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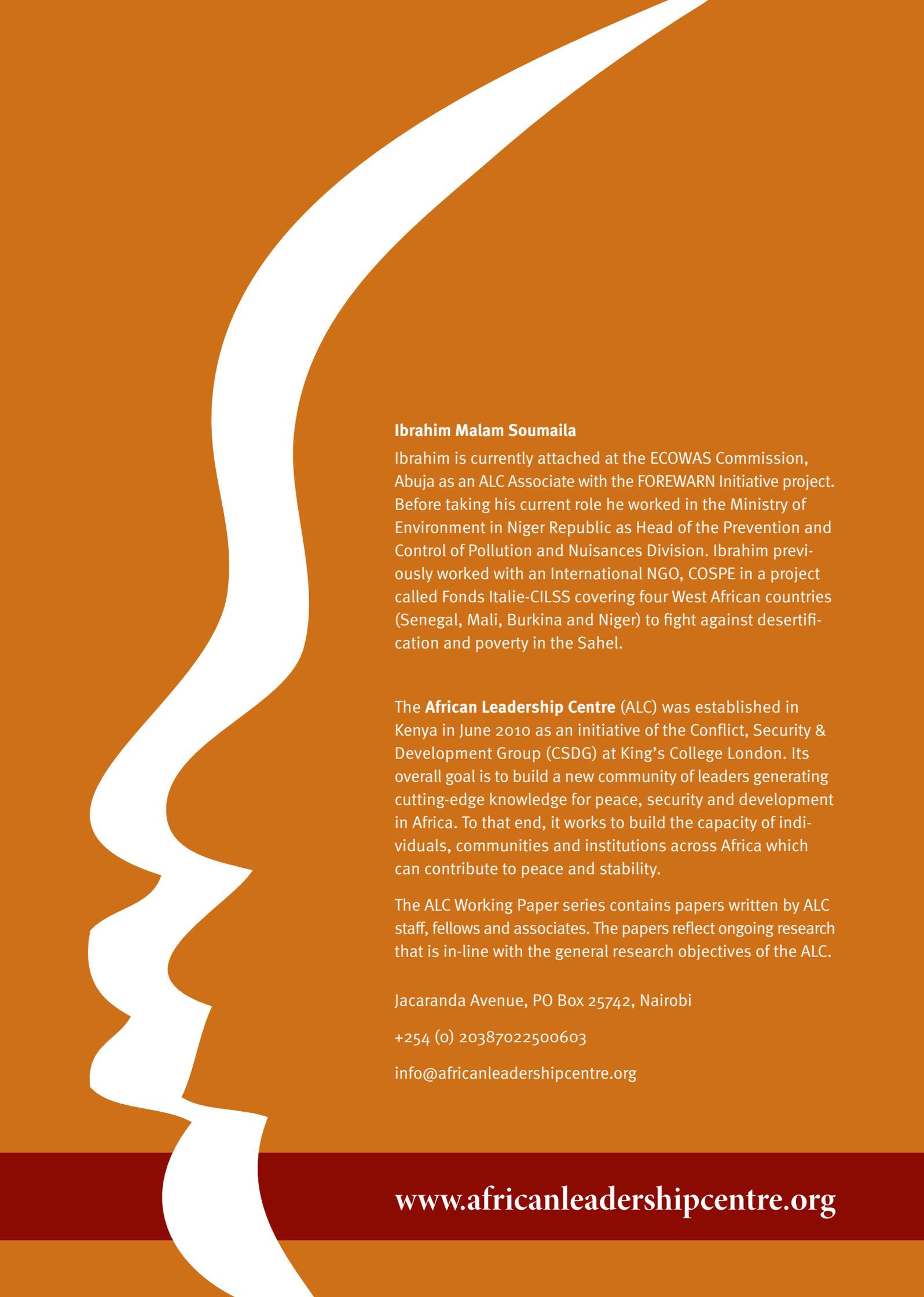
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“Community Vulnerability
Mapping”: Enabling
Participation and
Preparedness in Reducing
the Risk of Disasters and
Impacts of Climate Change
in West Africa

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**ALC WORKING PAPER,
NOV 2012:**

By IBRAHIM MALAM SOUMAILA

**“COMMUNITY VULNERABILITY MAPPING”:
ENABLING ANTICIPATION AND PREPAREDNESS
IN REDUCING THE RISK OF DISASTERS AND
IMPACTS OF CLIMATE CHANGE IN WEST AFRICA**

This paper is the product of research conducted during attachment to ECOWAS as part FOREWARN Programme. Any errors contained therein are the fault of the author



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Abstract

West Africa is considered as one of the regions that are most vulnerable to disaster threats and the impacts of climate change due to high levels of environmental degradation demographic growth, poverty and unregulated urbanisation. Although, vulnerability varies widely across West African states, their regions, communities, sectors and gender, reducing the risk of disasters and impacts of climate change will involve efforts at reducing the vulnerability of the people generally and increasing their capacities to anticipate risk and prepare for the impacts. Mapping the vulnerability of a community would reveal the extent of the risks, social and environmental problems, the urgencies related to disaster threats and climate variability as well as the resilience of the community. Importantly, it would also inform what needs to be done for the benefit of policy makers and planners at the community, national and regional levels.

This paper explores the justification for, opportunities for and challenges of conducting community vulnerability mapping and how this risk reduction and adaptation approach to addressing vulnerabilities and building resilience can be more beneficial to the Economic Community of West African States (ECOWAS) and its member states. The ‘community’ vulnerability mapping level considered is the commune (municipality),¹ which comprises a number of villages within the same area. The research methods adopted include literature review, web-based resources and case studies on vulnerability mapping in parts of Africa so as to consider the added value or the limitations of the approach. Based on the findings of the study, recommendations are addressed to communities, national authorities and

¹ In terms of administration, this corresponds to the “local government area” in some West African states.

ECOWAS on enabling anticipation and preparedness in disaster risk reduction (DRR) and climate change adaptation (CCA) at the community level.

The paper is divided into four chapters. The introductory chapter sets out the parameters of the study and incorporates a review of existing literature and clarification of concepts. Chapter two examines DRR and CCA policies at the national and regional levels as they relate to vulnerability mapping, and presents three case studies of tools and methodologies for mapping vulnerability, and further discusses their strengths and weaknesses. Chapter three considers challenges and opportunities for conducting CVM in West Africa. The penultimate chapter considers the role of ECOWAS and other stakeholders in supporting CVM, and the concluding chapter restates the findings of the study and incorporates relevant recommendations for stakeholders.

Abbreviations and Acronyms

AAP	Africa Adaptation Programme
ACMAD	African Centre of Meteorological Applications for Development
AGRHYMET	Regional Centre for Agro-hydro-meteorology
AU	African Union
CCA	Climate Change Adaptation
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
DfID	Department for International Development (UK)
DRR	Disaster Risk Reduction
ECOWAS	Economic Community of West African States
EU	European Union
EWS	Early Warning System
GEF	Global Environment Facility
GIS	Global Information System
HFP	Humanitarian Futures Programme, King's College London
IFRC	International Federation of Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
LDC	Least Developed Countries
NAPA	National Adaptation Programme of Action
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Assistance
RTU	Representative Territorial Unit
UN	United Nations
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme

1.0 Introduction:

1.1 Background

Over the last four decades, sub-Saharan Africa has experienced more than one thousand disasters.² Disasters and hazard events are a major threat to development, putting at risk and often reversing development gains. In West African countries, the disaster profile is characterised by extreme hydro-meteorological events,³ which is likely to increase in frequency and magnitude due to climate change. The West African disaster profile is closely linked to the vulnerability of its populations and economy and their low capacities and resilience to cope with natural hazards.⁴ Disasters are becoming more complex, interacting with various vulnerabilities, shifting to new areas with wider and even transnational impacts. West Africa is one of the regions that is most vulnerable to disaster threats and impacts of climate change due to several factors which include environmental degradation, rapid population growth, poverty and unregulated urbanisation.⁵ From the droughts of the 1970s and 1980s in the Sahel, proximate West African countries are today witnessing the effects of heavy rains, devastating floods and drought. During the mid 1980s, economic losses to drought were estimated at several millions of United States dollars.⁶

A large population of West Africans lives in areas affected by flood or drought.⁷ In recent years, floods have killed thousands of people and caused extensive damage in West

² World Bank. (2010). *Report on the status of Disaster Risk Reduction in Sub-Saharan Africa*. Washington, D.C., World Bank.

