

# **WOMEN VULNERABILITY AND LAND TENURE SECURITY FOR ADAPTATION TO CLIMATE CHANGE**

MALIHEH GHOLAMHOSSEINI

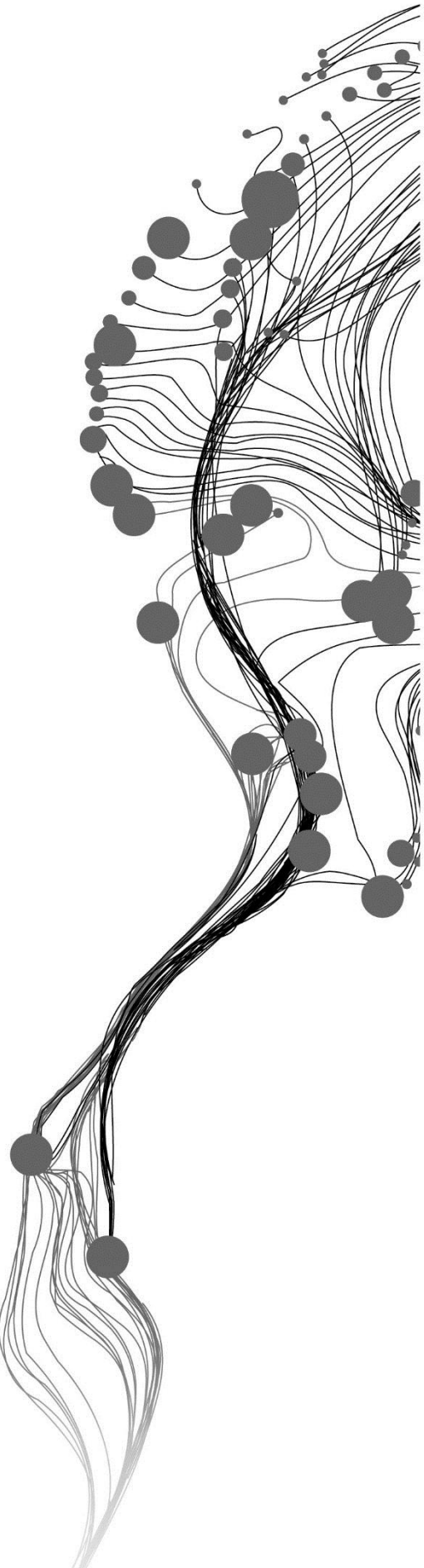
February 2015

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Specialization: Land Administration

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## ABSTRACT

Climate change is the serious problem all over the world and its consequences with both short-term and long-term effects are becoming more obvious. It mostly can be felt by effects on natural ecosystem, land suitability and land use. As a result, it affects supply of land for settlement and productive activities. Although these effects can be felt by whole society, there are some groups such as rural women (in developing countries) who are particularly vulnerable. This research, tries to explore women vulnerability in adaptation to climate change in context of land tenure. Although there are literature on women vulnerability in climate change which emphasis on women's insecurity of tenure as a reason for their vulnerability in climate change, there is a big gap to relate land tenure security to the effects of climate change on women. Moreover, in this research it is shown that as well as role of land tenure insecurity on women vulnerability, it is a hindering factor for women participation in adaptation to climate change. Here, research emphasises on the importance of women in adaptation to climate change. Since women have great knowledge and potential capacity for coping to climate change, their participation can have a positive effect on effectiveness of adaptation as well as reducing their vulnerability in climate change.

In order to search the role of tenure security on women vulnerability in adaptation to climate change, secondary data from different resources are used critically to have a comparative analysis in different situations. Therefore, cases from some of the vulnerable countries to the effects of climate change with different land tenure systems such as Islamic and customary land tenure system have been chosen. This diversity of cases could give more comprehensive indicators for exploring the objectives.

Based on cases of Ghana and Bangladesh, research reveals different factors of women vulnerability. Then, as finding women's insecurity of tenure as one of these factors (in vulnerability assessment in chapter two), two other cases of Ghana and Bangladesh on women's land right provide more information about women's insecurity of tenure and possible ways for enhancing their tenure security. In the next step, cases of Bangladesh and Indonesia give experiences of women vulnerability in land related issues arising from short-term effects of climate change. In last part, cases from Kenya and Ghana show the role of women's insecurity of tenure as hindering factor for women participation in adaptation activities. All these information from cases are analysed and linked in chapter five, to show importance of women's security of tenure on women vulnerability in adaptation to climate change. Then, SWOT analysis, provides influencing factors on women vulnerability in adaptation to climate change in context of land tenure.

Based on this research, women's insecurity of tenure increase women vulnerability in adaptation to climate change. But there is not enough evidence to prove that security of tenure can reduce their vulnerability. This research shows that decision making power, low level of education and access to information and institution are so important regarding women's insecurity of tenure and women vulnerability in adaptation to climate change.

Key words: *Women, Vulnerability, Land tenure, Adaptation, Climate change*

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## LIST OF ACRONYMS

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IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
UNDP	United Nations Development Programme
FAO	Food and Agriculture Organisation
UNCHS	United Nations Centre for Human Settlements
GLTN	Global Land Tool Network
STDM	the Social Tenure Domain Model
FIG	International Federation of Surveyors
IISD	International Institute on Sustainable Development
OHCHR	Office of the High Commissioner for Human Rights (United Nations Human Rights)
ICRW	International Centre for Research on Women
ILC	International Land Coalition
CCAFS	Climate Change, Agriculture and Food Security



# 1. INTRODUCTION

## 1.1. General introduction

The climate change affects the whole society, in particular the poor and disadvantages groups due to their less capacity to cope with the adverse effects of climate change. Considering such different impacts of climate change, it is needed to address the link between adaptation efforts and wide range of socioeconomic sources of vulnerability including poverty and gender inequality. Since adaptation actions to climate change and its positive impacts are a necessity in the world, it is vital that adaptation efforts be gender sensitive and pro-poor considering gender based vulnerabilities.

Environmental and socioeconomic factors make gender as a key determinant of vulnerability. Due to the interactions with land and natural resources, e.g. in agricultural practices, the role of women have focused much in managing the family affairs through the small businesses, but poverty of women and inequity especially in access to land make women vulnerable in climate change. In spite of women's limited access to land and its effect on their vulnerability, not enough research has been carried out on land tenure (or land rights) linking the vulnerability of women to the effects of climate change. This research intends to look at women's vulnerability from the perspective of land tenure and it will explore the role of women's security of tenure in reducing women vulnerability in adaptation to climate change.

## 1.2. Background and justification

Climate change has wide range of consequences with short or long-term impacts. These changes that is causing by emission of greenhouse gases has been observed in different parts of the world through rise in temperature, changes in precipitation, changing pattern of rainfall and runoff leading to extreme weather events and disasters such as floods, draughts, landslides, strong winds and typhoons (Pollner, Kryspin Watson, & Nieuwejaar, 2010). Human intervention and activities in using fossil fuel, land use change, industry, cattle and agriculture increase emission of these gases (Dankelman, 2002). As a result, the effects of human activities are also seen in the form of 'natural disaster' or 'disaster'. Although adaptation to climate change is highly recognized for adjusting the effects of climate change, there is a great need to understand the risks of climate change on the communities and individuals, particularly on women in adaptation planning. This consideration of human aspect of climate change can help to increase adaptive capacity of the society with the view to reduce their vulnerability (Heltberg, Siegel, & Jorgensen, 2009).

There are different definitions that presented for vulnerability in literature, Adger (2006) defines it as '*harm resulted from exposure of group or individual to stresses caused by environment or social change*' and he claims that the challenge regarding vulnerability is to improve adaptive capacity. According to (IPCC, 2007b), "vulnerability is the degree which the system is incapable to cope with the negative effects of climate change and it differs across regions, generation, genders, ages and population". There are different possible drivers such as governmental policy, and population growth which affect degree of vulnerability that people experience in facing with climate change. The adverse effects of climate change would have the greatest impacts on people in developing countries due to geographic exposure, low income, dependence on climate sensitive assets such as agricultural land, timber lands or water resources (Heltberg et al., 2009), especially on women who suffer from poverty because of their weak adaptive capacity.

Climate change is a challenge for three global issues i.e. social justice, equity and human rights. Gender is a dominant aspect that associates these global issues, and gender mainstreaming is considered vital in adaptation to and mitigation of climate change efforts and vulnerability assessment. It is an approach for integration of gender approach and environmental planning (Aguilar, 2009). It includes any planned action and program for both men and women to ensure that both groups benefit equally. Gender mainstreaming in climate change use vulnerability approach to understand the relation of human and environment and is based on relation of risks, vulnerability and gender inequalities. Since risks and vulnerabilities are resulted from social inequalities as well as changes in environment, gender relation play an important role in adaptation planning. So considering role of land in women vulnerability, gender mainstreaming could begin with improving women access to land (Solar, 2010).

With providing more secure land tenure and property, women vulnerability to climate change can be reduced (Quan & Dyer, 2008); Improving women's access to, use of and control over land and productive natural resources in developing countries would provide them, better situation in their families and communities (UN Women and OHCHR, 2013). Access to land for rural women would give them personal income and it would provide them with economic and social independency (Arora Jonsson, 2011). Moreover, in land issues arisen from the effects of climate change like disasters, secure land right would let them to displace safely without fear of dispossession or eviction. Practically, without secure access to land and control over land and natural resources, women are less likely to cope with the effects of climate change (Aguilar, 2009).

Regarding the importance of land in context of vulnerability, International Institute on Sustainable Development (IISD) took a survey of land experts and they ranged the importance of land in vulnerability 4.5 out of 5. This result shows the significant status of land in vulnerability and it concludes that lack of tenure security or access to land for all groups will increase vulnerability (Brown & Crawford, 2006). Considering specified effects of climate change on women beside women's limited land rights on women vulnerability in climate change (Arora Jonsson, 2011), there is a need to explore the effects of women's security of tenure on their vulnerability in adaptation to climate change.

### **1.3. Significance of research**

Gender blind (it means without consideration of gender) adaptation planning can be harmful rather than efficient for development, since it can elaborate the existing gender inequality. So these kind of adaptation planning may decrease men vulnerability without any effect of women vulnerability or even increase their vulnerability in climate change. So gender mainstreaming is employed by UNDP in order to imply any plan differently considering the gender factor (gender sensitive). So it is so important to notice to gender mainstreaming. The different tool can be used for gender mainstreaming. (Vincent et al., 2010). This research would pay attention to gender mainstreaming in vulnerability assessment and adaptation efforts.

Although Gender mainstreaming is essential for policies to be effective for both genders and for adaptation to climate change (Alston, 2013), policy makers underestimate the importance of women who face threats and negative impacts of climate change for sustainable development through women participation in adaptation and mitigation planning (Denton, 2002). Considering role of women in natural resource use and management, being closer to the nature and their better awareness of nature protection, they have a significant role for adaptation and mitigation (Resurrección, 2013). Not to forget that their participation can confront climate change risks and disasters (Aguilar, 2009).

Reducing women vulnerability in adaptation to climate change through women secure land rights is not just to bring better living conditions for them. For example in terms of agriculture and food security, about half of food production in world is prepared by women. Although women have a crucial role in food production, they have limited access to land and they are not included in decision making. So in face with climate change effects, women loose the income and crop production. Equity in access to land and natural resources and women's property right benefit them economically and socially (World Bank, 2005) and it can improve

agricultural production regarding food security as well as reducing women vulnerability (Solar, W., 2010; UNDP, 2009).

#### **1.4. Literature review**

This section reviews concepts on climate change, adaptation to and mitigation of climate change, and women vulnerability. It also highlights the relation between land and climate change and women's rights on land in order to find the impact of women security of tenure on vulnerability in climate change adaptation. This review on literature has been done in three major parts as following themes:

- Climate change and key concepts
- Women vulnerability in climate change
- Climate change, land and Women's rights on land

##### **1.4.1. Climate change, mitigation of and adaptation to climate change**

'Mitigation' and 'adaptation' are two options combating climate change. Climate change mitigation includes processes of reducing greenhouse gas emission to decrease the pace of climate change and increasing the rate of absorption of these gases. (Quan & Dyer, 2008). The term "Mitigation" is defined as "An anthropogenic intervention to reduce the sources of greenhouse gases" (IPCC, 2007a). When there is an already change in climate, adaptation planning are needed to reduce vulnerability and risks of climate change for humans as well as ensuring sustainable development (Schipper, Liu, Krawanchid, & Chanthy, 2010). IPCC further defines adaptation as "Adjustment in natural or human systems in response to actual or expected effects of climate change and to reduce vulnerability, which diminishes harm or improve useful prospects". The origin of the term adaptation is in natural sciences, then it applied in human systems. Social science usage of adaptation in human system concern with survival or success of society. Groups with inadequate methods of coping will not be able to cope with negative effects of climate change and other group with increased capacity to adapt can cope to changes easily.

There are different views and purposes of adaptation research. In climate change, adaptation analysis such as *Impact assessment*, *specific adaptation option*, *vulnerability indices* and *practical adaptation initiatives* have been presented by many scholars with different distinct purposes (Smit & Wandel, 2006). *Impact assessments* estimate effects of and damages caused climate change with and without adaptation to assess the degree to which negative impact of climate change can be reduced or moderated. The purpose of this analysis is to estimate the impact of climate change and the difference which adaptation can make. *Specific adaptation option* focuses on particular system which is subjected to climate change stimuli aiming to assess and rank the different adaptation options and identify the best or better ones. Tools such as cost effectiveness and variables like effectiveness, efficiency, cost, benefits or equity can be used for ranking these different options. The *vulnerability indices* in adaptation analysis focus on vulnerability (or adaptive capacity) of communities or regions. Different criteria, variables and indices can be used for comparative analysis. Actually vulnerability in this analysis is the starting point and adaptation efforts are expected to direct to groups and areas with great exposure or less adaptive capacity. *Practical adaptation initiatives* investigate adaptive capacity and adaptive needs in a particular region or community in order to enhance adaptive capacity and implying adaptation initiatives. It tends to seek what can be done to reduce the vulnerability and it would comprise comparison through communities and societies to find adaptive strategies for reducing vulnerability.

##### **1.4.2. Adaptation to climate change, adaptive capacity and vulnerability**

Adaptation with any purposes is associated with vulnerability and adaptive capacity. Adaptations are manifestations of adaptive capacity, and they present ways to reduce vulnerability. Vulnerability is a degree to which biologic, socioeconomic or biophysics system prone to the negative effects of climate change and unable to cope with them (IPCC, 2007b). According to Figure1, IPCC considers three core concepts for exploring vulnerability; 'exposure' to which a system is physically at risk, 'sensitivity' which says the level of

likelihood to be affected by risks, and ‘adaptive capacity’ which state system ability to adjust stresses and cope with negative effects of climate change. Degree of Adaptive capacity depends on socio economic, technology or infrastructure context (Solar, 2010).

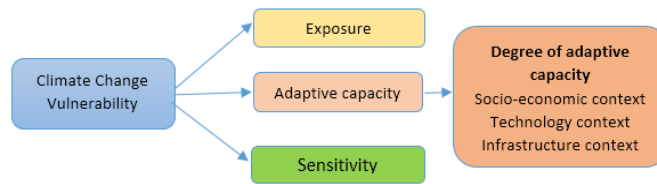


Figure 1-1 Climate change vulnerability (Solar, 2010)

Sensitivity and exposure are dependent on interaction of system or community and attribute of climate change stimuli. Particular conditions such as type of settlement, settlement location, livelihood or land uses can effect on sensitivity and exposure of system and they are dependent on broader drivers (or determinant) such as social, political, cultural and environmental conditions. Many of these drivers are similar to those which affect adaptive capacity of a system.

There are many definition for adaptive capacity. It can be defined as ability of system to modify its characteristic in order to cope better with external stresses. Thus adaptation is adjustment in system behaviour that enhance the adaptive ability to cope with stresses (Adger, Brooks, Bentham, Agnew, & Eriksen, 2004). Adaptation occur over time and a system need time to realize its adaptive capacity as adaptation. It can be said that adaptive capacity represent potential adaptation. Future adaptation to climate change is resulted from current realization of adaptive capacity that determine the future vulnerability of a system.

#### 1.4.3. Women vulnerability in climate change

Regarding women vulnerability in climate change adaptation, different factors are briefly mentioned here. First of all, climate change affects both men and women in society, however there are some reasons such as social and economic issue, and political barriers that make women particularly vulnerable. As mentioned above, vulnerability to climate change is a function of exposure, sensitivity and adaptive capacity.

Regarding vulnerability as a function of exposure to climate change, Arora Jonsson (2011) links vulnerability to poverty since 70% of poor people are women (due to being unpaid worker and headed household). Poor are highly vulnerable and disproportionately affected by climate change and they suffer death, injury, illness, being homeless and refugee in case of disasters (Dankelman, 2002). Because they have more direct interaction with nature and are more dependent on threatened natural resources and they live in marginal areas. For example, in rural areas they live in river basin, which are more exposed to hazards and it makes them less protected (Neil Adger, 1999).

Considering sensitivity as factor of vulnerability, Because of women household positions and their role in taking care of household and children, it is difficult for them to move from the events such as disasters. Natural disaster like flood increases water borne diseases, and women and children are more sensitive to the health problems than men and also more sensitive by food scarcity in case of draughts or other disasters (Denton, 2002). Referring to Figure1-1, high sensitivity leads to higher vulnerability in climate change.

As result of social rooted issues and gender inequalities they have less capacity to cope with negative effects of climate change, and they are more vulnerable (Figure 1-1). Gender inequalities exist in a) Roles and responsibilities, b) Knowledge and information, c) Income and education d) Participation and power and e) Access to land and other resources (Solar, 2010). For example, lack of education can make women especially vulnerable in climate change because most of women in rural area don't have opportunity to pursue their education, as a consequence it will be difficult for them to access to information and warning about disasters, and it reduce their ability to response and to cope with effects of climate change. Or having less access to land and other resources, make them unable to convert these resources to income.

#### 1.4.4. Climate change, land and women's rights on land

Despite the complexity of relation of climate change and land tenure, climate change effects are recognisable on natural ecosystem and land use system. Climate change reduces land suitability for settlement and land supply in agriculture and it can even cause displacement of people. As a consequence, issues like land occupation, land conflict and settlement would arise. Therefore land tenure supporting land management, secured supplies and access to land is a key factor to deal with settlement, resettlement, conflicts, occupation and other land related issues raised from climate change and it is necessary for respond to climate change and it have to consider in adaptation planning (Quan & Dyer, 2008).

As it mentioned above, land is a significant element in context of vulnerability, and lack of tenure security enhance vulnerability In facing disasters caused by effects of climate change (D Fitzpatrick, 2008). For example tenure insecurity in case of displacement may result in land grabbing or loss of possession of land. And even because of fear of dispossession, people do not want to move from their land which can make them more prone to risks and more vulnerable to disaster. Secondary right holders like tenant, women right holders and right holders by customary land tenure are highly vulnerable to land risks such as being landlessness due to lack of tenure security. So it can be said that in some situations, victims and people who suffer from adverse effects of climate change actually suffer from inequality in land distribution and land access (D Fitzpatrick, 2008).

Tenure ranging from informal to formal reflects the relation between land and people. Land tenure is defined as bundle of rights on land, which encompass rights to enjoy, use, occupy, sell, cultivate, mortgage, rent and transfer and it determine who can use which resources for how long and under which situations. Land tenure security can be define as; a) degree of confidence which landholder feel without fear of being deprived. b) Certainly of individual's rights which can be recognized by others, and c) possibility of mortgage, sailing, transferring right through inheritance and protected against eviction (UN-Habitat, 2003). For women, Security of tenure need to be recognised individually and not based on their male relatives or marital status. It is needed to ensure equal rights for women to use, control and access to land independent from marital and family status.

