

Insecurity of Land Tenure and Women Vulnerability in Climate Change

Maliheh GHOLAMHOSSEINI, Arbind TULADHAR, and Liza GROENENDIJK, the Netherlands

Key words: Women, Vulnerability, Security of Tenure, Climate Change

SUMMARY

Climate change is a serious problem all over the world which has been attracting more concern over last decades. Consequences of climate change with both short-term and long-term effects are becoming more obvious, and mostly one can feel the effects on the natural ecosystem, land use, land suitability and supply of land for settlement and agricultural productive activities. Although these effects are felt by the whole society, there are other factors that make some groups such as women more vulnerable than others. Many kinds of literature suggest that women insecurity of land tenure is the factor of women vulnerability in climate change, but the linkage of women land tenure security with their vulnerability is not clear, and needs further investigation. The objective of this paper is to explore the factors of women vulnerability in the rural area of developing countries, and then to find how land tenure insecurity reduce women adaptive capacity and make them especially vulnerable to effects of climate change. In order to achieve this objective, secondary data from the different case studies are used and discussed by the comparative analysis. Results of these cases confirm the importance of both quantitative and qualitative parameters of secure access in women vulnerability to climate change. Quantitative parameters in terms of inadequacy in the range of land right make women vulnerable mostly in facing with long-term effects of climate change on livelihood, natural resource use system, crop yield, and resource productivity. And qualitative factors in the protection of land rights for women increase their vulnerability by putting them at risk of being landless, homeless and facing with violence especially in facing with short-term effects of climate change. In addition, the result of this research highlight the important of social aspects as a link between women security of tenure and their vulnerability; Social norms, culture and religion are factors which affect the level of women vulnerability in climate change directly, and indirectly through insecurity of tenure.

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1. INTRODUCTION

Climate change is one of the most urgent current issues with extensive effects on the ecosystem and human development. These impacts of climate change can be seen in the failure of infrastructure, the increase in the severity of poverty, or loss of environmental, political, economic and social security. Considering the different impacts of climate change, progressively more severe in many parts of the worlds, it is needed to consider risks of climate change on the communities and individuals. This consideration of the human aspect of climate change can help to increase the adaptive capacity of the people affected by climate change with the view to reduce their vulnerability (Heltberg, Siegel, & Jorgensen, 2009). The term “vulnerability” is presented with different definitions in literature, According to IPCC (2007), “vulnerability is the degree which the system is prone to the negative effects of climate change and incapable of coping with them, and it differs across regions, generation, genders, ages and population”. 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). In addition, poor and disadvantaged groups are more vulnerable than other groups due to their less capacity to cope with the adverse effects of climate change.

Gender relations such as the power relations between women and men which assign different roles and responsibilities, and put them in the different economic situation is a factor that is often underestimated in the climate change discussion. Due to women’s role in natural resource management, and the interactions with land and natural resources, e.g. in agricultural practices, and negative effects of climate change on natural resources and land suitability, more research is needed on inequity especially in access to land and its relation with women vulnerability. In facing with climate change, and pressure on land and its suitability for settlement and productive activities, people with poor tenure security are in risk of loss of access to land, loss of income and agricultural services for coping to climate change. This research intends to look at factors of women vulnerability, and then women’s vulnerability from the perspective of land tenure to explore the role of women’s insecurity of tenure in women vulnerability based on secondary data from literature-derived cases.

2. METHODOLOGY AND DATA USED

Data collection in this research is based on a) literature review, and b) case study research. In order to achieve study objective, in addition to the literature review on women vulnerability, their adaptive capacity, land tenure and women’s rights on land (section 3), secondary data from different case studies are presented (section 4) and discussed by a comparative study (section 5). The secondary data derived from the literature are used in three sections to search a) factor of women

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vulnerability, b) linkage of land tenure insecurity and women vulnerability, and c) women's land rights.

