

Towards a gender sensitive vulnerability assessment for climate change: Lambani, Limpopo Province, South Africa

Jacqueline Goldin^{*1}, Cobus Botha²,
Thabiso Koatla^{*2}, Kobus Anderson^{*2},
Germaine Owen¹ and Ally Lebese^{*1}

Abstract

Women's limited access to resources and decision-making processes increases their vulnerability to impacts of climate change. Despite their own vulnerability, women are often responsible for caring for close relatives, extended families and friends during hazardous and traumatic events (whether its famine, floods, drought or forced displacements). Based on experience and knowledge it is believed that women are more vulnerable to the effects of climate change than men, primarily as they constitute the majority of the world's poor and are more dependent for their livelihood on natural resources that are threatened by climate change. The paper proposes a gender sensitive vulnerable assessment framework that is scaffolded by three key concepts: exposure, temporality and resource base. Because the study is grounded in the Capability Approach Framework it captures multi-dimensionality and intangible goods which are emotions such as fear, anger, shock or shame. It seeks to better understand the differentiated responses of men and women to climate variations and stress such as extreme heat, cold, droughts or floods in a specific site, Lambani, in the Limpopo Province of South Africa. The main aim is to understand different responses of men and women

to climate change in order to design and populate a vulnerability assessment (VA) framework. In order to do so the Capability Approach (CA) is applied as a theoretical frame with its lens on diversity and social justice. The CA thus provides an expanded notion of human well-being that taps into the emotional life of women and men in Lambani.

Key words: climate change, Capability Approach, emotions, gender, Limpopo Province, resilience, vulnerability, social justice

Hacia una evaluación de vulnerabilidad sensible al género para el cambio climático: Lambani, Provincia de Limpopo, Sudáfrica

Resumen

El acceso limitado de las mujeres a los recursos y los procesos de toma de decisiones aumenta su vulnerabilidad a los impactos del cambio climático. A pesar de su propia vulnerabilidad, las mujeres a menudo son responsables de cuidar a sus familiares cercanos, familiares extendidos y amigos durante eventos traumáticos y peligrosos (ya sea hambre, inundaciones, sequías o desplazamientos forzosos). Sobre la base

^{*1}University of the Western Cape, Department of Earth Sciences, Private Bag X17, Bellville, 7535, South Africa.

^{*2}ARC-Institute for Soil Climate and Water, Private Bag X01, Glen, 9360, South Africa

Corresponding author: Jacqueline Goldin (jaquigoldin@gmail.com)

¹Likely and Very Likely Regional Impacts on Physical, Natural and Human Systems (IPCC 2013 in Nagel 2016)

de la experiencia y el conocimiento, se cree que las mujeres son más vulnerables a los efectos del cambio climático que los hombres, principalmente porque constituyen la mayoría de las personas pobres del mundo y son más dependientes para su subsistencia en los recursos naturales que están amenazados por el cambio climático. El documento propone un marco de evaluación vulnerable sensible al género que está estructurado por tres conceptos clave: exposición, temporalidad y base de recursos. Debido a que el estudio se basa en el marco de enfoque de capacidades, captura elementos multidimensionales e intangibles que son emociones como el miedo, la ira, el shock o la vergüenza. Busca comprender mejor las respuestas diferenciadas de hombres y mujeres a las variaciones climáticas y al estrés como el calor extremo, el frío, las sequías o las inundaciones en un sitio específico, Lambani, en la provincia de Limpopo, Sudáfrica. El objetivo principal es comprender las diferentes respuestas de hombres y mujeres al cambio climático para diseñar y poblar un marco de evaluación de vulnerabilidad (AV). Para ello, el enfoque de capacidades (CA por sus cifras en inglés) se aplica como un marco teórico con su lente sobre la diversidad y la justicia social. El CA proporciona así una noción ampliada de bienestar humano que se nutre de la vida emocional de las mujeres y los hombres en Lambani.

Palabras clave: cambio climático, enfoque de capacidades, emociones, género, provincia de Limpopo, resiliencia, vulnerabilidad, justicia social.

Introduction

By 2020, between 75 and 250 million people in Africa are projected to be exposed to increased water stress; yields from rain-fed agriculture could be reduced by up to 50% in some regions by 2020; agricultural production, including access to food, may be severely compromised.¹ Women are all too often on the receiving end of the effects of increasing environmental degradation and depletion of natural resources, in part because of their involvement in, and reliance on, livelihood activities which depend

directly on the natural environment. During trying times women often care not only for themselves but also for the displaced, hungry, elderly, children, wounded and sick. Cross-national data looking at disasters suggests that women suffer higher morbidity and mortality from these events. This is not necessarily due to the event itself, but more likely gender unequal aid and post-disaster recovery processes (Neumayer & Plumper, 2007). In a study of 4600 natural disasters in 141 countries between 1981 and 2002,² researchers found that natural disasters lowered the life expectancy of women more than men, killed more women than men and/or killed women at an earlier age than men (Nagel 2016). Feminist political ecology approaches, among others, have documented the gender differentiated effects and experiences of resource use and degradation, as well as marginalization from resource related decision-making, from irrigation management to flood risk, to village-led forestry (Goldin et al, 2017; Harris, 2006; Nightingale, 2006; Sultana, 2014).

In general, it has been suggested that women remain largely absent from the climate change related decision-making processes and little has been done to date to address the existing marginalisation of women, nor their need to be integrated into environmental and climate change policy and policy making processes (Denton, 2002). Despite the blatant social dimension of climate change, the language of climate change is highly technical. There is a level of generality and gender blindness of much climate change science and even when human aspects of climate change are the subject of scientific inquiry, researchers generally fail to delve into distinctions of gender, race, class or age (Nagel 2016:79). Policy makers, researchers and development planners claim to represent the interests of the poor but use a language that is often inaccessible to poor communities.