³ It is estimated that 80 to 90 percent of natural disasters are floods, tropical rainfall and drought.

⁴ Ibid. *Op cit*.

⁵

⁶ Tarhule, A., & Lamb, P. J. (2003). Climate Research and Seasonal Forecasting for West Africans: Perceptions, Dissemination, and Use? *Bulletin of the American Meteorological Society*. 84, 1741-1759.

⁷ Nicholson, S. E., Tucker, C. J., & Ba, M. B. (1998). Desertification, Drought, and Surface Vegetation: An Example from the West African Sahel. *Bulletin of the American Meteorological Society*. 79, 815.

Africa.⁸In 2010, the floods that have pervaded the region caused the loss of over 370 lives and affected about 1.5 million persons.⁹ The countries most affected were Benin, Niger, Nigeria and Senegal.¹⁰ Unpredictable rainstorms and accompanying floods have increasingly become more frequent in the region destroying infrastructure, property, crops and human lives.¹¹ Peoples, mostly affected by these floods are small scale peasant farmers, fishermen, coastal area residents, women, children and the aged.¹² For example, in 2010 the rainy season caused serious flooding that damaged crops and killed livestock as over 141 000 hectares of cereal crops and cash crops were destroyed.¹³ .

In addition to disasters and climate change, poverty also has a significant impact on the vulnerability and coping capacity of communities.¹⁴ The recurrence of food shortages especially in the Sahel region has reduced the income and livelihoods of families and populations which rely on agriculture as the primarily economic activity.¹⁵ Vulnerability varies widely across states in the region, and within states and communities.¹⁶ The degree of vulnerability of a people largely depends on their ability to cope with contingencies, adaptation and recover from those events, and often also depend on economic and social factors.¹⁷

1.1.1 Objectives of the study

An assessment of vulnerability to the threats of flood and food scarcity or food insecurity related to climate change is needed to identify the areas where climate change impacts are projected to become severe. Appropriate tools should be considered in assessing the

⁸ IFRC. (2008). *International Federation launches emergency appeal for floods preparedness in West and Central Africa*. [Online]. International Federation of Red Cross and Red Crescent Societies. 11 July 2008. Available at: <http://bit.ly/ZDn4IV>. Accessed on: 19 January 2013.

⁹ AFP. (2010) *377 dead in West and Central African floods: UN*.19 October 2010. Available at: <http://bit.ly/16RdwuK>. Accessed 25 March 2013.

¹⁰ Ibid.

¹¹ Lindell, M. K., & Prater, C. S. (2003). Assessing community impacts of natural disasters. *Natural Hazards Review*.

¹² Alexander, P. (2011). The Link between Climate Change, Gender and Development in Africa. *The African Statistical Journal*.12.119-140

¹³ FAO. (2011). *Disaster risk management strategy in West Africa and the Sahel FAO (2011-2013)*. [Online] Rome: Food and Agricultural Organization. Available at: <http://bit.ly/YDpTrP>. Accessed on: 4 March 2013

¹⁴ Blackden, C. M., & Wodon, Q. (2006). *Gender, time use, and poverty in sub-Saharan Africa*. Washington, D.C., World Bank. ; African Development Bank. (2003). *Poverty and climate change: reducing the vulnerability of the poor through adaptation*. New York, N.Y., World Bank.

¹⁵ . FAO, (2011.)

¹⁶ Ibid.

¹⁷ Denton, F. (2002). Climate change vulnerability, impacts, and adaptation: why does gender matter? *Gender and Development*. 10, 10-20

vulnerability of communities to disaster risk and climate change. The focus of this research paper is to show the importance of mapping vulnerability to floods, drought, and food scarcity at the community level in efforts to reduce disaster risks and build the resilience of the populations. The main objective is to highlight the benefits, prospects and challenges of mapping the vulnerability of communities in the context of disaster risk reduction (DRR) and climate change adaptation (CCA) in the ECOWAS region. The findings should inform what is required to get community vulnerability mapping (CVM) right, and how the results of CVM could improve the policy, planning and action at the community, national and regional levels.

Others objectives of this paper are to:

1. emphasize the need for local capacity building and sensitisation on community resilience through the mapping of the vulnerability of communities;
2. show CVM as a tool for participatory problem solving in identifying and reducing vulnerability to disaster risks and climate change impacts ;
3. Develop recommendations for various stakeholders on CVM.

1.1.2 Statement of the problem

Reducing the vulnerability of communities to hazards, impacts of climate change and poverty is now one of the main priorities of governments of developing countries and development partners.¹⁸ Agriculture (including livestock, fisheries and agro-forestry) is the main economic sector in the West African region, representing around 35% of its GDP and employing around 60% of its active labour force.¹⁹ At the same time it is one of the most vulnerable sectors to climate change.

Several policies, strategies, action plans, projects and research continue to be developed and implemented to increase the resilience of communities to disasters and climate change impacts such as floods droughts and desertification. The assessment of vulnerability is useful in informing policymakers and planners at all levels, development

¹⁸ African Development Bank. (2003).

¹⁹ Jalloh, A. (2013). *West African agriculture and climate change: a comprehensive analysis*. Washington, DC, International Food Policy Research Institute.

partners, civil society, non-governmental organizations (NGOs) and local communities. A useful assessment tool which can provide a quick view of the location, extent and nature of risks is the Community Vulnerability Mapping (CVM).

In West Africa, the national adaptation programmes developed have identified areas vulnerable to climate change impacts and early warning and disaster management systems are in place in some countries. Some early warning systems have elaborated vulnerability maps to food security and these maps which cover a large scale with some disparities among municipalities and villages, remain generally at national level. The lack of vulnerability maps at community level in relation to most recurrent threats in the region (floods, drought, and desertification and food insecurity) reduces the implementation of risk reduction measures and adaptation measures both by local authorities and populations.

1.1.3 Structure and methodology

This paper is divided into five chapters. The introductory chapter sets out the parameters of the study (objectives, problem statement, structure and methodology) and incorporates a review of existing literature and clarification of concepts. Chapter two examines DRR and CCA policies at the national and regional levels as they relate to vulnerability mapping, and presents two case studies of tools and methodologies for mapping vulnerability, and further discusses their strengths and weaknesses. Chapter three considers challenges and opportunities for conducting CVM in West Africa and considers the role of ECOWAS and other stakeholders in supporting CVM. The concluding chapter restates the findings of the study and incorporates relevant recommendations for stakeholders. The methodology of the research includes three case studies that consider tools and methodologies for vulnerability mapping in Africa including the work of DARA with Risk Reduction Index and Climate Vulnerability Monitor in Ghana. Secondary data are used with the review of existing literature and web based resources.