In many parts of the world, especially in developing countries, women's right to land is not defined properly and their limited right to land is not secured. Therefore in facing with effects of climate change they lose income and crop production or in facing with disasters, particularly in case of death of husband or men in their family, women lose their rights and access to land on displacement and they will in danger of land grabbing and loss of possession even by male relatives. These situations reveal the importance of secure land tenure and its role in women vulnerability (D Fitzpatrick, 2008). Different approaches can be taken to secure land rights to response to the effects of climate change. Pro-poor approach is one of approaches which can promote security of tenure for women since gender aspects are important in this approach. Pro-poor system builds on community, and is based on local approaches. All citizen and both gender irrespective to age, marital status or other limitation have right on their property (D Fitzpatrick, 2008).

More than 70 percent of people in developing countries are out of land registration system and just 2-3 percent of these ownerships is by women (Lemmen, 2010). Therefore UN-Habitat by Global Land Tool Network (GLTN), proposed the concept to support continuum of land rights to cover all formal and informal tenure system to meet needs of all groups in society. Traditional land registration system usually considers the main rights such as ownership or leasehold, but it ignores the customary land tenure and poor people's rights without understanding continuum of rights that encompass overlapping rights, group rights and secondary rights. Pro-poor land tools based on continuum of rights can help to promote security of tenure for majority of people (Zevenbergen & Augustinus, 2011). The Social Tenure domain Model (STDm) as a pro poor land tool by covering all citizen's land right could be an option for secure women's tenure to reduce their vulnerability in adaptation climate change (Lemmen, 2010).



### 1.5. Research problem

As it mentioned in section 1.1, climate change is a global issue, which makes threats to the environments and human by severe weather events, and changes livelihoods with sever effects on health and food production. For adjustment to these adverse effects of climate change, adaptation planning is needed to reduce vulnerability. Although there are variety of scholars who studied climate change context on vulnerability frameworks and indices, adaptive capacities and evaluating them, is still needed in adaptation in context of human dimensions which is closely linked to people vulnerability.

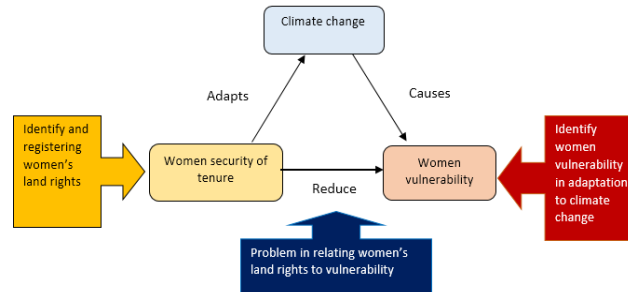


Figure 1-2 Three key words of research and related gaps

In this research, women are main target group to reduce their vulnerability and land tenure is considered as an important factor to reduce vulnerability in adaptation planning. Based on literature review, women are particularly vulnerable to the impacts of climate change, and access to land in mentioned as one of the reasons for their vulnerability. In order to search women vulnerability in context of land tenure, there are some research gaps: firstly, the research gap (problem) is to relate women's land rights to women vulnerability (dark box in middle of Figure 1-2). In order to find this relation there are two other important gaps; a) Term of 'women vulnerability' is not well recognised yet, we have to know concept of women vulnerability and the factors which made women vulnerable (right box in Figure 1-2), and b) Women's land rights are not properly defined and land rights are not defined related to vulnerability (left box in Figure 1-2). Therefore by covering these gaps, this research try to find the role of women's security of tenure on their vulnerability in adaptation to climate change.

### 1.6. Conceptual framework

In this section, a conceptual framework is presented to show the main pillars of research and interaction between them. This framework shows that on one hand, climate change causes women vulnerability and on the other hand, land tenure is considered as a factor for reducing women vulnerability and for adaptation to climate change.

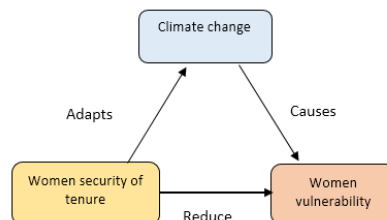


Figure 1-3 Conceptual framework

The hypothesis of this research is to explore the role of land tenure security on reducing women vulnerability. To study this hypothesis, the research is based on secondary data from selected case studies in context of climate change, women's land rights, women vulnerability and adaptation to climate change. Based on literature reviews and secondary data, women's land rights and the ways for securing their land right, and role of this tenure security on their vulnerability and adaptation to climate change would be investigated. With this investigation in context of land tenure, this research expects to find women's

insecurity of tenure as reason for their vulnerability, and so identifying women security of tenure as an effective indicator for enhance their adaptive capacity to reduce their vulnerability.

## **1.7. Research objectives and research questions**

In this section, research main objective, sub-objectives and research questions would be presented.

### **1.7.1. Research main objective**

To explore the effects of women's security of tenure on reducing women vulnerability in adaptation to climate change.

### **1.7.2. Research sub-objectives**

The following sub-objectives set in order to achieve the main objective of this research:

- To identify factors for women vulnerability in climate change.
- To describe women's rights on land as factor of women vulnerability.
- To analyze women vulnerability and adaptation to climate change with respect to women tenure security.

### **1.7.3. Research questions**

The following questions will be answered to achieve sub-objectives of this research:

#### *Sub-Objective 1*

1. What are different approaches on vulnerability in climate change?
2. What is knowledge about women vulnerability in climate change?
3. What are the factors for women vulnerability in climate change?

#### *Sub-Objective 2*

4. How does different land tenure define women's land rights?
5. How can women's land rights be secured?

#### *Sub-Objective 3*

6. How are women vulnerable to the effects of climate change in land related issues?
7. How women's security of tenure can empower them for adaptation to effects of climate change?

## **1.8. Hypothesis**

Women tenure security can reduce women vulnerability in adaptation to climate change.

## **1.9. Research design and methods**

The research design in Figure 1-4 presents main steps in research, from the research question and sub-objectives to find answer for those questions and test the hypothesis. The provided research design present an overall view on research. As it can be seen in Figure 1-4 research would begin with literature review and definition of research objective, sub-objectives and research questions. The next step is providing research matrix to identify research methods, data required and anticipated result regarding the sub-objectives and research questions. Then phases in data collection are presented in three phases. Qualitative approach based on case study research is used in this research in order to find answers for research problems. There is not any field work in this research and it is done based on literature review and using secondary data on case studies. Case study approach in this research consists of three main parts regarding defined sub-objectives. Analysis on secondary data and comparative study of various cases in different regions would follow in this research. As it can be seen in Figure 1-4, Analysis of resulted data from above steps lead to conclusion and provide recommendation on improving women's land rights to response to climate change and reduce women vulnerability. This assessment can test hypothesis and show the extent of applicability and efficiency of using land tenure for adaptation to climate change in order to reduce women vulnerability.

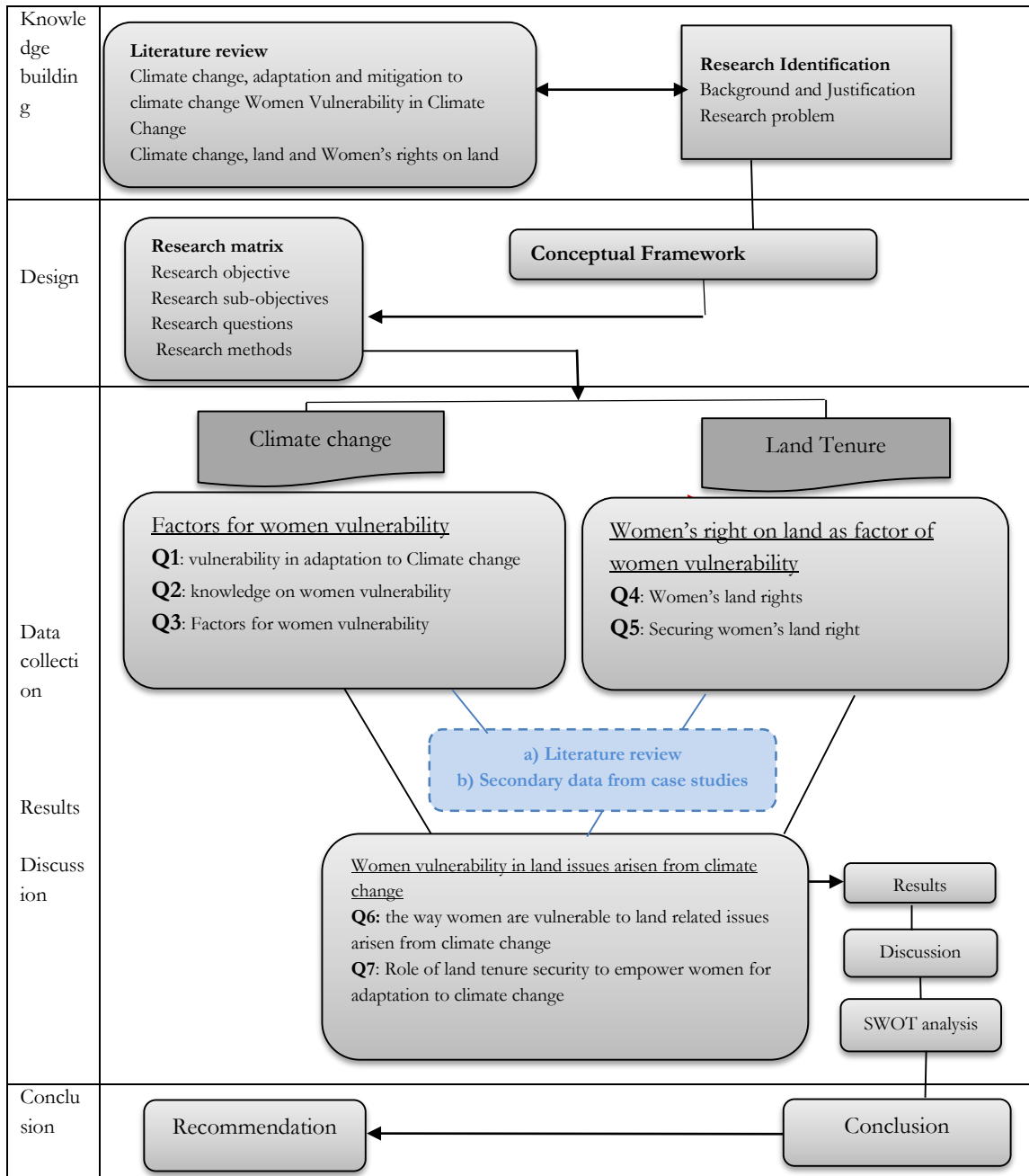


Figure 1-4 Research design

**1.9.1. Methods of data collection**

Data collection in this research is based on a) literature review, and b) case study research. So, for achieving study objective, In addition to *literature review* on climate change, land tenure, Women's rights on land and women vulnerability in adaptation to climate change, *secondary data* are used to investigate role of land tenure security in reducing women vulnerability and adaptation to climate change by comparative study on different case studies from different regions. At least two case studies would investigate and assess for each sub objective as follow; 1) Vulnerability, 2) women's right on land, and 3) women vulnerability with respect to women's security of tenure and adaptation to climate change. This data collection can be done through scientific articles and journals, reports, guidelines, training manual and toolkits from international organisations.

Generally, there are two main methods of data collection which can be done by using primary and secondary sources. Primary sources of data collection are observation, interviewing and questionnaire which provide the first hand information for researcher while secondary data are provided second hand information by documents from earlier research, articles, journals, governmental or non-governmental publication, personal records, media such as newspaper, magazines or other different sources (Kumare, 2010). This research use the secondary data from different case studies and it doesn't involve field work.

There are some advantages and disadvantages for each data collection approach. The first advantages of using secondary data is economy. Secondary data can achieve by low cost because another person collected these data. In addition, more data are available from wide variety of sources and in less time they are accessible, and analysis of secondary data can be done quickly in comparison with primary data. there are some disadvantages in using secondary data; In comparison with primary data, secondary data are not perfect, wide variety of available secondary data can be overwhelming, it is difficult to evaluate this data and maybe secondary data from different sources conflict each other (Chua, 2005). Regarding the topic of this research and using comparative analysis, using secondary data suits in this case. Although vulnerability and land tenure system need to be analyses for regions specifically, but using secondary data from different sources can provide more comprehensive data.

Different sources such as official statics collected by governmental departments, scholar journals, technical reports, scientific articles, and reference book can provide reliable information. The first step for collecting the secondary data in recognition of organization and institution conducting research in this research area. Considering the women vulnerability and land tenure for and adaptation to climate change different international institution such as United Nations Development Program(UNDP), International Centre for Research on Women (ICRW), World Bank, International Union for Conservation of Nature (IUCN), United Nations Centre for Human Settlements (UNCHS), United Nations Human Settlements Program (Unhabitat), Global Land Tool Network (GLTM), International Federation of Surveyors (FIG), International Institute on Sustainable Development (IISD), Office of the High Commissioner for Human Rights (United Nations Human Rights) (OHCHR), International Land Coalition (ILC), Women's Environment and Development Organization (WEDO), gender and disaster network (GDN), Global Gender and Climate Alliance (GGCA) United Nations Development Fund for Women (UNIFEM) and the International Office for Cadastre and Land Records (OICRF) can provide related and reliable information. This organization, university library and local NGO's, websites such as Landesa and Huairou Commission can also be helpful for finding relevant case studies and secondary data.

The first important step before data collection is to be clear with objective of secondary data collection. Table 1-1 three provide the key concepts that would take into consideration for collecting relevant secondary data based on research objective.

Table 1-1 Focus of this research

focus	content
Topic focus	Climate change
Issue	vulnerability
group	women
Focused geographic area	Developing countries
Catchment area	Rural area
Sector	Land tenure

In working with secondary data, it is necessary to notice availability, validity and reliability of these data. It is important to use reliable resources to provide right information in right time, so quality of information provided by different sources need to be analysed by following criteria (Chua, 2005):

- Adequacy: information have to be checked if they are enough to answer the questions or not. And also it is important to use enough information and not seeking for more details and more precise than that.

- Timelessness: provided information need to be in the proper time which is considered in the research.
- Relevance: information have to provide most related data to research questions to be able to answer them.
- Coverage: collected data need to be adequate to cover the scale of the problem.
- Transparency: for any information provided by resources there is a need to be explicit about the information, assumption and methods which led to conclusion as well as any limitation on data accuracy.
- Objectivity: using different and varies resources can provide wide and balance prospective in order to address the problem and make recommendation.

### 1.9.2. Research matrix

The provided research matrix contain sub-objectives, research questions, research methods, data required and anticipated result (Table 1-2).

Table 1-2 Research matrix

Research sub-objectives	Research questions	Research methods	Data required	Anticipated results
<b>To identify factors for women vulnerability in climate change.</b>	1. What are different approaches on vulnerability in climate change?	1.Literature review	1.relevant scientific journals, articles and working papers 2.related reports, guidelines and toolkits from international organisations 3.secondary data on case studies	1. Collection of different approaches and methods to analyse vulnerability.
	2. What is knowledge about women vulnerability in climate change?	2.case study		2. Concrete women vulnerability concept.
	3. What are the factors for women vulnerability in climate change?			3. Factors for women vulnerability in climate change.
<b>To describe women's rights on land as factor of women vulnerability.</b>	4. How does different land tenure define women's land rights?	1.Literature review	1.relevant scientific journals, articles and working papers 2.related reports, guidelines and toolkits from international organisations 3.secondary data on case studies	4. Women's land rights in different land tenures system.
	5. How can women's land rights be secured?	2.case study		5. Recommended solution to secure women's right on land.
<b>To analyse women vulnerability and adaptation to climate change with respect to women tenure security.</b>	6. How are women vulnerable to effect of climate change in land related issues?	1.Literature review	1.relevant scientific journals, articles and working papers 2.related reports, guidelines and toolkits from international organisations 3.secondary data on case studies	6. Women vulnerability in climate change in land related issue.
	7. How women's security of tenure can empower them for adaptation to effects of climate change?	2.case study		7. The extent that women security of tenure can empower them for adaptation to climate change

### 1.9.3. Methods of data analysis

After literature review and data collection on case studies related to sub-objectives and for final analysis, SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis can be used. In this way, strengths, weaknesses, opportunities and threats can identify to provide influencing factors on women vulnerability in and adaptation to climate change in context of land tenure.

### 1.10. Thesis structure

An outline of structure of thesis is presented by Figure 1-5, then it is following with a summary of content of each chapter.

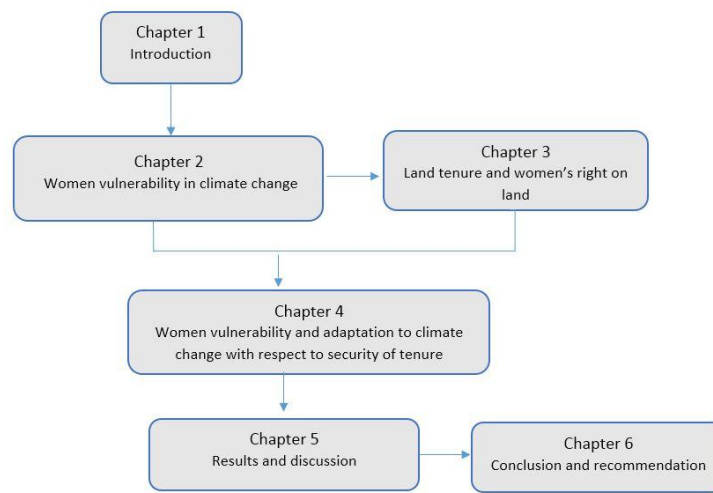


Figure 1-5 Thesis structure

#### Chapter 1: Introduction

This part contain an overview and introduction of thesis by background and justifications, importance of study, then referring to research problem, research objective and research questions, and in last part of introduction, research methodology, data analysis, anticipated output and hypothesis would explain briefly.

#### Chapter 2: Women vulnerability in Climate Change

This chapter includes literature review on women vulnerability in order to find different approaches on vulnerability and different factors which lead to women special vulnerability in climate change, moreover data from related case studies would be used to justify literature review.

#### Chapter 3: Land tenure and women's right on land

Content of this chapter is related to second sub objective which is women's rights on land. It includes literature review on women's land rights compounding with data collected from related case studies.

#### Chapter 4: Women vulnerability and adaptation to climate change with respect to security of tenure

The comparison of literature review and secondary data from case studies of previous chapters as well as literature review and case study analysis related to Women vulnerability in perspective of security of tenure would present in this chapter.

#### Chapter 5: Results and Discussion

Discussion on data resulted from previous chapters by SWOT analysis would be done in this chapter and based on that, result can be presented.

#### Chapter 6: Conclusion and recommendations

This last chapter is assessment of whole research in order to test the hypothesis and make a conclusion, Moreover it include further recommendation.



## 2. WOMEN VULNERABILITY IN CLIMATE CHANGE

### 2.1. Introduction

The term ‘vulnerability’ has been used in literature in many different ways and there are many approaches to vulnerability. The purpose of ‘vulnerability assessment in adaptation to climate change’ is to identify vulnerability of community or regions in order to identify adaptation strategies. In this research, women as one of the vulnerable groups are target of this vulnerability assessment, in order to find different factors for their vulnerability. This assessment would help to identify the proper adaptation strategy to enhance women adaptive capacity and as a result, reduction in their vulnerability.

In order to identify factors for women vulnerability in climate change, chapter two reviews theory and concepts of vulnerability and presenting different factors of women vulnerability in climate change by analysing two case studies concerning gender and climate change. This chapter focuses on answering the first three research questions; 1) different approaches in vulnerability to climate change, 2) knowledge about women vulnerability in climate change and 3) factors for women vulnerability to climate change, to achieve first sub-objective of this research.

Chapter two starts with literature review at wider view to vulnerability by looking at different approaches to vulnerability to climate change (section 2.2). Then knowledge about women vulnerability and indicators of women vulnerability would be presented based on literature review in section 2.3. This chapter follow with deriving factors of women vulnerability by cases related to gender and climate change from two different countries. Review of women’s socioeconomic position and women vulnerability in Ghana and Bangladesh would present in next sections (2.4 & 2.5.) respectively. Finally, chapter summarise in section 2.6.