While climate change is global in nature, its impacts are not expected to be globally homogeneous but rather differentiated across regions, generations, age classes, income groups, occupations and between

² Neumayer and Plumper 2007 writing on the impact of catastrophic events on the gender gap in life expectancy. According to Nagel (2016) they included 12 types of disasters in their study, all but two were weather or climate related

³ We take Alwang *et al.* (2001)'s definition of vulnerability which is the probability of falling below a certain threshold within a time period

women and men. The consequences of climate change are predicated to be potentially more significant for the poor in developing countries than for those living in more prosperous nations (Olmos, 2001; IPCC, 2007a; USAID, 2007a; UNDP, 2009). Africa being a home to many of the world's poorest nations, has already demonstrated its vulnerability to the effects of current climate variability (e.g. effects of events such as droughts and floods).

The social justice dimension is pertinent. In Iris Marion-Young's (2011) work on responsibility and justice the author posits that a just society would not punish failure and that it would make the opportunity to learn and develop skills that help with adaptation and well being during a life time. This is pertinent when considering vulnerability where advantage might be producing disadvantage for some — in this case for women and children. We are considering here the structural constraints and opportunities that individuals face and the choices facing individuals in relation to these constraints (2011:26). Interestingly, Neumayer and Plumper's 2007 study links gender equality to life expectancy claiming that in countries where women have more equal social and economic rights, in other words where the society is a more just one, there is less difference in life expectancy between genders during or after disasters.

Our argument is that the linkages between environmental degradation and human security require more concrete examples to better understand the pathways and effects of vulnerability³ and resilience. Women's experiences and voices are key to such an enriched understanding. For all these reasons a gendered vulnerability assessment framework (VAF) is needed which captures the narratives and voices of relatively impoverished rural women and in so doing brings the authentic experience and concerns of women around climate change to the fore. A gender sensitive vulnerability assessment is crucial as it provides the necessary framework for assessing the gender dimension of climate change. According to Babugura (2010), the concept of gender differentiated impacts is traditionally used in the context of

poverty and disaster studies to identify and address factors that constrain the development of gender responsive policies and strategies. The gender differentiated impacts in poverty and disaster studies have been attributed to gender inequalities, women's status, their activities and socio-economic vulnerabilities in general. Gender differentiated impacts in the context of climate changes are linked to differentiated vulnerabilities and their adaptive capacity (the ability to adjust to the changing climate so as to moderate potential damages, to take advantage of opportunities or to cope with the consequences). Within a social context, resilience depends on people's capabilities to adapt to internal and external shocks and stresses. This means that when change such as climate change occurs, resilience provides the mechanisms for restoration and reorganization which are critical for adaptation (Gunderson & Holling, 2002; Berkes & Folke, 2002). With appropriate resources, women and men have the ability to develop complex adaptive strategies differentiated by gender so as to build resilience to climate variability and change. Ziervogel, Cowen and Ziniades (2016) take the idea of resilience one step further and consider the way resilience can be transformative and not just adaptive in their idea of "thrivability" and anti-fragility.

Linked tightly with notions of social justice and equality, we often see women, the poor, developing nations, and other marginalized communities among those not only most affected by these changes, but also paradoxically, among those communities least engaged in decision making and the building of solutions to deal with these challenges. In many of these senses, women and the poor have limited power and influence in discussions of how to respond most effectively to environmental changes (Nelson et al., 2002). However, we do not assume that all parts of a system have the same vulnerability; subsystems and components and differentiated social units, may produce disadvantage – or advantage - and result in an experience of exposure that differs not only due to gender but also to age, disability, health, income generating activities and so forth.

⁴ There are 19 sub-villages that comprise Lambani and four sub-villages were sampled

Site of investigation

The primary focus for investigation has been on local scale impacts and local scale decision making processes in several sub-villages of Lambani. Lambani⁴ (GPS coordinates: 22°42'59.78"S; 30°50'00.01"E) is located about 60 km north east of Thohoyandou and 13 km from the Punda Maria Gate of the Kruger National Park in Limpopo province of South Africa. The village is between a small stream (northern side) and the Levuvhu River (south). The area is in the drier part of the Limpopo province and classified as semi-arid and regularly experiences droughts resulting in low or no yields. Long-term climate data of 44 years indicates that the mean annual rainfall is 588 mm and an evaporative demand of 1395 mm due to summer rainfall coupled with high temperatures resulting in an aridity index of 0.42. The highest average rainfall (115 mm) occurs in January whilst the lowest (6 mm) occurs in June and August. Piped water to the villages is irregular and taps are often dry for long periods. Villagers then have to travel long distances to collect water from the Levubhu river. Sometimes droughts are followed by severe floods. This was the situation during the 2012/13 season that is the focus of this study.

In short, Lambani is prone to adverse weather conditions, ranging from severe mid-summer droughts and from time to time floods occur. Sporadic droughts and floods occur from time to time; years with less than 200 mm and more than 1200 mm rain have been recorded. The total annual amount of rainfall received is often "normal" for the area, but the distribution and amount received per rainfall event is often irregular, e.g. in January 2013 more than 480 mm was received in less than 2 days whereas the total average long-term average rainfall in January is 115 mm. In 2012 it was very dry and planting was only done in January 2013 after a few normal rainfall events. Later in January after planting, more than 600 mm of rain fell in less than two weeks. Croplands and homestead gardens were flooded and crops were totally destroyed. Some

of the homesteads were also destroyed. As clay houses collapsed, valuable top soil was washed down the river. These extreme events left many villagers without food and shelter for some time. Not all villagers received flood disaster assistance from either local municipality or from provincial government apart from the few that were selected — and this without any consultation with either local leadership or villagers.

