

## **PERI-URBAN LIVELIHOOD AND ADAPTIVE CAPACITY: THE CASE OF DAR ES SALAAM**

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Peri-urban growth patterns are shaping most of the urban development in sub-Saharan Africa, raising concerns regarding vulnerability to global environmental change in unplanned settlements. To date, there has been little exploration of the implications of peri-urban patterns for social vulnerability and adaptation options. The study discussed in this paper, conducted in Dar es Salaam, Tanzania, illustrates the livelihood strategies and environmental management practices used by peri-urban dwellers, while underlining challenges and opportunities for adaptive capacity. The study confirms that peri-urban areas are complex hybrid systems in which the urban and the rural are blended together. According to a few scholars, the acknowledgement of such hybridity leads to a reconsideration of the dominant strategies for addressing environmental issues in peri-urban areas. Assuming the transition to urban is the best solution, those strategies emphasize the role of infrastructure and services provisioning. Moreover, a criticism of dominant approaches arises through analysis of the recent trend toward ecological security in global cities' environment management.

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### **Introduction**

According to UN Habitat, “for the first time, in 2009, Africa’s population exceeded one billion, of which 395 million, almost 40 per cent, lived in urban areas. This urban population will grow to one billion in 2040, and to 1.23 billion in 2050, by which time 60 per cent of all Africans will be living in cities.” (UN Habitat, 2010b). Rapid urban growth leads to the proliferation of unplanned settlements and, in fact, in the last several decades peri-urban informal areas have accommodated most of the demographic expansion in African cities. Those processes have shaped highly fragmented and dynamic rural-urban interfaces, characterized by constantly changing land uses, activities, social and institutional arrangements and defined by Simon (2008) as “forms of hybridity” due to the coexistence of urban and rural features.

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*“In these peri-urban or ‘rur-urban’ (Reardon et al., 2007) landscapes, common assumptions about the values, activities, land use and social organization of ‘rural’ or ‘urban’ populations may not be valid, and policies for addressing the vulnerability and adaptive capacity of these populations to environmental change may be ineffective.” (Eakin et al, 2010, p. 14).*

Because of residents’ relationships to environmental changes and their heavy dependence on natural resources, and because the “rural” and the “urban” are so intertwined, these spaces pose “new” institutional challenges for socio-ecological planning and vulnerability assessment (Eakin et al, 2010).

It is broadly assumed, in different research fields, that the degree to which urban and peri-urban populations depend on natural resource-based economic activities plays a significant role in determining their vulnerability to environmental risk. “

*“Resource dependency in this context can be characterized as dependent on the structure and diversity of income, social stability and resilience. Dependency and its implications can be observed through a combination of reliance on climate dependent resources; variability in such income sources; and migration and other social variables associated with stability and resilience [...] The diversity of income sources, and the variability of those income sources across time, can be used as an indicator of vulnerability at the household level, where it is hypothesized that the greater diversity of income the greater resilience of livelihood to disruption of particular sources.” (Adger, 1999 pag 254).*

However, in those peri-urban areas, vulnerability is equally likely to be associated with a heterogeneous flow of materials and resources involving a variety of economic activities, actors, institutions (Eakin et al, 2010), power relations, global-local processes and drivers of change. How do peri-urban livelihoods and the rural-urban interplay shape autonomous adaptation strategies to environmental change? And in what ways is institutional environmental planning and management evolving to support the capacity of peri-urban communities to respond to environmental change? Are the “informal” autonomous and “formal” institutional strategies and practices acting synergistically? In a context of lack of resources and “poor” fiscal systems this synergy may be an essential element of, if not a precondition for the effectiveness of planning actions.

In sub-Saharan African cities, functional decentralization and infrastructure provisioning are often advocated as sustainable “solutions” for improving unplanned and underserved settlements. It is widely argued that improved urban planning and provision of public services and infrastructure are crucial for the development and promotion of resilient cities (Stern, 2007) and for addressing environmental threats. There is a broad consensus that betterment of housing conditions and provision of modern infrastructures are the best ways to reduce environmental risk and vulnerability to climate change in unplanned settlements (UN Habitat, 2003). The majority of studies agree that *“in most cities, planning for adaptation must first overcome an inadequate infrastructure base”* (Satterthwaite, 2008) in order to enhance adaptation and reduce urban vulnerability. Governments play a key role in enhancing adaptation (Adger and Agrawala et al. 2007) and monitoring land-use management systems and sources of urban vulnerability. They should ensure that all urban dwellers have access to infrastructure and services, should guide where settlements develop,

regulate hazardous human activities that can produce disasters, design land use regulations and zoning to influence land availability and encourage and foster better quality housing and safer sites (Satterthwaite et al 2007).

Traditionally, all these strategies and policies categorize specific economic activities, land use, infrastructures and resources as either rural or urban and adopt a sector-based approach. In order to address the effects of environmental change, the presumed distinction between urban and rural, even if it is already becoming increasingly less relevant for planning (Allen, 2003), needs to be overcome completely.

Mattingly (2009) has proposed a way to address planning in peri-urban areas. He reviewed the results of past research on the peri-urban interfaces (PUI)<sup>2</sup> and proposed policies and actions to “*improve the passage from rural to urban living*”. These policies and actions should reinforce “*other policies [e.g. land planning and land-related policies] aiming at better environmental management, and [...] strengthen local and family food security through support for small farmers with market knowledge, better access to seeds and fertiliser, micro-credit and so on*” (Mattingly, 2009 p. 50). He argues in favor of conducting “[...] *land planning that is sensitive to peri-urban social and economic factors or help farmers obtain more of the value of their land rights [...]*” (Mattingly, 2009 p.50). To implement this planning the coexistence of different institutions in peri-urban areas and the overlap of their competences and functions must be managed. This implicates the resolution of conflicts between urban governments, which are oriented to develop “*not natural resource-based*” activities, and rural governments focused mainly on agricultural uses.