3. WOMEN VULNERABILITY, ADAPTIVE CAPACITY AND LAND TENURE

3.1 Vulnerability

As mentioned, there is a variety of definitions for term “vulnerability”, and it has been conceptualized in many ways, for example, it is applied differently by natural and social scientists. In addition, the vulnerability has been mentioned in relation with concepts such as resilience, fragility adaptability, susceptibility and risks, and also exposure, sensitivity, adaptive capacity, and robustness. 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 (Figure 1). Sensitivity and exposure are dependent on the interaction of system or community and attribute of climate change stimuli. Particular conditions such as the 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 the adaptive capacity of a system. For example, different factors such as socio-economic, technology or infrastructure context affect the degree of ability of the system to modify its characteristic in order to cope better with external stresses to enhance adaptive capacity (Solar, 2010). And the adjustment in system behaviour that enhance the adaptive ability to cope with stresses is the adaptation (Adger, Brooks, Bentham, Agnew, & Eriksen, 2004).

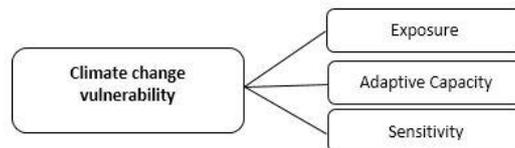


Figure 1. Climate change vulnerability (Solar, 2010)

By existing different conceptualization 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 the purpose of vulnerability assessment and policy concept. The different vulnerability concepts could distinguish by vulnerability factors that are taken into consideration. For example, United Nations (2004) consider four group of these factors: physical, environmental, social and economic. And Füsse, (2007) categorize different approaches to vulnerability by independent variables of vulnerability to Scale (internal and external) and domain (Socioeconomic and biophysical).

Social factors of vulnerability are linked to the well-being 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 includes 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 organization, and governance.

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There are some indicators to examine the relative vulnerability of a social group; Neil Adger (1999) states that factors of Socio-economic vulnerability are inequality, poverty, dependency on resource and institutional adaptation. Economic factors of vulnerability are linked to the status of individuals and groups in society. The level of access to resources, credit and insurance can affect vulnerability, and groups such as poor and females who are in lower level economically, are more vulnerable.

The Socioeconomic approach is the one with the focus on people, investigating the most vulnerable and the reasons of vulnerability. Moreover, there are different socioeconomic differences between men and women in the society which are rooted in social structures in the different communities and countries in the world. Women roles and responsibilities, their access to human secured rights, level of literacy, participation in decision making and etc. are different in society (United Nations, 2004). Moreover, their different access to credit and resources put them in different level economically (Angula, 2010). So women's socioeconomic position in society would help to find factors of their vulnerability in climate change.

3.2 Women vulnerability

Gender equality refers to equal rights, responsibilities and opportunities for both men and women in society, at work and in the home (Aguilar, 2009), and climate change would exaggerate the existing pattern of gender inequality and gender disadvantages in the society (Quan & Dyer, 2008). There are different factors for this exaggeration (Vincent et al., 2010), for example, Facing with social, political and economic barriers limit women adaptive capacity and make them especially vulnerable (United Nations, 2009).

Women constitute the 70 % world's poor, and as being poor they have the closer relation to nature and more dependent on natural resources, and basically they receive hardest hit by environment degradation (Resurrección, 2013). Women in the rural area in developing countries are responsible for fetching water and collection of fuel (United Nations, 2009). Negative effects of climate change on water resources and woody plant and land degradation as well as increasing their burden, could have the negative impact on their health, household activities and their time for economic productivity (UNDP, 2009). Moreover, it increases the tension in the household, and competition over scarce resources in communities, leading violence, and domestic abuse.

Women responsibility in household management, taking care of children and elderly, besides the lack of education, and social norms made them reluctant to leave their homes and community without men relatives and it affect their mobility. Limited mobility would make them vulnerable in different ways, for example, exposure to severe climatic changes or disaster by remaining in the vulnerable area, dependency on resources, and losing an additional source of income (UNDP, 2009).

Low level of education (due to the higher priority in boy's education, marriage in younger ages, household activities, and depriving of education in the lack of resources) is another factor affecting on their qualification for finding a formal job, employment, economic position, escaping from poverty, and make them more dependent on their husband and unpaid jobs on husband's lands.

Moreover, it reduce their access to information and make them less aware of climate change, and its variations or climate hazards.

