environment, health, and disaster preparedness.	■ Men and women who are active in social organisations may become members of working group of climate change at village level. They can get technical assistance from any formal organisations to increase their knowledge regarding gender inequality in climate change vulnerability, and how to create gender equality in facing climate change impacts. ■ They can also become agents of change for climate change adaptation. Hence they can assist everyone to get involved in the process of climate change adaptation, such as in the identification of the problem, preparation of an action plan and its implementation.
Community	■ There are initiatives from various organisations to supply drinking water when drought events occur. It invites people to cooperate when there are long queues and help their neighbours get water. ■ The village institution has worked with some organisations to socialise about environment and farming, so that both men and women have more knowledge and skills in farming and can be more aware of the condition of the environment.	■ The garbage bank is one example of the cooperation between organisations which could change behaviour so that they people can start sorting and differentiating between organic and inorganic waste. In addition they can earn money when they bring the waste to the garbage bank. ■ The self-awareness forum, youth organisation, and others have the potential to cooperate with the working groups on climate change in Cirebon City to strengthen the adaptive capacity of the community to deal with climate change impacts.	■ The involvement of men and women in cooperation between organisations or in their programmes is a good opportunity to create networks. Then it can be followed by a planning process for climate change adaptation. ■ The cooperation between community and organisations is an initial step to identify men and women who have the potential to be agents of change for climate change adaptation with criteria that can be discussed together. ■ The strong cooperation between community and organisations can encourage to build community resilience in the face of climate change impacts.

Level	Action areas		Recommendations for gender equality in response to climate change impacts
	Rural area	Urban area	
Policy	■ The local government of Cirebon District has programmes in the agricultural sector, such as improvement of the farmer's welfare, enhancement of agricultural production and agricultural marketing. These could increase the knowledge and skills of farmers. However, those programmes cannot solve farmers' problems when drought occurs. ■ Although Cirebon District provides food crops, the local policy for food security in Cirebon District has not been effective during droughts and it requires food supplies from other regions	■ The local government of Cirebon City has joined the ACCCRN Programme to address climate change impacts. Through this programme, a City Resilience Strategy has been developed to deal with climate change and there have been two kinds of pilot projects: on rainwater harvesting and greywater management which could increase community awareness regarding the importance of saving water. ■ Flood encourages local governments to spread information about self-awareness to keep the environment clean in order to prevent other floods.	■ Policy analysis about mainstreaming gender in climate change adaptation can be an input into the policy making process. ■ Policy development and policy advocacy can promote gender equality in climate change adaptation and also mitigation. ■ Those steps can influence the implementation of gender equality in response to climate change impacts, both adaptation and mitigation.

Source: Primary data analysis (2015)

The analysis shows that everyone is needed in climate change adaptation, especially at the village level. Men usually have more roles than women, and may contribute by being the leader or coordinator of activities in the planning process of climate change adaptation. Although there are fewer roles for women, they can be entrusted to think of various solutions at the same time and they can hold many responsibilities, including safeguarding the children and the elderly. In addition, daily social interaction among women is higher than men because almost all men focus on working to support their families, while women spend more time at home. Therefore, women can also promote climate change adaptation because they often interact with other people with different attitudes and behaviours.

The participation of women in urban development and other activities is strongly supported by policies. Women often have a better understanding of environmental conditions and they act as key informants to explain detailed problems in the village. Men should not prevent the involvement of women in community discussions as this against human rights. Women and men should develop equal participation in the decision making processes.

The varying degree of men's and women's capacity does not have to be a differentiating factor, but it may become the driving force for mutual protection. If a working group on climate change is already established at village level, then any implementation of technical assistance should start with the assumption that men and women have the same capacity. All members of this working group should encourage everyone to join and care about the environment for a better life, and climate change impacts may be decreased if people are equally concerned. This participation may increase community resilience since everyone can get a better understanding of climate change and its impacts as well as how to respond to it.

5 Integrating gender dimensions in climate change adaptation

Mainstreaming gender in climate change adaptation needs to be carried out in various ways to ensure that a gender analysis is considered in the formulation of policy and programmes. The gender analysis in the context of climate change vulnerability indicates that women and men have different life experiences, capacity, and vulnerabilities that are affected differently by climate change. This section provides recommendations on how to mainstream gender-sensitive strategies into climate change adaptation policies and programmes.