Mattingly proposes that rural governments give more support to peri-urban agriculture. “*They could take the lead in providing technical advice on peri-urban farming and soil fertility maintenance; improving access to credit, [...] strengthening security of tenure; [and defending] the land needs and land rights of farmers, including [...] against more powerful and aggressive urban governments*” (Mattingly, 2009 pp. 50-51). On the other hand, urban governments should take responsibility for the impacts of their actions (e.g. new land demands and waste management) through planning “*the expansion of the city to give more time to the most vulnerable farmers*” (Mattingly, 2009 p. 51). and through using sensitivity in design and timing, transparency in decision making, supporting initiatives, and compensation.

In Dar es Salaam, which is our case study, local government addressed the problem of rural-urban integrated planning by designing a Strategic Urban Development Plan in 1999 (SUDP,1999)<sup>3</sup>. However, plans for land use zoning and building regulation are still designed along relatively rigid urban/rural divides.

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<sup>2</sup> He mainly refers to the Development Planning Unit research groups on PUI at the University College of London, where he is an associate professor.

<sup>3</sup> Strategic Urban Development Plan (SUDP) designed to replace the Dar es Salaam Master Plan was one of the key objectives of the Sustainable Dar es Salaam Project (SDP). The Sustainable Cities Programme is a UN-HABITAT/UNEP programme started in the early 1990's. Its aim is to assist cities in achieving more environmentally sustainable growth and development. It is founded on a participatory urban decision making process, and promotes sustainability through environmental planning and management (EPM) approach. Although a draft document was ready in 1999; even today, the SUDP has not legally superseded the 1979 Master Plan.

While detailed urban plans exist that regulate the building activity within pre-defined “urban” boundaries, development and land use plans in the remaining extra-urban domain, even if regulated by numerous Land Acts at the national level, are still inconsistent and waiting for “the city” to come. The same problem occurs in vulnerability assessment and adaptation planning at the local level; in fact the entire region of Dar es Salaam is considered to be a future “urban region” requiring infrastructure provisioning.

The rural–urban interface is particularly challenging when addressing adaptive capacity concerns. While the environmental change in African cities (and in Least Developed Countries in general) is broadly studied, these issues have received little attention in peri-urban areas, despite the fact that they constitute the most at-risk part of African cities.

It is argued that peri-urban areas should be treated as integral elements of urban systems in spatial, social, economic, *“functional and planning terms, because they and their environments are integral to the growth and operation of growing cities”* (Simon 2008). Those same peri-urban areas include rural features and are relevant to rural development and livelihood policies. Furthermore, the focus on peri-urban areas is crucial because the urban-rural interface is also the place with the most potential for positive change, due to the many “forces” that come together in this space (Erling, 2007, cited in Simon 2008). While explaining the nature of this potential, Erling gives the example of multifunctional urban agriculture as a source of *“creative and ingenious new approaches to producing food amid competition for land use”*. Others (Davila, 2002; Allen, 2003; ...) argue that there are other opportunities for positive changes that could be useful for adaptation to environmental change, such as livelihood diversification, access to services, reuse of waste in agriculture and waste recycling for re-sale in the city (though this might be associated with health problems and pollution), greater access to information and decision-making.

According to the common conceptualizations emerging across climate change literature (Smit and Wandel, 2006), **vulnerability** is a function of the exposure and sensitivity of a system to hazardous conditions and the ability, capacity or resilience of the system to cope, adapt or recover from the effects of those conditions. **Exposure** and **sensitivity** are linked to the properties of a community or group and are dependent on the interaction between their characteristics and the environment (the context in a broad sense) and on the characteristics of the climate impulse (change).

**Adaptive capacity** refers to a *“system’s ability to adjust to a disturbance, moderate potential damage, take advantage of opportunities and cope with the consequences of a transformation that occurs”* (Gallopín, 2006, p. 296). For other authors this means *“the capacity to modify exposure to risks associated with climate change, absorb and recover from losses stemming from climate impacts, and exploit new opportunities that arise in the process of adaptation”* (Adger and Vincent 2005, p. 400).

According to these definitions, while exposure and sensitivity orient the potential impact of climate change, adaptive capacity can be a major influence on the eventual impacts thereof. Therefore adaptive capacity is an obvious focus for adaptation planning because it is the component of vulnerability most amenable to influence social systems in coping with climate changes (Marshall et al, 2010). Adaptive

capacity is closely related to many other concepts, such as **resilience**, coping ability, adaptability, management capacity, flexibility, robustness and stability (Smit and Wandel, 2006). In this paper resilience is conceived as a perspective for adaptation planning, rather than a clear and well defined concept to address vulnerability reduction.

This paper analyzes livelihood, natural resource management and autonomous adaptation strategies in the peri-urban areas of Dar es Salaam, Tanzania. The purpose of the analysis is to illustrate how the interacting dynamics of livelihood, institutional activities, rural-urban relations (interplay) and environmental change offer both opportunities and challenges for enhancing peoples' adaptive capacity.

Dar es Salaam is the largest city in Tanzania and the third fastest growing urban agglomeration in Africa. In 2000 it accommodated 33.7% of the Mainland urban population and Kinondoni was the most populous municipality in the city (Un Habitat, 2010c). While Tanzania's urban growth rate is expected to be 4.5% between 2015 and 2020, in Dar es Salaam it is projected to be higher (UN 2010). Like in most rapidly growing cities of sub-Saharan Africa, informal growth represents the predominant "*mode of urbanisation*" (Roy 2005). Several studies estimate that about 70% of Dar es Salaam's population live in informal settlements (Kombe 2005; A. Lupala 2002). Other scholars, like Kironde (2006), argue that more than 80% of the buildings in Dar es Salaam are located in unplanned areas (Hill and Linder, 2010).