### 2.2. Vulnerability and different approaches to vulnerability

The term ‘vulnerability’ has been used in literature in many different ways and there are variety of definitions for that. Vulnerability conceptualised in many ways for example it is applied differently by natural and social scientists. Vulnerability has been mentioned in relation with concepts such as resilience, fragility adaptability, susceptibility and risks, and also exposure, sensitivity, adaptive capacity critically and robustness. By existing different conceptualisation of vulnerability, Füssel (2007) state that there are not any single or unique one which could fit all the vulnerability assessment and it depends on purpose of vulnerability assessment and policy concept. Existing the various terminologies on vulnerability characterized in climate science, economic, development, risk assessment or policy analysis sometimes become problematic (Füssel, 2007). For example, one of the most applicable vulnerability conceptualisation provided by IPCC (as it mentioned in section 1.4.2.) is based on considering three core concept for vulnerability: exposure, sensitivity and adaptive capacity. Whereas Turner et al.(2003) in framework of vulnerability for sustainability science, define vulnerability based on three component of exposure, sensitivity and resilience. In addition there are many differences in definition of these concepts such as resilience and adaptive capacity.

The different vulnerability concepts could distinguish by vulnerability factors that is taken into consideration. For example (United Nations, 2004) consider four group of these factors: physical, environmental, social and economic. Physical factors describe exposure of vulnerable element in region. Environmental factors describe state of environment within the region. Social factors are linked to level of



wellbeing of individuals, groups and community such as education level, human rights, access to these rights, social equity, custom or good governance, and economic factors are dependent on the available economic resources for individuals, groups or communities and their economic status.

In many other research, vulnerability has defined as biophysical or social (or socioeconomic) vulnerability (Füssel, 2007) or they consider internal or external aspects of vulnerability (Bradshaw, 2004); the system is exposed to external side and internal aspects determined their impact on the system (Füssel, 2007).

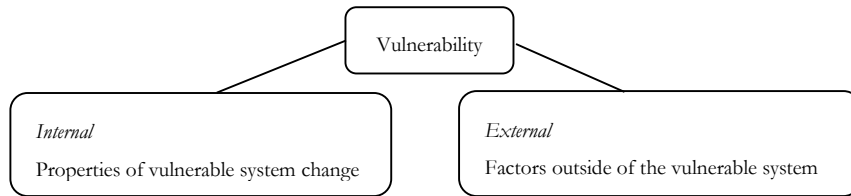


Figure 2-1 Internal and external aspects of vulnerability

Füsse, (2007) noticed to independent variables of vulnerability to Scale and domain. Scale is considered as the internal and external vulnerability factors. Internal factors referring to properties of vulnerable system or community itself while external ones refer to factors outside of the system. Typically it reflects the geographic boundaries and scope of vulnerability assessment, for example in a local assessment national policies would be consider as external vulnerability factors. Domain are considered in two groups of Socioeconomic and biophysical factors; socioeconomic vulnerability factors are investigated by social science and they are related to economic resources, social institution, power distribution and other social and economic properties of considered group while biophysical factors are system properties investigated by natural science. Table 2-2 presents some examples in these domains and scales.

Table 2-1 The four categories of vulnerability factors (classified by scale and domain) (Füssel, 2007)

Domain	socioeconomic	Biophysical
scale		
Internal	Income Social capital Access to information/ Level of education Access to resources	Environmental conditions Topography Land cover Geographical position
External	National policies International aid Governmental institution	Sever storm/ Typhoons Flood Sea level rise

Comparing with the vulnerability framework presented by Turner et al. (2003), Internal socio economic vulnerability and internal biophysical vulnerability respectively are compatible with resilience and sensitivity, and external socio economic vulnerability and external biophysical vulnerability with human conditions and with environment conditions.

By considering ‘cross-scale’ (combination of internal and external factors) and ‘integrated’ (combination of socioeconomic and biophysical factors) different approaches to vulnerability researches explained by Füsse, (2007): risk-hazard approach (internal biophysical vulnerability), Socioeconomic approach (Cross-scale socioeconomic vulnerability), pressure and release model (PAR, Internal integrated vulnerability), integrated approach and resilience approach (cross-scale integrated vulnerability). It can be seen in Table 2-3.

Table 2-2 Major approaches to vulnerability research (Füssel, 2007).  
Abbreviations: IS (internal socioeconomic), IB (Internal biophysical), ES (external socioeconomic), EB (external biophysical)

Approaches	IS	IB	ES	EB	description
risk-hazard approach		X			internal biophysical vulnerability
socio economic approach	X		?		Cross-scale socioeconomic vulnerability
Pressure-and-release model (PAR)	X	X			Internal integrated vulnerability
integrated approach	X	X	X	X	cross-scale integrated vulnerability
Resilience approach	X	X	?	?	cross-scale integrated vulnerability

*Risk-hazard approach* is suitable in order to measure risks to certain element that arise from their exposure to particular type of hazard. In this context, vulnerability definition refer to physical system. It consider the two distinct factors of 'hazard' and 'vulnerability' to determine 'risk'. Implication of risk-hazard approach for people seems more difficult because their exposure to hazards mainly is dependent on people's socio economic factors. The vulnerability concept applied in risk-hazard approach is characterize as 'internal biophysical vulnerability'. The term 'sensitivity' also are used for representation of this concept.

*Socioeconomic approach* is descriptive model of socio economic vulnerability to different external stresses. In this approach, focus is on analysis on people, exploring the most vulnerable group and asking causes of this vulnerability. Socioeconomic approach can categorised as 'internal socioeconomic vulnerability' or 'Cross-scale socioeconomic vulnerability' (Table 2-3). The term 'adaptive capacity' and 'resilience' are also used to represent this concept of vulnerability. In this concept, vulnerability is defined in term of 'ability of individuals, groups or communities to cope with external stresses on their livelihood and wellbeing' (Neil Adger, 1999).

*Pressure-and-release model (PAR)* involve regional pressure and stresses, core causes and regional vulnerable condition, and it present an illustrative model of vulnerability, not exactly defining term 'vulnerability'. Starting point of PAR model can referred to risk-hazard framework.

*Integrated approach* can be consider as a combination and extension of Risk-hazard approach and Socioeconomic approach in different integrated approaches such as 'hazard of place model' and 'joined vulnerability framework' (Turner et al., 2003). In this context, vulnerability would define as 'The likelihood that individuals, groups or communities would expose to hazards'. Integrated vulnerability assessment have focused on physical stresses such as natural hazard or climate change.

*Resilience approach* is another type of vulnerability research with focus on term 'resilience'. Resilience and vulnerability are two related concepts. In some literature, vulnerability is flip side of resilience whereas in other sources it state that a community need to be prepared and less vulnerable in order to achieve a high resilience (Usamah, 2013). Turner et al. (2003) mentioned resilience as one of the factors of vulnerability besides exposure and sensitivity. Considering vulnerability as a flip side of resilience, it compromise internal factors. But with consideration of resilience as one of the three factor of vulnerability, this approach can considered closely linked to integrated approach (Füssel, 2007).

The main discussed approaches of vulnerability are different in their ability and their application regarding the main climate change policy options (adaptation, mitigation and compensations). Risk-hazard approach is mostly suitable for mitigation and compensation policies. Integrated approach seems fine for all three climate policy options. Pressure-and-release model and resilience approach have not implied broadly in order to implication of climate policy options. For adaptation policies and adaptation planning, socioeconomic approaches is better option, especially when focus is on people, their vulnerability and causes of their vulnerability. In this research, purpose is to find the indicator of women vulnerability in climate change and searching security of tenure as an indicator of their vulnerability for adaptation to climate change. So in next section women's socioeconomic vulnerability would assess as the first step of the research.

**2.2.1. Socioeconomic approach to vulnerability**

The focus in socioeconomic approach is on people, investigating the most vulnerable and the reasons of vulnerability. In this context, emphasis is on social dimension of vulnerability and it is defined by Neil Adger (1999) as ‘exposure of individuals or groups to livelihood stresses as result of social and environmental changes and their ability to cope with these stresses’.

Social factors of vulnerability (social vulnerability) are linked to wellbeing of individuals, groups and community and it include different aspects such as education level or literacy, human rights, access to these rights, social equity and gender issues. These social factors can affect people vulnerability in climate change (United Nations, 2004). Social vulnerability include wider aspects such as cultural aspects, tradition and beliefs which are important in the selecting ways for coping to climate change by societies. It is also linked to political aspects, Institutional organisation and governance also are some factors determining social vulnerability, that is why socioeconomic approach by some scholars is mentioned as political-economic approach. Economic factors of vulnerability are linked to status of individuals and groups in society. Level of access to resources, credit and insurance can affect vulnerability. So groups who are in lower level economically, are more vulnerable such as poor and females.

**2.2.1.1. Elements of socioeconomic vulnerability**

Two discrete aspects of vulnerability can help to explain the scale of issue and unit of analysis; individual aspect which can determined by factors such as access to resources and social status of individuals and collective aspect of a nation or community is determined by institutional and market structure such as social security or infrastructure. There are some indicators to examine the relative vulnerability of a social group; the main elements of vulnerability stated by Neil Adger (1999) are inequality, poverty, dependency on resource (at individual level) and institutional adaptation (at collective level), presented in Figure 2-2.

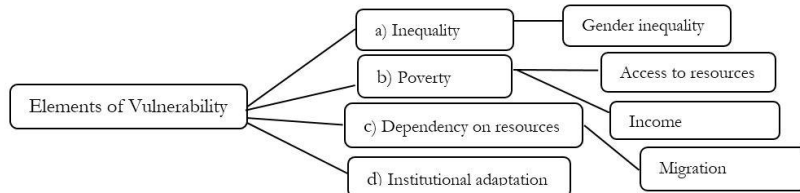


Figure 2-2 Elements of socioeconomic vulnerability revised after (Neil Adger, 1999)

*a) Inequality (collective aspect):*

Inequality is linked to vulnerability directly and indirectly. Inequality within a society or communication and between different groups of population can lead to vulnerability. The direct link of inequality and vulnerability is related to allocation of resources, as it can be seen in right part of Figure 2-3. It is based on connection of private resources and adaptive capacities to adverse effect of climate change. While indirect linkage of inequality and vulnerability is concern with diversification of income sources and poverty as it can be seen in left part of Figure 2-3. This link is indirect because increasing inequality doesn't cause poverty necessarily but in longer term, reducing inequality can reduce poverty.

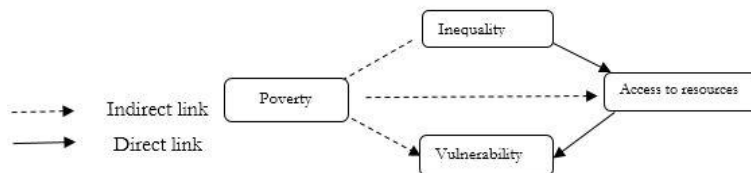


Figure 2-3 Link between inequality and vulnerability (Neil Adger, 1999)

Bradshaw (2004) state that vulnerability (socioeconomic vulnerability) focus on lack of access to resources. This concept of vulnerability pay attention to people in society and the difference among them, and it is a key to predict and understand different impacts of climate change. The hardest hit would be for these groups

(Bradshaw, 2004; Enarson, 1998): poor and low income, single parent, and socially isolated household, immigrant, foreigner, refugee, children, young people, indigenous and ethnic group, homelessness and women. Even among women, poor, elder, disable, household headed, homeless, immigrant, isolated and rural receive highest hit (Enarson, 1998). Practically socioeconomic vulnerability looks at resource available for different group of society in active concept. That is to say, rather than describing the current situation of social group (passive concept), it tend to prospect of changing the situation (active concept). As mentioned before, vulnerability assessment is just a start point in order to identify adaptation planning.

*b) Poverty*

Poverty has an indirect relation with access to resources affecting exposure and adaptive capacity. Considering relation of poverty with level of income, is a key factor to access to resources, as it can be seen in Figure 2-3. Access to resources is based on social and economic relation. Although measuring access to resources is difficult, it could be said that poor have less access. As explained in section 1.3.3. Poorer people prefer to live in marginal area since they cannot afford buy land ,and these area are more risky area which are more prone to effects of climate change, so more exposure to effects of climate change and therefore more vulnerability. Living in these areas and lack of access to transportation or more cost of access and transportation can make poor poorer.

Moreover In case of disasters, access to resources is prerequisite to cope with effect of climate change. As well as injuries, death and other adverse effects of disasters, it can lead to migration (temporary or permanent) or loss of land or other resources. Moreover changes in access to resources by disaster can lead to more poverty, for example loss of land or loss of land use rights for those who their rights is dependent on others such as women. Access to resources can be secured through secure access to land and land ownership which can make it easier for owner to migrate or can provide them more time to manage their land or sell it.

Based on relation of poverty, income and access to resources, it is important to consider access to resources as a source of income. As well as using resources such land for agricultural purposes, rights over land are important as a source of income. Rights to buy or sell land defined contumely or legally are linked to poverty (by raising income). Therefor poverty is an important element in individual vulnerability to climate change since poverty can affect access to resources, and access to resources is a key factor in facing with climate change and also is a key factor in raising income.

*c) Dependency on resources*

Dependency on resources is an element which can affect individual vulnerability. Practically dependency on resources would lead to social and economic stresses, because of instability and variability of income as well as risk of failure of those resources from the view of economic aspect and also dependency on resources leading to migration could lead to instability household level and social instability. So dependency on climate sensitive assets such as land or water would result in economic and social instability and so vulnerability to climate change. (Neil Adger, 1999). Mostly, poorer and marginalised group are more dependent on resources. Although migration is an important factor of resource dependency, consideration of different kind of immigration is essential. For example “pull’ migration is an answer to more attractive situation such as moving to urban area while “push” migration is caused by damaging circumstance such as loss of assets. Moreover migration can occurs for whole member of households as a result of extreme events as a last choice or in some cases some member of household migrate to increase income of household in order to reduce dependency on resources and enhancing the livelihood security. These sources of incomes can be in urban areas, agricultural, forestry or fisheries in other regions. But in the second type, (migration of some member of household) migration can have negative effects on remaining member. For example, in some cases which men migrate to cities in order make more money and female-headed household left behind are poorest. so as result of male migration, vulnerability of women would increase (Aguilar, 2009). That is to say, the strategy of migration in order to make different income sources in order to reduce dependency and vulnerability can lead to increase vulnerability.

*d) Institutional adaptation*

Institutional adaptation is one of the most important factors. All mentioned indicators of vulnerability (poverty, access to resources and inequality) are predicted by influence of institutions. Poverty and different allocation of resources are determined by institutions. And they are formal institutions which manage and implement property rights (although in some developing countries they are managed customarily, institutions can promote their efficiency and in longer term cover all of them). More generally, it can be said that structure of institution is so important in vulnerability assessment and finding factors of vulnerability in order to characterize suitable adaptation planning. Also structure of institution and their performance in examination and implication of different adaptation planning is so important (Neil Adger, 1999). For example, in smart agriculture for adaptation to climate change in Ghana, institutional arrangement in land tenure system was main obstacle for women participation in adaptation planning (Naab & Koranteng, 2012).

### **2.2.1.2. Socioeconomic vulnerability: gender analysis**

As mentioned in sections 1.2 and 1.3. Gender mainstreaming is needed in any policies or programs to be sure their implication for both men and women in all levels. It is a strategy to involve women in all dimensions of policies or planned actions such as design, monitoring, implementation or evaluation. And it is considered in all political, social and economic level, therefore women as well as men can benefit equally (Alston, 2013; Vincent et al., 2010). Regarding the gendered climate change impacts, not many efforts and implications have been done in policies and planning for mitigation and adaptation to climate change. In climate change context, gender mainstreaming is to be sure of comprehensiveness of policies and programs and to make women supported and empowered to be able to take action on their own. It is designed to bring gender equality (Alston, 2013).

There are different socioeconomic differences between men and women in the society which is rooted in social structures in the world, since women roles and responsibilities, their access to human secured rights, level of literacy, participation in decision making and etc. are different in society, so gender issues are so important regarding social vulnerabilities (United Nations, 2004). Moreover their different access to credit and resources, put them in different level economically.

(Angula, 2010). Gender analysis (gender sensitive analysis) is used to refer the gender dimension of any given issue. Gender analysis can be defined differently in any context, but the objective is identification of differences to provide available opportunities for men and women. Considering the different approaches to vulnerability, several authors point out that gendered approach to study and analysis the effect of climate change on women is essential to reach the goal of gender equity in this type of intervention. So gender analysis is considered as the best approach in order to achieve gender equality and reducing their vulnerability (Lambrou & Piana, 2006). Gender analysis focuses on understanding the relationship between men and women, gender household relationship, empowerment and access to resources, participation and decision making at all levels (Angula, 2010). Gender analysis (gender sensitive analysis) is used to refer the gender dimension of any given issue. Gender analysis can be defined differently in any context, but the objective is identification of differences to provide available opportunities for men and women.

## **2.3. Women vulnerability**

In this section after an overview on indicators for women vulnerability provided by literatures, case studies from Ghana and Bangladesh would be investigated in order to provide more accurate data regarding women vulnerability and the factors of their vulnerability which could lead to policy making improving their adaptive capacities for adaptation to climate change. (Angula, 2010; Bradshaw, 2004; Omari, 2010).

### **2.3.1. Elements of women vulnerability**

Climate change incremental effects such as land degradation, changing in pattern of precipitation can affect particularly on women, and it is not due to their sex and their natural weaknesses compared to men, rather

it is due to social and cultural rules in society (Vincent et al., 2010). Gender equality refers to equal rights, responsibilities and opportunities for both men and women in society, at work and in the home, and climate change would exaggerate the existing pattern of gender inequality and gender disadvantages in the society. There are different elements for that, such as limited access to resources, dependence on natural resources division of labour, lack of education, access to information, limited mobility and exclusion from decision making. These elements can be seen in Figure 2-4. Relation of these elements and gender inequality with climate change and women vulnerability is presented in Figure 2-5.

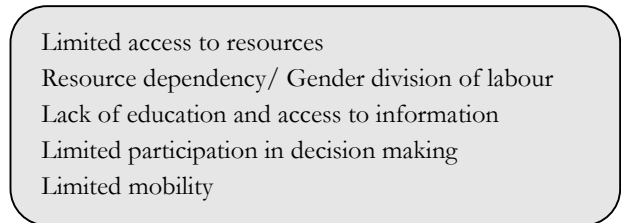


Figure 2-4 Elements of women vulnerability (which are related to gender inequality) (Vincent et al., 2010)

Dankelman (2010) categorised these factors differently, by emphasizing on five factor as a critical factors for women vulnerability which are access and control over land and natural resources, access to credit and technology, access to education, decision making power and participation in social progress, but these factors are different in various regions, and vulnerability assessment need to be conducted regionally.

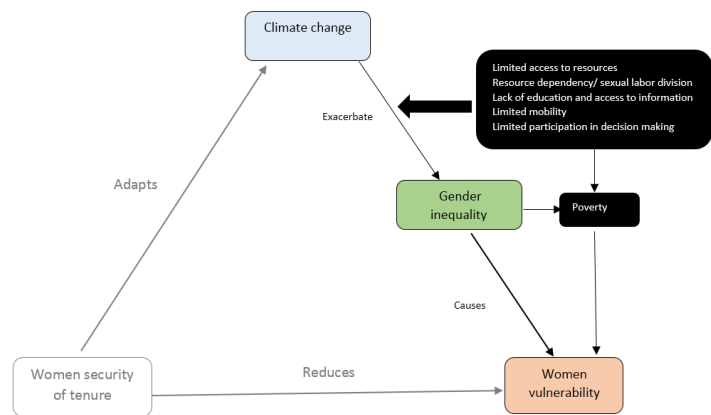


Figure 2-5 Relation of gender equality with climate change and women vulnerability

In many developing and poor countries women have limited access to resources such as land, livestock, tools and credit. Access to land and security of tenure is mostly highlighted as an important reason for women vulnerability in climate change (Vincent et al., 2010). It would explain more in next chapter that women rights over land in different part of the world and in different countries. Not having the ownership, and just having the use right and even dependency of these rights to their relative has effect on their particular vulnerability.