Droughts and floods in Lambani have a large impact on household food security and rural livelihoods. For this reason Lambani is an ideal location to conduct empirical research into the relationship between vulnerability, resilience, gender and climate change. It is a site where 87% of the respondents had heard of climate change and 69% said that there are new words in the village to describe climate change and claimed that the idea requires a new language. It is also a site where 93% said that there would be more storms, 98% said that it would rain more and 84% responded that they expected greater heat but also greater cold.⁵

The Lambani area has a high proportion of elderly and women due to the fact that many of the men and youth have left for the urban areas to seek greener pastures. The majority of the villagers are unemployed (over 70%) and the rate of poverty is extremely high. Access to basic services such as water, health, houses, etc. has become a dream to the village due to chronically poor service delivery. There is one clinic that was built in the village, but unfortunately it can not accommodate all the patients due to high demand and it is also situated far from some of the sub-villages. The village experiences many days without clean drinkable water whilst mobile clinics only visit on certain days of the week. When asked subjectively whether or not respondents considered their village to be very poor, moderately poor or not too poor at all, 47% reckoned that they were very poor, 45% that they are moderately poor and only 8% of respondents thought that they were not poor at all.

⁵ A survey was conducted using a standardized survey instrument. The sample size was 275 households and the respondent was the household head. The survey was conducted in August 2014. The data was triangulated using qualitative research methods: transect walks, participatory action workshop, semi-structured interviews, two way matrices and emoticons. The research took place over a period of two years starting in August 2014 and ending in August 2016. The research was funded by the Water Research Commission, Pretoria and was part of a solicited research project (K5/2314) entitled "Towards a Gender Sensitive Approach to Climate Change"

Towards a Vulnerability Assessment

We consider vulnerability in its multi-dimensionality and propose the interconnection of multiple stressors within the proposed frame. Like Iris-Young, we are concerned with exposure to structural injustices as one of these stressors. Although we see that people, in Lambani are able to make choices that affect how their lives go, we note structural failure as a fundamental cause of poverty. We claim that people should be compensated or helped when they are disadvantaged due to these structures. Adaptation processes in line with development strategies that reduce vulnerabilities and increase people's adaptive capacity in a broad sense would bring immediate benefits as well as strengthen people's ability to deal with future threats (Burton et al., 2002; Huq *et al.*, 2003; Adger *et al.*, 2007). As the discussion above has indicated, although the impacts of climate change are affecting and will continue to affect disproportionately poorer rural and urban communities in developing countries (if something is not done urgently), few of the vulnerability and adaptation assessments adequately explore the gendered or socially differentiated nature of those impacts (Cannon, 2002; Nelson *et al.*, 2002; Skutsch, 2002; Lambrou & Grazia, 2006; Dankelman, 2008).

The methodology that was deployed is designed to assess the strengths and weaknesses that exist in

the socio-political and geographical landscapes of Lambani. A range of specific questions include: a) How well is Lambani able to cope with external stress such as droughts and floods and what are the coping mechanisms of the village? b) At what point would Lambani no longer be able to cope (tipping point)? c) How resilient is the system (the combination of social, political and environmental factors) to droughts and floods and have they experienced these events in the past? d) How likely is it that the villagers would be able to cope in the future? e) How exposed is the system to the impacts of climate change and is this a system subject to existing stress? f) do the villagers experience worry and stress around climate and are there fears that the conditions will get worse? g) and finally, if so what are the reasons for these fears and also for expressions of other emotions such as anger, shame, pride and hope?

The importance of considering differing types and levels of vulnerability is especially stark in efforts to build resilience in the agriculture sector, particularly in poorer rural communities. In considering the vulnerability framework, it was helpful to draw on empirical evidence elsewhere and in particular the following case study materials: Bangladesh (Cannon, 2002), Malawi (Kakota *et al.*, 2011) Ghana (Amuzu *et al.*, 2010), India (O'Brien & Leichenko, 2004), and South Africa (Babugura, 2010). These studies were

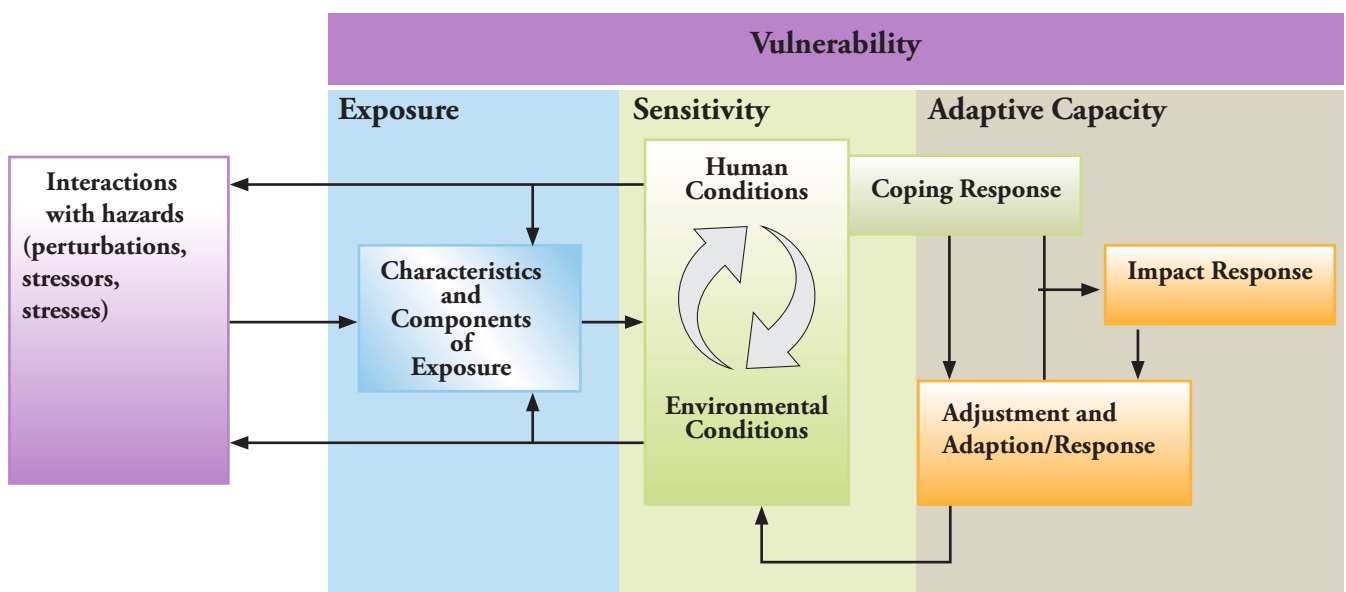


Figure 1: Vulnerability Assessment Framework (Sonwa *et al.*, 2012).

used to assess — and validate — whether and in what ways results from our own study contribute and add value to discourses on gender and climate change.

