INTERIM NARRATIVE REPORT

Project title:	**Adapting to Climate Change in Coastal Dar es Salaam**
Project acronym:	**ACC Dar**
Grant Contract Beneficiary:	**Sapienza University of Rome**
Contact Person:	**Prof. Silvia Macchi**
Partner in the Action:	**Ardhi University Dar es Salaam**
Associate in the Action:	**Dar City Council**
Reporting period:	**From 01/02/2012 to 31/12/2013**
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Data contribution and reviews to the successful submission of this report have been provided by all the project team members.

The project is co-funded by European Union

Table of contents

List of figures

List of photos

ANNEX VI
INTERIM NARRATIVE REPORT

1. DESCRIPTION

1.1. Name of beneficiary of grant contract: Sapienza University of Rome

1.2. Name and title of the Contact person: Prof. Silvia Macchi, Project Coordinator

1.3. Name of partners in the Action: Ardhi University of Dar es Salaam (ARU)

1.4. Title of the Action: Adapting to climate change in coastal Dar es Salaam (ACC DAR)

1.5. Contract number: 2010/254-773

1.6. Start date and end date of the reporting period: from 1st of February 2012 to 31st of January 2013

1.7. Target country(ies) or region(s): Tanzania, Dar es Salaam

1.8. Target groups: Dar's municipalities and their wards laying on the Ocean coast

Final beneficiaries: Inhabitants of Dar's coastal areas

1.9. Country(ies) in which the activities take place (if different from 1.7):

2. ASSESSMENT OF IMPLEMENTATION OF ACTION ACTIVITIES

2.1. Executive summary of the Action

ACC Dar project aims at improving the effectiveness of Dar's municipalities initiatives for supporting those coastal peri-urban dwellers partially or totally depending on natural resources in their efforts to adapt to CC impacts. More specifically, the action will improve the capacities of Dar's municipalities by providing them with enhanced methodologies for mainstreaming adaptation into their Urban Development and Environment Management (UDEM) strategies and plans, and by increasing their understanding of adaptation practices.

This report covers the second year of the project from 1st of February 2012 until 31st of January 2013. The Department of Civil and Environmental Engineer of Sapienza University of Rome (SAPIENZA) is the project coordinator, Ardhi University (ARU) is the local partner and the Dar City Council (DCC) is acting as associate. The three Dar's municipalities of Ilala, Temeke and Kinondoni has been the main stakeholders in the action implementation.

In the framework of the work package 1 "Improve Understanding in Adaptation", the statistical analysis of data from the 6000 households survey provided relevant knowledge on the nature and components of adaptive capacity in coastal Dar's peri-urban areas. From the analysis results two issues have been identified as focal topics for the household adaptive strategies: access to water and access to land, chosen respectively to focus the participatory activities held in March 2012 in Kinondoni and in September 2012 in Kigamboni involving around 800 residents. The findings from the households and local institutions surveys have been evaluated during the International Workshop held in Dar es Salaam from 6th to 8th of June 2012.

In the framework of the work package 2 "Develop Methodologies for Designing Adaptation Initiatives", three research teams are working in parallel. One team already developed and validated the methodology to monitor Land Cover changes, using remote sensing images (land cover maps and related working papers are published into the project web site). Its results are feeding into the work of the second team, who is performing the monitoring of coastal shallow watershed, to create scenarios on people's vulnerability to seawater intrusion and identify priorities for adaptation. The third team is working on the methodology to ensure people's participation in the goal formulation process, using back-casting scenario techniques. A preliminary framework of the whole workflow from land cover mapping and groundwater monitoring to goal formulation has been defined. The results of this WP will be presented in the International Workshop foreseen in Rome on April 2013.

As regards the work package 3 "Build the Capacity of Dar's Municipalities" in understanding CC issues, designing adaptation activities and integrating them in their UDEM strategies and plans, the capacity-building strategy has been prepared. The assessment of the needs to be addressed in the action, the selection of participants, the training programme and the development of all the necessary materials have been finalized. The capacity-building includes 3 weeks of residential training during 6 months tutored on the job training aimed to develop the trainees' capabilities for mainstreaming adaptation goals into their daily job and an event to present their proposals for adaptation to the wider public. The target for the capacity-building are 40 officers from DCC, Dar's municipalities and the Wami Ruvu Water Basin Office. The strong commitment and the availability of the local authorities at all institutional levels remain an asset to secure project goals achievement.