Dependency on natural resources and gender division of labour in also a reason for women vulnerability in climate change. Women have the major role in resource management, for example in most developing countries women are responsible for fetching water for their families. So with effect of climate change such as lack of precipitation or drought, they have to put more time to bring water from long distances. Another example of women dependency on natural resources can be in energy production; since in rural area in many developing countries energy come from biomass fuels such as wood or agriculture wastes, and management and collection of fuel is women’s business, moreover women need these energy for cooking or heating. So

climate change and its effects such as desertification and deforestation can made women to pass long distances and heavy physical labour in order to make energy.

Lack of education is mostly distributed among women. In many societies, especially rural areas in developing countries women are less educated due to higher priority in boy's education, marriage in younger ages and household activities. Moreover in lack of resources, girls are the ones who be deprived from education. As result of lack of education, they have less access to information and as result they are less aware of climate change, its variations or climate hazards which out them in higher level of vulnerability. Moreover lack of education has effect on their qualification for finding formal job and employment. Therefore they are would be more dependent on their husband and unpaid jobs on husband's lands. So their education also has affect them economically as well. Limited mobility is another factor of women vulnerability. As mentioned in element of vulnerability in section 2.2.1, migration is one coping mechanism mostly using by men. There are some restriction for women for leaving their community such as their household role, the fact of remaining at home which is dictated to them by society and lack of education. Limited mobility would make them vulnerable in different ways, for example in case of facing with severe climatic changes or disaster, and also they would lose an additional source of income (mentioned before that migration sometimes is for making additional income and reduce dependency on resources).

Exclusion from decision-making is one of the factor which has limited awareness of women's need. It is necessary to women participate in decision making in order to make more comprehensive decision. Lack of power in decision making is not just in community level. In many countries, as men are head of household, there are the main decision makers. Although women have close relation with environment and a great local knowledge on conservation and potential adaptive capacity, their voice cannot be heard, not in family nor in community.

Although various factors (such as Limited access to resources, Resource dependency/ sexual labour division/ Limited mobility, Lack of education and access to information and Limited participation in decision making) mentioned by literature for women vulnerability, they could be different in regions. Due to the diversity of socioeconomic conditions and divergence in effects of climate change across the countries and regions, specific regional vulnerability assessment is necessary. Regards to these divergence, Ghana and Bangladesh has been chosen to examine women vulnerability in climate change.

African countries are among the most vulnerable countries to effects of climate change globally because of widespread poverty and dependence of most of the population on agriculture especially rain-fed agriculture. Ghana in west part of Africa is located at the intersection of three hydro-climatic zones, and subject to the impact of El Niño Southern Oscillation, the Inter-Tropical Convergence Zone and West Africa monsoon. The country is highly vulnerable to climate change, variability and uncertainty which led to Increases in the frequency and intensity of rainfall, floods and landslides, along with the occurrence of extended periods of drought and intense heat. Bangladesh located in south Asia (which is among the regions most impacted by climate change) in low-lying delta in one of the most vulnerable countries to climate change, prone to different climate-related natural disasters such as flood, cyclone, river erosion, landslide and droughts. These two highly vulnerable countries to climate change with their ecological differences, women socioeconomic position and different land tenure system seems to be good cases for comparison study of women vulnerability in this chapter.

## 2.4. Ghana case study

This section provides a case from Ghana (WEDO, 2008b) with overview of climate change in Ghana in order to search gender, human security and climate change. This case is used in order to find the factors for women vulnerability in climate change.

Ghana is located on the south central coast of West Africa. This country is in danger of desertification and deforestation, specially in Northern part. rising temperature and excessive heat, variability in rainfall (decline in rainfall or torrential rains), sever dry wind and sea level rise are environmental threats that are expected in Ghana (WEDO, 2008b). Rainfall and temperature variability, especially in semi-arid region can lead to draught and flood, such as flood happened in Northern Ghana in 2006 (Quan & Dyer, 2008). These climate change issues could affect soil, lands, coastal zones and tropical forests, and they reduced crop yields and deccreas natural resources (UNFPA & WEDO, 2009). Effect of climate change in Ghana are regionally diferent; for example droughts is major problem in North of Ghana, while variability of rainfall is most important threat for forest zones.

Climate change doesn't affect all people in Ghana equally, men and women have different levels of vulnerability. There are significant difference between men and women and between male and female-headed household in needs, constrains and opportunities for access and managing productive resources, services and income-generating opportunities. So it is imortant to look at women socioeconomic position, prior to searching factors of their vulnerability.

### 2.4.1. Women's socio-economic position

In section 2.3.1 elements of women vulnerability has been provided (Figure 2-4) based on literature, here women socioeconomic would be analyse based on those factors.

#### a) *Women access to land*

Women have a great role in agriculture but they have limited access to land and credits. About 80 % of rural area in Ghana are regulated by customary law and rural women access to land is based on this tenure system. Based on customary law, all members of society regardless of their gender have use rights or customary freehold. But male have control over land in household, and they are in charge of land tenure arrangements practically. Therefore, women access to and is through their male relatives and it can limit women's direct access to land ownership or even land use. Basically, smaller farms with lower quality are manages by women and generally there are a big gender differences in land holding.

Farmers have poor access to credit. Mostly credit access is from families, friends or informal networks which are not reliable resources. For subsistence farms, women obtain credit from farmers and traders while male market-oriented farms obtains more credit from private banks and public sector. Small part of land is assessed trough market by renting or buying since access to land mostly is through land distribution by village or family, or used free of charge. Generally, women access through the market is less than.

#### b) *Resource dependency/ Gender division of labour*

Agriculture is an important sector in economy and the main employer for both men and women, with employment of 55 % of active population which shows dependency on resources in this country. Almost three-fifth of the rural population has second job and men are employed in waged activity five times more than women. Generally women are less involved in paid works, and in formal sector they have lower position than men. Mostly they are unpaid family worker or working in informal sector which is less secure, less stable (lower income and not protected by law).



Figure 2-6 Ghana and its location in



Both men and women are involve in domestic and productive activities. But domestic tasks (such as collecting fire wood and water, Cooking and taking care of children) are mainly carried by women, and their participation in productive task almost is equal with men. As result of this dual task, women don't have enough time to benefit from economic, continue their education, improve their capabilities and improving their wellbeing (FAO, 2012).

*c) Female and male level of education*

As mentioned, education level is important factor in determining household ability to have better working opportunities and escaping from poverty. In rural area, 29 % of women and 52 % of men are literate. As well as high rate of illiteracy, this percentage shows gender differences of illiteracy. Therefore, women have less access to formal sector employment.

*d) Limited participation in decision making*

Based on national constitution, equal rights for all citizens are accepted, but considering the women population which is 51%, women's participation in local governance and in parliament (2004-2008) was around 10%(FAO, 2012). Lack of women participation can be seen in all public services and civil society organization in trade unions, judiciary and NGOs. Participation in decision making is crucial for realization and implementation of women's rights and also for benefits from climate change discussions and adaptation planning.

#### **2.4.2. Women vulnerability in climate change**

In this section a case study related to gender, climate and human security would investigate in order to look at the factors of women vulnerability In Ghana (WEDO, 2008b). Since women are not presented sufficiently in policy and decision making, it is difficult to state their concern and make them more vulnerable. With mentioned women's socioeconomic position and gender inequality in Ghana, women are likely to receive high hit by changes in climate. Their vulnerability can separately discuss in agriculture, fisheries, water, energy and health:

*a) Land and Agriculture*

Women's contributions in agriculture are evaluated In Ghana. As mentioned in section 2.4.1.a women manage more small and poor farms and social norms deny women access to fertile lands. These lands are more sensitive to changes in climates which need more labour to save yield crops in unpredictable and intense changes in climate. Moreover women's rights over land is not secured. Based on customary tenure system, that women access to land is through their male relatives and men have control over land (this part would explain specifically in Chapter three). Therefore climatic changes would affect women ability to use available land. Inequality in access to land by gender comes into sharp when productive activity of women in facing with climate change is examined. Based on analysis of effects of climate change on cereal production in Ghana, changes in temperature over the years decrease maize yield from 0.5 percent in 2000 to 6.9 in 2020. Logging activities in forest zones doubled which accelerate the widespread erosion, reduce crop yield and deforestation. These process increase climate change with negative effect on women's productive efforts in agriculture.

*b) Fisheries*

Fishing activity in Ghana is gendered. Mostly men go for fishing and women are in charge of storage and marketing. So supports provided for this sector are not gender specific, and it can make problem for women who sell fish as income activity. This situation can be worsen by effects of climate change leading to loss of income for poorer women and also lower level of protein in diet.

*c) Water*

Water is critical for farming as well as being basic need, especially in rural area in northern parts of Ghana where small- scale irrigation system are used. So lack of access to water for women can lead to their poverty. Mentioned in 2.4.1.b women are responsible for provision of water supply. Women usually walk long distance to fetch water and carry it to home. Based on research on effects of climate change on water resources in Ghana, changes in precipitation or rise in temperature can cause reduction in both runoff and

groundwater by more than 20 % in 2020. These scenario can have negative effects on both irrigation and water supply for household. So women would be force to allocate more time and energy to go longer distance for fetching water which could have negative impact on their health, household activities and loss of income for women, leading to their poverty.

*d) Energy*

Almost 60% of energy consumption in Ghana is biomass in form of firewood and charcoal. So energy sector shows that it is sensitive to climate change. Variable precipitation and high temperature leading to water shortage and negative effects on woody plant and land degradation result in reduction in biomass production. Due to women responsibility for collecting firewood (mentioned in section 2.4.1.b.) with negative effect of climate change, they are forced to spend longer hours for collecting wood.

*e) Health*

Climate change, extreme or lack of precipitation or related disasters such as flood or droughts could impact health of women and children. It is predicted that climate change can cause serious health problem for them with diseases such as cardiovascular or respiratory. In case of flood, women and children are most vulnerable to death and injuries, and they don't have chance for disaster preparedness. Moreover diseases such as Choloric, malaria and malnutrition may increase by varied climate and pregnant women and children are especially vulnerable to malaria. Climate change could effect on availability of traditional medical plants using by women which can have negative effect on women's health. In addition climate change increase their workload and force them to spend more time (considering their role in providing energy and water) which has negative effect on their health.

*Summary*

This case study investigate effect of climate change on women in different sectors such as land and agriculture, Fisheries, Water, Energy and health. Based on the women's socioeconomic position In Ghana and existing gender inequality, climate change have the great impact on women in these sectors. As mentioned, gender division of labour and their dependency on resources made them vulnerable in water and energy sector. Effect of climate change on women in agriculture is related to women's land right. Since women don't have secure land rights, climate change can affect ability of women to use available land. Moreover because of their lack of access to fertile land, their land are very sensitive to climate change and need more labour. So it can be concluded that women's secure access to land is an important factor for women vulnerability in climate change.

As mentioned before as result of lack of women participation in decision making, gender sensitive approaches in environment conservation are difficult to consider and imply. There are many laws and policies in Ghana regarding the protection of environment, but gender responses is limited. Policies have to take women into account; their needs, their responsibilities, their uses of resources and their vulnerability. But the policies and their implementation mainly failed to consider gender aspects in Ghana. It is mainly because of considering just economic growth as a factor of development and issue of sustainable development and gender are left behind. Women's participation in decision making can promote policy making in the more gender sensitive way.

## **2.5. Bangladesh case study**

Bangladesh is located in south Asia which is one of the most vulnerable region by climate change and it is among most disaster-prone countries in the world due to geological and hydrological characteristics, flat topography, extreme climate variability, high population density and poverty. And it is expected that intensity and frequency of disaster will increase as result of changes in climate. Moreover, agriculture is the main sector in national economy in this country which is highly sensitive to climate change (Ahmad, 2012). Poverty is Bangladesh is largely rural phenomenon and Bangladesh experienced economic growth which increases income inequalities, but gender inequality is still a main concern (Mitchell, 2011). Floods, Cyclones,

river erosion, draught, landslides and sea level rise are threats of climate change in these country, and one of the most devastating flood in Bangladesh happened in 2007 (WEDO, 2008a). This case has been conducted in six rural areas in Bangladesh based on qualitative and quantitative instruments to understand gender aspects of climate change and find factors of women vulnerability. (Ahmad, 2012). This case study consider both climate- related disasters as well as incremental effects of climate change.

### 1) *Women vulnerability in climate change*

The following section look at different factors which affect women vulnerability and their adaptive capacity. As mentioned in IPCC framework, adaptive capacity is one of the main factors of vulnerability (section 1.4.2). With improving people's adaptive capacity in climate change, their vulnerability would decrease.

*Gender division of labour:* Women responsibility in household management, taking care of children and elderly, and social norms made them reluctant to leave their homes without men relatives and it affect their mobility. Moreover, women are responsible for water and fuel gathering, and effect of climate change fresh water and firewood increase their burden and the allocated time for these activities (which reduced their time for other activities, such as economic productivity, networking, skill development, information gathering, and community activities). Base on social norms, family don't allow them to take 'inappropriate' jobs and be dependent and it result in less economic options for them. In case of having job, because of lower education, they receive lower income. Moreover Scarcity and lack of resources increase the tension in household, leading to domestic abuse. And as result of competition on scarce resources between communities, women face violence while they are collecting firewood and water.

*Health problem:* Women are more prone to illness as difficulties in sanitation facilities and bathing during disasters. Also they are more sensitive to disease in compare with men. As a coping action of families in climate vulnerable areas, some families force girls to marry in young age, and they use it as a coping strategy to ensure their security and reduce expenses. But it increase women vulnerability because young marriage could affect their level of education, young pregnancy, and poor health. Women are more in danger of malnutrition too.

*Inheritance law:* Based on information collected by respondent, many of women lost access to land and property by husband or father death. And it is due to inheritance, customs and religion, as well as lack of information about legal rights and inability to access to justice system. With loss of assets, women had no collateral. Therefore, they do not have access to loans from the formal banking system to enhance their economic opportunities and income. In Islam, women inherit property of husband or fathers, but their share of inheritance is half of children and their brothers. In many cases, women give their right to their brothers to keep the good relation with their parental family, but in case of divorce or abandonment, women don't have any joint right of their fathers inherited properties.

### 2) *Adaptive capacity*

Women have less control over capitals, limited voice in decision making, and limited economic opportunities. These factors reduce women capacity to adapt to climate change. And it shows that Adaptive capacity is gendered.

*Access to and control over resources and income:* Access to assets and resources and ability to transfer to income is important to improve adaptive capacity. Based on data from case study vulnerability differs by income. Non-poor have highest adaptive capacity because of more assets, and the ability to transfer the assets to incomes. And they change their livelihoods by running business. Women who majority of them are poor have less



Figure 2-7 Bangladesh and its location in Asia

access to assets and so less adaptive capacity. Their lower economic position is due to caring household duties, low education levels, limited opportunities for skill development, and gender division of labour. In addition, effect of climate change in scarcity of natural resources, increase women's workload and reduces time for income generation and networking. Moreover, Social norms limit women ability to generate income. For example in area hit by cyclone, while many women are educated, instead of involving to generate income, continue their traditional household's roles and it limit their income and so affect their adaptive capacity. Just 10 % of women have access to market.

Women have less control over resources and it decrease their ability to transform capitals to income. The women who take part in this survey didn't title to land, also they have limited ownership and decision making power. Men are household's decision makers who decide on income and expenditure.

*Restricted access to institutions:* and also they have less access to formal institution because their access to institution is commonly through men relatives. Therefore, it limits women's access to adaptation supports and information. And it increase women vulnerability in climate change, by reducing their ability to cope in facing with both disasters and long term effects of climate change.

*Migration* can be used as an adaptive strategy by both men and women. All household member or some of them may migrate permanently, for livelihood reason or because of natural hazards. With migration to urban area, women have more economic opportunities, more freedom, more access to information and more decision making power which increase their adaptive capacity. On the other hand, they may face difficulties, especially poor women. For example low level of education and skills make it difficult for them to find formal job, or they may become forced to marry for security. This case shows that 77 % of men compared to 23% of women migrated in last decade in area which shows women are less mobile. With this lack of mobility, they remain in climate vulnerable area. As mentioned above, women's responsibilities in household restrict their mobility.

Comparison of men and women adaptive capacity in six rural area of case study shows that in Rangamati, adaptive capacity of men and women are closest in comparison with other five rural are. Women have equal access to land and marketing, and they can bargain with customers in order to achieve more profit and they are not dependent on men for selling products. As a result of access to resources and ability to transform natural capital to income, they are less vulnerable to climate change.

#### *Conclusion*

This case study reveal that gender division of labour is one of the factors of women vulnerability to climate change by increasing their workload in facing with climate change and giving less time to women for earning income. Moreover, Income position is an important factor to improve adaptive capacity. But as mentioned, women had less access to resources, less ability to transfer resources to income and also less control over resources (which decrease their adaptive capacity). Mostly women in these areas didn't have land ownership, they had limited decoction making which reduce women's productivity. Inheritance law also is one reason of losing women's access to land after natural disasters by death of their husbands or their father. In addition they have limited mobility compared to men which affect their economic position and more prone to effects of climate change by remaining in vulnerable areas.

Moreover Comparison of result from different rural areas reveal the great role of access to land in women's adaptive capacity.

## **2.6. Summary**

This chapter provided information on different approaches to vulnerability. Then socioeconomic approach to vulnerability explained. After overview on elements of socioeconomic vulnerability, different factors of women vulnerability to climate change presented. Based on Literature these factors are: a) limited access to land and other resources, b) Gender division of labour, dependency on natural resources, limited mobility c) Lower education, lower information, and d) Limited participation in decision making. Information achieved from case of Bangladesh reveal that limited *access to institution* also has effects on access to

information and adaptation supports by formal institution. This factor can be added to lower education, as it can be seen in Table 2-4. It is important to mention that level of influence of these factor on women, the way that these factors make women vulnerable and reason behind them is different due to women’s socioeconomic position in these countries. Since cultural aspects and traditions are different.

Table 2-3 Comparison of women vulnerability in Ghana and Bangladesh

Factors for women vulnerability	Ghana Case study	Bangladesh case study
Limited access to land and other resources such as credit (and market)	<p>distribution of land by lineage or family/ not market base</p> <p>Use rights/ dependent on their male relatives/reduce their ability to use available lands/ decrease in crop yield.</p> <p>Limited access to fertile land/ sensitivity of smaller &amp; poor farms to changes in climate.</p> <p>Less access to credit (for purchase land &amp; agriculture equipment)</p> <p>Unpaid worker/ household activity.</p>	<p>Most of women don’t have title to land.</p> <p>loss of access to property by husband or father death (patrilineal inheritance system)/ unable to use it as collateral</p> <p>Being poor and less access to resources/ less access to market/ so less ability to transform assets &amp; being dependent on men for selling their products.</p>
Gender division of labour, dependency on natural resources, lack of mobility	<p>Dependency on natural resources by working at agriculture</p> <p>Women responsibility in collecting water and firewood/ more workload &amp; less time for productive &amp; domestic activity, access to information &amp; negative effects on their health (in both cases).</p> <p>less employed in waged activity</p>	<p>Gender-gap in wages Because of lower education.</p> <p>Limited mobility &amp; limited jobs due to responsibility in household management and social norms.</p> <p>As lack of mobility, they lost income and more prone to effects of climate change by staying in vulnerable area.</p> <p>Facing with violence in scarcity of resources because of responsibility for collecting water and firewood.</p>
Lower education, lower information and restricted access to institutions	<p>Higher rate of illiteracy/less access to formal sector employment.</p>	<p>less access to information and institution</p> <p>wrong coping strategy due to lack of information (for both men and women)</p> <p>limited choices of job selection due to less education</p>
Limited participation in decision making	<p>Lack of women participation in all public services and civil society organization.</p>	<p>Men are main decision makers. Decide about women’s job and marriage.</p> <p>less access to public institution,</p> <p>Less decision making power I household reduce their ability to use land productively.</p> <p>Patrilineal system. Lack of information about legal system, and ability to access</p>

Looking at result of two case studies from Ghana and Bangladesh reveal that lack of access to and control over land is one of the factors of women vulnerability in climate change. But regarding different women’s socioeconomic position in these two case studies, insecure land tenure increase women vulnerability differently. In Ghana access to land mostly is through land distribution by village or family, or used free of charge and Small part of land is assessed trough market by renting or buying. But in Bangladesh, land is an important source to use as collateral and to access to income and it can improve women adaptive capacity.