Designing a vulnerability assessment (VA) framework

A VA is the process of identifying, quantifying, and prioritizing (or ranking) the vulnerability in a system. It is challenging to design a VA and essential to take into account not only the potential of external climatic stressors as well as external factors such as policy initiatives and strategies to mitigate (or not as the case might be) but also internal stressors and multiple development concerns (economic, demographics, education, etc.) that exist in a given location. Complex and less obvious aspects of vulnerability, such as values, beliefs and emotions and the way in which the intricate relationship between these aspects unfold, are captured using both quantitative and qualitative methods together. What people do is affected by their feelings and emotions and for this reason emotional responses form an integral part of the VAF. The construction of the VAF adopts a flexible and practical approach, using authentic experiences — with all their limitations — to populate the frame. The research is multi-scalar and is concerned with the macro-forces and the broad-scale environmental and human systems within which local systems reside. The institutional arrangements, politics, stressors that exist at the macro scale are likely to affect local systems. We note these as the structural injustices referred to above and claim that these amplify disadvantage and stress.

O'Brien *et al.* (2004) state that vulnerability can be viewed both as an end point - where climate change results in vulnerability - or as a starting point determin-

ing adaptive capacity and the impact that climate change will have. We do not see this as either/or but rather as a continuum – vulnerability being both a starting point and a result. The non-governmental organization, Action-Aid, uses a participatory vulnerability assessment (PVA) tool to ask the question why floods occur in the first place and how do members (at the local level) adjust to them. Our concern is whether and in what ways members are able to adjust to these stressors and furthermore to ask the question who is responsible for reducing flood risk and whether and in what ways a village might be able to mitigate for these events.

Similar to Sonwa *et al.* (2012), in Figure 1 above who organize their framework using three core concepts, we decided that three core concepts would best inform our VA framework and form a scaffold around which the empirical evidence pivots. The first concept is the idea of exposure where sensitivity, resilience, adaptation, external and internal stressors and health hazards were considered. Exposure is the fact or condition of being affected by something – a condition of being exposed and of having no protection. The notion of exposure was scrutinized and here the way in which patriarchal stereotypes — or lack thereof — would influence the way in which some segments of the society are prejudiced along gender divides was also considered. The second idea is that of temporality which is about whether or not particular events are once off occurrences or whether they are iterative events. Temporality is the state of existing within or having some relationship with time. It is crucial to know whether a particular stressor is ongoing or once off by asking the question how sporadic a given event might be, whether or not it is iterative and if it is once off can recurrence in the future be anticipated. Thirdly, vulnerability cannot be measured unless the resource base

⁶ Methods used: qualitative: semi-structured face-to-face interviews, transect walks, participatory action research workshops and quantitative: standardized survey instrument, emoticons (see footnote 5)

⁷ Similar to Ostrom's (2009) contribution, a framework of key variables that are essential for any gendered assessment of vulnerability to climate change was developed taking cognisance of complexity and multi-dimensionality and determining which categories and key variables are likely to be useful. Ostrom's (2009) "General Framework for Analysing Sustainability of Social-Ecological Systems" is helpful when identifying variables, both from the primary data collection undertaken for the VA and secondary data that is deemed relevant

⁸ Adaptation to human induced climate change, adaptive capacity, adaptation deficit, adaptation and mitigation linkages, adaptation in situ, autonomous adaptation, climate change risk, limits to adaptation, maladaptation, planned adaptation

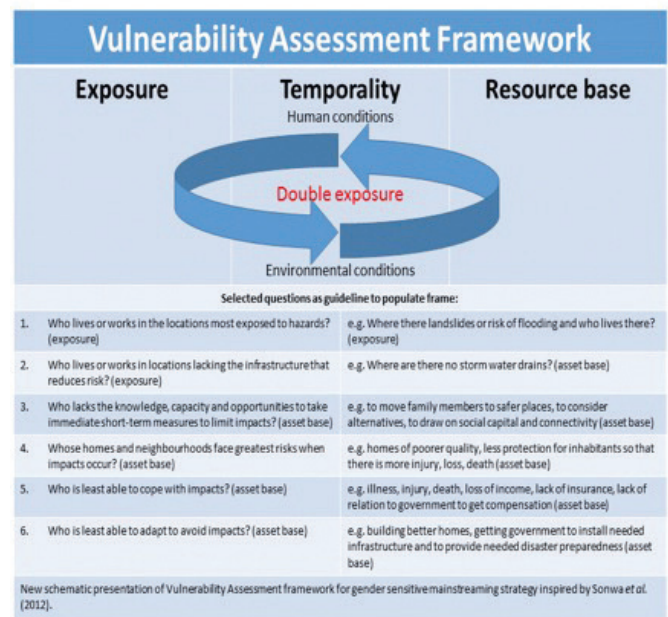
⁹ Mukheibir & Ziervogel (2009) draw attention to four major principles from which actions to adapt to climate change can be developed: (1) adaptation to short-term climate variability and extreme events is included as a basis for reducing vulnerability to longer-term climate change, (2) adaptation policies and measures are assessed in a development context (3) adaptation occurs at different levels of society, and (4) both the strategy and the process through which adaptation is implemented are equally important. Because of their relevance these four elements inform our VA

is known. Here both the material (tangible) and non-material (intangible) goods that are present are looked at. First of all we identify the existing physical and social assets of the villagers.⁶ Here the questions typically tap into the internal and external connections (social capital) of the village as we consider how strong these networks (resources) are and whether and in what ways they might serve individuals during times of stress. Importantly, as Hardoy & Pandiella (2009) remind us, adaptation cannot eliminate all risks from extreme events which is why a critical part of adaptation lies in the resources, institutions and networks that can be activated post disaster. Entitlements such as legal incentives and social grants are also classified as resources. When examining the resource base we also ask what safety nets are in place to mitigate for stressors to the system. Taking the idea of a resource base one step further, we consider the notion of choice as we believe that choice is of intrinsic and not only instrumental value. Here the ideas of agency and control over one’s life, life satisfaction, empowerment, pride, dignity and a sense of hope and of belonging are critical. Emotional well-being is included as an intangible good – or resource. Feelings of anger, despair, sadness, fear and so forth are goods that undermine and erode the social fabric and result in ill-being.⁷