1.1.4 Concepts of vulnerability and vulnerability mapping

Vulnerability is considered to be the “degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.”²⁰ There are various definitions on vulnerability that have been suggested by various authors. Neil Adger suggests that it ‘is the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt.’²¹ Ben Wisner *et al* define vulnerability as the ‘characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event and process).’²² Practitioners like the United Nations International Strategy for Disaster Reduction (UNISDR) defines vulnerability as: ‘a measure of the capacity to absorb the impact and recovery from a hazard event and is conditioned by a range of physical, social, economic and environmental factors or processes.’²³ All the three definitions though varied, have a common emphasis on ability of the victims to adapt and cope with natural hazards.

Broadly vulnerability assessments and monitoring have been conducted in various scientific fields with the objective of informing stakeholders and decision-makers about the potential consequences of hazardous events and existing opportunities for proactive measures and policy interventions that can lead to effective hazard preparedness and risk reduction.²⁴ While multiple context, scale and system-tailored assessment methodologies for social and environmental vulnerability are available, vulnerability mapping stands out as a useful and widely accepted tool for communicating assessment results to a wide range of audiences. Separate maps can be presented for the geographic and demographic extent of exposure to hazards, adaptive capacity and ranked vulnerability measures. This allows the user to visually follow steps undertaken during the analysis,

²⁰ Bernstein, L., Pachauri, R. K., & Reisinger, A. (2008). *Climate change 2007: synthesis report*. Geneva, Switzerland, IPCC.

²¹ Adger, W.N. 2006. *Vulnerability*. *Global Environmental Change*. (16) 3, 268-281.

²² Wisner, B. P. Blaikie, T. Cannon, and I. Davis. 2004. *at risk: Natural hazards, people's vulnerability and disasters* (2nd ed). London and New York: Routledge. P. 11.

²³ UNISDR. (2007). *Disaster risk reduction global review 2007*. Geneva, Switzerland, United Nations International Strategy for Disaster Reduction. P. 12.

²⁴ Birkmann, J. (2006). *Measuring vulnerability to natural hazards: towards disaster resilient societies*. Tokyo, United Nations University.

identify vulnerability drivers across geographic units or sectors and detect priority areas for intervention.

Mercer *et al.* (2010) acknowledged participatory mapping as one of the tools for identifying extrinsic and intrinsic components of vulnerability.²⁵ Over the last four decades, the practice of participatory mapping has become widespread among development workers and researchers.²⁶ It has been used for a wide range of applications including managing natural resources, planning farming activities, implementing health and educational activities, and resolving territorial disputes. Maps are powerful instruments that give visual expression to realities that are perceived, desired or considered useful.²⁷ Mapping the vulnerability of a community is essential as part of long-term planning for DRR, CCA and sustainable development. Multi-scale vulnerability maps are also developed to demonstrate current exposure, sensitivity, and adaptive capacity of agricultural and fishing populations in relation to food security. It helps to identify who is vulnerable and why, existing practices, and how vulnerability and food security may change in the future in relation to multiple stressors, including climate change. These maps will be useful in engaging with policymakers at different levels and to further national and regional development strategies.²⁸ Vulnerability maps are also useful in the social development planning through the information in health, water and education coverage.

1.1.5 The Link between Disaster Risk Reduction and Climate Change Adaptation

DRR and CCA are increasingly being recognized as essential elements in attaining the development goals of the West African region. CCA is defined by the Intergovernmental Panel on Climate Change (IPCC) as 'the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities'.²⁹ On the other hand, UNISDR defines DRR as

²⁵ Mercer, J., Kelman, I., Taranis, L., & Suchet-Pearson, S. (2010). Framework for integrating indigenous and scientific knowledge for disaster risk reduction. *Disasters*.

²⁶ Bernstein, L., Pachauri, R. K., & Reisinger, A. (2008). *Climate change 2007: synthesis report*. Geneva, Switzerland, IPCC

²⁷ Chambers, R. (2008). *Revolutions in development inquiry*. London, Earthscan.

²⁸ Ericksen, P., Thornton P., Notenbaert A, Cramer L, Jones P, Herrero M. (2011). *Mapping hotspots of climate change and food insecurity in the global tropics*. CCAFS Report no. 5. CGIAR Research Program on Climate Change, Agriculture and Food Security (CAAFS). Copenhagen, Denmark. Available online at: www.ccafs.cgiar.org.

²⁹ IPCC. (2007). *Climate Change 2007: 4th Assessment Report*. Intergovernmental Panel on Climate Change. IPCC

systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.³⁰ Examples of activities where both CCA and DRR overlap include preparing risk assessments, protecting ecosystems, improving agricultural methods, managing water resources, building settlements in safe zones, developing early warning systems, instituting better building designs, improving insurance coverage and developing social safety nets. These measures are intrinsically linked to sustainable development, as they reduce the risk to lives and livelihoods and increase the resilience of communities to all hazards.³¹

DRR looks at both natural and man-made hazards with some direct and short time response and prevention, while CCA involves planning for a long-term approach of building the resilience to the climate impacts. There is significant similarity between DRR and CCA at the level of implementation in the field but CCA is a new approach in the adjustments of measures to build the capacity of communities or countries to the impacts of the climate variability in the long-term. The Hyogo Framework for Action (HFA) recognizes the need to integrate 'existing climate variability and future climate change into strategies for the reduction of disaster risk and adaptation to climate change..³² The HFA, UNISDR and DRR regional and national platforms have made commendable progress in advancing DRR in countries. CCA needs more engagement of decision makers in terms of policies, funds and scientific research which bring an added value in DRR by identifying areas vulnerable to disasters and planning for response to, prevention and mitigation of the potentials risks. "For instance, models of expected sea-level rise in urban coastal areas can enable city planners to identify vulnerable areas and act accordingly in order to reduce emerging and future risks".³³

DRR and CCA are complementary approaches and have a cumulative effect, reinforcing each other in building resilience and the capacity to cope with adverse and changing conditions. Improved knowledge on the linkages between extreme weather events and climate change is needed and can facilitate strategies to reduce vulnerability. The DRR

³⁰ UNISDR. (2004). Terminology: *Basic Terms of Disaster Risk Reduction*. United Nations International Strategy for Disaster Reduction. UNISDR: Geneva.

³¹ UNISDR. (2008). *Briefing Note: Climate Change and Disaster Risk Reduction*. United Nations International Strategy for Disaster Reduction UNISDR: Geneva.

³² ISDR. (2007). *Hyogo Framework for Action 2005-2015: building the resilience of nations and communities for disasters*. Geneva, UN ISDR.

³³ IOM. (2010). *Disaster risk reduction, climate change adaptation and environmental migration A policy perspective*. Geneva, International Organization for Migration. Available at: http://publications.iom.int/bookstore/free/DDR_CCA_report.pdf. Accessed on: 19 March 2013. .

and CCA should be brought into the development agenda, dialogues and resourcing in relation to other development subjects.

2.0 Existing Mechanisms, Comparative Tools and Case Studies

2.1 Existing policies and mechanisms on disaster risk reduction and climate change adaptation in West Africa

2.1.1 Mechanism on DRR and CCA at Local level

Governance in most West African countries is decentralized, whereby there are authorities at local level. Such decentralization ideally allows for a level of autonomy (power sharing, financial budget) at the local level. The policies and bye-laws developed and applied at the local level are guided by national policies, strategies and legislation, and in a federal structure also by state policies and legislation. The local level of government is significant as it is the one closest to the people and should be more reflective of their realities and aspirations and more responsive to their needs. In some parts of West Africa however, local administration is beleaguered by severe lack of capacity to deliver development to the people.