Although women have a close relation with the environment, great local knowledge on conservation, and potential adaptive capacity, their voice cannot be heard, not in family nor in the community, resulted in the limited awareness of women's need. Men as head of household are the main decision-makers, and women have limited access to and control over 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). Due to limited control over land, women cannot decide on use of land, and considering women's major role in agriculture as one of the most sensitive sector to climate change, particularly in subsistence farming for family consumption, climate change could have an intense effect on women production, incomes and food security (Quan & Dyer, 2008; Vincent et al., 2010). Moreover, negative effects of climate change on land suitability for settlement and production put women at risk of loss of access to land in facing with land issues such as inheritance disputes due to the weak protection of their rights over land. lack of women participation in governance, civil society organization, judiciary, and NGOs which exist in many developing countries can also reduce realization and implementation of women's rights and also for benefits from climate change discussions and adaptation planning (FAO, 2012).

There is a different category of factors of women vulnerability by scholars; Dankelman (2010) characterized five factors as a critical factors for women vulnerability: access and control over land and natural resources, access to credit and technology, access to education, decision-making power and participation in social progress. And Vincent et al. (2010) categorized these factors differently, by emphasizing on the gender division of labor and dependency on natural resources, lack of education and access to information, limited mobility and decision-making power and limited access and control over resources (natural resources and credit). Due to the diversity of socioeconomic conditions and divergence in effects of climate change across the countries and regions, the specific regional vulnerability assessment is necessary to find factors of women vulnerability.

3.3 Land tenure

Land tenure defines the relationship between people (as individual or groups) with respect to land and its resources. It 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 lands such as the right to use, control and transfer land with associated responsibilities and constraint, developing in the manner which establishes the power between individuals and social groups. therefore, elites and middle classes in the society have the stronger form of land tenure while poor and the vulnerable group have the weaker form of tenure (Palmer, Friccka, & Wehrmann, 2009).

There are varies land tenure arrangement in different countries and even within a country, as the result of different social, religious, cultural, and political system. The two main categories of land tenure are; influenced by western laws or by tradition and customary law. And five main land tenure systems are Angelo-American, French-German, Socialist (Communist), Ethnic group

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(Customary) and Religious (Islamic) concepts. Land tenure is often categorized into four types: private, communal, open access and state lands (Tuladhar, 2004).

Tenure system has two main dimensions; a) property right dimension which is the security of land rights associated with tenure properties, and b) property right distribution to whom these 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 economic benefits derived from land (Roth & Haase, 1998). The important component of tenure security can be defined as a) the degree to which rights are recognized, b) level of protection against the claim by others, and c) duration of the rights on the land. The ability of the landlord to heir, lease or grant land with the guarantee is another factor of tenure security (Mitchell, 2011).

3.4 Women's land rights

Women's access to land is affected by many factors such as formal legal system, custom, religion, status within the domestic unit, economy and education (FAO, 2002). Mostly their right to land and other resources are determined by practice and custom, rather than according to law. So the majority of women don't have secure land and property rights, whether in statutory or customary land. Women who the majority of them are poor can use the 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. And regularly their use rights which are in relation to their status as the wife, daughter, mother or sister are not secure and they change easily by the dispute in families, labor, mobility, and death. But this is not always the case, there are some factors such as livelihood systems and external shocks e.g. natural disasters which make women's land rights more insecure and make them more vulnerable with respect to land tenure (Palmer et al., 2009).

Women insecurity of tenure is based on different reasons. So 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). 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 the bundle of rights) parameters have to be considered.



Figure 2. Women's secure access to land

3.5 Tenure security and vulnerability in climate change

Linkage of land tenure and climate change is complex, but both abrupt changes result from increased extreme weather events and long-term effects of climate change, can be felt by its effect on natural ecosystem, land suitability and land and natural use system. Adequate tenure security is needed by tenure system in order to secure access to land for responding to livelihood changes and

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settlements in effective land and resource management system. As it can be seen in Figure 3, Climate change decreases water supply, land suitability for agriculture and settlement, crop yield and natural resource productivity. As the result of the 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 (Quan & Dyer, 2008).