Adaptation to climate change should be considered alongside the city's broader development policies and objectives, since adaptation can contribute to resilience and sustainability. Additionally, local development plans are legal documents and the local government has the responsibility to enforce and implement the policy or programme.

5.1 Integration of gender and climate change adaptation into local medium-term development planning (RPJMD)

Gender is an important analytical framework because it highlights the different ways women and men manage risks and access opportunities and the implications of these differences for reducing vulnerability to climate change. Gender mainstreaming is needed in policies and programmes related to climate change adaptation so that women and men gain equality by transforming the mainstream.

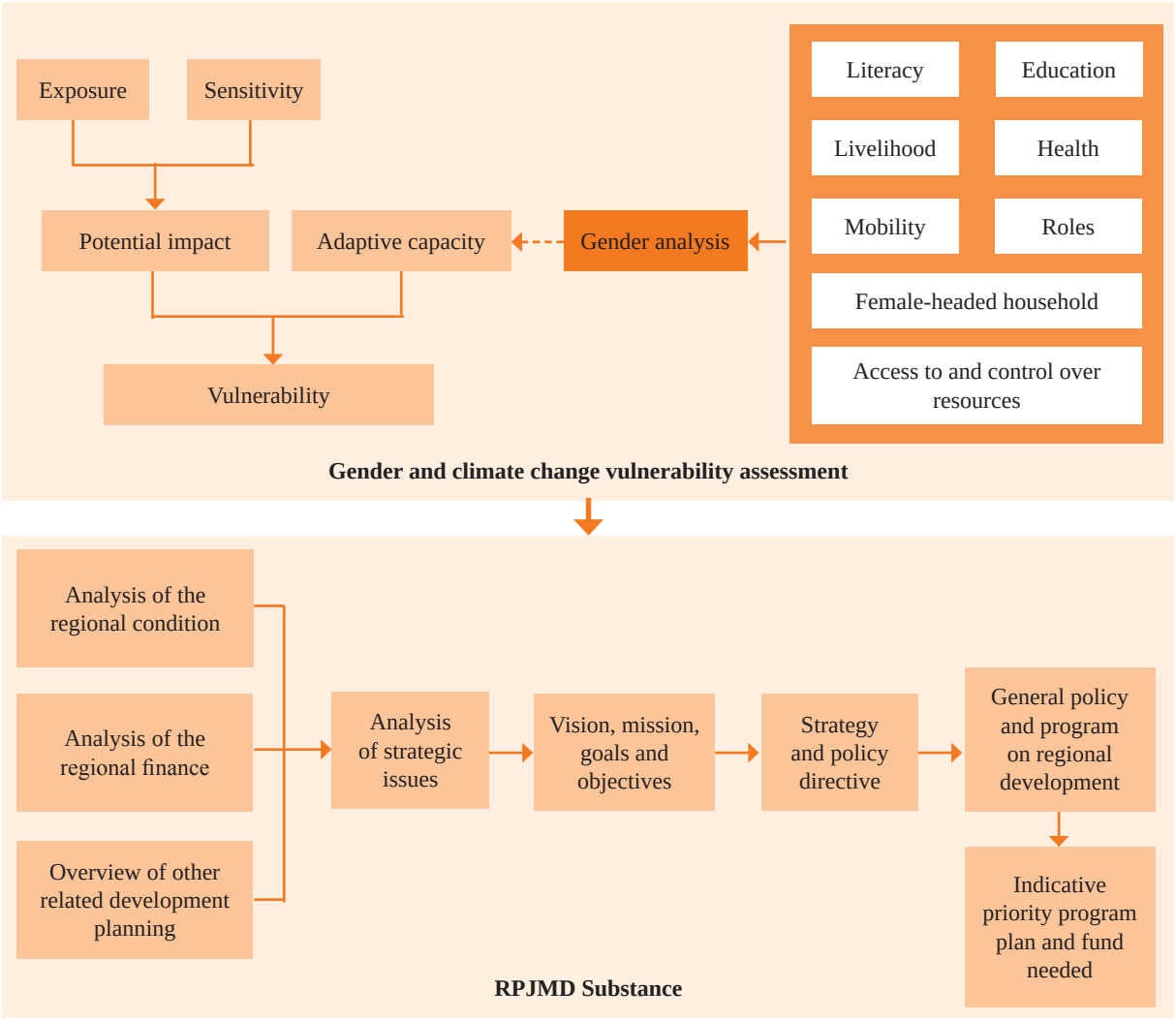
As a broad development challenge, climate change adaptation can be integrated into development planning systems. The challenges are how to ensure its implementation in budgeting and financing processes. Implementation and a monitoring and evaluation mechanism can be mainstreamed into the planning process. The availability of a policy framework or regulation platform, financial capacity, institutional capacity and programmes are the main requirements for mainstreaming and integrating climate change adaptation into development planning. In this case, gender and climate change adaptation should be integrated in the Medium-term Development Plan (RPJM).