In Nigeria for instance,³⁴ while all levels of government share powers in environmental protection and health regulation; lack of capacity and poor governance by some local governments means that the state administration takes over such functions to fill in the gap.³⁵ Meteorology is a matter on the Exclusive Legislative List, which means that only the federal government can legislate on and control that sector. Agricultural development is on the Concurrent Legislative List, which means that both the federal and the state levels can create institutions and projects for agricultural development. DRR and CCA are a different case altogether as relevant treaties are yet to be domesticated, national and state policies are just being developed and related competences or responsibilities are yet to trickle down to the local level. From time to time, local authorities bring their support to the people and communities affected by disasters, but there are as yet no clearly defined strategies for longer term DRR and CCA at that level. National policies and strategies should be well harmonized to the local authorities so that DRR and CCA can be clearly emphasized in the community (municipality) development plans and the communities sensitized about the disasters and climate effects.

Faced with various risks associated with disaster and climate variability, communities of the West African region have over time developed coping strategies. In the Sahel countries, these coping strategies include those relating to the fight against degradation of agricultural land and management of soil fertility, locust infestation, gully erosion, floods and others climate change impacts.³⁶ Farmers recover land through the construction of structures such as half-moons or *Zais* and the stone contour bunds to retain runoff and increase soil productivity.³⁷ Some of these methods are widespread in the Sahel and these techniques enable farmers to collect rain water, to maintain the humidity of the soil and to increase food crop yield and fodder for grazing. Farmers rely on these techniques each year in the degraded land to address climate variability particularly low rainfall. Many farmers have become agro-pastoralists combining agriculture and animal husbandry and this new strategy allows farmers to adapt to changing circumstances. In fact, this combination of activities allows farmers to use crop residues for animal feed and to use animal droppings to fertilise crops, to diversify their sources of revenue by selling animals during food scarcity so as to buy food. This adaptation mechanism has the advantage of bringing farmers and ranchers to reduce rural conflicts. During droughts, herders also sell

³⁴ Nigeria is a federation with three levels of government: federal, state and local.

³⁵ In Anambra State for instance, these functions have not been fulfilled by the local governments and have been taken over by the state government for the past ten years. Presently the state government has contracted out its environmental management and sanitation role to a foreign company for similar reasons of lack of capacity to deliver on development and poor governance.

³⁶ Local adaptation practices; Dr Hubert N'DJAFI OUGA, Regional Centre AGRHYMET, special newsletter

³⁷ Zai these are small reservoirs dug out in the ground and enriched with organic fertilizer, then covered with a thin layer of soil

vulnerable animals to reduce losses and buy feed for the remaining animals. In the case of disasters such as floods, people relocate temporarily from the area and are helped to settle by their neighbours, relatives, government or international organizations and NGOs.³⁸

2.1.2 Mechanism on DRR and CCA at National level

The main stakeholders involved in DRR and CCA at national level are the national government and its MDAs, nongovernmental organisations, development partners, the scientific community, the civil society and private sector. The local authorities and communities need to be integrated as stakeholders in the whole process of DRR and CCA.

At the national level, all the West African countries have ratified and signed the UNFCCC and the Kyoto Protocol and are committed to contribute to reduce the emission of greenhouse gases at a level that would prevent dangerous effects on the climate such as depletion of the ozone layer.³⁹ Also, some technical committees on climate change and variability have been formed and parliamentary committees on the environment generally deal with CCA and DRR issues.⁴⁰

National Adaptation Plans of Action on Climate Change (NAPA) enable Least Developed Countries to identify priority activities that reflect their urgent and immediate needs to adapt to climate change. The main objective is to identify a ranked list of priority adaptation activities and profiles of projects designed to facilitate the development of proposals for the implementation of NAPA. In West Africa, 14 countries have developed a NAPA: Benin, Burkina Faso, Cape Verde, Ivory Coast, Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo.⁴¹ Many projects have been developed from the NAPAs in collaboration with UNDP to enhance the adaptation practices of communities and also to build resilience to the impacts of climate change. The

³⁸ FAO. (2011) *Disaster risk management strategy in West Africa and the Sahel* (2011-2013).

³⁹ UNFCCC. (1990). *United Nations Framework Convention on Climate Change*. United Nations Framework Convention on Climate Change [Bonn, Germany], UNFCCC. <http://www.unfccc.de>.

⁴⁰ De Vit, C. and Parry, J. (2011) Review of current and planned adaptation action: West Africa. November 2011. International Institute for Sustainable Development.

⁴¹ FAO. (2011). *Disaster risk management strategy in West Africa and the Sahel* FAO (2011-2013).

projects focus mainly on sustainable development and vulnerability issues of developing countries by funding studies and research, training and technical support to tertiary institutions, stakeholders such decision makers, civil society, media to enhance the scientific understanding of vulnerabilities and adaptation and promotion of information sharing.⁴²

Several countries have put in place early warning systems and disaster management bodies but there is a weak preparedness and responses to climate disasters by these bodies mainly due to lacks of sufficient operationalization and funds. Some countries such as Senegal have recently started to established national emergency funds to respond to disasters and Nigeria established the National Emergency Management Agency (NEMA) in 2000 to manage disaster in the country. In addition, there is a bill before the National Assembly to amend the NEMA Act, to provide for an integrated and coordinated disaster management policy, DRR, ensure emergency preparedness, rapid response and post-disaster recovery. Interestingly, one of the proposed new paragraphs in the bill include: “ensuring that both communities and local authorities are empowered to manage and reduce disaster risk by having access to the necessary information, resources and authority to implement actions for disaster risk reduction”. The President of Nigeria may issue a proclamation of a state of emergency in any part of the federation when “there is an occurrence or imminent danger, or the occurrence of any disaster or natural calamity, affecting the community or a section of the community in the Federation.”⁴³

The new national policies for the promotion of improved stoves and renewable energy, cooking gas and participatory management of natural resources, are also forms of adaptation that are developed in parallel with traditional methods for harvesting fuel wood, the main source of energy in the Sahel.⁴⁴ The lack or limited access to detailed, reliable and updated data and information remains a challenge in many countries in West Africa in analysis of risk and vulnerability. This lack of relevant data hinders proper analysis of the situation on the ground and the development of risk and vulnerability maps, as well as the design of rapid, targeted and effective response interventions.

⁴² De Vit, C. and Parry, J. (2011) *Review of current and planned adaptation action:*

⁴⁴ [Ibid.](#)

Many countries in West Africa such as Niger, Nigeria, Ghana, Burkina, Mali and recently Benin have early warning systems (EWS) which monitor agricultural production, drought and floods.⁴⁵ These systems are essential for monitoring and assessing risks and warning of potential crises. However, at the national level, where EWS exists, they often tend to prioritize the analysis of food supply at the expense of accessibility and food utilization based on the livelihoods of households. Thus, at the Community level, households rarely have access to EWS that integrate their traditional knowledge.⁴⁶

A number of leading national and local NGOs in West Africa are involved in the implementation of internationally funded projects that aim to address various climate change issues, including adaptation. The mission of these NGOs consists mainly of contributing to development and environmental preservation through capacity building and awareness-raising activities.⁴⁷ These groups appear to be acting independently of one another, although some are members of broader networks, such as the Climate Action Network.