Urban growth will occur in an environmental context that is particularly at risk. According to data collected by UNDP (2009) and IPCC (2007), the main effects of climate change in Dar es Salaam are flooding, sea level rise, drought and changes in rain patterns. Furthermore, global climate change scenarios show that the temperature will continue to rise and rainfall will increase in the years to come (IPCCb, 2007). In addition, urban development and changes in socioeconomic conditions in peri-urban areas are altering exposure and sensitivity to environmental changes. These factors are likely to exacerbate the physical drivers of the changes mentioned above, impacting the probability of climate events and stresses and orienting the positive or negative impacts thereof.

In the face of evident environmental changes, peri-urban dwellers are now diversifying their livelihoods, in some cases moving towards lower dependence on the natural resource base and increased reliance on urban employment and services. This diversification entails changes in social relations, values and livelihood priorities.

The following section will introduce the location and method of the survey. In the last two sections evidence of how different people living in peri-urban areas address environmental change is presented and the link to both urban and rural features and dynamics is explored. Finally, the relevance of the study as regards interpretive approaches and spatial planning (for peri-urban areas) is discussed.

## **Methods**

The research seeks to build the knowledge base for the identification and development of adaptive measures tailored to the needs of peri-urban communities in sub-Saharan Africa. The aim is not to measure current

adaptive capacities and vulnerabilities, nor to quantify impacts or effects of adaptation practices. Rather, the focus is to document the ways in which peri-urban communities experience and address changing environmental conditions and the actions and strategies that institutions are implementing to improve adaptation or adaptive capacity. This paper looks at human–environment systems vulnerability, including communities, households and groups located in peri-urban areas, with a focus on the natural resource systems upon which people depend.

Adaptive capacity can be investigated on a range of levels (individual, household, institutional, national, etc); this paper focuses on community adaptive capacity and is based on investigations conducted at the household level.

As mentioned before, the investigation is centred on rural-urban processes and community assets, analyzing household livelihoods, adaptation strategies and environmental management as the main factors that determine adaptive capacity. The analysis also considers that asset-oriented approaches may mask the role of processes and functions in supporting adaptive capacity while “*understanding adaptive capacity, [actually], entails recognising the importance of various intangible processes: decision-making and governance; the fostering of innovation, experimentation and opportunity exploitation; and the structure of institutions and entitlements [...]. Doing this requires moving away from simply looking at what a system has that enables it to adapt, to recognising what a system does to enable it to adapt*” (Jones et al 2010, ODI). The household focus enables *a better understanding of how and why people organize their activities* and of *collective and individual processes of decision-making within families* (Preston, 1994). Thus, household livelihood strategies give relevant information as regards both collective and individual processes of environmental management and adaptation strategies.

Given the crucial role of peri-urban areas in settlement processes, the activities undertaken in peri-urban areas must be included as a fundamental resource in the adaptation action plans<sup>4</sup>. Starting from the definition of adaptive capacity, mentioned above, it is hypothesized that adaptive capacity in peri-urban areas depends on four main factors:

- Type and magnitude of local environmental impacts of climate change;
- Rural-urban dynamics, land-use patterns and urban fabric;
- Local capacity to cope with climate change effects;
- Institutional capacity in environmental management and urban development planning.

Based on this interpretative framework<sup>5</sup>, a household questionnaire was developed and administrated in 2009. The questionnaire was structured around four main areas of investigation, identified through a review

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<sup>4</sup> Refers to *action planning* or “*a multi-dimensional and on-going process that takes place in real time*” (Friedmann, 2005 ) as a viable solution for addressing the uncertainty, fast-changing environment and lack of financial resources which characterize contexts like sub-Saharan African cities.

<sup>5</sup> The survey presented here is part of a broader research study in which several types of investigation have been performed: a) household questionnaires; b) ward and district questionnaires (to understand policies and instruments for

of the literature on peri-urban areas and through discussion at the ARDHI University of Dar es Salaam. Those four areas are as follows:

1. Rural-urban interaction;
2. Access to resources (land, water, energy, etc.);
3. Environmental management (water, waste, soil, etc.);
4. Climate change: environmental transformations and autonomous adaptation strategies.

Rural-urban interaction, economic flows, the flow of resources and socio-cultural relations are fundamental to understanding urban and regional development dynamics. The rural-urban divide has been addressed in key documents that constitute the core of the UN Habitat mandate. As underlined in the Istanbul Declaration and the Habitat Agenda (para. 613 and 169), rural and urban areas are interdependent from an economic, environmental and social point of view. As such, an integrated approach and balanced peri-urban plans in which the “urban” and the “rural” support each other are needed.

Questions regarding resource access aim, on the one hand, to identify resource use and the management regime, and on the other hand, to identify obstacles and opportunities in adaptation to climate change in peri-urban areas. Access to water, land, shorelines, sea and raw materials constitute determining factors in communities’ adaptive capacities. Similarly, resource management modalities have a considerable effect on the vulnerability of communities.

Finally, the questionnaire was designed to collect information on local autonomous practices and strategies for adapting to environmental changes, which, as established by COP 7 (Decision 28/CP.7), must be considered in identifying adaptation priority actions. Particularly, the research should help in understanding the environmental changes observed by residents of peri-urban areas, their perceptions of the causes of these changes and the strategies implemented to address them in both short and medium-term.