Since the start of the project, a considerable effort has been put into the dissemination of its activities and results in order to spread information about the ongoing activities, to enlarge networking, to involve new stakeholders interested, to share knowledge about the scientific findings.

2.2. Activities and results

The project does not aim at preparing an additional plan, rather it seeks to build knowledge and develop methodologies with a twofold purpose: mainstreaming adaptation objectives in current plans and programs related to Urban Development and Environmental Management and contributing to improve their effectiveness.

The conceptual framework of the project could be represented using this chart, based on Füssel, H.-M. and R.J.T. Klein, 2006: Climate change vulnerability assessments: an evolution of conceptual thinking. Climatic Change, 75(3), 301-329.

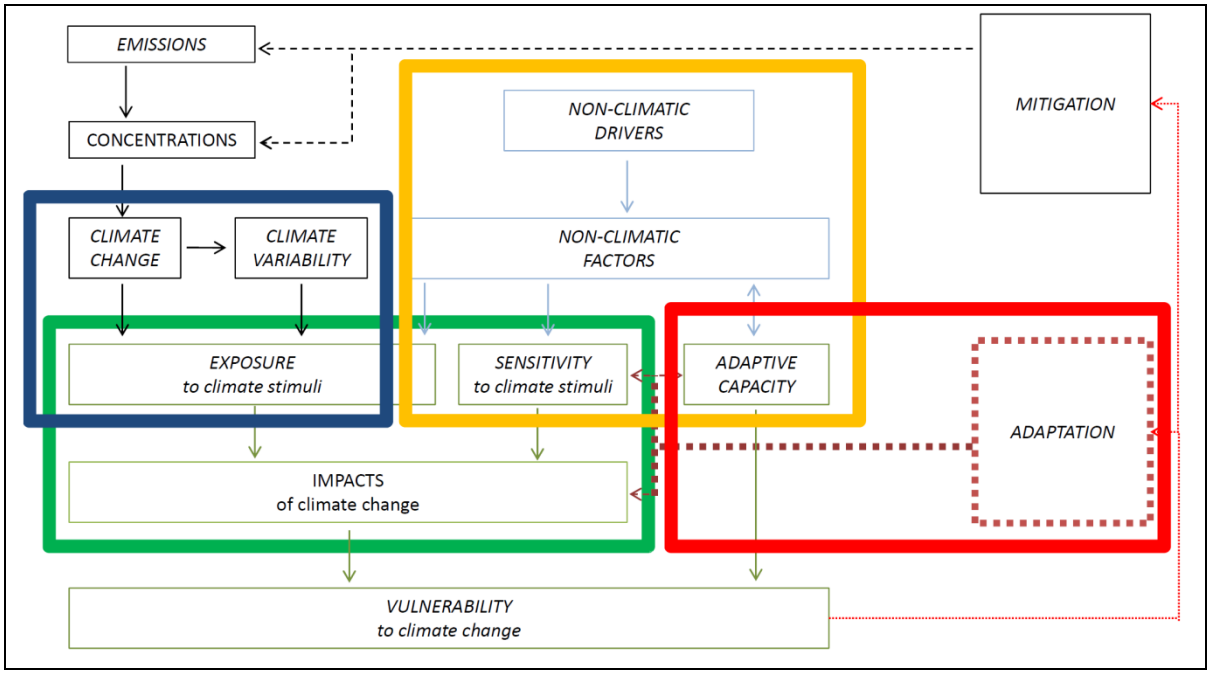

Figure 1 Conceptual framework covered by the project activities

The functional relations of the sub-activities and the main outcomes of the project could be summarized as following:

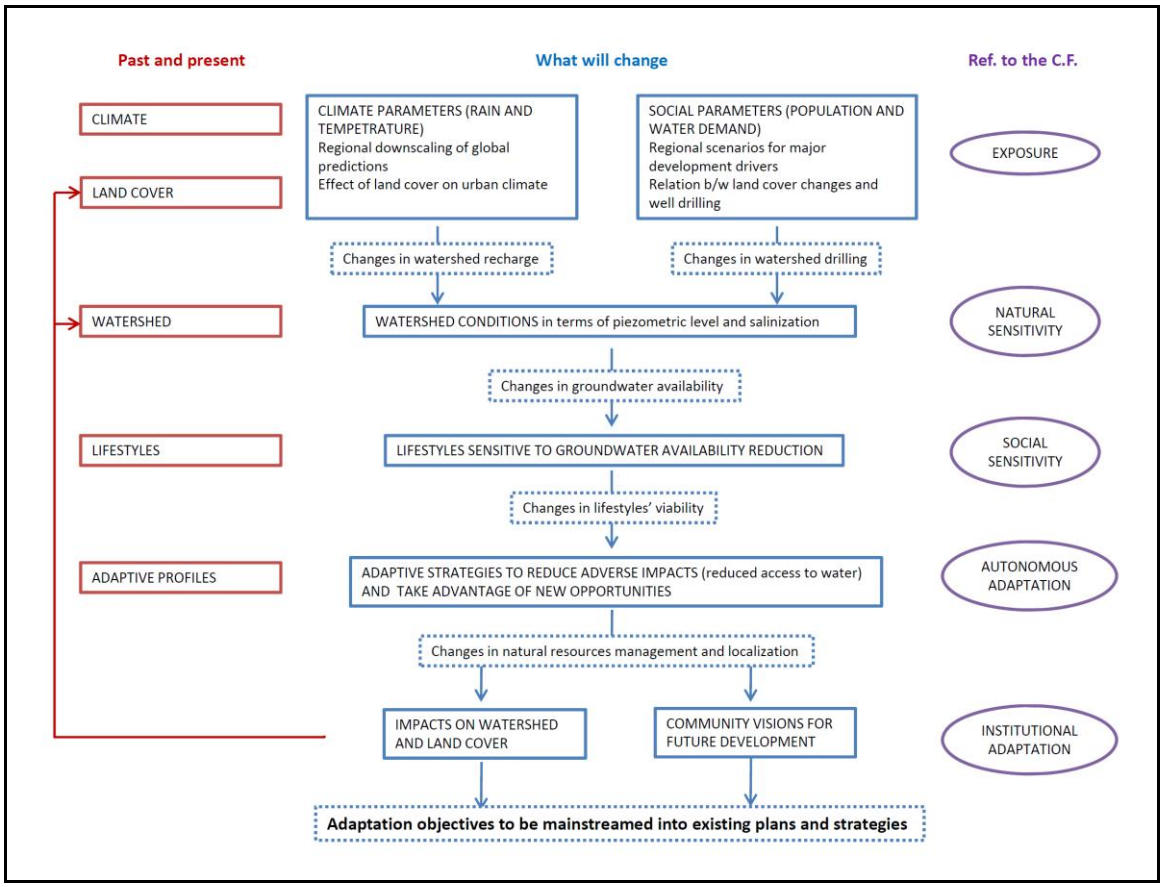

Figure 2 Functional relations framework

WORK PACKAGE 1: "IMPROVE UNDERSTANDING IN ADAPTATION"

The activities foreseen are all devoted to the purpose of increasing knowledge on autonomous local capacity to adapt to CC and raising awareness on adaptation issues.

Activity 1.1 "Investigate the livelihoods of population dependent on natural resources and their concern for CC"

Objectives

The main objective of the activity 1.1 is to provide an assessment of climate related concerns for the population living in coastal Dar's unplanned and underserviced neighbourhoods, where the dependence of livelihoods on locally available natural resources is usually quite high. Those people are already experiencing a number of environmental changes (decreasing availability of water, loss of land along the seashore, etc.). In response to these changes, they autonomously carry out adaptation activities (e.g. changing water sources, type of crops or livestock, land and soil management, differentiating household activities, etc.), which in turn impact their living environment and entail changes to social relations, values and livelihood priorities.
Analysis of the data collected by interviewing a sample of approximately 6000 households is expected to provide valuable information on Dar's municipal services, which will facilitate a better understanding of the relationship between climate change and livelihood strategies in peri-urban Dar. More specifically, the study focuses on what natural resources peri-urban households have access to, how they use the natural resources at their disposal, what changes in climate they have observed, and what strategies they have adopted to cope with those changes..
Besides knowledge enhancement, the study also aims to build a basis for the development of a survey procedure. This procedure is tailored to the capacity of Dar's municipal services and can be used to monitor the above-mentioned topics. It is hoped that this will allow for evaluation of institutional adaptation initiatives that support peri-urban households in their effort to cope with climate change.