In Indonesia, the RPJM is a planning document for five years consisting of a vision, mission, and programme of the elected president (RPJMN) at national level, or the regional head (governor/ mayor) at province and district/city level (RPJMD). At the local level, the formulation of RPJMD must refer to the RPJMN and also to local long-term development planning. The Local Medium-term Development Plan (RPJMD) consists of a regional finance directive, a strategy on regional development, and a general policy and programmes for the local government institutions. Integration of gender and climate change adaptation in the RPJMD can be accommodated in the preparation of the RPJMD.

The results of the gender and climate change vulnerability assessment can be an input for identification or analysis to finalise the section on `the analysis of the condition of the region' in the RPJMD which can enrich the population and environmental issues. Furthermore, the critical issues on gender and climate change vulnerability can be an input to formulate the analysis on strategic issues contained in the section on `analysis of strategic issues' in the RPJMD. By integrating the issues of gender and climate change vulnerability in strategic issues, it is expected that policy makers will be made aware that gender and climate change vulnerability needs to be considered in the formulation of district/ city development vision, mission and goals. The policy makers should formulate gender-responsive policies and programmes to address gender inequality in climate change adaptation.

In the process of the RPJMD preparation, there are deliberations of development plans (Indonesian: *Musrenbang*) at sub-district and village level because Indonesia has applied a participatory approach. This is a good opportunity to propose gender-responsive programmes if the village heads and community leaders have ideas on how to reduce gender sensitivity issues in order to realise the importance of gender equality in climate change adaptation. Some ideas in accordance with district/ city development visions, missions and goals may be accommodated in the RPJMD (Figure 13).

Figure 13: Integration of gender and climate change vulnerability assessments into local medium-term development planning (RPJMD)



Source: Author's Analysis 2016

5.2 Government institution mapping for gender mainstreaming

In order to ensure gender mainstreaming in climate change adaptation, government institutions at national and local level need to be identified. The roles and responsibilities of related government institutions on gender inequality and climate change should aim to reduce gender gaps in climate change adaptation programmes and oversee their implementation. The roles of government institutions are very important because they have the power and interest to build sustainable development and climate resilience at local level.

There are many national and local government institutions which have policy and programmes related to climate change adaptation. In order to avoid overlapping policies, the involvement of key institutions with legal authority in the decision-making process is required. The key institution has a major influence on the participation of other stakeholders; they also have strong connections. Key institutions can build a space to develop activities, but they can also hinder ongoing activities. This analysis is focused on three main functions of key institutions:

- Agenda: the linkage between legal vision and mission of government institutions with gender inequality and/or climate change.
- Arena: the linkage between the roles and responsibilities of government institutions regarding the intervention of mainstreaming gender in climate change.
- Alliance: the ability of government institutions to cooperate with other divisions or sectors regarding mainstreaming gender in climate change.

Key institutions in national government are listed in Table 4 below.

Results of the institutional mapping to identify the key national government institutions are shown in Figure 14, with the numbers representing the national government institutions in Table 4. So, the key institutions for mainstreaming gender in climate change adaptation at national level are the Directorate of Environment in Ministry of National Development Planning (BAPPENAS), the Deputy of Gender Mainstreaming in Political, Social and Legal Affairs in the Ministry of Women's Empowerment and Child Protection (KPPPA), and the Directorate of Climate Change Adaptation in the Ministry of Environment and Forestry (KLHK). These institutions need to have strong coordination in order to link gender and climate change adaptation into national development planning, especially in programmes.