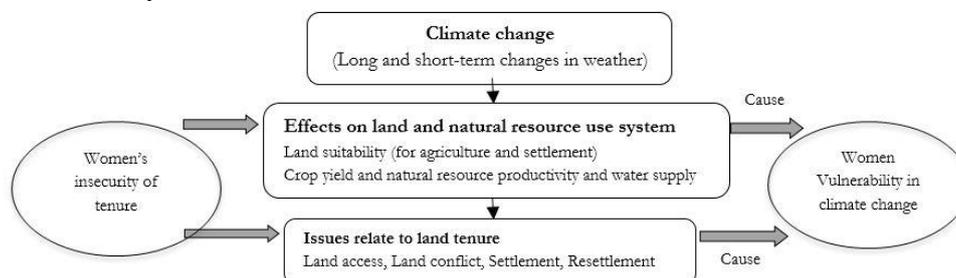


Figure 3. Linkage of climate change and women vulnerability with respect to tenure security

Those with insecure land tenure like women would be especially vulnerable considering the two mentioned phase of the relation of land tenure and climate change (Figure 3). First, Women have a great role in environment preservation and knowledge of natural resource system (Resurrección, 2013), But the lack of access and control over land and productive resources is a hindering factor for women to use their knowledge and potential capacity in facing with climate change (Abeka et al., 2012). For responding to livelihood changes, in facing with long-term effects of climate change in water shortage, land suitability for agriculture and decrease in crop yield and resource productivity, land tenure security have a great role in providing incentive and capability to invest in adaptation measurements, such as construction of irrigation system and development drought resistant crops, and as a result, improving adaptive capacity. their insecure rights over land make them unable to take the decision over land or having long term investment (Mitchell, 2011). Cases from Ghana and Kenya would provide more information in this regards. Secondly, as mentioned (lower box in Figure 3), reduction of suitable land and pressure over land, imply changes in people access to land and it causes conflicts over land which make people with insecure land rights in risk of losing access to land. Settlement and resettlement programs are important to provide secure access to land for landless and homeless people, but women are one of the groups who are rarely considered in these programs (Quan & Dyer, 2008). Or as the result of dependent land rights, they are in risk of loss of access to land by the death of male relatives as the result of inheritance law and customs. Cases of Bangladesh and Indonesia would present more details on this part.

4. CASE STUDIES

Secondary data from different case studies taken from literature would present in order to search a) women's land rights, b) factors of women vulnerability, and c) role of land tenure security in women adaptive capacity, and women vulnerability in land related issues as the result of insecure tenure.

4.1 Women's land right

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Based on the case taken from literature in Volta region in Ghana, this country has pluralistic tenure system; both statutory and customary. Although statutory laws provide more equality in land rights for women, access to land and control over land is strongly determined by customary practices (Duncan & Brants, 2004). Men who are main decision makers (in both household and community level) have control over land. Since the head of lineage or clan is men, they assign control over land to men. In Addition, the inheritance from the father is the main way of acquiring land, but mostly men can obtain lands in this way because of the patrilineal inheritance system. Although women can acquire land by the purchase of land or as a gift from parent's grandparents or spouse, their rights are generally secondary rights which are through others, especially male relatives. The difference in access rights to land is also between different categories of women, for example, widows with or without children, adopted or half-daughter, married or divorced women, and widows. And 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. Women are reluctant to go to the court in the case of disputes because it is a taboo for them to challenge their male relatives in court, and it can result in a divorce or the destruction of family relationships. This case highlighted the gender inequalities in regard to security of land tenure. Women's land tenure is not secure since women access to and control over land were affected by many different factors such as the patrilineal inheritance system, local traditions and customs, decision-making powers, marital status and land disputes.

The case taken from literature in two villages in Noakhali district in Bangladesh shows women like other citizens, can purchase and own the land. But they don't have any legal rights of ownership on family-purchased land unless her name mentioned on the land document. Family lands are mostly in the name of men, just less than four percent of private land in Bangladesh is in the name of women, mostly are bought by labor income or selling their jewelry. Land tenure seem to have a great role in this unequal pattern of land distribution leading to poverty, for example, distribution of government-allocated lands is twisted against poor, rich and influential people, and women are the most vulnerable regarding the distribution of khas lands (SARWAR, Islam, & Monzoor, 2007).