Description of the activity

The development of the whole activity 1.1 includes several steps, summarized by the following workflow.

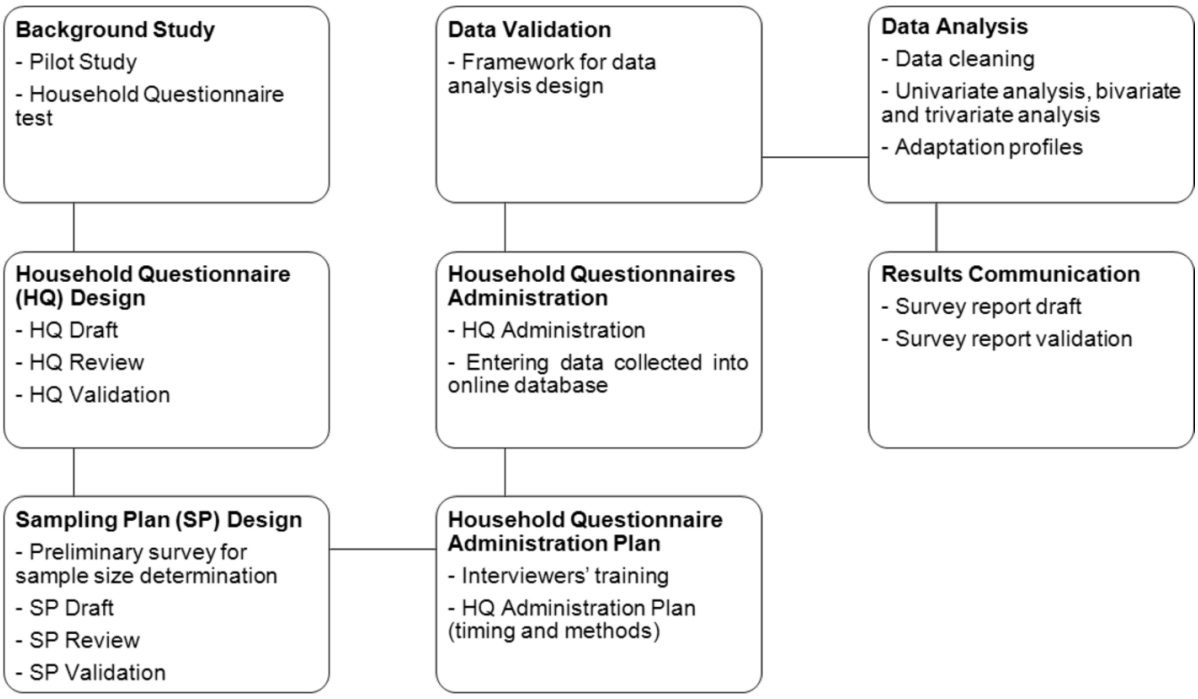

Figure 3 Activity 1.1 Workflow

The reporting period relates the last two phases of the workflow: Data Analysis and Results Communication.

Achieved results

Within the coastal plain sixteen wards were identified for questionnaire administration to a sample of the households. The sample size (5%) was estimated from census data provided by the local government (120.000 households) and the number of households selected for questionnaire administration was 6000. The household questionnaires were administered face-to-face using a hard copy version. Later on, the data collected were entered by the interviewers into an online database.
The data analysis was conducted in January-February 2012 by SAPIENZA and ARU by using the following techniques: univariate (frequencies), bivariate (two-way), and trivariate analysis (three-way cross-tabulation). Variable frequencies were analysed for all the questionnaire sections while two-way cross-tabulation was used to analyse the covariation among variables from different questionnaire sections. Three-way cross-tabulation was used to specify, interpret and explain relations already investigated between two variables. Those analyses were then combined in order to define few households' adaptation profiles.
The findings and conclusions of the data analysis are described into details in the Working Paper 1.1 "Investigating the Livelihoods of the Population Dependent on Natural Resources and their Concerns Regarding Climate Change" accessible at

http://www.planning4adaptation.eu/Docs/papers/08_Working_Paper_Activity_1.1.pdf

It is worth noting the key findings from data related to the environmental changes observed by residents of peri-urban areas, their perception of the causes of these changes and the strategies implemented to address them in both the short- and medium-term. The frequency and relation with characteristics of peri-urban households have been analysed for each of these topics.