These ministries have already produced national regulations for addressing climate change in Indonesia. KLHK formulated the Indonesian Action Plan on Climate Change in 2007, and currently carries out the programme on Reducing Emissions from Deforestation and Forest Degradation (REDD+). BAPPENAS devised the Indonesian Climate Change Sectoral Road Map in 2010, the Indonesian Adaptation Strategy in 2011, and the National Action Plan for Climate Change Adaptation in 2014. Meanwhile, KPPPA recently published `Technical Guidelines for Gender-Responsive Climate Change Adaptation at Local Level' to increase knowledge on mainstreaming gender in climate change adaptation for all stakeholders, and it carried out training to deliver technical guidelines to pilot projects of ACCCRN member cities in Indonesia. It is expected that collaboration with these ministries through capacity building at provincial and district/city level can lead to the achievement of national goals. The hope is that climate change and gender integration process can be implemented effectively.

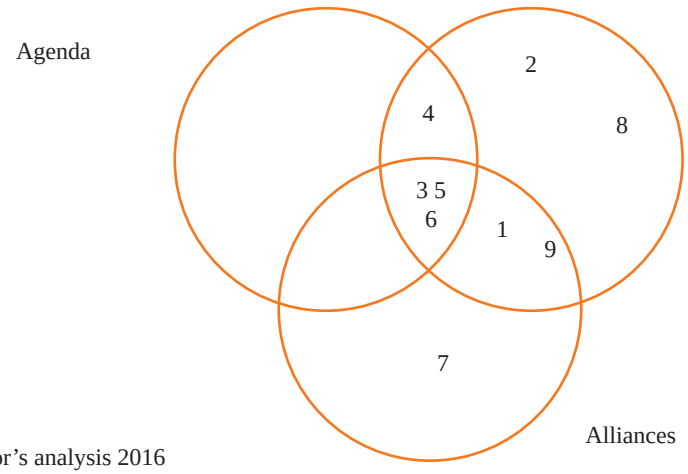
Table 4: Position and main role of national government institutions for mainstreaming gender in climate change adaptation

No	Ministry/ Institutions	Position and main role of national government institutions		
		Agenda	Arena	Alliance
Ministry of National Development Planning (BAPPENAS)				
1.	Directorate of Population and Women's Empowerment and Child Protection			
2.	Directorate of Poverty Reduction			
3.	Directorate of Environment			
Ministry of Women's Empowerment and Child Protection (KPPPA)				
4.	Deputy of Gender Mainstreaming on Economic Affairs			
5.	Deputy of Gender Mainstreaming on Political, Social And Legal Affairs			
Ministry of Environment and Forestry (KLHK)				
6.	Directorate of Climate Change Adaptation			
National Family Planning Coordinating Board (BKKBN)				
7.	Directorate of Population Impact Analysis			
National Agency for Disaster Management (BNPB)				
8.	Directorate of Disaster Risk Reduction			
9.	Directorate of Community Empowerment			

Note: High Moderate Low

Source: Author's analysis 2016

Figure 14: National government institutional mapping for mainstreaming gender in climate change adaptation



Source: Author's analysis 2016

At city/district level, local government institutions can receive technical support regarding climate change vulnerability and adaptation from national government. Support can be in the shape of training for capacity building or budget allocation to implement the adaptation actions. Cirebon City has received assistance from the Rockefeller Foundation in cooperation with Mercy Corps Indonesia to strengthen resilience through the ACCCRN initiative. It is possible and acceptable to receive funding from donors because the national government budget is very limited.

There is a working group on climate change in Cirebon City, whose members are various stakeholders, including local government institutions, universities, and non-government organisations. The working group was established under the ACCCRN Programme as a replication city in Indonesia; all members have a high commitment in addressing climate change impacts and strong coordination in every activity. This indicates that Cirebon City is implementing the preparation of climate change vulnerability assessment and the city resilience strategy. However, there is no working group on climate change in Cirebon District. However, the local government of has a programme on food security to stabilise the food needs in the case of extreme climate. This indicates that the local government of Cirebon District has the capability to reduce vulnerability caused by climate change.

In order to formulate policies, programmes and projects which include gender responsiveness in climate change adaptation, it is necessary to identify the key institutions which can intervene at the local level. This section focuses on determining the agenda, arena and alliances for a working group on climate change in Cirebon City, and in related local government institutions in Cirebon District. Based on the analysis, it can be concluded that the key institutions for mainstreaming gender in climate change adaptation in Cirebon City are: (1) the Local Development Planning Board (BAPPEDA); and (2) Community and Women's Empowerment, and Family Planning Board (BPMPPKB). The key institutions for mainstreaming gender in climate change adaptation in Cirebon District are: (1) the Local Development Planning Board (BAPPEDA); (2) the Environmental Board (BLHD); and (3) the Women's Empowerment and Family Planning Board (BPPKB).