The VA contributes to an existing body of knowledge by presenting these three notions: exposure, temporality and resource base. In populating the VA frame the work of Hardoy & Pandiella (2009), Satterthwaite *et al.* (2009) and Mukheibir & Ziervogel (2009) is also useful. Hardoy & Pandiella (2009) focus on urban poverty and vulnerability to climate change in Latin America. These authors proposed six aspects of vulnerability. Table 1 captures, and expands on these aspects and frames the inquiry in such a way that gender differences and the political notion of power would be captured. Satterthwaite *et al.* (2009) have a careful definition of terms⁸

which place emphasis on the idea of adaptation — or lack thereof. Once the schematic and key variables has been presented, the next step is to answer the six questions that Hardoy & Pandiella (2009) propose in Table 1. A seventh question is helpful – and this is what prior knowledge (indigenous or acquired through external opportunities of learning) helps mitigate for vulnerability within the frame of exposure, temporality and resource base and bearing in mind what indigenous or acquired knowledges are relevant. Hardoy & Pandiella’s questions presented in the table below are scrutinised through the lens of the three core notions.⁹

The schema below presents our Vulnerability Assessment Framework - including the table capturing Hardoy & Pandiella’s questions. It reflects the three core notions of exposure, temporality and resource base, not forgetting multi-scalarity and multi-dimensionality which we refer to in our schema as double exposure.



Theoretical frame: the Capability Approach (CA)

¹⁰ Entitled “Development of an institutional adequacy index using the multi-dimensional poverty framework.”

¹¹ Atique’s (2014) Master of Law’s dissertation examines climate change and draws attention to the fact that literature on climate justice and adaptation is vast but it has not yet employed one of the most popular recent developments in contemporary liberal justice theory, the CA. Atique claims that the CA is particularly useful when considering human dependence on the natural world because of the explicit ways that basic capabilities depend on the environment and a stable climate system. See also Pelenc *et al.*, (2013)

¹² Evidence of emotional responses to climate change in Lambani was collected through the use of emoticons that captured a wide range of emotions but in particular anger, hope, pride and fear were identified as relevant markers. A chart depicting 15 emotions were used and respondents were asked which emotions they identified with and what circumstances in their everyday lives evoked particular emotions. The respondents were then invited to ‘match’ emoticons with their experience in the 2013 flood

The theoretical frame, the Capability Approach (CA), pioneered by the Nobel prize winning economist, Amartya Sen was used. The main argument of Sen's (1999) seminal work '*Development as Freedom*' is that individuals achieve freedoms — or fail to achieve them — because of social, political and economic constraints or opportunities. People can be deprived of physical (material) goods — such as pipes, toilets and taps and this lowers their living standards, narrowly defined. However, there is also deprivation of intangible goods which have an effect on dignity, agency and empowerment that undermines multiple aspects of well-being. These deprivations are in domains that are less easily measured because they are invisible and as Krishna (2002) said when speaking of attitudinal components of social capital such as trust, these are often only carried around in people's hearts and heads.

The CA is also sometimes called the Human Development Approach (HDA) and it is historically associated with the Human Development Report (HDR) lodged in the Office of the United Nations Development Programme (UNDP). It provides a framework used to evaluate a wide range of projects and programmes around civil society issues. More recently it has been used in a Water Research Commission Project (K5/1971) by Goldin *et al.* (2013)¹⁰ to evaluate institutional settings within the context of water resources management.¹¹ Gender and the ideas of inclusion and exclusion, power, agency and choice, are at the core of the analysis.

When bringing the CA to the ideas of climate change, resilience and vulnerability we adopt an expanded CA, embracing discourses of affect and emotions as well as feminist philosophical notions of justice. Goldin's (2003, 2010, 2015) earlier work on shame as well as Wutich & Ragsdale's (2008) study, draw on the work of Zemblyas (2011), claiming that emotions are of public concern. They are deeply embedded structurally and the dimension of power is crucial in determining the nature of the emotions that are experienced. Some water users feel helpless, others

experience fear, anger, shock or positive emotions such as hope, pride etc. in the face of extreme climatic events. There is also a focus on the psychological experiences of men — their worries and concerns. The wide range of feelings that extreme events evoke determine the way in which people act — or do not act — in the face of traumatic climatic occurrences.¹²

The CA is a normative framework because it claims that freedom to achieve well-being and an improved quality of life is of primary moral importance. It is also normative because it believes that people can decide for themselves what works and what does not work. Certain social environments and social interventions will promote positive attributes, such as a sense of agency, empowerment, self-respect, autonomy — and others will perpetuate deprivation and exclusion and feelings of disgust, fear or shame. As such, the CA is ideal when considering ideas of equity, power and social justice that we have discussed above.

The authors are not interested in these ideas (within this context at least) simply as a philosophical question but rather they are interested in them because they have a practical implication for a vulnerability assessment. We ask a wide range of questions — for instance, whether it is just that woman should have to build her home on her own without state intervention or disaster relief? Did a particular woman have choice or was there simply a 'no choice' situation? Is it just that a mother should worry about having enough food for her child or that she should worry about livestock trampling in her crops because she cannot afford a fence to protect the food garden? How do the experiences of old women differ from those of young women — and what are the differentiated experiences of men and women?