2.1.3 Mechanism of DRR and CCA at Regional level.

Despite the significant impact of disasters on West Africa's core development sectors such as agriculture, energy, health, infrastructure, education, as well as environment, DRR has been inadequately integrated into development policies and strategies in the region.⁴⁸ The consequence is that every disaster occurrence results in enormous set back on food security, economic growth, poverty reduction and overall progress towards sustainable development. There is a clear connection between DRR and the achievement of the Millennium Development Goals (MDGs). It has become increasingly apparent that disasters are among the major factors holding back progress towards achieving the MDGs in Africa.

⁴⁵ Grünewald, F and Paul, J. (2012). *From early warning to reinforcing resilience: Lessons learned from the 2011-2012 Sahel response*. [Online]. Dakar. A report for the IASC Principles. 26 November 2012. Available at: <http://bit.ly/15q2ihp>. Accessed on: 26 March 2013.

⁴⁶ FAO, (2011), *Strategie de gestion des risques des catastrophe en Afrique de l'Ouest et au Sahel(2011-2013)*

⁴⁷ De Vit, C. and Parry, J. (2011) *Review of current and planned adaptation action*.

⁴⁸ Pelling, M., & Wisner, B. (2009). *Disaster risk reduction: cases from urban Africa*. London, Earthscan.

The ECOWAS Commission has made substantial progress in implementation of the Hyogo Framework for Action (2005-2015), the Africa Regional Strategy for Disaster Reduction as well as the ECOWAS Policy for Disaster Risk Reduction which was adopted by the Heads of State of ECOWAS at a summit held in Ouagadougou in 2007.⁴⁹ The DRR Policy is complemented by an Action Plan which is being implemented.⁵⁰ The objectives of the DRR Policy include: to provide an inter-governmental framework for collaboration and partnership for ECOWAS Member States in Disaster Risk Management; promote integration of DRR into ECOWAS Member States National Development Policies, Plans and Programmes; facilitate ECOWAS Member States to develop and strengthen institutions, mechanisms and capacities for building resilience to hazards; promote incorporation of risk approaches in emergency preparedness, rehabilitation and recovery programmes of ECOWAS Member States; enhance the contribution of disaster reduction to peace security and sustainable development of the sub region.⁵¹

A strategic framework (2012-2015) has been developed to enhance the implementation of the ECOWAS Regional Policy and Plan of Action for DRR and to seek funding from development partners. Some of the constraints related to the implementation of the ECOWAS DRR Policy and Plan of Action include insufficient financial resources and human capacity,⁵² lack of political will from the decisions makers and political instability in parts of West Africa.⁵³ Others constraints are the insufficient collaboration between some relevant directorates such as Humanitarian and Social Affairs and Early Warning though there is a committee put in place for crosscutting issues.

Also, ECOWAS, in collaboration with Member States, has established and strengthened national platforms for DRR, which comprise relevant MDAs, civil society groups, the private sector and others stakeholders. National platforms are multi-sectoral and interdisciplinary in nature, with the responsibility for policy guidance and coordinating DRR activities and programmes in the country. The objectives of the national platforms are to

⁴⁹ ISDR. (2007). *Hyogo Framework for Action 2005-2015: building the resilience of nations and communities for disasters*. ; DHA. (2006) ECOWAS Policy For Disaster Risk Reduction.[Online] Humanitarian Affairs Department: Available at: http://www.preventionweb.net/files/26398_4037ecowaspolicydrr1.pdf . Accessed on 25 March 2013.

⁵⁰ Ibrahim, M. ECOWAS DRR Strategy and Programme of Action.[Online] *DRR Risk Assessment Training Workshop*. November 2009. Dakar, Senegal. Available at: <http://bit.ly/12gL93T>. Accessed on 23 March 2013.

⁵¹ DHA. (2006) *ECOWAS Policy For Disaster Risk Reduction*

⁵² As at the time of writing, ECOWAS has only one DRR officer (Head of DRR Division) who is mandated to drive implementation of the Plan of Action and to cover the 15 Member States as well as collaborate with several partners.

⁵³ DHA. (2006) *ECOWAS Policy For Disaster Risk Reduction*.

have the National commitments for DRR strengthened using the ECOWAS and ISDR mechanisms and the Hyogo Framework Action.⁵⁴

In collaboration with relevant sub-regional partners and institutions, specifically the West African Economic Monetary Union (WAEMU), Permanent Inter-State Committee for Drought Control in the Sahel (CILSS), United Nation Economic Commission for Africa (UNECA), African Centre of Meteorological Applications for Development (ACMAD), the ECOWAS Commission set out to implement the recommendations of the International Conference on the Reduction of Vulnerability to Climate Change held in January 2007 in Ouagadougou, Burkina Faso and the Ministerial Dialogue on Climate Change held in November 2008 in Cotonou, Benin Republic. Subsequently, a Programme of Action for Adaptation to Climate Change Vulnerability in West Africa has been developed.⁵⁵ Priorities of this Programme of Action include adopting and implementing CCA programmes that will promote sustainable development, in particular poverty reduction, and contribute to the achievement of the MDGs. The overall objective is “to develop and strengthen the resilience and adaptability of the sub-region to climate change and extreme weather events”.⁵⁶ These projects enhance the adaptation capacity of the populations and also raise their awareness to the related impacts of climate change.

At the forefront of the development of the region, ECOWAS is a preferred partner of major international institutions are already supporting several countries in the region to integrate climate change into national policies and strategies, and at the community level through Communal Development Plans and integrating vulnerability to climate effects in maps of communal resources.⁵⁷

2.2 Case studies on vulnerability mapping

This section examines the importance of mapping the vulnerability of communities in the context of West Africa. Important factors that characterize this region include the process

⁵⁴ ISDR. (2007). *Hyogo Framework for Action 2005-2015*:

⁵⁵ ECOWAS. (2008) *ECOWAS environmental policy*. [Online] Environmental Directorate. Abuja: Nigeria. Available at: <http://bit.ly/13iu37Z>. Accessed on: 23 March 2013.

⁵⁶ Niasse, M., Afouda, A., & Amani, A. (2004). *Reducing West Africa's vulnerability to climate impacts on water resources, wetlands, and desertification: elements for a regional strategy for preparedness and adaption*. (Eds.) Gland, Switzerland, IUCN--the World Conservation Union.

⁵⁷ ECOWAS. (2008) *ECOWAS environmental policy*.

of democratization and decentralization and the promotion of development at community level. The examination is based on case studies of vulnerability mapping of the district of Buzi in Mozambique, and the country study of Ghana conducted by DARA.⁵⁸

The choice of the case of Buzi community is guided by the threats concerned in the study particularly floods, drought, and pests which are most characteristic of the threats faced by communities in the West African region⁵⁹. In the context of risk reduction and disaster management and adaptation to climate change, access to information at all levels is one of the most important challenges. This is especially as local people are able to use their own knowledge in planning adaptation to climate change. Issues of vulnerability must involve exchange of information, knowledge and learning between and among national governments, regional authorities, development agencies and vulnerable communities. The capacity of all stakeholders must be strengthened for effective collaboration in terms of reducing risks and adaptation. This section of the paper considers how the vulnerability mapping done in the cases below could enhance DRR and CCA in West Africa particularly in relation to floods, and food insecurity or scarcity which are widespread in communities in the region.

2.2.1 Mapping the vulnerability of communities, The case of Buzi, Mozambique

The study was conducted in the District of Búzi which is located along the river Búzi in the southern part of the province of Sofala, Central Mozambique and shares coastline with the Indian Ocean. Common natural disasters in Búzi include droughts, floods and cyclones.⁶⁰ Earthquakes also occur but usually they do not lead to disasters. Erosion and uncontrolled fire are human-triggered or mankind accelerated disasters which are increasingly becoming a problem in the area.⁶¹ Nine communities of the district of Buzi were assessed in 2002 through the support of the local centre for Geo-information at the Catholic University of Mozambique. The project had the objective of establishing and enhancing DRR at the community level. The principal hazards covered in the study are floods,

⁵⁸ Dara, & Climate Vulnerable Forum. (2012). *Climate vulnerability monitor: a guide to the cold calculus of a hot planet*. [Madrid], DARA.