In Cirebon City, there are two key institutions that should encourage mainstreaming gender in climate change adaptation, namely BAPPEDA of Cirebon City, which has the authority to coordinate all programmes at local government level for city development, and BPMPPKB of Cirebon City, whose main duties among others are coordination, facilitation and advocacy for the implementation of gender-responsive policies and programmes. When it comes to building urban climate change resilience, these institutions have strong coordination and the same objectives as other stakeholders in the working group on climate change. Therefore, key institutions can lead the working group to determine how it takes into account gender sensitivity issues in relation to climate change impacts and local policies and programmes in RPJMD.

The key institutions in Cirebon District have a big challenge in advocating for mainstreaming gender in climate change adaptation, because climate change issues have not yet been discussed in the local development plan. Therefore, this region needs capacity building for all local government institutions so as to enhance an understanding of climate change and its impacts, and capacity to cope with impacts. BAPPEDA of Cirebon District has a strategic function to coordinate and communicate with all local government institutions on climate change issues.

BLHD also can contribute by carrying out a study on climate change impacts in Cirebon District as a baseline condition to think about how to reduce climate change impacts. It is essential to start raising awareness of climate change through several studies, so as to provide knowledge on climate change vulnerability. Furthermore, policy makers should consider mainstreaming climate change into local development planning and generate the policies and programmes for climate change adaptation. This situation will be an opportunity to include gender equality in climate change adaptation which can be taken into consideration by BPPKB of Cirebon District. Finally, climate change adaptation will be only be implemented effectively if there is a similar understanding on climate change issues and a commitment to address climate change impacts at the local level by all stakeholders.

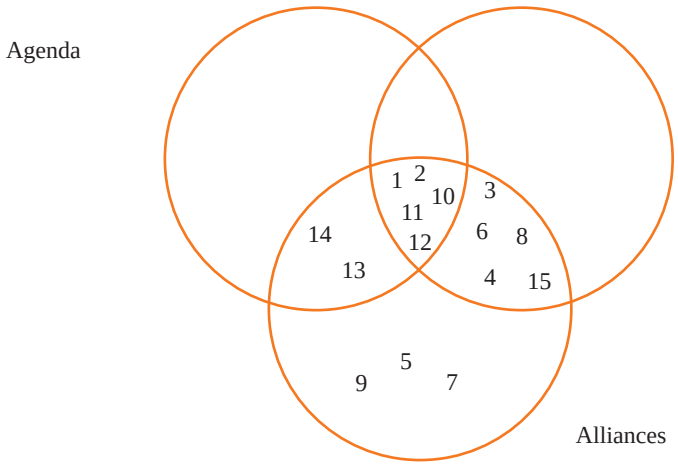
Table 5: Position and main role of local government institutions in mainstreaming gender in climate change adaptation

No	Ministry/ Institutions	Position and main role of national government institutions		
		Agenda	Arena	Alliance
Local Government Institutions of Cirebon City				
1.	Local Development Planning Board	High	High	High
2.	Community and Women's Empowerment, and Family Planning Board	High	High	High
3.	Public Works, Housing, Energy and Mineral Resources Agency	Low	High	High
4.	Marine, Fishery, Livestock and Agriculture Agency	Low	High	High
5.	Cleanliness and Parks Agency	Low	Low	Low
6.	Health Agency	Low	Low	High
7.	Social, Empowerment and Transmigration Agency	Low	Low	Low
8.	Environmental Office	Low	Low	High
9.	Disaster Management and Fire Fighter Office	Low	Low	Low
Local Government Institutions of Cirebon District				
10.	Local Development Planning Board	High	High	High
11.	Environmental Board	High	High	High
12.	Women's Empowerment and Family Planning Board	High	High	High
13.	Food Security and Agricultural, Fisheries and Forestry Extension Board	Low	Low	High
14.	Agricultural, Plantation, Livestock and Forestry Agency	High	Low	High
15.	Health Agency	Low	Low	Low

Note: High Moderate Low

Source: Author's analysis 2016

Figure 15: Local government institutional mapping for mainstreaming gender in climate change adaptation



Source: Author's analysis 2016

6 Conclusions

Climate change and its impacts are a reality in the coastal area of Cirebon, where drought has led to long dry seasons. This has resulted in the disruption of rice cultivation cycles and crop failure, and also causes flooding during the rainy season, with high rainfall affecting areas with human settlements. The case studies focused on two villages that represent rural and urban areas with populations over 24,000, classified as exposed to climate change impacts. The study explored human vulnerability by focusing on a gender analysis of climate change vulnerability and on the importance of mainstreaming gender in climate change adaptation initiatives.