The concept of social capital is linked into an understanding of capabilities (opportunities) as is evident, for instance, in the study of Cannon (2002) who examines experiences of floods in Bangladesh. Cannon considers an expanded notion of poverty and makes the links between vulnerability, poverty and

¹³ Semi-structured interview with key respondent, Lambani, August 2015. Meetings were usually held under a tree in the center of the sub-village

¹⁴ Participatory action workshop, Lambani, September 2016

gender explicit. The point that this author makes is that floods — however devastating — have provided an opportunity to build new social capital. However, in extreme events social capital may be destroyed or become more fragile as our own research findings reflect where *“there is no village hall built for the villagers even though the villagers have requested one from both government and tribal council. During rainy season or when it is either very cold or too hot villagers hardly attend any meeting.”*¹³ Feelings of being socially isolated are aggravated as villagers feel sad, neglected and helpless because they hoped that government would come to their rescue during extreme weather events — especially the floods — but they found themselves having to deal with the damages caused by the floods on their own.

Women are expected to play the role of ‘farm wife’ even though they more often than not have higher levels of education than the men. In our own study there are clear gender divides *“as men are the head of the family and women are the caregivers.”*¹⁴ Women carry additional burdens in Lambani as *“some of these women (girls) they are at school; when they are back from school, they go to fetch water and you can see this is too hard; they don’t have time.”*

Babugura (2010), in her gender and climate change study also made use of a nuance of feelings and aspirations. Words such as hope, fear, motivation etc. are used when reporting the results of her study. Themes which run throughout Babugura’s (2010) report are vulnerability, resilience, coping, adaptation and mitigation. All terms are used in relation to the condition of the environment as well as the well-being and circumstances of people in the study area. It is helpful to apply the CA when addressing climate change because it resonates with ideas of diversity and plurality. The way an environmental benefit or burden is experienced can vary according to both geography and available capabilities (plurality). The CA is able to picture vulnerability with higher specificity, taking into consideration differences in gender, age, class etc. This suits our focus on the VA where case specific examples are more helpful than vague generalisations.

Applying the CA to notions of adaptation to climate change encourages an assessment of vulnerability that takes into account difference, diversity and power in particular contexts.

Our own study captures aspirations and emotions of rural men and women in Lambani which we then use to populate the VA fitting this evidence into our conceptual ideas of exposure, temporality or/and resources. This is reflected in the extracts below:

“it feels painful when the crops are flooded during flooding events and it is also painful when there are droughts while the effects of extreme events get us worried.”

And

*“I was very scared that flood will destroy my house too, every time it rains the canal keeps on increasing. I think we are coping but it is difficult to explain how we coped to the situation. We just adapted the situation, I felt very bad about it.”*¹⁵

This study reveals that women are the most affected during extreme climate conditions; and 68% of men say “women would be more affected than others” and 80% of women say this.

There are contradictions that emerge as one scrutinises concerns happening on the ground – particularly around gender. Take for instance a typical meeting around the big tree (next to headman’s homestead) where the project team gathered with small-scale farmers at various stages of the research in Lambani and where we see that women sit on the ground and men take seats in front of the tree. This is, seemingly, denigrating for women — and our impulse is to suggest that they must feel ‘lower’ than the men and be less comfortable. However, during several interviews with women they expressed themselves quite differently saying, for instance *“we can sit on the chairs if we want to”* and the matter of choice, which we had not first considered became apparent *“but we choose not to as its not comfortable sitting on the chairs.”* Flanagan (2013)

¹⁵ Semi-structured interviews with key respondents, Lambani, August 2015

critiques the women, environment and development (WED) paradigm for being essentialist and for simplifying the role of women. It does however introduce into the gender debate, relational perspectives of women and men. The article of Flanagan (2013) is useful because it reflects on the nuanced relationships between men and women and allows for a portrayal of women as not simply being victims but as also having power and agency. Indeed, at times, the convolutions around patterns of power are surprising. Our own premise, at the inception of this research, was that women would be most likely to rebuild their homes as caretakers and mothers, with a natural instinct to protect their young and a resilience that could be replicated. What was discovered, however, was that men rebuilt the homes and that the traditional way in Lambani is for men to engage with construction as they are the ones who have been to 'build schools' where they have learnt about bricklaying. Women do not object to this role that men play – and seemed 'proud' or 'relieved' that the men were taking care of the household. The WED critique sits well here because it challenges the assumption that women are the 'natural' carers, not only of the home but also of the environment and challenges the premise that they are also the victims and the ones who are disempowered.

Although residents are not necessarily speaking directly about climate change, clearly there is a sense of vulnerability amongst the villagers. Eighty nine percent of respondents said: *'I am scared that things are changing too much around here.'* Only 10% were not scared. Asked differently – *'do you feel fearful or afraid?'*, 97% of the sample said yes they do feel fearful and afraid. There was no differentiation between age. Ninety two percent said that *'they can not believe what is happening'* and 95% of respondents feel confused. There are feelings that emerge from respondents such as anger and feeling hopeless. Seventy five percent of respondents feel angry and only 25% do not and there is a significant difference here between male and female respondents as 82% of male respondents are angry whereas 68% of female respondents are angry. Around 77% of respondents irrespective of gender feel

helpless. On the positive side there are 56% of respondents who feel hopeful that they would be able to do something but 42% feel they would not be able to do anything. Here there is a difference between male and female with men feeling more hopeful (61%) than women (52%). Those between the age of 41 and 50 are slightly more hopeful than those younger or older. Forty one percent of respondents feel proud that they could make a difference and that they could do something *'at these times'* whilst 55% feel they could not make a difference. There is a distinct gender skew here with 64% of female respondents who do not feel proud that they could make a difference contrasted with 47% of male respondents. On the same theme of agency or empowerment only 18% of the respondents felt that they make a big impact on their communities. Forty three percent said that they make a small impact on their village but 39% said that they do not think that they make any impact at all on their village. Sixty three percent feel hopeful that things will get better but 36% do not have hope that things will get better. Women feel less hopeful than men. Overall, results of the study reveal that more women than men are not hopeful that things will get better, they do not feel proud they can make a difference and they do not feel they can change things at all. These attributes are proxies for empowerment and indicate low levels of agency experienced by women in Lambani. However, authentic experiences of residents, such as this extract from one respondent in Lambani also captures the idea of resilience, where women are not simply victims but also survivors: *"after all these events, we are able to go back to our normal lives. By virtue of the fact that we go back and plant in normal season, it shows we have adapted."*¹⁶