The results show that the households involved in the survey have developed multiple adaptation strategies and environmental management practices to cope with environmental threats, and that those strategies are linked to modalities of accessing resources, household activities and dependence on natural resources.

The analysis was conducted focusing on the relation and interdependence between:

- household characteristics and observed environmental changes
- household characteristics and adaptation strategies
- adaptation strategies and main sources of income
- dependence on natural resources and adaptation strategies
- adaptation strategies and rural-urban relation
- adaptation and land tenure regime
- adaptation strategies and modalities of accessing water
- income level and future adaptation strategies

These relations have been explored by identifying three classes of resource dependency:

- Dependent, which includes households engaged in farming, livestock, fishing, or charcoal making as their main source of income, who possibly practice agriculture as secondary activity
- Partially Dependent, which includes households engaged in shop/small businesses or employed in urban areas but practice agriculture as secondary activity
- Not Dependent, which includes households engaged in shop/small businesses or employed in urban without secondary activities.

Some of these relations are shown in the following figures.

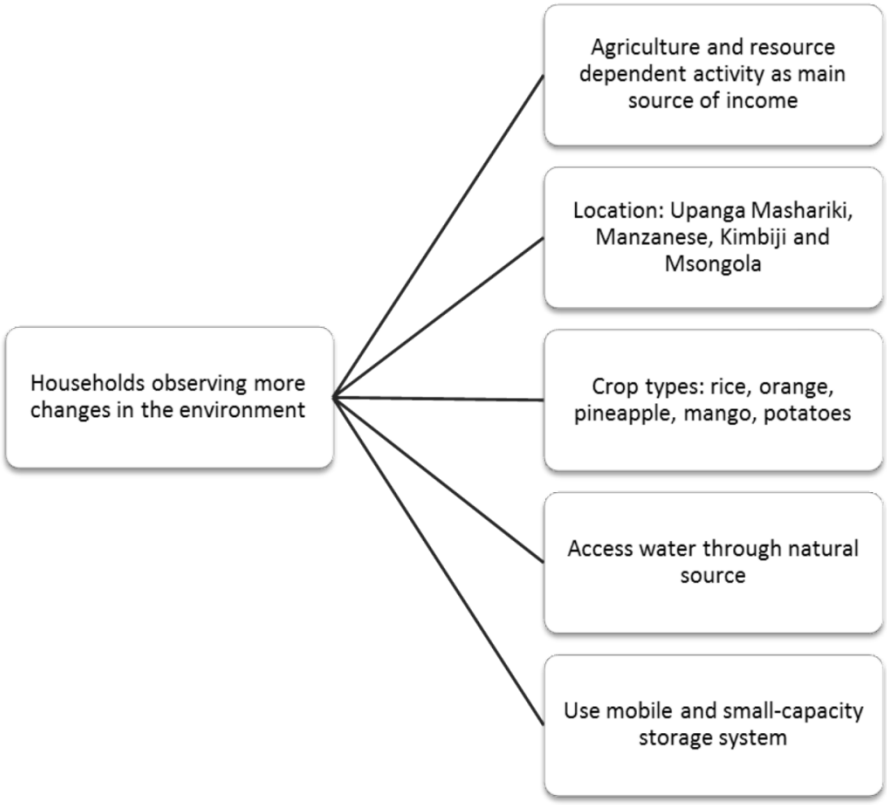

Figure 4 Characteristics of Households Observing More Environmental Changes

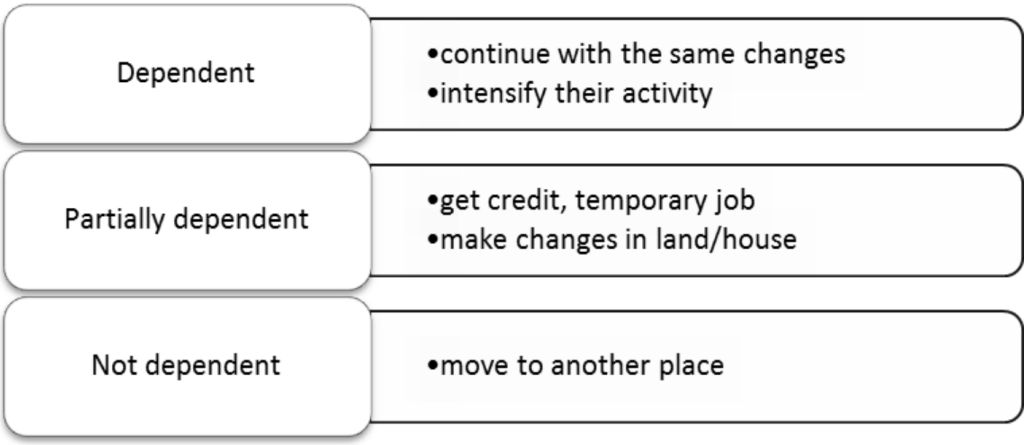

Figure 5 Relation Between Dependence on Natural Resources and Adaptation Strategies

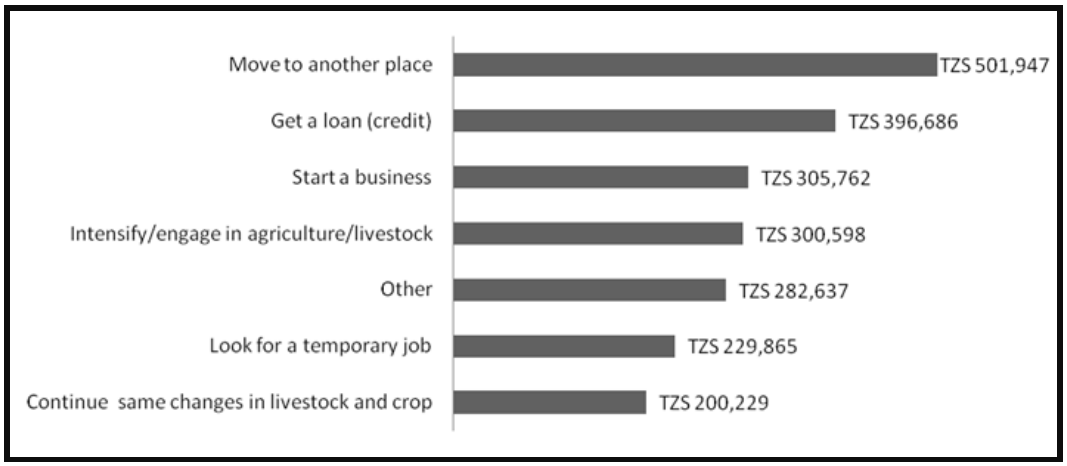

Figure 6 Mean Income for Each Future Adaptation Strategy

According to the findings of the analysis, two types of adaptation profiles can be discerned, as shown in the Figure below here.