There are eight variables of gender analysis which indicate people's knowledge, capacity, and opportunities to cope with or adapt to climate change impacts: literacy, education, livelihood, access to and control over resources, health, female-headed households, mobility, and roles in decision making. The study results show a difference in climate change vulnerability between urban and rural areas in Cirebon. In general, Cirebon City (Kesepuhan) has a lower level of climate change vulnerability than Cirebon District (iPegagan Lor). This difference is shown through the gender analysis variables. Indirectly, these variables indicate individual ability, culture, behaviour, and awareness of people in an area.

The study also found different adaptive capacities to climate change between the urban and rural areas. People in Kesepuhan, represented as the urban area, have a better individual capacity than people in Pegagan Lor, represented as the rural area. This is indicated by the higher level of literacy and education of people who live in Kesepuhan. A similar situation can also be found in the case of livelihoods, access and control over resources, female-headed households, and roles in decision making, reflecting the culture of people in an area. People who live in an urban area have greater potential to adapt to climate change.

Participation in decision-making processes is also different for men and women, both in the rural and urban areas. Men's participation (in rural and urban areas) still dominates the main activities of local life. However, the gap between men and women's participation in the urban area is narrower than in the rural areas.

The health conditions and mobility of people (in both urban and rural areas) in response to climate change are not optimal. This situation implies physical weaknesses and a lack of awareness among people. Behaviour, awareness and culture are influenced by levels of education. Education cannot be underestimated and should be a priority among policy makers at local, regional, and national level.

As a broad development challenge, climate change adaptation can be integrated into development planning systems. The availability of a policy framework or regulation platform, financial capacity, institutional capacity, and implementing programmes can encourage the integration of gender equality and climate change adaptation in medium-term development plans. Policy makers should ensure that gender equality and climate change adaptation is integrated in district/city development planning. The role of government institutions is also critical to help reduce gender gaps in climate change adaptation programmes and to oversee implementation.

Based on these findings, it can be deduced that gender mainstreaming in climate change adaptation initiatives in urban areas is easier to implement than in rural areas. This is for two reasons: first, the level of individual ability (ie education), behaviour, awareness, and culture can determine how responsive people are to climate change. Adaptive capacity in urban areas is often higher than in rural areas for these reasons and has been the case in the study areas. Second, policy makers (ie local government) in urban areas are more aware of climate change adaptation. Local government awareness has been demonstrated through the formation of a city team for the Resilient City Strategy (initiated by the ACCCRN programme). In addition, the local government of Cirebon City has received training on gender integration in climate change adaptation, organised by the Ministry of Women's Empowerment and Child Protection, in cooperation with several national and international non-governmental institutions.

According to this analysis, we can conclude that gender mainstreaming in climate change adaptation is a complex process with multiple interconnecting strands. A variety of factors influence gender mainstreaming in climate change adaptation programmes, including education, economic conditions, culture, and the role of government, and these need to be examined comprehensively in order to implement gender mainstreaming in climate change.

References

Asia Foundation (2012). Gender in Indonesia. Available at: https://asiafoundation.org/resources/pdfs/IDgender.pdf

Australian Greenhouse Office (2005) *Climate Change Risk and Vulnerability: Promoting an efficient adaptation response in Australia.* Final report. Report to the Australian Government, Department of the Environment and Heritage by the Allen Consulting Group. Available at: www.sfrpc.com/Climate%20Change/4.pdf

BAPPENAS (2012). Policy Paper on Gender Mainstreaming in Climate Change Adaptation. Available at: http://www.bappenas.go.id/files/1813/5763/0712/policy-papergmccalaunching-cetak__20130320120610__3756__0.pdf

BNPB (2015) Hazard Map. Available at: http://bnpb.go.id/

BPS (2015a) Lemahwungkuk Sub District in Figures. BPS of Cirebon City, Cirebon City.