Based on Sharia law, daughter, mother and wife are entitled to inheritance rights, but the half share of the male which show that inheritance is discriminatory. In the case of divorce or abandonment, women don't have any legal right to claim husband's land, and they lose the access to her husband's family land completely, forcing to come back to their birth family. Women suffer significantly because of their lack of access to information, legal and instructional services in the patriarchal society where the male relative are in charge of solving problems, for example, many of them don't have any idea of spouse joint ownership of land. Moreover, in cases of women awareness of their rights, they don't know how to implement them or they are limited by society to exercise them. This case reveals that women generally don't have secure land rights since their access to land and control over land is connected with different factors such as gender and social construct, patriarchal ordering, and legal framework.

4.2 Factors of women vulnerability

The case taken from the literature in Ghana as a country in danger of desertification and deforestation, indicate that climate change doesn't affect all people equally, and men and women have the different level of vulnerability. Women's socioeconomic position in Ghana shows women

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unpaid work in family, responsibility in domestic tasks and collecting firewood and water, as well as less access to information due to higher rate of illiteracy, and lack of women participation in local governance, and civil society organization (WEDO, 2008) are factors of women vulnerability in climate change in the same way explained in section 4.1.

Women have a great role in agriculture in Ghana; they are mainly engaged in food crop cultivation and small-scale trading, but usually small and low-quality farm are given to women which are more sensitive and need more labor to save yield crops in unpredictable and intense changes in climate. Women farmers also have poor access to credit, and their access to credit is mostly from families, friends or informal networks which are not reliable resources as they may face with similar constrain at the same time. Moreover, women access to land is mostly use rights through their male relatives. Lack of control over land reduce women ability to take a decision over usage of available land to adapt climatic changes. (WEDO, 2008). Inequality in access to land by gender comes into sharp when the productive activity of women in facing with climate change is examined such as a dramatic decrease in maize yield by changes in temperature over the year. (FAO, 2012).

The case conducted in six rural areas in Bangladesh, located one of the most vulnerable region by threats of both short and long-term effects of climate change in shape of irregular intense floods, cyclones, river erosion, droughts, landslides and sea level rise also shows that vulnerability and adaptive capacity to climate change are gendered (Ahmad, 2012). In this case also, women are responsible for the household management, and water and fuel gathering. Low level of education in this case as well as the effect on job opportunities and economic positions, may force them to marry for security. In addition, their access to the institution is commonly through men relatives which limit their access to adaptation supports and information. Women have limited decision-making power in the household, and social norms and family decide on women's jobs or their marriage.

Women as being poor have less access to assets and resources and less control over them which decrease their ability to transform it to income. Most of the women don't have title to land in the study area, also, they have limited decision-making power over the land. And even many of women lost access to land and property by husband or father death due to inheritance, customs, and religion, as well as the lack of information about legal rights and inability to access the justice system. With the loss of assets, women had no collateral to access to loans from the formal banking system to enhance their economic opportunities and income. Both cases show the importance of women insecurity of tenure in their vulnerability. The case of Ghana mostly shows the importance of quantitative parameters of secure access to land for taking a decision over land for adaptation to climate change while in the second case importance of both qualitative and quantitative parameters can be seen as a reason of women vulnerability in climate change.

4.3 Linking vulnerability and tenure security

4.2.1 Effects of climate change on livelihood, land, and natural resource productivity

Considering the middle box in Figure 3 (effects of climate change on livelihood, land, natural resource productivity and crop yield) the case taken from literature in Kuresoi located in highlands of Kenya (Abeka et al., 2012) shows that women are responsible for 80% of food production, and

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they have great potential knowledge and adaptive capacity, but they are most affected in area by droughts and have the least adaptive capacity. Customary law in this area restricts women's right to land and property. Land tenure system in this region is unclear due to lack of deeds for small land holders and government's power for replacement of these deeds in any time. The existing titles are in the name of men, and they have control over land and women access to land for any use and management is dependent on men permission. So it is difficult for women to use land as collateral, access to credit and agriculture extension services. In addition, the lack of control over land reduces their tendency for participation in sustainable agriculture practices or long-term investment in land rehabilitation and soil quality. So quantitative parameters of secure access to land reduce their adaptive capacity, and increase their vulnerability (Abeka et al., 2012).