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ Kienberger, S (2007) *Assessing the vulnerability to natural hazards on the provincial/community level in Mozambique: the contribution of GIs science and remote sensing*, Joint CIG/ISPRS conference on geomatics for disaster and risk management, Toronto, Canada

erosion, drought, uncontrolled fire and cyclones with some additional hazards such as pests and, epidemics. The Participative Geographic Information (PGIS) practices are applied to the same local population through disaster risk committees. Data are collected (social and economical) through the revision of the administrative documentation and interviews and detailed mapping of the community area was carried out with the Global Position system (GPS) and the topographic base maps.

The methods of the participative Rural Appraisal toolbox were used and modified to address the specific issues around the hazard risks and analysis and to facilitate the reduction of vulnerabilities at local level.⁶² The methodology adopted was based in targeting different levels of decision making (community, district, and national, international) in which the risk and vulnerability related mapping of communities needs are integrated. Both social and economical base data were collected and the detailed maps produced include significant infrastructure (public buildings, roads, access to drinking water, bridges). Both the data used and maps were discussed through a participatory workshop gathering both the populations and local authorities.

A list of vulnerability indicators suitable for the specific Mozambican case was developed to set priorities for community plans as well as for disaster preparedness activities. Physical, socio-cultural, economic, and institutional vulnerability indicators were aggregated to gauge overall vulnerability. The outcomes serve as a basis for identifying programme focuses and needs for each community and community maps were produced. The maps were also key outputs of the assessment as up-to-date spatial data had been lacking for Mozambique.⁶³”The following conclusions and were drawn from the study: Vulnerability clearly focuses on a policy level and has to be addressed to decision makers in different contexts. Following this, the information/outcomes of the vulnerability mapping has to be presented in an understandable format. The identification of hazard vulnerability units and their spatial representation can be suitable to fulfil these requirements. Participatory methods and especially PGIS methods seem to be well suited to vulnerability assessment at the local level in a developing country.”

⁶² Ibid.

⁶³ Ibid.

2.2.2 Building resilience in communities in Ghana: the work of DARA

The Risk Reduction Index (RRI) is a tool developed by DARA for carrying out vulnerability assessment in clusters of areas referred to as Representative Territorial Units (RTU).⁶⁴ Assessments based on the RRI are carried out within geographically well-defined, risk-prone areas and provide in-depth analysis of existing conditions and capacities that either prevent or enable local and national actors to carry out effective risk management.

Another tool developed by DARA is the Climate Vulnerability Monitor. The Climate Vulnerability Monitor assesses the climate vulnerability of the world and its regions, countries and communities. The monitor represents one possible way of measuring climate vulnerability and can provide an independent analysis to decision makers, planners and development partners.⁶⁵ The monitor's analysis is built around four climate impact areas (health impact, weather disaster, habitat loss and economic stress) and five levels or factors of vulnerability (Acute which is the most vulnerable category, severe, high, moderate and low) and two points of time (2010 and 2030).

The health impacts considered are: climate sensitive disease rates, including for malnutrition, diarrheal infections, malaria and other key diseases. The weather disasters effects considered are floods, tropical and extra-tropical storms, and slides and wildfires. The habitat loss effects are desertification and sea-level rise while the economic stress effects considered include agricultural (land-based and fisheries), water/natural resources/biodiversity. In Ghana, three separate geographical areas or RTUs were assessed: Northern Ghana (Bolgatanga), East Coast and Accra metropolis.

The overview of the climate assessments conducted show a high rate of vulnerability of the population and socio economic activities. In addition to rise in temperature, floods, wind and rain storms, as well as changes in the pattern of rainfall have become serious climate-related concerns for Ghana today (Environmental Protection Agency, Ghana, 2011). From a study by DARA and the Climate Vulnerable Forum ,there are also a high number of deaths related to climate change and this is projected to decline by 2030 due to

⁶⁴Dara, & Climate Vulnerable Forum. (2012). *Climate vulnerability monitor*:

⁶⁵ DARA. *Climate Vulnerability Monitor 2010: The State of the Climate Crisis*. København: DARA- Climate Vulnerable Forum.

economic growth and improved health care. While mortality rates are not alarmingly high, more than 1 million people are estimated to be affected with diarrheal diseases on average each year due to the impact of climate change, and over 400,000 people suffer from hunger. Flooding is also a major concern both for rural and urban areas and especially in the East Coast and Accra regions, while desertification is estimated to have already affected 75,000 people in Ghana which could increase to 200,000 people at risk by the year 2030.⁶⁶

2.3 Discussion and analyses of the cases

The lack of accurate data and the use of GIS system at level the community appear to be a big challenge for vulnerability mapping in Mozambique.⁶⁷ The people involved in the vulnerability mapping had to be trained in the use of technological devices such GPS and GIS system. The illiteracy rate in some areas limited the participation of a large part of the population. Other limitations to the DARA approach include the high cost of GIS software and technical constraints related to of the number of available GIS experts. Also lack of significant financial resources could constitute a limitation. Mapping vulnerability at the community level will not be sufficient to effectively advance CCA given some uncertainties related of climate scenarios at local level.

The participatory vulnerability assessment and mapping have raised the awareness of local communities to climate change risks and enhanced adaptive capacity in the area. The methods of mapping vulnerability constitute a useful means of sharing information relating to risk at the local level and have also helped the scientific community through integration of local knowledge in CCA. Stakeholders in DRR and CCA including decision makers, land use planners, scientists and the local population (farmers, fishermen, herders, small businesses), whose livelihoods depend on climate-sensitive activities, use the maps generated during assessments to plan for and mitigate the effect of the risks identified in their area. The vulnerability maps are also used in the planning of land use and in emergency response after disaster. Community vulnerability mapping would enhance the efforts of governments, developments partners and NGOs in building

⁶⁶ Dara, & Climate Vulnerable Forum. (2012). *Climate vulnerability monitor*.

⁶⁷ Ibid.

communities resilient to climate threats (floods, food shortage) which affect the region each year.

DARA's assessment in Ghana reveals a lack of government policies specifically designed for CCA. In particular, at the community level, district development plans viewed did not account for the additional stress resulting from climate change, nor did such plans contain climate change-specific response considerations, whether to reduce carbon intensity or to address climate impacts.⁶⁸ Another challenge concerned the coordination of the Ghana National Climate Change Committee which involves a dozen government entities, and this lead to the fragmentation of national efforts in addressing climate change. The National workshop organised as part of the study shows that several others parts of the country are faced with climate stress but the relative stability of the country coupled with support of the international community places Ghana on a good stead in tackling the impacts of climate change.⁶⁹ The data collated through the RRI could be set in map to give an overview of the climate vulnerability of the RTU assessed with an exact location of the areas or localities prone to the risk within the RTU.

⁶⁸ Ibid.

⁶⁹ Mitchell, T., Van Aalst, M., & Villanueva, P. S. (2010). *Assessing progress on integrating disaster risk reduction and climate change adaptation in development processes*. Brighton, UK, University of Sussex Institute, Development Studies, Strengthening Climate Resilience.