Case of Ghana show that women are especially vulnerable in Agriculture sector regarding their insecurity of tenure. Their access to land are dependent on their male relative and they have access to poor and smaller plots of land. As result of insecure land rights, climatic changes would affect s women ability to use available land. Inequality in access to land by gender in Ghana comes into sharp when productive activity of women decrease in facing with climate change which affect food production. On the other hand, case of Bangladesh show that women are vulnerable to loss of access to land by inheritance. Access to land could enhance women's adaptive capacity since they can be transfer it to income.



## 3. LAND TENURE AND WOMEN'S RIGHT ON LAND

### 3.1. Introduction

In this chapter, the area of our focus is land tenure, and information from this chapter are supposed to achieve the second sub-objective. Based on information from last chapter and vulnerability assessment in two case studies from Ghana and Bangladesh, women's secure access and control over land is one of the factors of women's vulnerability in climate change. Therefore this chapter aims to investigate land tenure system to describe women's rights on land.

This chapter contains three main parts; first part provides literature review on land tenure, access to land, tenure security and women's land rights (section 3.2.). Section 3.3 assigns to bring more details on customary land tenure system, following by case study on women's land rights in Ghana. And in third section (section 3.4.) after looking at Islamic land tenure system, case of Bangladesh would investigate to clarify women's land rights in this country.

Summary of chapter, in section 3.5 gives a general view of chapter providing information on women's land rights in different land tenure system and securing women's rights over land.

### 3.2. Overview on land tenure

Land tenure defines relationship between people (as individual or groups) with respect to land and its resources. Land tenure is an institution, i.e., rules created by societies to regulate and define how property rights to be allocated in society. They define access to land such as right to use, control and transfer land with associated responsibilities and constraints. They develop in manner which establishes the power between individuals and social groups, therefore elites and middle classes in the society have stronger form of land tenure, while poor and vulnerable groups have the weaker form of tenure (Palmer, Friczka, & Wehrmann, 2009).

#### 3.2.1. Different land tenure systems

Different arrangements of land tenure systems exist due to the fact that they can be categorised by man-to-man relationship, man-to-land relationship and land-to-land relationship. There are various land tenure arrangements in different countries and even within a country, as a result of different social, religious, cultural, and political systems. For example in Europe, the different land rights such as ownership, freehold, leasehold and inheritance which express rights on land, in comparison in some developing countries these forms of rights are not enough to formulate a land tenure system. There are more varieties of rights on land such as communal rights (describe those situations where rights to use resources are held by a community). The two main categories of land tenure exist; influenced by western laws or by tradition and customary law. And five main land tenure systems are Anglo-American, French-German, Socialist (Communist), Ethnic group (Customary) and Religious (Islamic) concepts (figure 3-1). Land tenure is often categorised in four types of as private, communal, open access and state lands (Tuladhar, 2004).



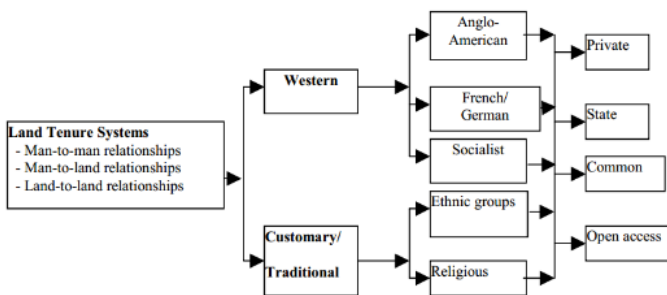


Figure 3-1 Taxonomy of land tenure and property rights (Tuladhar, 2004)

Land tenure would set by land written or unwritten law as a part of different legal system such as customary, statutory and common, and in some countries mix of these three legal system exist which is called legal pluralism. Various rights are defined in different tenure systems. Land tenure constitute of web of interesting such as overriding, overlapping and complementary interest, where more than one person share the same interest in one parcel of land (Palmer et al., 2009).

In most countries, there are more than one tenure system with different legitimacy and tenure security. So land rights still are not well defined and clear and Relation of people and land in these systems are very complicated. As a consequence there are overlapping rights, intense competition and conflicts (FAO, 2002b), for example, some countries in Africa which have been colonized by some European countries, have two land tenure system; one belong to colonizer and one based on customary law. In these countries, land legislation is based on European legal concepts but in reality, land rights on land are holding through families and communities by multiple rights through complex systems which are irrelevant to the legal tenure system. And in rural area customary tenure system is dominant because it is more accessible for them. So existence of several legal system (customary, statutory and common) over the same territory result in overlapping rights and contradictory rules and make confusion and tenure insecurity (Alegre, 2006).

Regarding presentation of two case of Ghana and Bangladesh in chapter two for assessing women's vulnerability in climate change, in this chapter cases of these two countries would use for accessing women's rights over land. almost 80 % of rural in Ghana are regulated by customary law and rural women access to land is based on this tenure system (FAO, 2012) and in Bangladesh 90 % of population is govern by Sharia law (Islam) and land tenure is based on Sharia law (Jinnah, 2013). Therefore an overview of customary and Islamic concept would present in next sections.

### 3.2.2. Security of tenure

Tenure system has two main dimensions; a) property right dimension which is security of land rights associated with tenure properties, and b) property right distribution to whom this land rights are distributed in. Tenure security can refer to individual's perception of rights on land and the degree of confidence not to be deprived of land rights or deprived of economic benefits derived from land by outsiders (Roth & Haase, 1998). The important component of tenure security can be define as a) the degree to which rights are recognized, b) level of protection against claim by others, and c) duration of the rights on land. Ability of landlord to heir, lease or grant land to others with guarantee is another factor of tenure security (Mitchell, 2011).

Continuum of right (Figure 3-2) can presents different level of tenure security. The right end is formal land right which is registered and recognised legally, and the owner (which is individual) has the right to transfer, or inherit the land. Informal land right, on the other side of continuum of right are traditional rights (customary rights) to land which belong to group of individual e.g. a clan or lineage, and these rights may not be registered officially (GLTN, UN-Habitat, & IIRR, 2012). Between these two formal and informal land rights, there are variety of rights over land, and depending on these rights, tenure can appear in different forms. It cannot be said that for example registered freehold is the best form of tenure with highest tenure

security and it depends on the particular situation. Moreover, The different types of tenure have different strengths and weaknesses (Palmer et al., 2009).

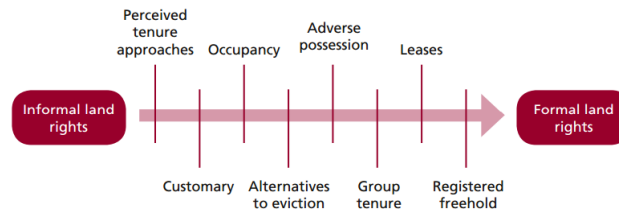


Figure 3-2 Continuum of right

### 3.2.3. Approaches to improve tenure security

The most commonly used approach for improving tenure security was individual titling and registration program (Alegre, 2006). Despite benefits of registration and recordation of rights by formal, conventional land administration system such as achieving greater security of tenure in some countries, It doesn't seem flexible enough to fit with different range of tenure system in various countries. There are many people out of titling coverage, at least 70 percent of land in developing countries is not registered, therefore it is inappropriate, too expensive and time consuming to imply titling and conventional approach in those developing countries. In some cases it just can cover the small part of territory within a country. For example in Africa which customary tenure system is dominant tenure system and administer virtually all lands, eliminating or replacing this tenure system is not desirable and necessary. Registration in Africa proved slow and expensive, between 2-10 % of land are registered.

In addition a primary capacity, combination of different factors, organization and strategies is needed to imply the conventional land tenure system for example land professions, civil society groups, public and academic organization. So in many developing countries, lack of these strategies or different tools can fail the implication of secure land tenure system for all with conventional approach (GLTN et al., 2012).

By experience with land registration system development, it is recognized that one model cannot fit different forms of tenure and land legislation, and land policies are needed to build on local level (Alegre, 2006). And the continuum of land rights approach is needed to use to cover different land rights (Zevenbergen, Augustinus, Antonio, & Bennett, 2013). Thus, In order to protect rights of people to land and property and increase tenure security as well as implication of land titling, various strategies have been implemented in different part of world such as legal recognition of customary land rights and land tenure which has been implied in Africa, and recognition of intermediate form of tenure such as short-term leases and land-use certificate implemented in some part of Asia. In any approaches for improving tenure security, it is necessary to have a clear view of all the existing land rights in area of implementation.

Tenure security also is related to access to land. In most countries there need some intervention in order to protect the land rights and access to land for some vulnerable group in context of land tenure, such women (Mitchell, 2011). But it is proved that providing tenure security for large number of people is challenging.

Tenure security, in terms of the recognition and protection of land rights, can be provided by the formal state, and in some countries through customary institutions and structures, to groups such as communities, and to individuals often within a group or community context. In any strategy and program for increasing tenure security, it is crucial to consider full range of formal, religious, customary and informal categories. Otherwise, some people would fall out of tenure system or people with lower level of access to land and tenure security would be most vulnerable to land grabbing and loss of land.

### 3.2.4. Women's land rights

Women's access to land is affected by many factors such as formal legal system, Custom and religion, Status within domestic unit and Economy and education. Although there is not reliable statistics, it can be said that majority of women's don't have secure land and property rights, whether in statutory or customary land.

Women's right to land and other resources mostly are determined by practice and custom, Rather than according to law. And it shows difficulty in translating law in practical improvement.

Rights to land are diverse, and in practice several rights to a parcel of can be held by several persons or groups, which could be refer as 'bundle of rights'. Rights of access to land can take form of: *Use rights* (rights to use land for grazing, farming or gathering forestry product), *control rights* (right to take decision on way of using and benefit financially) and *transfer rights* (right to sell or mortgage, heir, convey land to others or reallocate use or control rights).

As mentioned land tenure involve social and cultural issues, and it is reflection of power within the society as well as power within households. Considering the rights of access to land, Poor in community just have use rights. Women how majority of them are poor, can use land to cultivate crops in order to make food for their family without right of enjoying of profit from land and usually their husband have control and transfer rights of land.

Mostly women's use rights which is in relation to their status as wife, daughter, mother or sister are not secure and they change easily by dispute in families, labour, mobility, and death. Figure 3-3 shows institution that have effects women's access to land rights (FAO, 2002a). But this is not always the case. There are some factors such as livelihood systems and external shocks (e.g. natural disasters) which and make women's land rights more insecure and make them more vulnerable with respect to land tenure (Palmer et al., 2009). In countries with both statutory and customary law, understanding local situation is so important, because in case of conflict between customary and national laws, it is more likely that customary law be the winner. So as well as notice to gender equity in national constitution, they are needed to be accepted by local community. In many societies, there are a gender inequality in access to land, while equitable access to land is a human right. There are still not a good provision of women's land rights independent from their husbands and their male relatives. Sometimes, statutory law doesn't provide independent land rights for women. In some cases which statutory law accept it, enforcement and implication doesn't exist, and in traditional and customary societies, women direct access to land by parches and inheritance is limited.

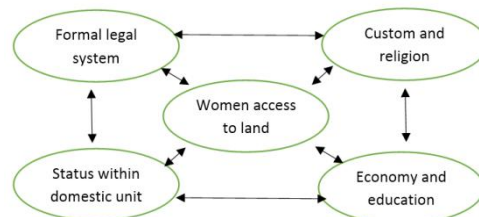


Figure 3-3 Institutions that affect women's access to land rights (FAO, 2002a)

### 3.2.5. Securing women land rights

Women insecurity of tenure is based on different reasons, in some African countries, it is mostly due to transformation of customary law and practices and statutory law, for example in formalisation of individual land rights, land titles were allocated to men as a head of households. Moreover most of the poor and women as marginalized group do not have their right registered in formal land tenure system in some countries. (GLTN et al., 2012). Therefor legal reform are not sufficient to ensure women's land rights in practice. And they can be at risk in land administration and land reform.

different efforts can be done to strengthen women's land rights such as legal changes to the concept of "head of household", joint titling or registration of land rights in the name of men and women (or women only); inform women of their land rights by legal aid campaigns; and measures to protect against disinheritance (Palmer et al., 2009). Some countries tried legal reforms to promote equal land rights for men and women, for example in Ethiopia, government start large-scale titling with both men's and women's name and photos on it. family law in Mozambique made women able to inherit property and recognises traditional marriage (Palmer et al., 2009). Some other countries used information campaigns which is critical to translating rights into reality, for example, women's union in Lao starts an active information campaign

which resulted in more female landholders. In Kenya they act even more than information campaign, a mechanism within the local land administration system start giving women awareness of their rights to protect them from landlessness.

In general, for evaluating women's secure access to land, both qualitative (e.g. protection of those rights) and quantitative (e.g. the range of rights holding by women over bundle of rights) parameters have to be considered. Some criteria developed at global level for evaluating design and implementation of land programs from gender perspectives by GLTN (Figure 3-4).

The International Federation of Surveyors, the Huairou Commission, the University of East London and UN-HABITAT have been collaborating under the umbrella of the Global Land Tool Network (GLTN) to develop a framework to assess the gender-responsiveness of new or existing land tools. The following criteria have been proposed:

1. Equal participation by women in the design and development of the tool;
2. Capacity-building, organization and empowerment of women and men to use the tool;
3. Inclusion of legal and institutional considerations;
4. Inclusion of social and cultural considerations regarding access to land;
5. Recognition of economic considerations regarding access to land;
6. Addressing issues of scale, coordination and sustainability.

Figure 3-4 GLTN Gender evaluation criteria (Palmer et al., 2009)

### 3.3. Customary land tenure system

Customary land tenure system control land based on customary law. Customary law defines how access to use, control and transfer the land allocated to peoples in society. These rules also regulate inheritance, marriage, divorce and membership of kinship and lineage. Rights in customary tenure are complex consisting of interconnection of individual and collective rights, usually refereed to 'bundle of rights'. These overlapping multiple land rights include 'management' rights such as right to transfer land and 'operational' rights such as right to access land or to cultivate land.

These customary law is usually unwritten, developed over the time, and grounded in traditions and social structure. These rules passed orally from generation to generation and they develop in responses to different factors such as population pressure or socioeconomic changes, and they are varies in different communities. In spite of diversity in customary land tenure, there are some common principals. Kinship or political groups (in form of homestead, families, villages or ethnic societies) have control over land use and right of disposition of customary lands. Land is mostly receive as an unrestrained resource to be used, and to preserving for future generation.

Customary land tenure system have strengths and weaknesses. A stable customary tenure system can provide social security and continuity. it has great power for development and adaption to changes, even some concepts and models exist for formalisation of customary tenure system to make it able to withstand pressure of urbanism. However in appearance of colonial system that discriminated against customary tenure many people would drop outside of formal system. Additionally, women have not gain access to hold land in their own right in some areas with patrilineal practices (Arko-Adjei, 2011).

#### 3.3.1. Land tenure in Ghana

Ghana has two land tenure system of statutory tenure and customary tenure system. The statutory tenure system is legally defined by Ghanaian law, and land ownership is defining privately or by state. Ghana Lands Commission's land registration projects manage private ownership and agencies of state manage state land. The majority of land in Ghana govern by customary land tenure system, it is mostly govern lands of tribes and families. Ownership of lands in this system is through allodial title vested by chiefs and lineage heads. Property belong to people, but this tenure system forbid sale while allow long-term leasing. Land is controlled and managed by elders and head of lineage to ensure access of all members to land (USAID, 2011).

Efficiency of Ghana's customary tenure system is under question, and there are some challenges in customary land tenure. A functioning customary land tenure have to be able to distinguish between individual, family and communal rights. Dispute between tenants and land holders, insecurity of tenure, uncertainty of ownership of land, scarcity of land and death are some of the current challenges of customary tenure system in Ghana. Some groups are socially vulnerable, even in well-functioning land tenure system. Women in particular have difficulties for land access. Since cultural pattern in Ghana expect men be economically productivity and women domestically productivity, women are supposed as their husband economy unit and they have access to land and their husband have control over their lands (USAID, 2011). The next case study would assess women access to and control of land in Ghana.

### **3.3.2. Women's land rights in Ghana**

This case taken from literature is related to access and control over land from gender prospective in Volta region in three zones of Ghana. The objective of this study is to investigate existing gender-specific constrain in land tenure system in this region (Duncan & Brants, 2004).

The study showed that access to land and control over land in the Volta Region was strongly determined by customary practices. Regarding access to land, it shows that men and women have equal access to lineage land as use rights. But further questioning revealed that women's access rights on land were less equal than firstly presumed as women's rights were generally secondary rights (which is trough others, specially male relatives). In comparison of perception of men and women about access right, women fear that they would be the first ones to lose their access to lands in facing with changes, stresses or increase in demand for lands, but men had more positive view of their rights. Moreover, this case shows that greater access to and control over land give them security of tenure and it would have positive impact on family welfare, household income, food supply and agriculture productivity.

Difference in access rights to land were observed also between different categories of women, for example widows with children could conserve full access to land after death of their husbands while widows without children not allowed to continue using their husband's land which generally inherited by brother. Adopted or half daughters cannot maintain access to their fathers land after his death but if they were men, they could have been given some inheritance right. With marriage women lose the right to their own lineage land and they could have access to their husband's land which increase insecurity of their rights. Moreover divorced women and widows, need to re-apply for access to lineage land in case of return.

Men are main decision makers in both household and community level. Men have control over land as control over land is linked to Land ownership (mainly vested in lineage, clans or by families). Since head of lineage or clan are men, they assign control over land to men. In Addition, inheritance from father is the main way of acquire land, but it is mostly men can obtain lands in this way because of the patrilineal inheritance system. Although it is difficult for women to own land in such a patrilineal inheritance system, there has been an increase in women's land ownership by increased purchase of land by women and acquiring land as a gift from parent's grandparents or spouse.

Based on this case, most of the people have limited knowledge of laws and legislation in this area. Men have more knowledge of the laws than women through using electronic mass media compered to women interactions with relatives or friends. With regard to land disputes, although courts are accessible to both men and women, few women used the State courts because it is a taboo for a woman to challenge their male relatives in court, it can result in a divorce or the destruction of family relationships. And also it is more time consuming. If statutory laws, which support equal rights for men and women, are to enhance women's rights in the Volta Region, then an increased knowledge of the laws by both men and women is required as well as an increased utilisation of legal aid and other legal services by women.

#### *Conclusion and recommendation*

This case highlighted the gender inequalities in with regard to security of land tenure. And positive effect of tenure security on agriculture production, food supply and income. So it is too important to improve women access to and control over land. Access to and control over land were affected by factors such as land

ownership, the patrilineal inheritance system, local traditions and customs, decision-making powers, perceptions, marital status and land disputes. Factors such as knowledge of land legislations and education were expected to have a positive impact on men's and women's access to and control over land, but could not be proven by the study.

Considering mentioned reasons, securing women's land tenure can achieve by: enhancing gender equality in access to and control over land, increasing the application of existing land legislations and providing legal support, increase in women's abilities to acquire and safeguard their land rights and improving the women's socio-economic position. These recommendation are needed to imply not only by government and through legal system but by all development organisations, NGOs, civil organisations, traditional authorities and Communities.

### **3.4. Islamic land tenure system**

Primary source of Islamic law (Sharia) is Holy Scripture 'Qur'an, but they are codes made by human interpretation defined by socioeconomic situation in society. Islamic legal conceptions influence lives of Muslims, including their attitudes to land and property rights, and it shaped Islamic land tenure system. (Sait & Lim, 2006).