The questionnaires were completed by forty households selected in four different wards (ten in each ward) (Fig.1) in the Kinondoni District<sup>6</sup>: Bunju, Kunduchi, Kawe and Msasani. The wards were selected through a series of field visits, a review of the literature on Dar es Salaam’s peri-urban areas and discussion with academics from the Ardhi University. Within each of the four wards two subwards were identified, one in a coastal area and the other in an inland area, (to obtain a better distribution of the cases). Subwards *Bunju A* and *Boco* were selected in the Bunju ward; subwards *Madale* and *Mtongani* were selected in the Kunduchi ward; subwards *Makongo* and *Changanikeni* were selected in Kawe ward. The fourth ward is urban rather

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urban planning and environmental management in Kinondoni district); c) surveys and data collection (to gather data and information on the current status of natural resources, infrastructure and services, land use, informal activities, pressures and environmental concern in peri-urban areas); d) interviews with research development centres, government institutions and NGOs (to acquire broader knowledge on policies, programs and tools for natural resource management, for adaptation to climate change and for urban and regional development at the national and local levels).

<sup>6</sup> Dar es Salaam has a regional administration with three Municipal Councils, namely Ilala, Kinondoni and Temeke. The three Municipalities are the three districts of the Region and are divided into Divisions, which are in turn divided into Wards. Wards are divided into villages in the case of rural areas and Streets in the case of urban areas. At times the villages are divided into hamlets which are the smallest units.

than a peri-urban ward (recently urbanized). It has been selected as a control in order to verify the responses from the other three peri-urban wards.

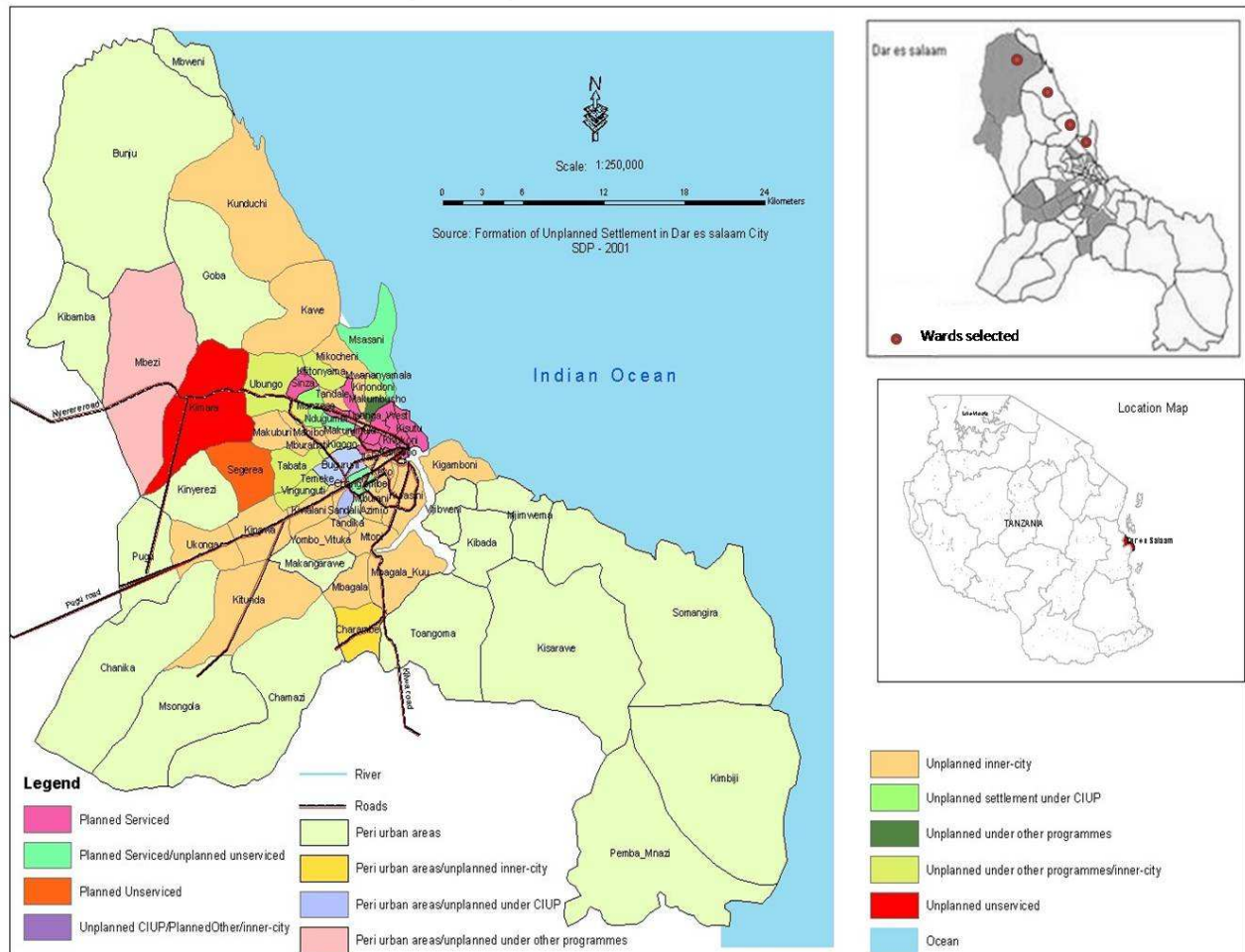


Figure 1. Dar es Salaam City – Municipal Boundaries (Source: Socio-Economic Survey city of Dar es Salaam, 2007)

All the wards are characterized by the coexistence of urban and rural activities (agriculture, livestock, businesses, schools, transport), informal settlements and activities, low-medium density settlement areas (each lot must be between 0.08 and 6 ha). The neighborhoods where the questionnaire was administered are located in areas with different environmental characteristics (coastal and inland areas with different morphologies) and close to major natural resources (rivers, ocean, wetlands, forests). Households were identified according to criteria of socio-economic and cultural heterogeneity in order to obtain a sample as representative as possible of the different dynamics of peri-urban areas. Furthermore, stable settled households, who were thought to have extensive knowledge of resources and local development dynamics and who are dependent on both urban and rural activities and resources, were selected.