In the village of Doggoh in Ghana which is particularly vulnerable to effects of climate change, the main economy activity of people is agriculture. And both men and women perform a 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 the dry season for producing vegetables for both sale and consumption, individual planting of the trees in their homes, application for compost and farmyard manure and following to improve soil fertility by retention and incorporation of crop residues. In this area also women land rights are hindering factors for adaptation practices in agriculture. In this area, women do not have their own land and they are mostly working on the plot of their husbands for food production. Therefore, 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. Fear of indebtedness, as the result of qualitative parameters of secure access to land, women are reluctant to participate these practices and adaptation initiatives and, therefore, it reduce their adaptive capacity and increase their vulnerability (Naab & Koranteng, 2012).

4.2.2 Effects of climate change and land-related issues

Regarding the third box in Figure 3 (women vulnerability and land-related issues arisen from climate change), case of Bangladesh shows that flood, cyclone, river erosion, landslides, and droughts in different parts of this country caused many land related issues such as temporary and permanent displacement, and conflicts as result of being landlessness, homelessness and land use change (due to land unsuitability); and fear of eviction and issue of land titling. People who are forced to find new lands for settlement and farming, in the most cases, settle on Khas land which is owned by state officially. Under the law, the land holding of former feudal landlords and private land holding above certain ceiling are intended to become Khas land (Garibay et al., 2010). Based on 1972 legislation 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 the result of the reversion of inundated chars land to state lands. Distribution of Khas lands is governed by some rules and regulations which are complicated and their implication is always difficult to enforce (Garibay et al., 2010). In resettlement programs, the families are selected by the local land administration for

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distribution of lands for agriculture and settlement. But some groups of landless households such as unmarried women, female-headed households, and widows without the son or without children are not considered in this resettlement. As the result, when women are the force to displace in Khas lands, they have the fear of dispossession or eviction because they don't have any defined right on these lands.

In the case related to destructive Tsunami in Aceh, many women displace which lose their social security and location-specific income containing access to common property resources. Female returnees are at risk of losing access to land when their relatives and neighbors try to make advantages of women's tenure insecurity to deny their claims. In some cases, women lose access to land due to social norms and legal rules which mediate their entitlement in inheritance through missing or deceased husband or relatives. As a great number of deaths in Aceh, inheritance cases were the predominant land-related conflicts. In Aceh, inheritance cases resolve based on Sharia laws which state widows and female children have inheritance rights to land, but not as equal as men. Primarily, inheritance of land in Aceh is determined at the local level, and Sharia court may determine land ownership in the cases that they are part of a bigger inheritance dispute. This research shows in some cases village leaders were unable or unwilling to prevent male relatives who deny the legitimate claim of widows or daughters. And this dispossession act in the 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 are not marital lands, and belong to the husband. So many women are deprived of their land rights as the result of customary and traditional barriers, and government weaknesses for claiming their rights to land and property (Fitzpatrick, 2008).

5. DISCUSSION

The information provided by cases reveal that: first, vulnerability to climate change and adaptive capacity are gendered, and women's socioeconomic position make them disproportionately vulnerable to effects of climate change. Secondly, insecure access to and control over land is one of the factors of women vulnerability besides gender division of labor (resulted in dependency on natural resources, and less mobility), low level of education (resulted in less access to information and institution), and social norms and decision-making power. Comparison of the information provided by different sources shows the importance of women insecure access to land in their vulnerability in facing with effects of climate change from two different aspects; first, effects of climate change on livelihood, natural resource use system, crop yield and resource productivity make women especially vulnerable (middle box in Figure 3) because of insecure access to land for food security and access to income through agricultural practices. Secondly, in facing with climate change they are in risk of loss of access to land when land related issues such as conflict, inheritance dispute, settlement, and resettlement resulted in lack of access to income through the land market and to home and sheltering (especially in facing with short-term effects of climate change).