Based on the Qur'an, earth belong to god. But it has not excluded the individual ownership of land and legal protection of individual property rights. Private ownership can obtain by transaction such as sale, gift or through inheritance. Inheritance of land as one of the most common way of acquiring land is among most detailed area of Islamic law. Although several field of Islamic law changed by modern reforms, inheritance is one of the most enduring legacies of Islamic law. Inheritance laws are guided by religious norms, but they are shaped by interplay of legal and cultural norms. Therefore, clarifying the complexity of Islamic inheritance rules may reveal great information for implementation of strategies designed to enhance tenure security especially when women's right are concerned.

#### **3.4.1. Land tenure in Bangladesh**

Almost 88.4 % of households in Bangladesh are located in rural areas so for most people in this country, livelihoods based on land and agriculture is still too important. Status of individual in rural area is determined by ownership of land (Mitchell, 2011).90 % of population is govern by Sharia law (Islam) and land tenure is based on Sharia law too (Jinnah, 2013). Land tenure also is define by Hindu and Christian in some parts of Bangladesh.

In Bangladesh women face with discrimination and there are many social and economic disparities between men and women which lead to unequal right and access to land. As well as discriminative law and regulation, and customary and social practices, existence of several law in different part of society and definition of law based on religion which effect on limited women's rights on land. Social practices and existing inheritance law are the most important factors affecting inequality in access to land is related to. Based on Sharia law there are different land rights for women as daughters, mothers or wife. And in Hindu law, women have different right as a daughter of late father, mother of late son or widow. Christian also defines different land rights for women as daughter, widow, mother of late son or sister of late person (Jinnah, 2013).

#### **3.4.2. Women's land right in Bangladesh**

This case is taken from literature to explore Women's rights to land in rural area in Bangladesh through land law and traditions. This study has been conducted in two villages in Noakhali district in Bangladesh for analysis of present status, roles and limitations of women and their land rights (SARWAR, Islam, & Monzoor, 2007).

Based on law, women Like other citizens, can purchase and owned the land. But they don't have any legal rights of ownership on family-purchased land, unless her name mentioned on the land document. This case shows not many women own land. Women just have less than 4% of private land in Bangladesh compared

with 96% for men. Family land are mostly in name of men. Even women, didn't have any idea of spouse joint ownership of land. There were some women who had the ownership of land and they were able to do that by labour income or selling their jewellery. But generally they don't access credit to buy lands. Land ownership and land tenure seems to have a great role in this unequal pattern of land distribution leading to poverty.

Due to women's Insecurity of tenure, they are especially vulnerable and land grabbing of private property is a major threat for security of people.

Regarding distribution of government-allocated lands, distribution of Khas land is twisted against poor and rich, and influential people. Based on study, women are the most vulnerable regarding the distribution of khas lands. Many of women struggle for a long time for founding their holding over the allocated Khas lands by government. Moreover, there are forceful competition to establish the control over them, and they are the main reasons of conflict. So Women have limited control over Char lands.

Based on Sharia law, daughter, mother and wife are not excluded from inheritance and under circumstances they are entitled to inheritance rights, but not equal with men i.e. sons, father or husbands. Women are given one half share of the male which show that inheritance is discriminatory.

A married women have access to her husband's family land or use land for production. But in case of separation or abandonment, women loss the access to land completely. Based on law in Islam, women are allowed to obtain access to land in period of three month in case of formal divorce, but they don't have any legal right to claim husbands land. In rural part, landless women come back to their birth family after marriage because of lack of access to land and property.

Women suffer significantly because of their lack of access to information, legal and instructional services in patriarchal society where the male relative are in charge of solving problems and women are dependent on male. Moreover, in cases of women awareness of their rights, they don't know how implement them or they are limited by society to exercise them.

#### *Conclusion and recommendation*

This case study reveal that women's access to land and control over land is connected with different factors such as gender and social construct, legal framework, patriarchal social ordering, and women generally don't have secure land rights.

Therefor it is recommended by this study that beside changes in formal law such as facilitating individual and joint titling, there is a need to provide information and education for both men and women to make them aware of benefits of women land ownership and legal aid to help women assert their rights. For example without enough information and education, in legitimating women's right over land, both joint titling and individual title could have negative implications. By joint titling, women find it difficult to control land or bequeath the land and it can make some potential problem for women in case of marital conflict. Individual title would put women under more pressure by their male relative to have the control over land.

### **3.5. Summary**

Cases from Ghana and Bangladesh show that there are gender inequality with regard to security of tenure. Women's insecurity of tenure, made them especially vulnerable in inheritance conflicts, land disputes and land grabbing. women's rights in both system is affected by patrilineal inheritance system, local customs and traditions, decision making power, marital status, and dependency on men. Based on lessened from cases, women's rights to land is not secured, since it dependent on wide variety of factors. Lack of access to legal system in case of Ghana, and legal system itself in case of Bangladesh which do not provide equal rights for both gender, and lack of access to information are some of reasons for women's insecurity of tenure.

Therefore, it is important to provide equal rights for both men and women in legal system, but securing land tenure for women is not limited to law and regulation. Any recommendation for improving tenure security is needed to imply by government, Development Organisations, Civil Organisations, Traditional Authorities and Local Communities. For securing women's land tenure it is needed to: enhancing gender

equality in access to and control over land, increasing the application of existing land legislations and providing legal support and facilitates women access to legal framework, providing information and education for both gender, increase in women's abilities to acquire and safeguard their land rights, and improving the women's socio-economic position.





## 4. WOMEN VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE WITH RESPECT SECURITY OF TENURE

### 4.1. Introduction

After assessing women vulnerability in climate change in chapter two, and land tenure system and women's land rights in chapter three, area of study in this chapter is women vulnerability with respect to land tenure and adaptation to climate change. Focus of chapter four is on sub-objective three which contain two different questions; one related to women vulnerability in land related issues arisen from climate change, and other one related to women empowerment with security of tenure for adaptation to climate change. after review the concepts and lessons on linkage of climate change and land tenure, specifically women's security of tenure in section 4.2, this chapter is divided in two main parts, each part related to one of two last research questions ; firstly, it aim to show the link of climate-related disasters with land issues. It investigate how climate change affect lands and livelihood, what are the land issues related to climate-related natural disasters and how women are vulnerable in these land related issues by looking at cases from Bangladesh and Indonesia (section 4.3). Secondly, it provide an overview on agriculture (as highly vulnerable sector to climate change), climate change and women role in adaptation. In this part, women's role, their knowledge and potential capacity, as well as role of land tenure insecurity in their participation in adaptation planning would search by extracting information from different cases from Kenya and Ghana (section 4.4). All these are investigated in order to find women vulnerability in land related issues and the way that land tenure could empower women to adapt to effect of climate change in agriculture.

### 4.2. Linkage of climate change and women's land tenure security

Linkage of land tenure and climate change is complex, but climate change can be felt by its effect on natural ecosystem, land suitability and land use change. These changes, decrease supply of suitable land for settlement and productive activity, and put it under higher pressure. So secure access to land for resettlement and changing livelihood demand is needed which shows importance of land issues and policies in adaptation planning.

Figure 4-1 demonstrate the linkage between climate change and land tenure. It start with showing main elements of climate change which consist both abrupt changes result from increased extreme weather events and long term changes in climate. The next is effects of climate change on land and natural use system; Climate change decrease water supply, land suitability for agriculture and settlement, crop yield and natural resource productivity. As result of adverse effect of climate change on land and natural resources, land supply would be under pressure, and it imply changes in occupation and system of land holding. So issue related to access to land, land conflicts, settlement and resettlement would arise, which are shown in third box in Figure 4-1. In case of climate-related natural disasters, disruption of land tenure system and property loss is also critical. Access to land and security of tenure are damaged as result of natural disasters. This destruction as well as disappearance and death of people result in conflict over inheritance of land rights. Therefor these land issues are a key considerations in adaptation planning. Adequate tenure security is needed by tenure system in order to secure access to land for settlements and responding to livelihood

changes in effective land and resource management system. Considering people, it can be expected, those with insecure land tenure like women be more vulnerable in climate change in these land related issues.

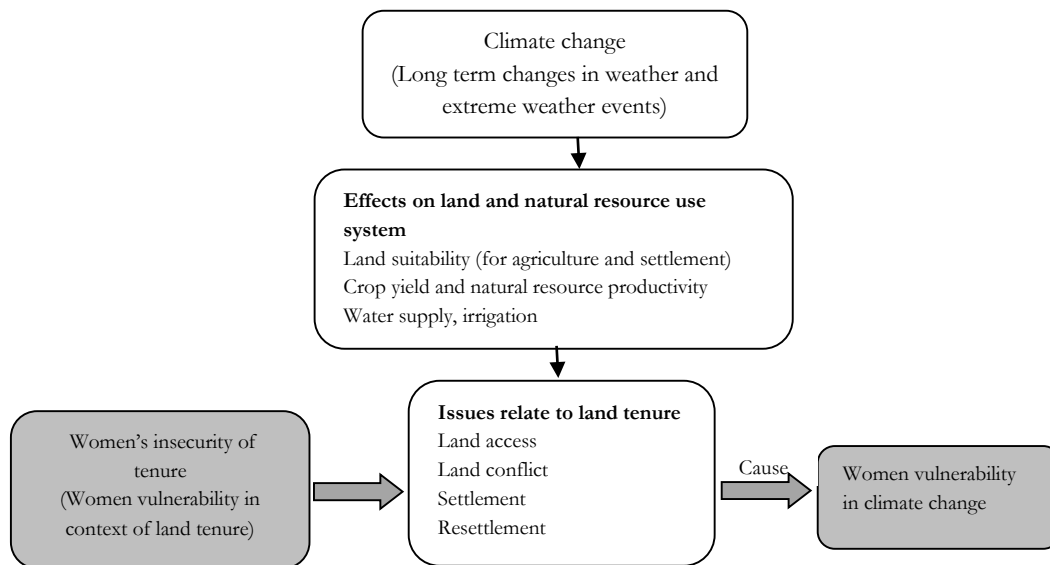


Figure 4-1 Linkage of climate change and land issues

Generally talking about women vulnerability, based on chapter two and three, women with limited access to land and insecure tenure are especially vulnerable in climate change due to difficulty in food production (the case in Ghana mentioned in section 2.4.2) or using land as collateral and access to credit (case Bangladesh in section 2.5). Moreover, people with limited access to land and other natural resources are vulnerable to climate change due to recapturing after natural shocks. That is to mean, for women with limited and insecure land rights (based on finding from chapter three), it could be difficult to recapture their insecure access to land, in facing with mentioned land related issues arisen from climate change (Figure 4-1). In section 4.2, effects of these land related issues on Women would be analysed by secondary data from Bangladesh and Indonesia.

#### 4.3. Land issue after different climate-related natural disasters

As mentioned in section 1.1, climate change have a wide range of consequences which some of them have impact in short-term such as intense rain and flooding and some others in longer term such as sea level rise. The first category which are 'extreme weather event' are responsible for natural disasters. They include:

- Extreme temperature highs- heat waves
- High level or lack of precipitation, and associated flooding and draughts
- Storms like windstorm and hurricanes
- Secondary effect of climatic events such as landslide (due to flooding) and fire forests (due to draughts)

McGuire (2013) discovered that climate change can lead to Tsunami too. He states that climate change is not just flood and draughts with affecting atmosphere and the oceans but the earth's crust as well. Based on his research, climate change driven by human activity seems to be increasing risks of a geologic reaction at the most inappropriate time.

In order to discuss land tenure and related land issues, we study cases of the most recurrent and damaging disasters i.e. flood and cyclone. Further we also look at the effects of river erosion and land slide, draughts and tsunami on land.

Floods and cyclone lead to loss of crops, livestock and other assets, temporary displacement, damage to infrastructure and property, economic losses, disruption of communication and essential services (e.g.

health, education and sanitation) and injuries and deaths of people. Negative effect is on land quality and making land unsuitable for appropriate use. Cyclone also washes away many fertile land, and many people including rural household become landless that resulted in illegal land grabbing, conflicts, large-scale migration and issue of land titling (by people relocation in less risky area) (Mitchell, 2011).

River erosion and land slide also has adverse effect on agricultural production, river erosion threat people living in river basin with washing lands away. They lead to loss of land, property homestead. As result of these disasters and people's landlessness and homelessness, they will be forced to displace permanently. Resettlement in new areas cause difficulties in finding agriculture and homestead lands and shelters. Moreover in these new areas, people have the fear of eviction because they don't have land titles.

Drought result in loss of agriculture production, which can lead to increase in food price, and it is a serious threat for food security. Moreover it put stress on household and national economy by reducing farm-based income and it force people to labour migration. People migrate to urban areas cause considerable threat for land tenure. Draught put a great stress on poor rural households because they are forced to sell their assets such as lands.

Tsunami also have a devastating effects on people and their livelihood. Damages of Tsunami on land can make people landless due to temporary or permanent usability of land. As result of landlessness and disruption of land tenure system, land records and boundaries, conflict over land increase. Moreover after tsunami, affected area is prone to storm surges or tropical cyclone, so there is maybe a need for resettlement in safer area.

In order to identify land issues in real situation responding women vulnerabilities, the following two case studies are studied. Next section provides information based on these two cases in order to refer women vulnerabilities in lands issues arisen from climate-related natural disasters. First case study is case in Bangladesh. Due to effects of climate change, dramatic increase in Intensity and frequency of natural disasters were observed in this country and made it one of the most vulnerable countries to climate-related natural disasters such as flood, landslide, river erosion and flood. And second case study is related to Tsunami in Aceh in Indonesia.

#### **4.3.1. Land issue after natural disasters in Bangladesh**

Bangladesh is located in the low lying Ganges Brahmapurta river delta. Bangladesh's delta is one of the most fertile land in the world, and also one of the most vulnerable to floods (Garibay et al., 2010). Bangladesh are flooded almost every year as result of rainfall and overflow of riverbank and this country has experienced the most devastated flood in 1998. The study indicates high population with skewed land ownership pattern have pushed the people for farming and settlement to marginal and risky areas. Chars (temporary lands within the major rivers) are an example of such marginal areas. Bangladesh experienced many cyclone such as Gorky cyclone in 1991 and the recent super cyclone in 2008 which caused serious damage to livelihood and assets. As result of flood and cyclone, river erosion is a serious threat. Many peoples and families are homeless and forced to migrate to urban areas because the river erosion occurs every year in Bangladesh.

Landslides also is a threats for Bangladesh in hilly area in Chittagong. In 2003 one of the most recent landslides caused loss of land, agriculture and human lives. The study also shows that Bangladesh is vulnerable to Droughts. It experiences high rainfall, and droughts often occur due to irregularities in rainfall. In 1973, Bangladesh has experienced droughts resulted in famine in 1974. (Garibay et al., 2010). Table 4-1 summarise the different land related issues caused by these disasters in Bangladesh.

##### *a) Occupation of Khas lands*

As mentioned above, natural Disasters and its adverse effect on lands force the people to find new lands for settlement and farming. In the most cases, people in Bangladesh settle on Khas land (which is owned by state officially). Under the law, land holding of former feudal landlords and private land holding above certain ceiling are intended to become Khas land (public land) which are mostly located in marginal areas such as along coast and rivers (Garibay et al., 2010). Due to flooding and erosion, living and working conditions on these lands are so harsh. Based on 1972 legislation (after catastrophic cyclone in coastal area)

for rehabilitating poor and landless people, the lands inundated more than 20 years and newly formed land become public land and the former landlords lost their right to retain it, although they are entitled to new lands by state (Quan & Dyer, 2008). Settlement in Khas land is disputed and is not secured from the land tenure perspective. These lands are subjected to land grabbing by elites and former owner and especially powerful landlords as result of this reversion (inundated chars land to state lands).

Table 4-1 Different disasters in Bangladesh and different land tenure issues (Garibay et al., 2010)

disaster	Area affected	Issues related to land tenure
Flood, Cyclone	Flood: In floodplain of these rivers: Brahmaputra-Jamuna, Ganges-Padma and the Meghna  Cyclone: in Coastal area and offshore islands (Bhola, Barisal, Patuskhali, Barguna, Chittagong and Cox's bazaar district)	Land unsuitable/ change in land use. Landlessness. Temporary displacement. Illegal land grabbing. Conflicts Large-scale migration Issue of land titling (by people relocation in less risky area).
River erosion/ landslides	River erosion: in Banks of Brahmaputra- Jamuna, Ganges-padma and Meghna, Brahmaputra and Teesta.  Landslide in: Chittagong and Gittagong Hill Tracts	Landlessness Homeless Permanent displacement Resettlement in new areas (challenge in finding new agriculture and homesteads lands and shelter) Fear of eviction in new areas (due to lack of registration and land titles)
draught	Especially in Northwest of Bangladesh.	Migration to urban area (threat to land tenure) Conflict (for access to water supply)

#### *b) Distribution of Khas lands*

Distribution of Khas lands is governed by some roles and regulations which are complicated and their implication is always difficult to enforce (Garibay et al., 2010). In resettlement programs, family are selected by local land administration for settlement in communities. The lands for agriculture and settlement as well as resource of income generation is provided for these families. But some groups of landless households are excluded in these resettlement program, for example unmarried women, female-headed households and widow without son or without children are not considered in this resettlement. As result, when women are force to displace in Khas lands, they have fear of dispossession or eviction because they don't have any defined right on these lands.

This case study shows that as result of these natural disasters in different parts of Bangladesh, landless and homeless female headed households, unmarried women who lost their family in disasters and widows are especially vulnerable. Because it is difficult for them to access to Khas land for displacement.

Moreover based on case study in chapter two, women are vulnerable in Bangladesh regarding inheritance of land (Ahmad, 2012). It can be said that in cases that as well as being landlessness as result of mentioned land related issues and distribution of Khas lands, women lost their access to their existing lands in case of death of their father or husband. And it is due to inheritance and law, as well as lack of access to information about legal rights and to justice system. Compare to case study regarding women's land rights in chapter two, In Islam, women inherit property of husband or fathers, but their share of inheritance is half of children and their brothers. In many cases, women give their right to their brothers to keep the good relation with their parental family, but in case of divorce or abandonment, women don't have any joint right of their fathers inherited properties.

#### 4.3.2. Land issue after natural disasters in Indonesia

This case is related to land issues to search women's right after natural disaster in case of destructive Tsunami in Aceh which was the worst hit province in Indonesia by tsunami in 2005. This case shows that tsunami has land related impact such as permanent loss of fertility of lands, damage to land agency, destruction of land records, loss of personal identity, inundation of coastal lands, destruction and alternation of boundary marks. To achieve tenure security, land agency started with a project called RALAS (Reconstruction of Aceh Land Administration System) based on systematic land title based on community-driven adjudication of land rights. It involves community-based determination of land ownership, heirs and land boundaries (Daniel Fitzpatrick, 2008).

Considering needs of women, gender disaggregated data are crucial. These data from displaced people by Tsunami shows that there were not a systematic discrimination in land ownership in Aceh. Widows and female household heads are more likely to be renters. The destruction of land records was widespread and the high degree of female ownership doesn't reflected in RALAS projects. Tsunami forced women to displace, and it remove their social insurance and location-specific income, and Women returnee are at risk of losing access to land when their relatives and neighbours try to make advantages of women's tenure insecurity regarding government weaknesses to deny their claims. In some cases, women lose access to land due to social and legal rules which mediate their entitlement through missing husband or relatives.

Moreover, gender disaggregated data on marital status of displaced people shows disproportionate percentage for displaced widow. This number may be is related to high level of conflict prior to tsunami. 10% of widows became widow as result of tsunami and it shows the link between conflict and disasters and their combined impact.