BPS (2015b) Kapetakan Sub District in Figures. BPS of Cirebon City, Cirebon City.

Bradshaw, S (2013) Women's decision-making in rural and urban households in Nicaragua: the influence of income and ideology. *Environment and Urbanization*, Vol. 25 (1): 81-94. IIED: London. Available at: http://eau.sagepub.com/content/25/1/81.full.pdf

Buddemeier, R.W.,S.V.Smith, D.P.Swaaney and CJ.Crossland (2002) The Role of the Coastal Ocean in the Disturbed and Undisturbed Nutrient and Carbon Cycles. LOICZ Reports and Studies Series No. 24. 84 pp.

Case, M, Ardiansyah, F, Spector, E (nd) *Climate Change in Indonesia, Implication for Humans and Nature*. WWF. Available at: http://assets.wwf.org.uk/downloads/indonesian_climate_ch.pdf

Conor, L (11 March 2016) *A Woman's Place is in The Climate Movement*. Available at: https://newmatilda.com/2016/03/11/a-womans-place-is-in-the-climate-movement/

Costello, A, *et al.* (2009) Managing the health effects of climate change. *Lancet*, 373:1693–1733. Lancet and University College London Institute for Global Health Commission Available at: www.ucl.ac.uk/global-health/project-pages/lancet1/ucl-lancet-climate-change.pdf

Dennison, C (2003) 'From Beijing to Kyoto: Gendering the International Climate Change Negotiation Process', paper presented at *53rd Pugwash Conference on Science and World Affairs - Advancing Human Security: The Role of Technology and Politics*

ECOSOC (1997) *Mainstreaming the gender perspective into all policies and programmes in the United Nations system*. Coordination of the policies and activities of the specialized agencies and other bodies of the United Nations system, Chapter V. Available at: www.un.org/womenwatch/osagi/pdf/ECOSOCAC1997.2.PDF

Füssel, HM (2007) Vulnerability: A generally applicable conceptual framework for climate change research. *Global Environmental Change* 17(2): 155-167.

IPCC (2001) Climate Change 2001:Synthesis Report. Available at: https://www.ipcc.ch/pdf/climate-changes-2001/synthesis-syr/english/summary-policymakers.pdf

IPCC (2007) Climate Change 2007: Synthesis Report. Available at: https://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

IPCC (2014) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Available at: http://ipcc-wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf

Lambrou, Y and Piana, G (2005) Gender: the missing component in the response to climate change. FAO Rome.

Leiter, T (2011) `Local Government Organizations: Re-assembling to Address Climate Change Adaptation'. Paper read at European Group for Organizational Studies Colloquium, 6–9 July, Gothenburg, Sweden.

Measey, M (2010) Indonesia: A vulnerable country in the face of climate change. *Global Majority E-Journal*, Vol. 1, No. 1: 31-45. Available at: www.american.edu/cas/economics/ejournal/upload/global_majority_e_journal_1-1_measey.pdf

McGranahan , G, Balk, D and Anderson, B (2007) The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones. *Environment and Urbanization*, Vol. 19 (1): 17-37. IIED, London. Available at: http://eau.sagepub.com/content/19/1/17.full.pdf

McLeroy, KR, Bibeau, D, Steckler, A and Glanz, K (1988) *An Ecological Perspective on Health Promotion Programs*. *Health Education Quarterly*, Vol 15 (4): 351-377. Available at: www.med.upenn.edu/chbr/documents/1988-McLeroy-An_Ecological_Perspective_on_Health_Promotion_Programs.pdf

National Geographic (nd) *Freshwater Crisis*. Available at: http://environment.nationalgeographic.com/environment/freshwater/freshwater-crisis/

Nicholls, RJ, Wong PP, *et al.* (2007) *Coastal Systems and Low-lying Areas. Climate Change 2007: Impacts, Adaptation and Vulnerability.* Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, ML, Canziani, OF, Palutikof, JP, van der Linden PJ and Hanson, CE (*eds*) Cambridge University Press, Cambridge, UK, 315-356. Available at: www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter6.pdf

Parry, ML (2007) Climate Change 2007: impacts, adaptation and vulnerability. Cambridge: Cambridge University Press.