The first methodological step in the design of the questionnaires was to define the strategic variables (contained in the four thematic sections mentioned above) for identifying the key factors for adaptive capacity. In the following section some of the variables that constitute the empirical base for evaluating the dominant approaches to vulnerability reduction are discussed.



## Results/Discussion

The analysis of the empirical data, collected in the four targeted wards in Dar es Salaam, shows that rural-urban interactions are crucial for livelihood maintenance in a changing environment, due to their economic, social and environmental relevance. Furthermore, households have developed multiple adaptation strategies and environmental management practices to cope with environmental threats, but these activities are still neglected in vulnerability assessment and adaptation planning. As a result, a need arises for a better understanding of the autonomous practices taking place in peri-urban areas and of the strategies for integrating those practices in to adaptation planning at the local level.

The analysis of the responses concerning *rural-urban interaction* showed that in the three wards the majority of households surveyed came from the same district, while only a few families were from other regions or other districts of Dar es Salaam. This shows that the development of peri-urban areas is not uniquely due to rural-to-urban migration flows; an urban to peri-urban migrations also exists, often induced by the upgrading programmes undertaken in those areas closer to the city centre from where several interviewees came.

Fifty percent of the respondents have indicated labour or family as their reason for moving to peri-urban e.g. the possibility to practice agriculture or free husbandry. Indeed peri-urban areas attract many people seeking a place which enables them simultaneously to undertake or continue rural activities and to be close to urban dynamics, benefits and facilities. People's movements between peri-urban areas and the inner-city, and vice versa, occur frequently and necessarily imply flows of people, resources, information, commodities, production inputs and decision-making power (Tacoli, 1998). It implicates that a plurality of activities and physical patterns exist which are based on urban and peri-urban interdependencies. Most respondents said they travelled to the city centre on a weekly basis (67%) while only 10% travelled either on a daily basis or only rarely. These movements are possible thanks to the local bus system (daladala) which serves almost every area of the region and is used by 90% of the respondents. In remote areas, this mode of transport is supplemented with private transport services by motorcycles and small vehicles (Bajaj and pikipiki).

The main sources of livelihood which were identified are agriculture and livestock (97%) along with other local informal activities (e.g. petty trade). For this and other reasons, the majority of respondents (83%) wish to live in environments with "free" spaces while only 17% of respondents wish to move to a more urbanized area with better infrastructure and facilities.

The second section of the survey highlighted *access to resources* such as water, land and energy and the presence or absence of related facilities in the areas where they live, including solid and liquid waste collection. In this section land tenure arises as an important issue linked to the urban planning process and actions implementation. Among respondents, over 60% do not have land title (for house and land), more than 30% have a title deed for rent (leasehold title), and the remaining 7% own a customary title (right of occupancy derived from ancient communities. This title is becoming ever less popular and, although legally

recognized, is not protected if other interests arise in urban development (Kironde, 2005). Even if only 30% have a title deed, almost all respondents claim they pay taxes for land and housing. This means that in some cases there are “indirect” and informal fiscal systems. For example people who don’t have a title deed and rent their land or their house from other land “owners”, may also pay taxes for services or land uses to the owner. In addition, 26% pay fees for water and electricity and only 9% have to pay for waste collection services which are often provided illegally by private parties (this happens especially in denser areas).

The responses concerning *resource management*, which also includes waste management, indicate that only 6% of households use a collection system provided by private parties while the remaining 94% manage waste autonomously. Of that 94%, some manage waste by burning, abandoning and burying it (46%), or by recycling useful materials and composting organic waste to be reused as fertilizer (46%). The remaining 8% of autonomous waste managers practice other activities like collecting materials, such as plastics or metals, for sale to companies or people that can treat or reuse them. Concerning sewage, no one uses a collection and disposal system; it is usually abandoned in pits until saturation (pit latrine). Only in very rare cases is a septic tank used. Most of households also undertake practices for water management, such as rain water harvesting, and rely on a variety of water sources. There are also informal groups and community-based organizations for maintenance of roads, canals, common spaces etc.

Regarding the section on *climate change*, almost all respondents noted changes in water availability, soil fertility, soil aridity, air humidity and rain patterns. Results show that water availability has been declining significantly in recent years. Rivers which normally flowed year round have become seasonal, and the water previously drawn from shallow pits in the wetlands or near rivers has decreased, requiring deeper digging. Other significant changes were observed both in the amount of rain and in normal seasonal rainfall patterns. Furthermore, a significant erosion of the coastline (approximately 100 meters in the last 30 years in some places) has occurred, changing villages morphology and fishermen's activities. These and other environmental changes result from a complex set of factors which include global warming as well as anthropogenic pressures and inadequate local environmental and urban policies.

Different strategies for coping with environmental changes are being implemented. Because of the decrease in water availability, many people change crop systems (e.g. moving from rice to cassava, which requires less water) or decide to stop farming and start breeding livestock. Most respondents, who have been observing rapid and significant environmental changes in recent years, are contemplating plans for coping with further deterioration of environmental conditions which go beyond immediate reactive solutions. They are considering strategies such as change of employment, transition from subsistence activities dependent on natural resources to activities only partially or indirectly dependent on them (eg trade or small business). In some cases respondents have even thought of moving to another area or returning to their rural native region.