The two key land right issues in this affected area which are inheritance and documentation of land rights. Women may face disproportionate barriers to accessing land after conflict or disasters:

##### a) *Inheritance*

As a great number of deaths by Tsunami in Aceh, inheritance cases were the predominant land related conflicts. In Aceh, inheritance cases resolve based on Sharia laws; Sharia court may determine land ownership in the cases that they are part of a bigger inheritance dispute. Primarily, inheritance of land in Aceh is determined at local level. Village leaders (keucik) are the most important actors in post-Tsunami inheritance disputes with applying customs (adat) in Aceh which is based on Sharia law. Based on this case, there are some complex cases which village leaders admitted uncertainty regarding application of Sharia laws such as rights of female orphans, recognition of joint property (Harta Bersama) from independently owned property (Harta Bawaan), the relative rights of daughters and uncles and relative rights of grand daughters and sons, right of widows (particularly against brothers of death husband) and marital property after divorce (without no divorce settlement). It can be seen that all the uncertainty by village leader for implication of Sharia law involve claims by women. These cases would be resolve by mobile Sharia court accompany the RALAS process.

This research show some cases where village leaders were unable (or unwilling) to prevent male relatives who deny legitimate claim of widows or daughters. And this dispossession act in form of: Threats of violence by male relatives, forcing women to get married (or remarried) to obtain any land and rejection of rights on land by stating that they belong to husband (it was not marital land).

Although there were some cases which show abuse of power in local level in Aceh, it shows some solution by village leaders based on custom which are more beneficial for women than Sharia Law. For example, In



Figure 4-2 Indonesia and its location in Asia

some cases (e.g. family abuse), family groups and village leaders negotiate a solution for inheritance locally which are more beneficial and equitable division of land for women in comparison with Sharia law (as explained in case of Bangladesh based on Islam, daughter's right of inheritance is half of sons). Generally it can be said that Sharia Court is not capable to resolve all inheritance cases. Moreover village-level authority is essential to protect women claimants from the relative's pressure. And more information for female can help them to seek leader's decisions.

*b) Documenting land rights*

The inheritance rights for widow is dependent on whether land is independently own by each of spouse or whether it is jointly owned by both of them. Based on primary data by RALAS, less than 5% of land parcels recorded in name of both spouse. Based on law, marital lands are co-owned by husband and wives. It state that if land is identified as marital property, titles have to issue by RALAS in name of both wife and husband. But women have to have enough information to be aware that in case of independent ownership, married women might lose their ownership by joint titling. Uncertainty in this cases arise from death of husbands (to admit the land history), loss of documentation by tsunami, original poor documentation of land or claims by relatives of husband.

#### 4.3.3. Overall result on women vulnerability in land related issues

Case study of Bangladesh reveal that women are vulnerable regarding resettlement and distribution of land rights. Since unmarried women and widows without children are not consider for allocation of Khas lands. So if female headed household living in marginal land lost their land by river erosion, and it is difficult for them to access to Khas lands. And in case of displacement, they have fear of eviction.

The case study of Indonesia shows that the most controversial land issues in Aceh are related to inheritance and documenting land rights. There are different reason for that such as loss of documents, death of husband and ignoring women's land rights by their relatives in conflicts over inheritance. Moreover, conflict and disasters and their combined impact are a threat for women, especially widows. Table 4-2 summarises land issues and women vulnerability in this issues.

Table 4-2 land related issues and women vulnerability in Bangladesh and Indonesia

Case study	Most dominant land related issue	Women vulnerability
Bangladesh	Landlessness, displacement and Resettlement (distribution of khas lands), inheritance	Not considering displaced unmarried women, female-headed households and widow without son or without children in distribution of Khas land. Fear of dispossession and eviction
Indonesia	Landlessness, pre-disaster conflicts , displacement, Inheritance, documenting land rights	Loss of land records, displacement, social buries and government weakness to secure women's returnee land rights from claims of male relatives and neighbours.

#### 4.4. Women in Climate change adaptation in agriculture

After addressing and assessing women vulnerability in different land related issues with regard to security of land tenure, this section aim to look at role of women's security of tenure for adaptation to climate change. Agriculture is main economic sector in many countries such as Ghana and Bangladesh, it has main role for food supply an many of women work in this sector. But this sector receive highest hit by changes in climate and make women especially vulnerable (as discussed on case of Ghana in chapter two). So it is important to pay attention to climate change adaptation in agriculture. On the other hand women have a great role in agriculture and potential knowledge on adaptation to climate change which is mostly underestimated. So next section assess women's potential capacity for adaptation to climate change in agriculture and the role of tenure security to encourage women participate in adaptation for using their great capacity.

#### **4.4.1. Climate change and agriculture**

Effects of climate change are very much visible in water and sanitation, bio diversity and ecosystem, health, agriculture and food security and desertification. But agriculture sector is especially one to makes women vulnerable and it is possible to argue that agriculture is the sector which receive worst hit by changes in climate, either short term climate disasters or longer-term changes in climate. Less predictable weather and any changes in temperature and precipitation, could lead to water shortage or increase in rainfall, droughts, land erosion, loss of soil fertility, and hence negative effects on agriculture and destruction of crops is a real threat for food security (Maharjan & Joshi, 2013).

Developing countries are expected to experience the hardest hit by climate change since the agriculture in their main source of income and livelihood for 75% of rural poor (Voegelé, Villarreal, & Cooke, 2009). The negative effect of climate change in this sector are mostly felt by small landowners, subsistence farmers and low quality farms which are mostly are managed by women in many countries (such as Ghana, as mentioned in chapter two). Although small holders receive the biggest hit by climate change, they are the least responsible for it. Draughts and floods are the major threats of climate change and many women are affected by erosion and decrease in crop yield and livestock productivity. Many efforts have been done through adaptation and mitigation measures. Many of these measures implemented throughout the world. Some of them were successful to build resilience in farming and livelihood and in reducing vulnerability of people and the environment. The sub-sections 4.4.2 and 4.4.3 provides understanding of women role on climate change adaptation in agriculture sector with emphasis on land tenure.

#### **4.4.2. Women roles in adaptation to climate change in agriculture**

Since men and women have different relationship with environment, degradation of natural resources by climate change affect them differently ( as discussed in chapter two) and they could have diverse effective role in adaptation to and mitigating climate change. It can be said, although women are disproportionately vulnerable in climate change, they can be part of solution in climate change adaptation. A strong gender approach in climate change recognise both men's and women's adaptive capacity in case of additional burden and potential capacities to make effective choices and to change these choices to favourite outcomes. This approach in adaptation and mitigation efforts as well as promoting gender inequality, empowering women with providing complimentary support such as educational and training programs, improve their mobility options, their voice in decision making and legal rights in formal and informal institutions, improve women potential capacities in using traditional and new adaptation technologies. And it can lead to a great reduction in poverty and food security.

Not considering gender in adaptation initiatives such as introduction of varieties of plant and crops tolerant to high temperature could have negative effects on gender inequality. In this case There are some possible negative impact on women because it require land, water and other resources used by women for their reproductive and household consumption which could increase their workloads (UNDP, 2009). Moreover excluding them from designing and implementation of adaptation policies means losing their indigenous knowledge and experience (Voegelé et al., 2009), while women with indigenous knowledge can implement good coping strategy to climate change, and good coping strategy can reduce vulnerability of both people and environment (Abeka et al., 2012). Women farmers in Bangladesh are a good example of preserving indigenous knowledge in their work e.g. using sugar for reducing soil salinity and raising cultivated land to save lands from water inundation by floods. Moreover they mixed compost fertiliser with the sandy soil in facing with reduction in harvest as result of sand deposits. Multiple cropping and intercropping practices was another women's coping strategy to lack of food and limited access to input (Abeka et al., 2012).

There are some hindering factors for women regarding their use of knowledge and potential capacity for adaptation in climate change in many developing countries such as lack of access and control over productive resources beside social structure, level of education and access to information (Abeka et al., 2012). Moreover analysis regarding land ownership and participation in adaptation and mitigation planning reveal that there is more incentive for acceptance and participation in different adaptation planning in south



Asia depending on ownership status of agriculture lands (Xenarios, 2012). Due to statutory and customary laws (disused in chapter three) women have less secure access to land and other resources, therefore less access to credit and agricultural extension services that gives them less motivation in making investment in adaptation planning such as land rehabilitation and soil quality, crop rotation, minimally disturb soil, permanent soil cover and etc. (Maharjan & Joshi, 2013). Because they need long term investment and in case of insecure land tenure, making decision for long term doesn't seem logic (Voegelé et al., 2009).

Land tenure security as well as giving motivation for participation in adaptation planning is matter of giving ability. Women with limited access to resources, are less able to cope with effect of climate change effectively or to invest in adaptation and mitigation practices. For example in areas which crop yield is affected by droughts or floods, reducing gender gap can safeguard food security; women who don't have secure land rights find it difficult to access the credit for buying drought-resistant seeds or equipment to adapt. Moreover without land as collateral, even they won't be able to start or expand off-farm business as a coping strategy. Considering land tenure role in giving *motivation* and *ability* for participation in adaptation planning, or using land as collateral for start other businesses, it can be said that land tenure security can empower women for adaptation to climate change. Different studies in the world has been done to investigate gender and adaptation in agriculture sector. In section 4.3.2.1, two cases would presents. First case study of Kuresoi in Kenya, related to women farmers adaptation to climate change and second case of Doggoh in Ghana, using gender lens to explore farmer's adaptation options in the face of climate change.

#### 4.4.2.1. Case studies on women roles in climate change adaptation

Regarding the first case in Kuresoi, climate change is a real challenge and it is making the area food insecure. It can be said that women often produce and manage food and other natural resources, with production of 80% of food. But they have least adaptive capacity, and also their knowledge on agriculture which is underestimated (Abeka et al., 2012). Gender sensitive approach to climate change adaptation in this country in new. Following case from Kuresoi take a look at women great knowledge and hindering factors for their participation in climate change adaptation.

Ghana and specially the upper west is highly vulnerable to variability in climate change, and agriculture which is the main sector of economy and food production is likely to receive the worst hit by climate change. 50% of women and 30 % of female headed households are employed in agriculture sector (FAO, 2012). Therefore any response to these changes is needed to be gender sensitive and consider women and their potential for adaptation to climate change. The case of Ghana would look at women potential capacity and hindering factors with regard to their participation in adaptation activities.

##### a) Case study from Kenya

This case is taken from literature (Abeka et al., 2012) investigates gender perspective of climate change and examines the specific contribution of women to the climate change adaptation of smallholder agriculture. It is about women in Kuresoi located in highlands of Kenya. This area has a good potential for agriculture since it is derived from volcanic material. But climate change made this area food insecure, since volcanic soil easily eroded by high rainfall and flooding resulting from complex topography.

The area is affected by droughts and women are most affected in this area. It exacerbates existing inequalities in key dimensions such as Wealth, access and understanding technology, education, access to information. And women have the least capacity to prepare for impact of climate change and to participate on mitigation and adaptation planning. Yet women

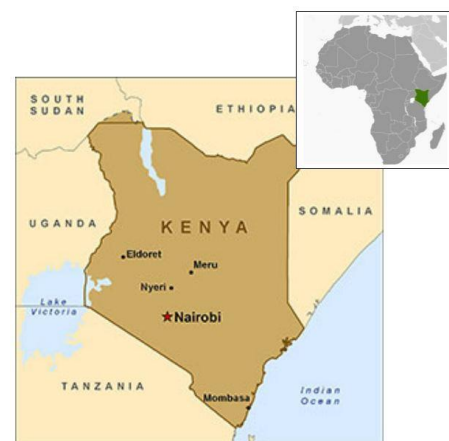


Figure 4-3 Kenya and its location in Africa

constitute the largest percentage of small holders in this strict and Small holder farming is mainly for subsistence

The literature study in Kuresoi reveals that women have a great local knowledge and experiences in coping with effect of climate change. For example to cope with diminishing seeds, women in this area started getting wild vegetable ( which thrive better in harsh conditions) seeds and planting them in farms to increase access to food. Women who take part in research described varies adaptation strategies such as planting drought-resistant crops. Also women have a clear view of what they need for adaptation to flood such as crop diversification and agriculture practices. Moreover they have skills and knowledge to learn about drought-resistant crops, proper use of manure, pesticides and irrigation.

Women have greater role in natural resource management and nutrition, and they are responsible for 80% of food production compared to men who mostly managing cash crops and livestock. But customary law in Koresoi restrict women's right to land and property. Land tenure system in Kuresoi is unclear due to lack of deeds for small land holders (and government can replace them anytime). The existing title are in name of men, and they have control over land and women need men's permission for access to land for any use and management. So in this case, it is difficult for women to use land as collateral, access to credit and agriculture extension services. In addition it reduce their tendency for participation in sustainable agriculture practices or long term investment in land rehabilitation and soil quality (Abeka et al., 2012).

By referring to complexity of adaptation to climate change, this case stress on gender sensitive approach to include women in adaptation to ensure effectiveness of adaptation to reduce both human and environment vulnerability. It founds that gender inequality which exist in access to land is a hindering factor for adaption to climate change. There are more factors for lack of women participation in climate change such as discriminatory culture, high level of illiteracy, Lack of knowledge and lack of access to knowledge and education for women is limited and they are not consulted for decision making.

#### **b) Case study from Ghana**

This study was is taken from literature (Naab & Koranteng, 2012) on analysis of gender issues in climate change, agriculture and food security. Since gender sensitive approach has been considered crucial for achieving climate smart agriculture by many organisation like CCAFS and FAO, the approach is to mainstream gender issues into climate smart agriculture making sure that women participate and get benefits as much as men. This study refer to village of Doggoh in the upper west region of Ghana which is particularly vulnerable to effects of climate change. The main economy activity of people in Doggoh is agriculture.

In the village, both men and women perform number of different activities at household's level as coping strategies against variable weather, drought and declining soil fertility. Women perform the climate smart agriculture practices such as gardening in dry season for producing vegetables for both sale and consumption, individual planting of the trees such as Aloe Vera in their homes, application for compost and farm yard manure and following to improve soil fertility by retention and incorporation of crop residues. In this case also there are some hindering factors for smart agriculture. The study reveals that women land rights is so important for participation in adaptation practices in agriculture. In this area women do not have their own land and they are mostly working on plot of their husbands for food production. It states that their major problem was land and water acquisition in dry seasons. Therefor they cannot invest in long term initiatives which change land use or farming practices substantially. In this case, if land tenure security is provided to women, there is not any such a big hindrance for women's participation in adaptation activities. Women often say that they are reluctant to participate these practices and adaptation initiatives because of fear of indebtedness (Naab & Koranteng, 2012).

#### **c) Overall result on women role on climate change adaptation**

As mentioned before, excluding women from designing and implementation of adaptation planning would lead to loss of their great indigenous knowledge and experience in coping with climate change on the other hand, gender approach in climate change and women participation in adaptation initiatives as well as

promoting their adaptive capacity (reducing their vulnerability) can improve yield crop and food security and reduce poverty. Two cases of Kenya, Ghana and illustrate the great role of women's access to and control over land for their participation in adaptation planning. In case of Kenya, women have access to their husband's lands and they don't have control over land, therefore they cannot make decision for land cultivation which affect their tendency and ability for participation in adaptation planning while they have a great knowledge and potential capacity for coping to effects of climate change. And in case of Ghana, women's insecurity of land tenure was the biggest hindrance for them for participation in long term farming practices and adaptation planning. Again, lack of access to and control over land, make them reluctant and incapable to decide on land function or implication of any long term changes or investment by taking part in adaptation activities. Based on these two cases it can be concluded that providing more security in land tenure system for women, may encourage and empower them to take part in adaptation to climate change and use their knowledge and their potential capacity.

#### **4.5. Summary**

The experiences and lessons in chapter four carried out from several case studies. The first part (section 4.3) related to women vulnerability in land related issues, conducted in two cases (of Bangladesh and Indonesia) shows not considering some group of displaced women in distribution of land make them especially vulnerable in landlessness, displacement and Resettlement because of fear of dispossession and eviction in new area of settlement. In case of Indonesia, loss of land records, displacement, social constrains and government weakness to secure women's returnee land rights from claims of male relatives and neighbours is main concern which made women vulnerable in issues of landlessness, pre-disaster conflicts, displacement, Inheritance, documenting land rights.

The second part of this chapter (section 4.4), provide information on women role in adaptation and role of land tenure security to give them both motivation and ability for participation in adaptation activities. Based on these cases, women awareness and education and their decision making power also other factors of adaptation to climate change in order to ensure of efficiency of adaptation initiative about both women and environment.

## 5. RESULTS AND DISCUSSION

### 5.1. Introduction

The chapter five is allocated to analysis and making through discussion by linking the information achieved from previous chapters to summarise women vulnerability in adaptation to climate change in context of land tenure. Section 5.2 provides result of research, then section 5.3 presents SWOT analysis with regards to link and discuss main result of research. Then based on this analysis, indicators of SWOT analysis as the influencing factors on women vulnerability are provided under section 5.4.

### 5.2. Results

In this part, main finding of research would presented based on conceptual framework of research (Figure 1-3) in different parts.

a) As mentioned before in chapter two, socioeconomic approach to vulnerability is best approach for analysis on people vulnerability. Social vulnerability include aspects such as cultural aspects, believes and traditions, and it is also linked to political aspects, institutional organisation and governance (this approach also called political-economic approach). Economic factors of vulnerability are linked to status of group and individuals in society, for example level of access to resources can determined level of vulnerability.

By searching women socioeconomic situation based on case studies, it was found that there is gender inequality. And existing gender inequality is so important regarding women vulnerability because climate change exacerbate this inequality. And it was shown in conceptual framework of research in Figure 2-5. The different factors exaggerate gender inequality in facing with climate change, and make women vulnerable such as a) limited access to land and other resources, b) Gender division of labour, dependency on natural resources, limited mobility c) Lower education, information and access to institutions, and d) Limited participation in decision making. This study shows that level of influence of these factor on women, the way that these factors make women vulnerable, and reason behind them is different due to women's socioeconomic position in different countries. And it was shown in chapter two that in case of Ghana and Bangladesh they were different, but this mentioned category of factors for women vulnerability is a general selection.

b) As it can be seen limited access to land is one of the factors of women vulnerability. Cases from Ghana and Bangladesh shows that there are gender inequality with regard to land tenure. Women's insecurity of tenure, made them especially vulnerable in inheritance conflicts, land disputes and land grabbing. women's rights in both system is affected by patrilineal inheritance system, local customs and traditions, decision making power, marital status, and dependency on men. Lack of access to legal system in case of Ghana, and legal system itself in case of Bangladesh which do not provide equal rights for both gender. Based on lessened from cases, women's rights to land is not secured, and it dependent on wide variety of factors.

Therefore, it is important to provide equal rights for both men and women in legal system, but securing land tenure for women is not limited to law and regulation. Any recommendation for improving tenure security is needed to imply by government, Development Organisations, Civil Organisations, Traditional Authorities and Local Communities. For securing women's land tenure it is needed to: enhance gender

equality in access to and control over land, increase the application of existing land legislations, provide legal support and facilitates women access to legal framework, providing information and education for both gender, increase in women's abilities to acquire and safeguard their land rights, and improving the women's socio-economic position.

c) In facing with climate change and scarcity of suitable land for settlement and productive activities, land related issue such as access to land, land conflict, settlement and resettlement would arise. Women are especially in risk of being landless, homeless or losing land by inheritance disputes and conflicts as result of insecurity of tenure. Based on case studies derives from literature on Bangladesh and Indonesia, some group of women such as widows and female headed household are not considered in resettlement programs, and it make them vulnerable in landlessness, displacement and resettlement because of fear of eviction. Moreover, loss of land records, displacement, social constrains and government weakness to secure women's returnee land rights from claims of male relatives and neighbours is main concern which made women vulnerable in issues of landlessness, pre-disaster conflicts, displacement, Inheritance, documenting land rights. Therefore, it is concluded that as result of insecurity of tenure, women are especially vulnerable in facing with these land related issues arisen from climate change. So it is recommended that providing security of tenure can reduce their vulnerability in climate change. It is shown by horizontal arrow in conceptual framework.