3.0 Challenges and Opportunities for Community Vulnerability Mapping

3.1 Financial challenges

One of the main constraints in mapping the vulnerability of communities to disasters and climate change at the national level is inadequate financial resources. Although glamorised in official speeches, DRR and CCA often receive insufficient funds in the annual budget of the countries. There is also insufficient funding of the few institutions of research by the governments; many of the institutions are funded by external partners.⁷⁰ The sheer number of municipalities, districts or local government areas in a country,⁷¹ is also a challenge in terms of conducting detailed vulnerability mapping across the whole country. However, a useful strategy is to begin with areas *prima facie* prone to high or regular incidence of hazard events and severe hydro-climatic events.

⁷⁰ The National Emergency Management Authority (NEMA) of Nigeria is an exception. NEMA supports six research centres of excellence on disaster risk management in Nigerian Universities to the tune of USD100, 000 per centre per annum.

⁷¹ For instance 266 in Niger Republic and up to 900 in Nigeria.

3.2 Capacity challenge

Another significant challenge concerning DRR and CCA in the region is the shortage of expertise and technical equipment for forecasting the risk of disasters and monitoring climate variability. Detailed meteorological data are lacking due to insufficient numbers of synoptic stations in the region, which makes information on climate change difficult on a small scale. Building the technical capacity of these stations and their personnel requires financial resources and time, cutting edge equipment and training for the control of technological tools used in the development of the vulnerability maps with GIS. . There's a need for capacity building for the stakeholders in climate change including decision makers, planners, analysts and GIS officers in MDAs, meteorological offices, and local communities.

3.3 Policy development, coordination and mainstreaming challenge

Despite their acknowledged role in the achievement of the MDGs, DRR and CCA are only mainstreamed into the policies and strategies in few West African countries. Often, there are many structures and institutions dealing with climate change issues at different levels in a country which creates a challenge in harmonizing policies and strategies and coordinating activities in the field. Meetings of some national platforms and committees mandated with coordination by the governments are often irregular, affecting information sharing and exchange of experience between the members and with other stakeholders. For example, in Nigeria," the National Platform has not been active, as it met the last time in 2010".⁷²

3.4 Communication and participation challenge

Communication on the impacts of climate change and need for adaptation is also a big challenge for the countries of the region because of the level of illiteracy and poor access to medias by the population.⁷³ Article 6 of the UNFCCC provides for the facilitation of access of the public to information regarding climate change and its effects, and also

⁷² Dia A.M, Wernerman, J.Grigoryan, A. Becchi, G. & Jung, C. (2012) *National capacity assessment report federal Republic of Nigeria part 1: Disaster risk reduction capacity assessment*. June 2012 Available at: <http://bit.ly/YF5DGg>. Accessed on: 14 March 2013.

⁷³ ISDR. (2007). *Hyogo Framework for Action 2005-2015*.

encourages the participation of the population in the assessment and setting the adaptation measures to face these effects among its recommendations.⁷⁴

Conducted in a participatory manner between communities, government and the scientific community, mapping the vulnerability of communities will create local communities anticipation in the prevention of disaster risk and adaptation to climate change.⁷⁵ Planning of development activities in the community will be in consultation between local communities, local elected officials, technical services of the state and administrative authorities from the vulnerability map of the commune with all risk areas. From these maps, the municipalities will have the management plans and subdivisions, and the already warned communities in the development of the vulnerability map will avoid build on areas of flood risk.⁷⁶ The mapping process should be coordinated by the technical services while the planning process under the local authorities.

Adaptation measures to a specific risk and/or hazard area can be identified and local committees of management of risks and disasters related to climate change can be created. These committees will be under the national systems of early warning and disaster management which will provide them the necessary support for capacity building (training, emergency equipment, etc.).

3.5 Participation and strategic leadership opportunity

In West Africa today, most development partners provide support to governments in the context of sustainable development through projects directly financed at the local level, carried out by international organizations or local NGOs. The goal is always effective involvement of local communities in order to guarantee the success of activities undertaken and build resilience of communities to the various problems they face.⁷⁷ The number of the NGOs funded by the international agencies and development partners increase in the field and these NGOs are carrying out the activities based on communal

⁷⁴ UNFCCC. (1990). *United Nations Framework Convention on Climate Change*.

⁷⁵ Ericksen, P, (2011). *Mapping hotspots of climate change and food insecurity in the global tropics*

⁷⁶ Ibid.

⁷⁷ Nyong, A., Adesina, F., & Osman Elasha, B. (2007). The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel. *Mitigation and Adaptation Strategies for Global Change*. 12, 787-797. Also see, Agrawal A. (2010). Local institutions and adaptation to local change. In. Mearns, R., & Norton, A. *Social dimensions of climate change: equity and vulnerability in a warming world*. Washington, DC, World Bank. Pp.173-198.

development plan or government programme. But these plans do not include for the most part the concepts of disaster management, DRR and CCA which are now some of the most significant obstacles to sustainable development.

The region provides innumerable opportunities for conducting of community vulnerability mapping. For this reason, various technical partners have carried out or are carrying assessments using different tools and standards and this need the participation of the local population, a strategic leadership and a priority setting by governments and government institutions. Decentralisation of administrative units means a transfer of some degree of responsibility in the management of the local environment, resources, and land use. Local authorities are closest to the people who are the repository of local knowledge and understand their own context and felt needs more than any external partner can hope for. The local authorities with the help of the some development partners could bring innovations in the collaboration of the populations in the development agenda through the participation in decision making.

3.6 Improved anticipation and adaptation opportunity

The drive for national strategic documents (NAPA) in most states in West Africa created a corresponding need for vulnerability mapping and has already enabled assessments in areas vulnerable to climates effects. The results of such mapping and assessments are handy tools in integrating DRR and CCA into planning to enable better anticipation, adaptation and preparedness. In some countries such as Niger Republic and Benin, the institutions responsible for CCA and disaster management are in the process of reviewing existing policies, training and sensitization of policy makers, parliamentarians, private sector actors, community-based organisations and the media.⁷⁸ Vulnerability mapping is now a concern of not only national governments but also state and local governments which are closer to the communities and therefore appreciate the need for and the value of anticipation and preparedness. The support of development partners and scientific institutions is essential in the context of better anticipation and adaptation. Geographic Information System (GIS) provide a powerful tool to predict impact while also anticipating

⁷⁸ Olhoff, A. (2011). *Opportunities for integrating CCA and DRR in development planning and decision-making. examples from sub-Saharan Africa*. Background Paper prepared for the 2011 Global Assessment Report on Disaster Risk Reduction. Geneva, Switzerland: UNISDR.

local needs before, during and after disaster pin-pointing risk and relating it existing neighbourhood resources.⁷⁹

3.7 Education and sensitisation

The vulnerability map is a tool for raising awareness of local populations to the different risks in their area and the risk factors, and can inform better response in the face of disasters.⁸⁰ Mapping the vulnerability of the communities during the development of the municipality plan is an opportunity of sensitization since it gathers the technical services, the local populations, the counsellors, the mayors local authorities and others stakeholders.⁸¹ Communities are engaged in addressing the development challenges as they participate in the diagnosis of their vulnerabilities. As they become more familiar with their environment they can provide more information on risk areas that can facilitate the planning on the mitigation of these risks. Adaptation measures used by local populations to climate change and natural disasters will also be observed through this participatory exercise.⁸² The resilience of the local populations to the climate hazards identified will be enhanced. The vulnerability map is an educational tool also in the sense that the local populations could identify areas prone to disasters and place them on a map. It generates greater awareness of the dangers to populations that are often ignored.