These strategies are being considered not only in response to exasperation of environmental problems but also in the event of higher population pressure and new urban developments, which would interfere with ordinary practices and activities (e.g. agriculture, livestock keeping, etc). This response is partly linked to the

causes to which respondents attribute environmental change. These environmental changes are equally attributed to changes in land use, local anthropogenic actions (mainly urban development) and global environmental change, which is more or less human-induced. In addition, only a few people attribute the ongoing changes to weak institutions and mismanagement of resources.

## **Conclusions**

The survey consisted of a limited number of interviews, could only observe some aspects (not all included in this paper) of households' behaviour and peri-urban dynamics. It is not possible to obtain generalized conclusions, but the information collected is an important starting point for structuring a more comprehensive and targeted survey, with more tailored questionnaires. Involving a larger sample of households in the survey could be useful in assessing the potential impacts of climate change and adaptive capacity and in developing methodologies and knowledge for supporting the design of appropriate local adaptation actions.

It is, however, necessary to consider a number of constraints on survey methodology and its application. Some of the most obvious obstacles are local authorities' lack of adequate knowledge and capacity as regards planning processes and implementation which are mainly based on "western principles", and limited knowledge of climate issues at the local level. The limited financial resources and the different priorities which need to be addressed (natural disasters, health and environmental emergencies, etc) often determine that medium and long term planning gets pushed aside and that projects which are not included in the short term policy are rarely implemented.

The results described in the previous paragraph demonstrate that the blend of "rural" and "urban" features is crucial for people's livelihoods and thus strictly linked to their adaptive capacity. To ignore the importance of the availability of land for farming and other activities, the possibility of reusing waste materials, the variety of water sources, and the different "informal" dynamics (and opportunities) could damage people's livelihoods and compromise their assets.

Movements of people, information, money and commodities intensify rural-urban linkages and increase livelihood diversification. Temporary or permanent migration, to or from the city, motivated by the search for jobs and living spaces, is a helpful mechanism for increasing earnings, expanding social networks and reducing vulnerability. Mobility and migration may also give rise to a growing phenomenon of 'multi-spatial' households and enterprises (Adell, 1999).

Peri-urban development and migrations may generate a local market for street vendors and hawkers, and the arrival of high-middle income dwellers, in search of more space for living or cheaper housing. This, in turn, may constitute job opportunities for domestic help workers.

Easy access to a variety of transport options enables a high frequency of commuting between peri-urban-areas and the city centre giving commuters access to services such as health and education as well as work opportunities.

Intense rural-urban interplay also creates the possibility of access to solid and liquid waste facilities. The growing flows of liquid and solid waste out of the city into surroundings areas and between peri-urban neighborhoods, although it might also be associated with health problems, represents opportunities for reducing the use of commercial fertilizers in agriculture, or for recycling solid waste for sale in the city. This contributes to an increase and diversification of sources of income.

Rural-urban interplay could also facilitate access to information and decision-making processes and structures (usually better represented in urban areas). In a rapidly changing environment access to environmental information and warning systems may be crucial in risk and vulnerability reduction.

Peri-urban dwellers have access to resources but this access is oriented by an “urban biased” development. Although (in peri-urban areas) there are several options for water supply, land uses, housing or other activities, most urban-oriented development plans may undermined these opportunities by ignoring the positive effects of the plurality of opportunities on people’s livelihoods and vulnerability.

Providing infrastructure and services, to accelerate the transition to the “urban” may, on the one hand, reduce vulnerability, but on the other hand it may modify or damage the livelihoods system and its flexibility. The focus on infrastructure “protection” and economic competitiveness as basic requirements for addressing environmental threats leads to the expulsion of hybrid practices and land uses in peri-urban areas. Conversion from peri-urban to urban uses (or pressure to convert) increases commercialization of land, thereby changing peri-urban areas into investment zones where customary practices of land allocation are no longer possible or allowed. This also implies a land regularization process and the imposition of certain fees, which may force poorer people to migrate, further marginalizing them, and making them more vulnerable to environmental changes and heavily impacting their livelihoods.

Peri-urban dwellers have a high capacity to change and adapt the ways in which they access and manage resources but at the same time they are exposed to considerable uncertainty.

The presence of multiple autonomous adaptation strategies and environmental management practices could be a crucial resource in the absence of financial revenues. Institutions responsible for implementing adaptation strategies at the local level are required to better understand how urban development and planned interventions impact on community’s adaptive capacity, both positively and negatively, and how existing approaches could be improved in order to contribute to communities’ adaptive capacity.

In the broader discussions of environmental sustainability there is increasing concern over *urban ecological security* (UES) which generates *strategies to reconfigure cities and their infrastructures* in order to *secure their ecological and material reproduction*. In addition to other contemporary sustainability challenges, UES is expected to respond to *the opportunities and constraints of resource constraints and*

*climate change* (Hodson and Marvin, 2009). In their paper, Hodson and Marvin stress the new dominant 'logic' of infrastructure provisioning which is characterized as *Secure Urbanism and Resilient Infrastructure (SURI)*, and express their concern about "how the pressures of UES and SURI as a strategic response are designed to secure the divisible securitization of resources at the metropolitan scale[...], rather than actively contributing to wider collective solutions for the implications of climate change and resource constraints (Hodson and Marvin 2009 p. 212). Their primary criticism is that the predominant focus is on economic aspects in urban governance, while ecological aspects are neglected.