Considering the first aspect, case of Ghana shows that women receive harder hit by climate change on their small, low-quality lands which make them especially vulnerable in climatic changes. The cases of Kenya and Ghana reveal that in spite of women disproportionate vulnerability, they have the potential adaptive capacity. Women with special knowledge of natural resource management

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can implement good coping strategy to reduce the vulnerability of both people and environment. But insecurity of tenure is a hindering factor which make women unable to take the decision over the efficient usage of available land for adaptation to climate change or use land as collateral for access to credit and agriculture extension services and make them reluctant for long term investment and participation in sustainable agriculture practices. Therefore, they have less adaptive capacity in facing with changes in livelihood and natural resource use system resulted in their vulnerability.

Regarding the second aspect, cases of Bangladesh and Indonesia reveal that women are vulnerable due to loss of access to land; by lack of women consideration in resettlement programs and settling down in Khas land, they have a fear of eviction or dispossession in the case of Bangladesh, But in some cases such as Indonesia, although there are titles in name of women, but are especially vulnerable and they are in risk of loss of access to land and facing with violence due to inheritance conflicts arisen from complexity of law based on religion, government weakness to reclaim women's rights and dependency of women's land rights on both customs and law. Regarding the importance of land for access to income through the land market, the case of Bangladesh shows that women don't have title to land, and lack of control over land reduce women adaptive capacity for transferring land to money or using land as collateral in facing with negative effects of climate change on the suitability of land. Islamic inheritance law also is one of the reason resulted in the loss of women access to their husband's or their father's land by disasters as effects of climate change.

All these shows important of insecure access to land in women vulnerability in climate change. To be more precise, quantitative parameters of secure access to land are the main reason of women less adaptive capacity in agriculture and their vulnerability while qualitative parameters of secure access to land are more dominant in facing with land related issues arisen by effects of climate change. In addition, they reveal the importance of social factors, custom, and religion in women security of tenure in facing with effects of climate change. Although case of Bangladesh shows that lack of title in name of women is one of the reasons of their insecure access to land with decreasing their ability for using land as collateral or transfer it to income in facing with negative effects of climate change on land suitability, but cases of Ghana shows that by existence of statutory law (which provide more equality in land rights), women's access to land is mostly defined by customary law and patrilineal inheritance system. The case of Indonesia reveals that even by having titles in the name of women, in facing with disasters and death of people, religion and customs besides the law define women right to land in inheritance disputes.

So effort for securing women's land tenure can achieve by different tools. Enhancing gender equality in access to and control over the land need to imply by all development and civil organizations, traditional authorities and Communities, and not only through the legal system. In the case such as Ghana, increasing the application of existing land legislations and providing legal support, increase in women's abilities to acquire and safeguard their land rights can help to secure their land rights. But in the case like Bangladesh, beside provision of 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), changes in the formal law such as facilitating individual and joint titling is needed. Based on the importance of social factors for improving tenure security and

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reducing women vulnerability in climate change, providing information and education for both men and women and capacity building in society play a crucial role.

6. CONCLUSION

Different case studies derived from literature reveals insecurity of tenure is one of the factors of women special vulnerability in climate change. Secure access to land is important in order to have access to home, shelter, food and income through agricultural practices, and access to credit through selling or buying land or using land as collateral. In Facing with negative effects of climate change, land tenure insecurity increases their vulnerability from two different aspects. First, Effects of climate change on livelihood, natural resource use system, crop yield and resource productivity make women especially vulnerable. And it is mostly related to quantitative parameters of secure access to land. Since they mostly have use rights (not control and transfer rights), they have less ability and intensive for taking the decision on land for adaptation to climate change, and also less ability to transfer land to income. Therefore, it reduce their adaptive capacity and increase their vulnerability to climate change. Secondly, in facing with climate change they are in risk of loss of access to land when land related issues such as conflict, inheritance dispute, settlement, and resettlement arise. It is mostly in facing with short-term effects of climate change in shape of more intense and regular disasters. As well as vulnerability due to being landless and homeless, lost of access to income, they face with violence. And it is mostly related to qualitative parameters of women secure access to land.

In order to increase the security of tenure and reduce the women vulnerability to climate change, although the provision of equal right and documents in the name of women by law is essential to provide secure access for women, but the importance of social factors in women security of tenure is critical. So providing information and education for both men and women and capacity building in society is necessary to help the insertion of women land rights through the society and reduce their vulnerability.

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