Vulnerability to natural hazards such as floods is better perceived by local communities when the entire geographical area of the watershed of a stream is shown. This is also the case when the vulnerability to food crisis is connected to the nature of the soil or insufficient stocks of food in the area. Mapping the community vulnerability is thus an important tool for an emergency response to a natural disaster. The topography of an affected area is very important for a response team in case of a disaster. Even some conflicts related to resource use such as grazing areas (farmers / breeders) can be avoided through the mapping of the area which determines not only the boundaries of the community but also areas for breeders, crossing corridors of animals to the rivers.

⁷⁹ Morrow, B. H. (1999). Identifying and mapping community vulnerability. *Disasters*.

⁸⁰ Ibid.

⁸¹ Ibid.

⁸² Agrawal A. (2010). *Local institutions and adaptation to local change*.

3.8 Collaboration and cooperation opportunity

The results of the mapping exercise usually provide a basis for multi-stakeholder engagement in building the resilience of communities against identified and prioritised risks and hazards. The maps can also help development partners to identify, prioritise and harmonise areas of intervention in the context of their development support. This in turn leads to better coherence in planning and efficiency in delivery. Validated maps could become a point of convergence for stakeholders to leverage on their various competencies and pool resources to scale up intervention efforts for greater success. CVM generates well-structured information, disaggregated data and graphical maps which are useful in developing strategies and plans. The good news is not only that the results of CVM could and do feed into national strategies and plans, but focusing vulnerability mapping to the community level also means that, phased over the medium term, a country could have a whole and detailed picture of the vulnerabilities of its numerous parts to enable both micro-planning and macro-planning, resource allocation and preparedness.

The experience and outcomes of DARA in Ghana and HFP in Senegal can be shared with other ECOWAS Member States. Also other partners such as World Food Programme (WFP), the World Bank, UNDP and OCHA are working in the region to support the mapping of vulnerability of communities to hazards and climate effects such as floods, drought, desertification, food scarcity, health and economic impacts.

4.0 Conclusion

4.1 Planning from the future

CVM helps to anticipate results of the interaction of hazards, risks and resilience in different contexts, and to elaborate adaptation, risk reduction and management measures so as to enable communities prepare better. Planning and action informed by effective CVM help to protect human lives, property, , businesses and livelihoods, micro and macro-economies, the natural and built environment; it thereby contributes to sustainable development. CVM is a useful tool which helps to identify the causes of disasters such as floods, the area prone to the disaster, and to disseminate the results to different segments of the public. In terms of food insecurity (which is presently a major challenge in the Sahel region), mapping areas prone to desertification and drought and using the results and outcomes of the mapping to inform policy, planning and implementation will help in building resilience.

At the community level the vulnerability map is also a means of education on as well as planning and prioritizing of, adaptive action and intervention by various stakeholders in building resilience to the various risks which they face now and in the future. As such, CVM helps to communicate the risks of disasters, to anticipate the actions necessary for mitigation and adaptation, and creates a rallying point for collaboration among technical departments, authorities, local communities and development partners. Although beneficial, conducting vulnerability maps at the community level is very difficult in the region given challenging geophysical terrain in some areas and the variety of vulnerabilities often interacting in a particular community, substantial financial resources required, scarcity of reliable data on meteorology and the expertise required for the use of

technological tools. The use of GIS is still underdeveloped in development programs in the region because of its high cost and technical nature.

4.2 Outcomes of the research

The CVM is a good tool for raising the awareness on disaster for the communities, local and national decision makers. It highlights the types of the disasters affecting the community and also their capacity in terms of resource and preparedness to manage these. The vulnerability maps produced by the EWS in some countries tend to focus on particular vulnerabilities in isolation. However, there are several drivers of vulnerability (including socio-economic conditions, environment and natural resources, land use and built environment, governance) and the interaction of different vulnerabilities suggest that vulnerability mapping should be comprehensive in order to inform robust policies and action. The focus on the “community” level in vulnerability mapping is not widespread in the region but the work being done by some development institutions such as DARA, HFP and UNDP in collaboration with national and local authorities could help in developing it.

For vulnerability assessments to be complete, they have to be harmonised and strengthened at the regional, national, state and local levels so as to better identify areas of convergence and overlap, prioritise areas of most need, leverage on competences of various stakeholders, pool resources and coordinate efforts more effectively.

The work of DARA in Ghana revealed shortcomings in the areas of leadership, priorities and multiple actions in climate change policy and studied vulnerability to climate change in the Volta Delta (Costal area) and Bolgatanga-Bongo -Navrongo (Northern area). The results of the RRI could be put into map to give a better snapshot of the area disasters threats and the study could expanded to others members States of the region.

4.3 Recommendations

To improve vulnerability mapping in the region, stakeholders must seek more efficient ways to identify vulnerabilities, anticipate and prepare for futures risks and impacts while breaking old habits which consist of playing fire-fighters after disasters have struck. The focus on the community level and involvement of local communities is essential in CVM

especially in the context of a sustainable development. The community's vulnerability to climate change effects should be assessed and the populations should be well informed about the risks and adaptation measures.

4.3.1 Communities

- Communities should participate in CVM to improve their access to information and technology,
- Communities should increase their capacity through the collaboration with the scientific in identifying the risk areas,.
- To benefit from the CVM, local populations should organises themselves to put in place a disaster committee for the sensitization and awareness of the community to the disasters risks identified during the map processing.

4.3.2 Members States

Member states have the primary responsibility to protect their citizens and territory from harm, including the responsibility to prevent. In a loose sense, this covers protection from disaster risks and the effects of climate change.

- National policies and strategies should be reviewed to integrated DRR and CCA at all level,
- Hydro meteorological and geographical data should be publicly available for their use by the communities and development partners in mapping the vulnerability at the community level.
- EWS and platforms must support the CVM to increase the capacity of the disaster reduction, prevention and emergency response vulnerabilities.
- Governments should encouraged the cooperation in the areas of CCA and DRR among national institutions, international organizations, NGOs (local and international) to build capacity and resilience to climate change.

4.3.3 ECOWAS

- In order to realize the vision of disaster reduction under the ECOWAS Vision 2020 document: “To create a region with resilient countries and communities”, and the overall vision of “ECOWAS of the peoples”, the following action points are recommended. The ECOWAS Commission should: Support assessment and mapping of vulnerabilities in communities within the Member States in order to set the development priorities and meet the Millennium Development Goals;
- Develop a map of the vulnerability of communities in the region to important disasters such as flood, drought, desertification, conflict and political instability;
- ECOWAS Commission should play a significant role to play in enabling CVM in its Member States including: advocating for the ratification and domestication of relevant conventions on DRR and CVM, supporting the articulation and implementation of strategies and programmes, harmonising regional strategies with national and local strategies, promoting platforms for sharing of learning and experiences among states and communities; and
- ECOWAS Commission should promote a transboundary DRR programme and activities between member’s states;
- ECOWAS Commission should work in partnership with relevant UN agencies and others development institutions to mobilize adequate resources for the activities of DRR and CCA such CVM, The Directorate of Humanitarian and Social Affairs should continue the drive to create , support and monitor the work of national platforms for disaster reduction within the members States;
- The Directorate of Humanitarian and Social Affairs and Environment should support collaboration between institutions in member states and the scientific community in developing capacity for CVM; and
- The Early Warning Directorate, in conjunction with development partners, should support and facilitate the use of GIS technology in mapping vulnerability at the community level.

4.3.4 Development partners, NGOs

Development partners should support communities, local authorities, scientist, members States and ECOWAS to provide financial and technical assistance in vulnerability assessment and for the dissemination of information.