The same article also questions the applicability of the *urban ecological security* approaches and solutions in contexts that are different from world cities: "World cities are using their capability, resources and networks to develop a style of transcendent urbanism that is claimed can overcome the potential limits of climate change and resource constraints to guarantee future economic and territorial growth. Critically, we need to ask what this means for the by-passed places, the new peripheries constructed by 'enclosure' and the ordinary cities of the North and global cities of the South. The implication is that such cities simply 'make-do' or 'improvise' with their restricted resources and constrained capacity as world cities establish themselves as ecologically secure spaces. Alternatively, 'ordinary' cities and cities of the south are configured as potential new markets that 'consume' the architectural and engineered eco-city fixes produced in the exemplary world cities. (Hodson and Marvin, 2009, p. 210).

There are, however, alternative approaches to SURI (e.g. transition towns) than may help in developing alternative or hybrid solutions. These alternative approaches aim to construct responses based on other principles, such as fair shares, mutual interdependences, social justice and the styles of *socio-technical solutions these would imply* (Hodson and Marvin, 2009).

This document has provided a overview of the problems linked to adaptation to climate change. It has highlighted the dynamics and resources of the peri-urban interface, and paid particular attention to areas, processes and functions that can be determinant for both the development of adaptation strategies and actions implementation.

The information obtained through the field survey is essential to identifying sustainable and viable adaptation options. Not only does it provide data on environmental management and autonomous adaptation strategies, it also reveals a neglected part of urban and rural-urban development processes; highlighting the conflicts and contradictions between urban development (under the dominant logic of ecological security) and peri-urban dynamics. Further studies focused on the peri-urban context and on rural-urban dynamics may contribute to a reduction in the uncertainty surrounding climate change projection. If the global scenarios are well known, what people are experiencing at the local level and which strategies and action they are undertaking require even more exploration.

Ultimately, if environmental change is tied to rapidly evolving social and economic landscapes (as it is in peri-urban areas), the challenge of defining appropriate measures for avoiding increased vulnerability is

greater. Enhancing adaptive capacity in this context requires a conception of populations and communities as an integrated system, free of the urban bias, where urban and rural features, cultures, economies, natural cycles and livelihoods are interdependent and mutually vulnerable.

As pointed out by Adell (1999), those who stressed the importance of the urban bias, relying on the socially reductionist assumptions “*that the main difference between rural and urban consists in their social ‘classes’*” do not consider “*the conflation of people and space*”. People, not places and physical infrastructure, are responsible for creating the flows, practices and relations between rural and urban areas and environmental management processes.

## References

Adell G. 1999, Theories and models of the peri-urban interface: a changing conceptual landscape, Literature review, Strategic environmental planning and management for the peri-urban interface. Research project. Development planning unit, University College London, London.

Adger, W.N., and S. Agrawala, with M.M.Q. Mirza, C. Conde, K. O’Brien, J. Pulhin, R. Pulwarty, B. Smit and K. Takahashi. 2007, Assessment of adaptation practices, options, constraints and capacity. In: Climate Change 2007: 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., Cambridge University Press, Cambridge, UK, 717-743.

Adger, W.N. and Vincent, K. 2005, Uncertainty in adaptive capacity (IPCC Special Issue on ‘Describing Uncertainties in Climate Change to Support Analysis of Risk and Options’) *Comptes Rendus Geoscience*, 337, 4, 399-410

Adger, W. N. 1999, Social vulnerability to climate change and extremes in coastal Vietnam, *World Development* 27(2), 249-269.

Allen, A 2003, Environmental Planning and Management of the Peri-Urban Interface: Perspectives on an Emerging Field, *Environment and Urbanization*, 15 (1), 135–147

Brand, F. S., and K. Jax. 2007, Focusing the meaning(s) of resilience: resilience as a descriptive concept and a boundary object. *Ecology and Society* 12(1): 23

Brooks, N. and W.N. Adger 2005, Assessing and enhancing adaptive capacity. *Adaptation Policy Frameworks for Climate Change*. B. Lim, E. Spanger-Siegfried, I. Burton, E.L. Malone and S. Huq, Eds., Cambridge University Press, New York, 165-182

Brook, R. and Davila, J. D. 2000, The peri-urban interface: a tale of two cities. Development Planning Unit, UCL, London, UK

Dahiya, B. 2003, Peri-urban environments and community driven development: Chennai, India, *Cities*, Vol. 20, No. 5, p. 341–352

Dar es Salaam City Council 2004, City Profile for Dar Es Salaam, United Republic of Tanzania

Douglas, I. 2006, Peri-urban ecosystems and societies transitional zones and contrasting values. In *Peri-Urban Interface: Approaches to Sustainable Natural and Human Resource Use*, edited by D. McGregor, D. Simon, and D. Thompson, pp. 18-29. London, UK: Earthscan Publications Ltd

Eakin, H., Lerner, A.; and Murtinho, F. 2010, Adaptive capacity in evolving peri-urban spaces: Responses to flood risk in the Upper Lerma River Valley, Mexico. *Global Environmental Change*

Erling, G. 2007, Multifunctional agriculture and the urban-rural interface. in Laband DN, ed. 2007. *Proceedings, Emerging Issues Along Urban-Rural Interfaces II: Linking Land-Use Science and Society*. Atlanta, GA: Auburn Univ. Cent. For. Sustain. 320 pp. <http://www.sfw.s.auburn.edu/urbanruralinterfaces> pp. 275–78

Folke, C. 2006, Resilience: the emergence of a perspective for social–ecological systems analysis. *Global Environmental Change* 16

Friedmann, J. 2005, Globalization and the emerging culture of planning, *Progress in Planning* 64 (2005) 183–234

Hill, A.; Lindner, C. 2010, Modelling informal urban growth under rapid urbanisation - A CA-based land-use simulation model for the city of Dar es Salaam, Tanzania. Doctoral thesis, TU Dortmund University Available at <https://eldorado.tu-dortmund.de/handle/2003/27283> [accessed, January 2011]

Hodson, M. and Marvin, S. 2009, ‘Urban Ecological Security’: A New Urban Paradigm?. *International Journal of Urban and Regional Research*, 33:193–215

IPCC 2007a , *Climate Change 2007. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds) Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

IPCC 2007b, *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007* Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.