Women *socioeconomic position* (defined by cultural aspects, customs and government) are very important in determining level of tenure security and women vulnerability in climate change. And comparison of reasons for women's insecurity of tenure and factors of their vulnerability in climate change, reveal that *decision making power, education and access to information and institutions* are important element to both improving tenure security and reducing women vulnerability.

d) All discussed before, was related to women vulnerability and tenure security. Although women are particularly vulnerable in climate change, they could be part of solution too. Based on cases of Kenya and Ghana, women have potential capacity for adaptation to climate change in agriculture. Regarding their role in resource management, they have a great knowledge for coping to climate change. But insecurity of tenure is an important hindering factor for their participation in adaption to climate change which can have negative effects on women. That is to say, without considering women in adaptation activities, they may increase their vulnerability. Because this activities use natural resources which women are dependent on them.

Women have restricted use rights, and titles are mainly registered in name of men, and women don't have control over land. On one hand, this insecurity of tenure does not let them to use land as collateral for access to credit and agriculture extension services which reduce their adaptive capacity. And on the other hand, it reduce their tendency and their ability for participation in adaptation activities. Because without secure land rights, they are not able to take decision about land for long term investment which is needed for participation in adaptation activities. In addition, there are more factors for lack of women participation in adaptation activities such as lack of *decision making power, low level of education and access to information, And socioeconomic position*.

By comparison of results, it is concluded that decision making power, low level of education and access to information and institution are so important. These factors have direct effect on women's security of tenure, their vulnerability and adaptation to climate change

All mentioned above shows that security of tenure is important related to women vulnerability in adaptation to climate change. Generally taking about women and climate change, women vulnerability is weaknesses, and their role in adaptation is strength. And security of tenure has effect on both of them. Moreover, all a) women vulnerability, b) land tenure, and c) adaptation to climate change are affected by internal and external

factors (inside or outside of community). So for linking and analysis of security of tenure for women vulnerability in adaptation to climate change, SWOT analysis can be used. Next section provides more details on this analysis.

### 5.3. SWOT analysis on women vulnerability

SWOT is a method for analysing strengths, weaknesses, opportunities, and threats of an organization and extracts four categories of strategies (result) by understanding internal factors presented as Strengths (S), Weakness (W), and external factors as Opportunity (O) and Threats (T). Strengths identify advantages organisation, they consist of any existing or potential resources or abilities within organisation. Weaknesses are existing forces within organisation which could serve as barrier and they are need to be avoided. Opportunities are existing or potential forces from outside of system which could obtain interesting trend. And Threats implied from outside of organisation could serve as obstacles (MindTools, 2012).

In order to analyse relation of women's security of tenure and women vulnerability in adaptation to climate change, SWOT can applied for this research. As discussed in chapter two and three, it can be said that women's security of tenure, women vulnerability and adaptation to climate change are affected by internal and external conditions. Therefore SWOT analysis is a good tool to find out influencing factors on women vulnerability and adaptation to climate change with regards to tenure security.

#### 5.3.1. Analysis of major findings

In order to start SWOT analysis, this part determined internal and external factors which influence women with regard to climate change. Based on main finding of previous chapters, internal factors would presents to serve as strengths, weaknesses, and external factors as opportunities and threats in this analysis. The result are illustrated in SWOT matrix in Table 5-1.

##### a) *Strength*

Based on chapter four, women participation in adaptation is so important, because on one hand, they are highly vulnerable to effects of climate change (as discussed in chapter two), and on the other hand, women have potential capacity for adaptation since they have great role in resource management and food security. Based on Cases from Ghana and Kenya, women have potential capacity which with participation in adaptation activities, as well as helping to effectiveness of these activities, it has effect on reducing their vulnerability. But, in situation that women have perception of tenure security, it can make them reluctant (or give them tendency) and incapable (or able) for participation in adaptation activities. Regarding whole situation in those cases, related to SWOT analysis, it can summarise as: 1) Women awareness of importance of land tenure security, 2) women's great knowledge on adaptation to climate change and 3) women participation in adaptation to climate change, and 4) Women, more sensitive to climate change (short and long term). These are potential advantages within society which need suitable policies to be real capacities.

##### b) *Weakness*

Based on women vulnerability assessment in chapter two, there are wide variety of factors which made women vulnerable. And with experiences from chapter three, there are some factors influencing insecurity of tenure. They contain both internal and external factors. But here, internal factors are considered as weaknesses in SWOT analysis, which can be summarised as: 1) Women low level of education, 2) Less access to and control over land, 3) Landlessness and homelessness, 4) Inheritance disputes, 5) conflicts.

##### c) *Opportunity*

Based on discussion on previous chapters and experiences from women vulnerability in climate change, women's security of tenure and women adaptation to climate change, government has a great role to provide appropriate and relevant policies (from outside of community) to secure women's land tenure, reduce women vulnerability and to adapt to current and future effects of climate change, either long term or short effects in facing with disasters. For presenting these governmental policies for reducing vulnerability and improve participation in adaptation as opportunities in SWOT analysis, these can be summarise as: 1)

Government awareness of gender sensitive policies, 2) Government awareness of securing women land rights, 3) Government awareness of reducing women vulnerability and 4) Utilisation of legal aid for women.

**d) Threat**

Regarding lessons learned from different cases in previous chapters, it can be said that government can prevent women vulnerability with policy making. Based on information from case studies, some policies in government resulted in women greater vulnerabilities. These can be summarised as 1) Insecurity of land tenure, 2) Lack of land registration and title in name of women, 3) Non-gender sensitive policies for adaptation to climate change and 4) men, the main decision makers.

Table 5-1 SWOT matrix of women vulnerability in adaptation to climate change with respect to land tenure

<b>External factors</b>  <b>Internal factors</b>	<b>Opportunities</b> 1. Government awareness of gender sensitive policies 2. Government awareness of securing women land rights 3. Government awareness of reducing women vulnerability 4. Utilisation of legal aid for women	<b>Threat</b> 1. Insecurity of land tenure 2. Lack of land registration in name of women 3. Non-gender sensitive policies 4. Men, the main decision makers
<b>Strength</b> 1. Women awareness of importance of land tenure security 2. Women's great knowledge on adaptation to climate change. 3. Women participation in adaptation to climate change 4. Women more sensitive to climate change (short and long term)	<ul style="list-style-type: none"> <li>• Securing land tenure system to motivate women participate in adaptation to climate change</li> <li>• Implementation of gender sensitive policies to use women potential capacity</li> <li>• Sharing information and facilitate women access to legal framework</li> </ul>	<ul style="list-style-type: none"> <li>• Provide women enhanced perception of tenure security</li> <li>• Involve women participation in decision making process for adaptation to climate change</li> <li>• Include women lands rights in registration process</li> </ul>
<b>Weakness</b> 1. Women low level of education 2. Less access to and control over land 3. Landlessness and homelessness 4. Inheritance Disputes 5. Conflicts	<ul style="list-style-type: none"> <li>• Provide training for women</li> <li>• Provide equal rights as man</li> <li>• Improve legislation</li> <li>• Proper gender sensitive resettlement program</li> </ul>	<ul style="list-style-type: none"> <li>• Support women's land registration (as well as men)</li> <li>• Improve conflict management</li> <li>• Improve inheritance law</li> <li>• Provide information campaign</li> </ul>

**5.3.2. Results based on SWOT**

The SWOT matrix of women vulnerability and land tenure for adaptation to climate change provides the Strengths (S), Weakness (W), Opportunity (O) and Threats (T). Moreover four types of strategies (Results) can be extracted from SWOT analysis which are:

- SO Results: use of opportunities for highlighting Strengths
- ST Results: use of strengths for resolving or avoid threats
- WO Results: use of opportunities to gradually overcome weaknesses
- WT Results: overcoming weaknesses through postponing threats

Here different results from this analysis are provided and explained:

**a) SO Results**

- Securing land tenure system to motivate women participate in adaptation

This result comes from S1 & S3\_O2. Women know that they need tenure security to take part in adaptation planning. Also government aware of the importance of tenure security for women for adaptation planning. So government have critical role in legislation to secure women's land tenure.

- Implication of gender sensitive policies to use women potential capacity

This result derived from S2 & S3\_O1. Women have a great knowledge and potential capacity for adaptation to climate change and when government know importance of gender sensitive strategies and imply them, women's can play important role in adaptation.

- Sharing information and facilitate women access to legal framework

This one, take out from S1-3 and O4. Utilisation of legal aid and information for women could facilitate access to legal framework to improve tenure security and improve their participation in adaptation planning. And it would provide opportunities to use women great knowledge in adaptation

#### **b) ST Results**

- Provide women enhanced perception of tenure security

This result carried out S1& S4\_T1. With being more sensitive, women receive more risks and while they are aware of importance of land security, higher perception of land tenure security for women, can overcome the threats outside of communities.

- Involve women participation in decision making process for adaptation to climate change

This strategy comes from S2 & S3\_T4. Here strength of women great knowledge and participation in adaptation in planning is so important in lack of participation in decision making.

- Include women lands rights in registration process

It is derived from S1 & S4\_T2. With being more sensitive, women receive more risks and while they are aware of importance of land registration and land records, higher perception of land tenure security for women, can overcome the threats outside of communities.

#### **c) WO Results**

- Provide training for women

This result is derived from W1\_O2-4. Women's low level of education is one of the reasons of lack of tenure security and vulnerability to climate change, so government which is aware of security of tenure and women vulnerability can provide training for women to improve tenure security and reduce vulnerability.

- Provide equal rights as man

This one comes out from W2\_O2 & O3 Less access to and control over land are defined for women in many communities, so providing equal rights for men and women by government can help to reduce women vulnerability.

- Improve legislation

Improve policy is more general result in compare with other WO result which could deal with landlessness, homelessness, conflicts and lack of access to and control over land by legislation. It is carried out from W2-5\_O1-3.

- Proper gender sensitive resettlement program

This result derived from W3\_O1-3. Many of women become landless and homeless because they are not consider properly in resettlement programs. So government awareness of gender sensitive policies, land tenure security and reducing women vulnerability can imply gender sensitive program to reduce women vulnerability.

#### **d) WT Results**

- Support women's land registration (as well as men)

It is derived from W2 & W4 & W5\_T2. Supporting the women land registration help to improve women's access to and control over land, and providing tenure security in case of facing with inheritance disputes and conflicts.

- Improve conflict management



This result is taken from W3-5\_T1. With conflicts management, women rights would be grantee and could reduce vulnerability in facing with inheritance disputes, conflicts and being landless or homeless.

- Improve inheritance law

By registration of women's land rights and increasing land tenure security, conflicts can manage in the way not to increase women vulnerability. This result comes out of W4\_T1 & T2.

- Provide information campaign

Providing information campaign in society is an effective tool could make women aware of their right and make them able to defend (in conflicts, inheritance disputes and being landless or homeless) and claim their rights (to keep their access to land). This result comes out from W1-5\_T1.

#### 5.4. Influencing factors on women vulnerability in adaptation to climate change

SWOT analysis provide 'influencing factors' as it is presented in table (Table 5-2). These are influencing factors on women vulnerability in adaptation to climate change in context of land tenure.

Table 5-2 Indicators of women vulnerability in adaptation to climate change with respect to land tenure

Results	Influencing factors
Securing land tenure system to motivate women participate in adaptation to climate change	Women participation in adaptation to climate change
Implementation of gender sensitive policies to use women potential capacity	Women motivation for participation in adaptation to climate change
Sharing information and facilitate women access to legal framework	Women awareness of legal system and their ability to access to legal framework
Provide women enhanced perception of tenure security	Women perception of tenure security
Involve women participation in decision making process for adaptation to climate change	Women participation in decision making (in both governmental and community)
Include women lands rights in registration process	Registered parcels in name of women
Provide training for women	Availability and accessibility of training for women
Provide equal rights as man	Difference in women's and men's rights over land based on law
Improve legislation	Existing gender equality and gender-sensitivity in laws
Proper gender sensitive resettlement program	Women's safety and secured land rights in new location
Support women's land registration (as well as men)	Land ownership in name of women
Improve conflict management	Loss of women's rights on land by conflicts, and time and effort needed for solving conflicts
Improve inheritance law	Loss of women's rights on land by inheritance disputes, and time and effort needed for solving them
Provide information campaign	Women awareness of women's land rights and awareness of both men and women about advantages of these rights for women.

Based on experiences from different case studies with different land tenure system, women socioeconomic and social and legal system, SWOT analysis provide a comprehensive view with comparison study of all cases provided in this research.

#### 5.5. Summary

This chapter provided the result of research. Then by emphasising on main finding of research, factors for securing women rights, factors of women vulnerability and adaptation to climate change were presented. Result of this research show negative effects of women's insecurity of tenure in women vulnerability for adaptation to climate change. In order to compare and marge all experiences and lessons from all cases in

different chapters, SWOT analysis were used in this chapter. The procedure for this analysis can be summarised as:

In chapter two, experience from two different cases were used to assess women vulnerability in climate change and finding the factors of vulnerability. As result of finding women's lack of access to land and tenure insecurity as one of the factors of vulnerability in chapter two, all factors of securing women land tenure from chapter three considered in SWOT analysis. Moreover, experiences of women vulnerability with respect to land related issues presented in chapter four (section 4.3) provide factors of women vulnerability with regard to land tenure security. These factors from chapter four, as well as factors of insecure women's land right from chapter three were used as weaknesses in this SWOT analysis. Strengths are mainly derived from information of cases of Bangladesh and Indonesia in chapter four (section 4.4) where we assess women's role in adaptation. As result of finding of lack of tenure security as hindering factors, women *potential* role in adaptation and their participation interred as internal factors in strengths. External factors were derived from the whole research to identify opportunities and Threats in this analysis.

From this SWOT analysis, different result derived based on strengths, weaknesses, opportunities and threats which resulted in influencing factors of women vulnerability in adaptation to climate change with respect to land tenure.



## 6. CONCLUSION AND RECOMMENDATION

### 6.1. Introduction

This research presents assessment of women vulnerability in adaptation to climate change in context of land tenure. It has been done in their main parts in chapter two, three and four regarding to the three sub-objectives. This chapter, presents overall conclusion and recommendation. Conclusion of this research provided based on sub-objectives, and hypothesis testing would be discussed in section 6.2. Then recommendation would provide under section 6.3.

### 6.2. Conclusion

The main objective of this research is *to explore the effects of women's security of tenure on reducing women vulnerability in adaptation to climate change*. Three sub-objectives has been defined in order to achieve main objective; first sub-objective was defined in climate change area, second one in area of land tenure and third sub-objective in area of climate change with respect to land tenure. Result of research would be presented as:

*a) Sub-objective one: To identify factors for women vulnerability in climate change.*

In order to achieve this sub-objective after reviewing different approaches to vulnerability, socioeconomic approach was explained more for assessing women vulnerability in climate change. Socioeconomic vulnerability include cultural aspects (e.g. believes and traditions) and political aspects (e.g. institutional organisation and governance), and economic aspects (linked to status of group and individuals in society). By searching women socioeconomic situation based on case studies, it was found that there is gender inequality. And existing gender inequality is so important regarding women vulnerability because climate change exacerbate this inequality. The most important factor of women vulnerability to climate change are; a) limited access to land and other resources, b) Gender division of labour, dependency on natural resources, limited mobility c) Lower education, information and access to institutions, and d) Limited participation in decision making. These factors exaggerate gender inequality in facing with climate change, and make women particularly vulnerable.

Based on result from different cases, it can be concluded that influence of these factor on women, the way that these factors make women vulnerable and reason behind them is different. These differences in women vulnerability in different regions is rooted in women socioeconomic position in society.

As mentioned in factors of women vulnerability, women's access to land is one of these factors which was insecure and limited in both countries due to different reasons. Again, regarded to different women socioeconomic position and different tenure system, insecure land tenure increase women vulnerability differently. Clarification on this part, is under next sub-objective.

*b) Sub-objective two: To describe women's rights on land as indicators for reducing women vulnerability.*

By achieving first sub-objective, women's rights to land comes out as one of the factors of their vulnerability in climate change. Information acquired from cases of Ghana and Bangladesh show gender inequality exist in access to and control over land. Although there are many differences in women's rights over land in both system, they are affected by patrilineal inheritance system, local customs and traditions, decision making power, marital status, dependency on men and lack of access to legal institution (case of Ghana), legal system

(which not provide equal rights for both gender in case of Bangladesh) and lack of access to information. Based on these cases, women's rights to land is not secured, since it is dependent on wide variety of factors. So it make women especially vulnerable with regard to land tenure system in case of inheritance conflicts, land disputes and land grabbing.

Based on this research, securing women's land tenure in case studies can achieve by: enhancing gender equality in access to and control over land legally (such as in case of Bangladesh), providing information about advantages of land ownership for both women men, and information about formal land administration system, increasing the application of existing land legislations (more in case of Ghana) and providing legal support, increase in women's abilities to acquire and safeguard their land rights and improving the women's socio-economic position. All these are needed to imply not only by government and through legal system but by all civil organisations, traditional authorities, development organisations, NGOs and Communities.

*c) Sub-objective three: To analyse women vulnerability with respect to women tenure security on land, and women adaptation to climate change.*

This third sub-objective contain both land tenure and climate change. With regard to that, two main research questions are defined; one related to women vulnerability in land related issues and other one, related to women adaptation to climate change with respect to land tenure.

In facing with short term effect of climate change women become force to displace, and women lose the social security and location-specific income. The case of Bangladesh revealed inequality in access to land as result of not considering female headed households and widows in land distribution by government. It makes homeless and landless women have fear of eviction and dispossession by displacement in new areas and not feel secured. The case of Indonesia showed that women may lose their land and face with violence as result of loss of records by disasters and being ignored by relatives and neighbours, effects of pre-disaster inheritance conflicts combined with effect of disaster, patrilineal inheritance system and complexity of inheritance law. Social barriers and government weakness to secure women's land rights from others claims on land is one of the main concern which make women vulnerable in land related issues arising from climate change.

However, related to women adaptation to climate change, cases of Kenya and Ghana revealed that women have great role in natural resource management, great potential adaptive capacity, local knowledge and experience in coping with effects of climate change. They have restricted use rights, and titles are mainly registered in name of men, and women don't have control over land. This tenure insecurity, reduce their tendency as well as their ability for participation in adaptation because adaptation planning mostly are long time and need changes which women don't have enough control over land to imply those changes. Moreover, due to limited land right, they are unable to use land as collateral for access to credit for investment, agricultural equipment and extension services. Therefore, it can be concluded from research that women's insecurity of land tenure has a negative effect on women vulnerability and adaptation to climate change. But, based on these information, it is difficult to conclude vice versa, and say that women's security of tenure can empower women for adaptation to climate change.

*Hypothesis: Women tenure security can reduce women vulnerability in adaptation to climate change.*

This research shows some cases of negative effect of women's insecurity of tenure on women vulnerability in adaptation to climate change. But there is not enough evidence to prove that security of tenure can reduce their vulnerability.

### 6.3. Recommendation

Basically this research has been done based on secondary data from different sources e.g. policy and project documents, as well as scientific papers. As well as some advantages of using secondary data (mentioned in section 1.9.1), reliance on these data has some disadvantages too, and this research is not an exception and free of disadvantages of secondary data. One of the recommendation for this research could be using primary data by field work. As well as this general recommendation, it comes out from this research that land tenure security is an important factor related to women vulnerability in adaptation to climate change. But it shows that there is not enough gender disaggregated data for searching land tenure, vulnerability and adaptation. So for achieving main objective of this research, many case studies have been used separately to achieve each sub-objective. Considering all mentioned, this research has following recommendation for further research:

- More research to collect primary gender disaggregated data on vulnerability and adaptation to climate change could present more details on their relation.
- As mentioned, women's local knowledge on adaptation planning and decision making were importance factors of adaptation to climate change and reducing vulnerability. Therefore, further research can be done to make effects and importance of these factors more clear.
- In order to find factors of women vulnerability, registration on women's name is mentioned as one of these factors. However individual and joint titling in some cases can increase women insecurity of tenure as result of social constrain. Further research in this field seems interesting.
- In this research we talked about effects of legal system as well as effects of communities on land tenure implication for women and as result, effects on their vulnerability. But why there is difference between legal system and community's implication in tenure system, and how it can be reduced. These question are motivating start for further research.
- More research for finding relation of land tenure and migration as an adaptive strategy in facing with climate change is stimulating for further research.



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