Conclusion

The effects of climate change are increasingly visible and pose severe threats to human survival globally. According to Sen's CA (1999), the five instrumental freedoms linked to human development and their survival that should be present and that women should have access to are political freedom, economic facilities, social opportunities, transparency

¹⁶ A woman responding in a participatory action workshop, Lambani, September 2016. See also Goldin et al (2017)

¹⁷ Our study finds that protective security is absent but it has not measured explicitly for the other freedoms listed here although they are implicit in the findings and are evidently lacking

guarantees and protective security.¹⁷ Access to these are necessary for women to gain a better quality of life and to acquire the capabilities they need to act as their own agents of change. This study makes a contribution to the literature on vulnerability, climate change and gender by using the CA to frame the final analysis and organise the data whilst at the same time expanding on the CA literature using notions of complexity, climate change and vulnerability.

In Lambani, because of extreme weather conditions, villagers experienced loss of livestock, houses, roads, bridges and pipelines that curtailed their freedom of movement and activated feelings such as fear, worry, pain, sadness, being powerless or helpless. The relationship between the environment and the human is interrupted when there are severe climatic events and this influences resources or assets — both tangible and intangible. It also means, that there is more exposure and that there is a dimension of temporality as the feelings evoked are not ‘once off’ but iterative.

Like Atique (2014), this research does not assume that all parts of the system have the same vulnerability; subsystems and components, especially social units, may experience exposure differently, register different impacts, and maintain different response options using not only gendered lens but a lens that allows for differences and diversity along the lines of health, education, age, disability etc. The authentic experiences of individuals are captured and are used to populate the vulnerability assessment framework which is fundamentally gendered in its approach. The lens of the CA allows for social and political recognition — something that vulnerable communities recurrently fight for. The open-ended nature of the CA makes it context-specific and flexible. It assists us in organising our empirical data according to the concepts of exposure, temporality and resources. This village-level study used participatory or procedural methods to determine what capabilities individuals in vulnerable communities (such as Lambani) value. Applying a capability lens to adaptation and resilience serves as a reminder of the equity dimensions present in adaptation. Different populations

are affected by climate change in varying ways and to differing degrees, often due to disparities in social and economic contexts and people’s underlying capabilities or opportunities. Climate policies rarely take into account these diverse levels of capabilities. The CA helps in an endeavour to identify policies that enhance equity and build capabilities, whilst avoiding unintended negative consequences, particularly for the least well off. The emotional well-being of villagers is critical when designing a vulnerability framework and forms part of the resource or asset base. Developing a VA framework for extreme weather conditions that is gender sensitive is crucial as a tool to inform policy and the adoption of adaptation strategies. The vulnerability framework is a policy guide that can contribute to an understanding that women and girls experience extreme events differently to their male counterparts and that strategies need to be sensitive to these differentiations and mitigate accordingly.

References

- Adger, WN, Agrawala, S, Mirza, Q, Conde, C, O'Brien, K, Pulhin, J, Pulwarty, R, Smit, B and Takahashi, K (2007). ‘Assessment of Adaptation Practices, Options, Constraints and Capacity’ in *Climate Change Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson (eds) pp. 717–43 Cambridge, UK: Cambridge University Press. URL: <http://www.ipcc-wg2.gov/AR4/website/17.pdf>.
- Amuzu, C, Jones, N and Pereznieto, P (2010). *Gendered risks, poverty and vulnerability in Ghana: making a difference?* Overseas Development Institute, London.
- Atique, A (2014). *Assessing Capabilities Approach as an Evaluative Framework for Climate Justice*. LLM Environmental Regulation and Sustainable Development Newcastle Law School.
- Babugura, A (2010). *Gender and climate change: South Africa case study*. Cape Town: Heinrich Böll Foundation Southern Africa.

- Berkes, F and Folke, C (2002). Back to the future: ecosystem dynamics and local knowledge. In: Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: Understanding Transformations in Human and Natural Systems*. Island Press, Washington DC.
- Botha, JJ, van Staden, PP, Koatla, TAB, Anderson, JJ and Joseph, LF (2014). Rainwater harvesting and conservation (RWH&C) for cropland and rangeland productivity in communal semi-arid areas of South Africa. WRC Report No. 1775/1/14. Water research Commission, Pretoria, South Africa.
- Burton, I, Huq, S, Lim, B, Pilifosova, O and Schipper, E (2002). From Impacts Assessment to Adaptation Priorities: The Shaping of Adaptation Policy. *Climate Policy* 2 (2) pp.145–59.
- Cannon, T (2002). Gender and climate hazards in Bangladesh: *Gender and Development*, 10 (2) 45-50.
- Dankelman, I (2008). Gender and Climate Change: local security in an era of global environmental change. Draft. Radboud University, Nijmegen.
- Denton, F (2002). 'Climate change vulnerability, impacts, and adaptation: why does gender matter?' in *Gender & Development*,(10)(2) pp. 10 – 20.
- Flanagan, C (2013). 'Is history repeating itself? A critical discourse analysis of the representation of women in climate change campaigns' Development Studies Institute, London School of Economics.
- Goldin, J (2003). Washing away the sins of the past. *International Journal of Public Administration* (26) (6): pp.711-730.
- Goldin, J (2010). Water policy in South Africa: Trust and knowledge as obstacles to reform. *Review of Radical Political Economics*, 42(2) 195
- Goldin, J (2015). Hope as a critical resource for small scale farmers in Mpumalanga in *Human Geography*, a new radical journal (8) (3) pp. 24 - 36
- Goldin, J, Fatch, J, Owen, G and Ncube, G (2013). Towards an Institutional adequacy index using the multi-dimensional poverty approach, WRC K5/1971 Final Report.
- Hardoy, J and G Pandiella (2009). "Urban poverty and vulnerability to climate change in Latin America", *Environment and Urbanization* (21) (1), pp. 203–224.
- Harris, L (2006). "Irrigation, gender, and social geographies of the changing waterscapes of southeastern Anatolia." *Environment and Planning D: Society and Space* (24) (2): pp. 187-213.
- Huq, S, Rahman, A, Konate, M, Sokona, Y and Reid, H (2003). Mainstreaming adaptation to climate change in least developed countries (LDCs). International Institute for Environment and Development, London. URL: <http://pubs.iied.org/pdfs/9219IIED.pdf>.
- Intergovernmental Panel on Climate Change (IPCC), (2007a). Climate change: Impacts, adaptation and vulnerability. IPCC Working Group II Report. Lonescu, C., R.J.T. Klein, J. Hinkel, K.S. Kavi Kumar and R. <http://www.ipcc.ch/pdf>.
- Intergovernmental Panel on Climate Change (IPCC), (2007b). Climate change – impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Cambridge University Press, UK. <http://www.ipcc.ch/activity/wg2outlines.pdf>.
- Kakota, T, Nyariki, D, Mkwambisi, D and Kogi-Makau, W (2011). Gender vulnerability to climate variability and household food insecurity in *Climate and Development* (3) (4).
- Krishna, A (2002). Active social capital. Tracing the roots of development and democracy. Columbia University Press.
- Lambrou, Y and Grazia, P (2006). *Gender: The Missing Component of the Response to Climate Change*. Rome: FAO. (http://www.fao.org/sd/dim_pe1/docs/pe1_051001d1_en.pdf).