Republic of Indonesia, 2015. Indonesia's Intended Nationally Determined Contribution (INDC). Available at: http://www4.unfccc.int/submissions/INDC/Published%20Documents/Indonesia/1/INDC_REPUBLIC%20OF%20INDONESIA.pdf

River, WS (2006) Australian Local Government Attempts to Deliver Beneficial Environmental Outcomes. Local Environment 11 (6):719-732.

Röhr (2007) Gender, Climate Change and Adaptation. Introduction to the Gender Dimensions. Bcakground Paper

UNESCO and UIS (2013) Adult And Youth Literacy: National, Regional and Global Trends, 1985-2015. Available at: http://www.uis.unesco.org/Education/Documents/literacy-statistics-trends-1985-2015.pdf

UN Women (nd) Indonesia. UN Women Asia and the Pacific. Available at: http://asiapacific.unwomen.org/en/countries/indonesia

UN Women (2009) Women, Gender Equality and Climate Change. UN Women Watch

UNDP (2015) Gender Responsive National Communications Toolkit. Available at: http://www.undp.org/content/dam/undp/library/gender/UNDP%20Gender%20Responsive%20National%20Communications%20Toolkit.pdf?download

UNDP (2010) Gender, Climate Change and Community-Based Adaptation. Available at: http://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/climate-change/gender-climate-change-and-community-based-adaptation-guidebook-/Gender%20Climate%20Change%20and%20Community%20Based%20Adaptation%20%282%29.pdf

UNDP, UNCDF and UNEP (2010) Local Governance and Climate Change: A Discussion Note.

UNHCR (2015) *Human Mobility in the Context of Climate Change*. Available at: www.iom.int/files/live/sites/iom/files/pbn/docs/Human-Mobility-in-the-context-of-Climate-Change.pdf

Valiela, I (2006) Global Coastal Change. Blackwell, Oxford, 368 pp.

Watson, JEM, Rao, M, Kang, A-L (2012) Climate change adaptation planning for biodiversity conservation: A review. *Advances in Climate Change Research* 3(1): 1-11. Available at: http://ac.els-cdn.com/S1674927812500018/1-s2.0-S1674927812500018-main.pdf?_tid=f679b21a-dac4-11e5-993d-00000aab0f26&acdnat=1456297698_aede618b91cfd88e38eb27517b43ca6b

WHO (nd) *Gender, Climate Change, and Health*. World Health Organization. Available at: www.who.int/globalchange/GenderClimateChangeHealthfinal.pdf

WHO (2012) *Mainstreaming Gender in Health Adaptation to Climate Change Programmes*. World Health Organization. Available at: www.who.int/globalchange/publications/Mainstreaming_Gender_Climate.pdf?ua=1

World Bank (2010). Indonesia: Climate Change, Washington, DC: The World Bank. Available at: http://go.worldbank.org/HQQFW5MV70

WRI (2001). World Resources 2000-2001: People and Ecosystem: The Fraying Web of Life

Zikra, M, Suntoyo, Lukijanto (2015) Climate Change Impacts on Indonesian Coastal Areas. *Procedia Earth and Planetary Science* 14, pp. 57–63. Available at: http://ac.els-cdn.com/S1878522015002362/1-s2.0-S1878522015002362-main.pdf?_tid=2490e65a-9df3-11e5-882d-00000aab0f26&acdnat=1449610512_b4fc8168a5519e3933d269af057faebe

Mainstreaming gender in climate change adaptation: a case study from Cirebon, Indonesia

Asian Cities Climate Resilience Working Paper Series

This working paper series aims to present research outputs around the common theme of urban climate resilience in Asia. It serves as a forum for dialogue and to encourage strong intellectual debate over concepts relating to urban resilience, results from the ground, and future directions. The series is also intended to encourage the development of local research capacity and to ensure local ownership of outputs.

The series has arisen out of the Asian Cities Climate Change Resilience Network (ACCCRN, www.acccrn.org), an initiative funded by the Rockefeller Foundation.

The series is intended to present research in a preliminary form for feedback and discussion. Readers are encouraged to provide comments to the authors whose contact details are included in each publication.

Published by IIED June, 2016

IIED order no: 10792IIED
http://pubs.iied.org/10792IIED.html

ISBN 978-1-78431-370-8

80-86 Gray's Inn Road, London WC1X 8NH, UK

Tel: +44 (0)20 3463 7399

Fax: +44 (0)20 3514 9055

email: humans@iied.org

www.iied.org