Tignor and H.L. Miller (eds.) Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Julio D. Davila 2002, Rural-urban linkages: Problems and opportunities, *Espaço e Geografia*, Vol. 5, No. 2 pp. 35-64

Kironde, J.M.L. 2005, Current changes in customary/traditional land delivery systems in sub Saharan African cities: The case of Dar es Salaam city

Kyessi S.A, Misigaro A., Shoo J. 2009, Formalisation of Land Property Rigths in Unplanned Settlements: Case of Dar es Salaam, Tanzania, TPAT, Issue No. 6, May 2009

Kombe, W., Kreibich, V. 2006, The governance of informal urbanisation in Tanzania. Mkuki na Nyota Publishers, Dar es Salaam

Kombe, W.J. 2005, Land use dynamics in peri-urban areas and their implications on the urban growth and form: the case of Dar es Salaam, Tanzania, *Habitat International*, 29, 113–135

Lupala, A. 2002, Peri-urban land management for rapid urbanisation. The case of Dar es Salaam. SPRING Research Series 32, Dortmund

Marshall N.A., Marshall P.A., Tamelander J., Obura D., Malleret-King D. and Cinner J.E. 2010, A Framework for Social Adaptation to Climate Change; Sustaining Tropical Coastal Communities and Industries. Gland, Switzerland, IUCN. v + 36 pp.

Marshall, F., Waldman, L., MacGregor, H., Mehta, L. and Randhawa, P. 2009, On the Edge of Sustainability: Perspectives on Peri-urban Dynamics, STEPS Working Paper 35, Brighton: STEPS Centre

Mattingly M. 2009, Making land work for the losers. Policy responses to the urbanization of rural livelihoods. *International Development Planning Review*, 31(1): 37-64

McGregor D, Simon D, Thompson D, eds. 2006, The Peri-Urban Interface: Approaches to Sustainable Natural and Human Resource Use. London/Stirling, VA: Earthscan. 336 pp.

Pickett, S. T. A., M. L. Cadenasso, and J. M. Grove. 2004, Resilient cities: meaning, models, and metaphor for integrating the ecological, socio-economic, and planning realms. *Landscape and Urban Planning* 69: 369-384

Preston, D. 1994, Rapid Household Appraisal: A Method for Facilitating the Analysis of Household Livelihood Strategies. In: *Applied Geography*, 14(3): 203-213



Roy, A. 2005, Urban informality – Towards an epistemology of planning. *Journal of the American Planning Association*, 71 (2), 147-158

Satterthwaite, D. 2008, Adapting to climate change, in *id21 insights* 71 January 2008, research findings for development policymakers and practitioners. *Climate change and cities*, p. 2. Available at <http://www.eldis.org/id21ext/publications/insights71.pdf> [accessed, January 2011]

Satterthwaite, D., Huq, S., Pelling, M., Reid, A. and Romero-Lankao, P. 2007, *Building Climate Change Resilience in Urban Areas and among Urban Populations in Low- and Middle-income Countries*, commissioned by the Rockefeller Foundation, International Institute for Environment and Development (IIED) Research Report, 112 pp.

Sen, A. K. 1984, *Resources, Values and Development*. Blackwell, Oxford.

Simon, D. 2010, The Challenges of Global Environmental Change for Urban Africa, *Urban Forum* (2010) 21:235–248

Simon, D. 2008, Urban Environments: Issues on the Peri-Urban Fringe, *Annual Review of Environment and Resources*, Vol. 33: 167 -185

Smit, B., Wandel, J. 2006, Adaptation, adaptive capacity and vulnerability. *Global Environmental Change* 16 (3), 282–292

Stern, N. 2007, *The Economics of Climate Change: The Stern Review*, Cambridge: Cambridge University Press

Tacoli, C. 1998, “Rural–urban interactions; a guide to the literature”, *Environment and Urbanization*, 10 (1), 147–166.

United Nations Human Settlements Programme (UN-Habitat) 2003, *The Challenge of Slums: Global Report on Human Settlements 2003*, London: Earthscan

Tanner, T., Mitchell, T., Polack E., and Guenther, B. 2009, *Urban Governance for Adaptation: Assessing Climate Change Resilience in Ten Asian Cities*, IDS Working Paper 315

UNDP 2009, *UNDP Climate Change Country Profiles*. Tanzania, C., McSweeney, M. New and G. Lizcano, <http://country-profiles.geog.ox.ac.uk>, General Climate

UN-Habitat 2010a, *State of African Cities 2010, Governance, Inequalities and Urban Land Markets*, Nairobi: United Nations Human Settlement Programme

UN-Habitat 2010b, Population of African cities to triple, Spokesperson & Head Press & Media Relations Unit. Available at <http://www.unhabitat.org/documents/SOAC10/SOAC-PR1-en.pdf> [accessed, January 2011]

UN-Habitat 2010c, Informal Settlements and Finance in Dar es Salaam, Tanzania, Nairobi, 2010

UN (United Nations) 2010, World Population Prospects: The 2008 Revision and World Urbanization Prospects: The 2009 Revision, <http://esa.un.org/wup2009/unup/>, Wednesday, February 09, 2011