- Marion Young, I (2011). *Responsibility for Justice*, Oxford University Press
- Mukheibir, P and Ziervogel, G (2009). 'Developing a Municipal Adaptation Plan (MAP) for Climate Change: The City of Cape Town' in Bicknell, J, Dodman, D and Satterthwaite, D (eds),. *Adapting Cities to Climate Change: understanding and addressing the development challenges*. Earthscan Climate, UK.
- Musemwa, M (2011). Environment and Natural Resources in eds Kondlo, K and Ejiogu, C (2011): *Africa in Focus: HSRC, Democracy, Governance and Service Delivery. Governance in the 21st Century*.
- Narayan, D (1997). *Voices of the poor, poverty and social capital in Tanzania*. The World Bank.
- Nelson, V, Meadows, K, Cannon, T, Morton, J, Martin, A (2002). 'Uncertain predictions, invisible impacts, and the need to mainstream gender in climate change adaptations' in *Gender and Development* (10) pp. 51-59.
- Nelson, V (2011). *Gender, generations, social protection & climate change: a thematic review*. Overseas Development Institute.
- Neumayer, E and Plumper, T (2007). *The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy* (97) (3).
- Nightingale, A.J (2006). 'The Nature of Gender: Work, *Gender and Environment*' in *Environment and Planning D: Society and Space*, 24(2) pp.165-185.
- O'Brien, K and Leichenko, R.M (2004). 'Winners and losers in the context of global change' in *Annals of the Association of American Geographers* 93, 89–103.
- O'Brien, K, Eriksen, S, Schjolden A and Nygaard, L.P (2004). 'What in a word? Conflicting Interpretations of Vulnerability in Climate Change Research' in *CICERO Working Paper 2004* (4).
- Olmos, S (2001). 'Vulnerability and adaptation to climate change: Concepts, issues, assessment methods' in *Foundation Paper, Climate Change Knowledge Network* <http://www.iisd.org/cckn>.
- Ostrom, E (2009). 'A General framework for analysing sustainability of social-ecological systems' in *Science* (325) (5939) pp. 419–422.
- Pelenc, J, Lompo, M, Ballet, J, Dubois JL (2013). 'Sustainable human development and the capability approach: Integrating environment, responsibility and collective agency' in *Journal of Human Development and Capabilities* (14) (1) pp. 77-94.
- Sen, A, (1999). *Development as freedom*. Oxford University Press, Oxford
- Skutsch, Margaret, M (2002). 'Protocols, treaties, and action: the 'climate change process' viewed through gender spectacles' in *Gender & Development*. (10) (2) pp. 30-39 (http://pdfserve.informaworld.com/707568_666_741921471.pdf).
- Sonwa, D.J, Somorin O.A, Jum C, Bele MY, Nkem JN (2012). *Vulnerability, forest-related sectors and climate change adaptation: The case of Cameroon in Policy Econ* (23) pp.1-9.
- Sultana, F (2014). 'Gendering Climate Change: Geographical Insights' in *The Geographical Journal* (66) (3) pp. 372-381.
- Terry, G (2009). 'No climate justice without gender justice: an overview of the issues' in *Gender & Development* (17) (1) pp. 5-18 Available from http://pdfserve.informaworld.com/942336-_908827558.pdf.
- UNITED NATIONS, (2009). 'Women, gender equality and climate change' *Fact Sheet, UN Internet Gateway on Gender Equality and Empowerment of Women*. Online: www.un.org/womenwatch/feature/climate_change.
- United Nations Development Programme (UNDP), (2009). *Resource Guide on Gender and Climate Change*. United Nations Development Programme.

USAID, (2007a). 'Adapting to Climate Variability and Change' United States Agency for International Development. Washington, DC.

USAID, (2007b). Gender terminology. <http://www.usaid.gov>.

Wutich A, Ragsdale K (2008). 'Water insecurity and emotional distress: Coping with supply, access and

seasonal variability in a Bolivian squatter settlement' in *Social Science and Medicine* (67) pp. 2116 –2125.

Ziervogel, G, Cowen, A, Ziniades, J (2016). "Moving from adaptive to transformative capacity: building foundations for inclusive, thriving and regenerative urban settlements" in *Sustainability*, (8), pp. 1 - 25



Photo by Ken Treloar on Unsplash