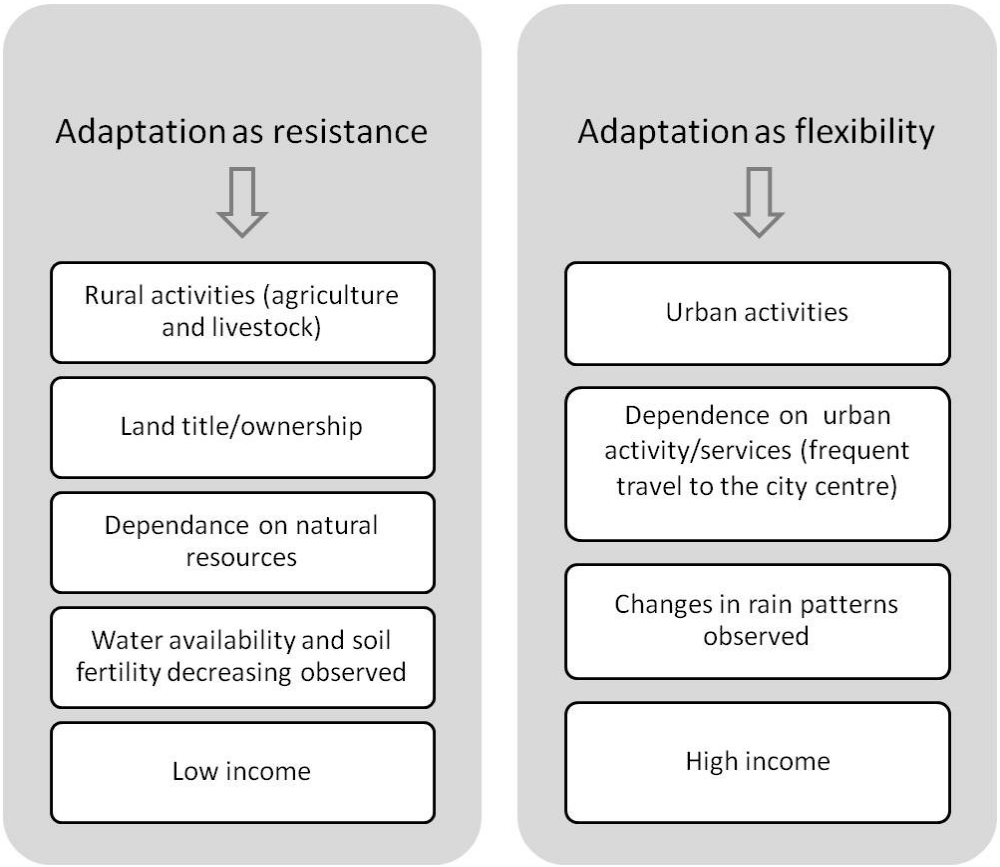

Figure 7 Characteristics of Households Oriented to Flexible or Resistant Adaptation Strategies

The first profile type describes families who are more oriented to "resistance", to staying in the same place, and adapt by improving or intensifying the activities they are already practicing, and changing the characteristics of their land and house according to environmental changes. Those households usually practice rural activities as their main source of income or as secondary activities, and typically have the ownership or a title deed for their land. They are totally or partially dependent on natural resources and have a low mean income. Furthermore, being engaged in agriculture and livestock, they are more sensitive to changes in water availability and soil fertility.
The second profile type describes households adopting "flexible" adaptation strategies. Those households are likely to move to other places, to change their income activities and to modify their livelihoods arrangements. They are engaged mainly in urban activities, have a strong dependence on the city centre and a high mean income as compared with the other profile type. The environmental changes they observe are mainly variations in rain patterns.

Conclusions

The analysis of data from the household survey provided relevant knowledge on the nature and components of adaptive capacity in coastal Dar's peri-urban areas.
A better understanding of the relationship between the characteristics of peri-urban households' and their autonomous adaptation strategies is the primary result. There is a twofold interaction between the two sets of information. First, autonomous adaptation practices impact the characteristic features of the peri-urban, either in a positive or negative way. Second, those features function as both opportunities and constraints for the diverse adaptation practices that peri-urban dwellers undertake to cope with changes in their living environment.
A visual representation of this relationship is as follows:

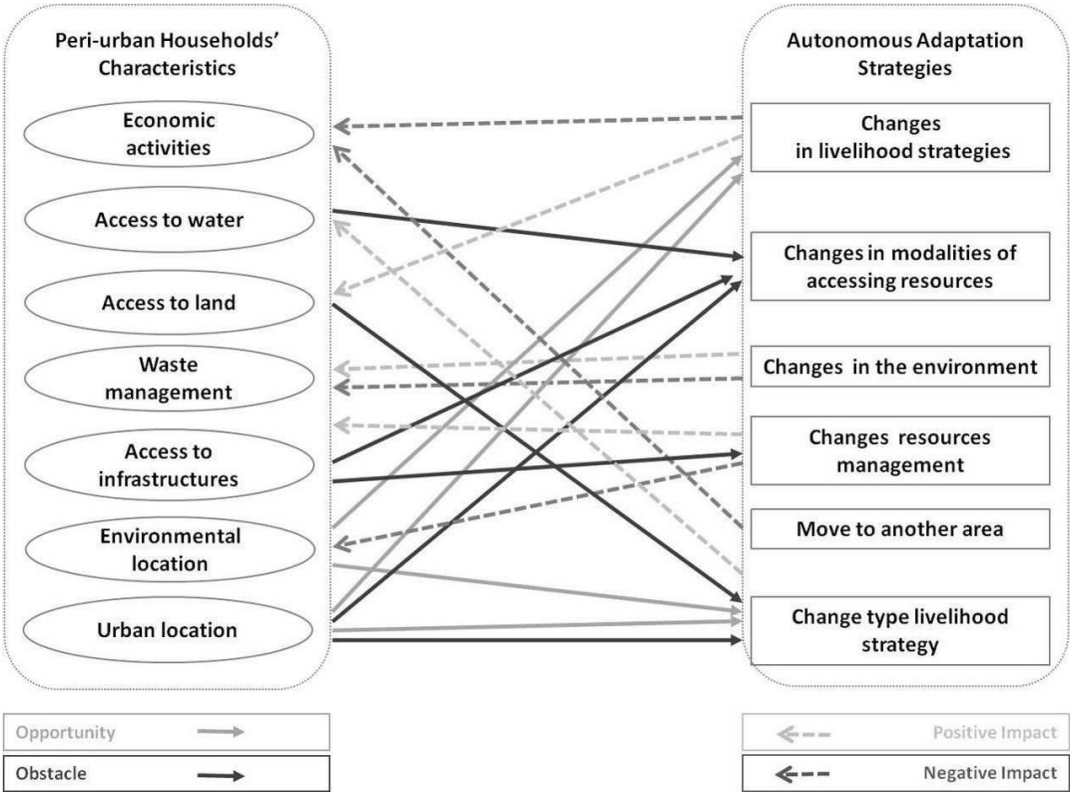

Figure 8 Reciprocal Interactions Between Peri-Urban Households' Characteristics and Autonomous Adaptation Strategies

The analysis shows that peri-urban households' adaptive capacity is linked to the possibility of diversifying sources of income and modalities of accessing water, land and other resources. Furthermore, most of autonomous adaptation strategies identified depend on the presence of both urban and rural features in peri-urban areas. This rural-urban mix allows individuals to develop hybrid livelihood strategies in which rural-urban and formal-informal practices complement, subsidise or support each other. For this reason, investigation of the mutual interaction between autonomous adaption practices and the characteristics of peri-urban households is essential to understanding households' vulnerability to environmental change.

It should be underlined that adaptation practices can produce negative or positive impacts on the social environmental and economic condition of households. For example, using organic fertilizers in urban agriculture or increasing the cultivated acreage to cope with soil aridity or decreasing soil fertility can improve waste management through organic waste recycling. On the other hand, negative impacts can also be generated by adaptation practices that create risks and pressure on the environment. For example, the construction of small embankments across drying rivers to preserve water for agriculture and domestic purposes could damage the river ecosystem and exacerbate the effects of changing climate on people (restricted access to water) and natural resources.

Links with other project activities

The results of the analysis conducted within the activity 1.1 helped to identify two key issues on which participatory activities focused under activity 1.3: access to water and access to land, showing the crucial role played by these issues in shaping adaptation practices of peri-urban households.

Furthermore, the information generated by the analysis feeds into the activity 2.1, to draw land use maps and explore the link between land cover and climate change impacts, and into the activity 2.2, for assessing vulnerability scenarios to seawater intrusion phenomena. Moreover, the georeferencing of interviewed households will allow to compare data coming from future surveys.

The knowledge developed and lessons learned through the activity 1.1 and the whole survey procedure will be transferred to local institutions in order to inform their capacity building under WP3.

Activity 1.3 "Explore local options of autonomous adaptation and raise awareness on climate change"

Objectives

The activity aims to explore the local options for autonomous adaptation and to raise awareness on climate change through an innovative participatory methodology addressed to the target population, i.e. Dar's coastal plain inhabitants living in unplanned and underserviced neighbourhoods and depending on natural resources. More in detail, specific goals of the activity are:

- To raise consciousness among the target population on their capacity to adapt to environmental changes, included CC related ones;
- To improve the knowledge on people's ways to access and manage natural resources in the peri-urban and to cope with changes in their living environment coming out from the household survey data analysis (under activity 1.1);
- To identify the social and cultural implications of the diverse autonomous adaptation strategies emerging from the household questionnaires and further explored through the Forum Theatre (FT) technique;
- To understand what are the obstacles to those strategies and their nature in order to frame institutional activities more favourable to those practices.

Description of the activity

Based on the results of the feasibility study conducted in September 2011, two cycles of "Participatory Theatre (PT)" through the "Theatre of the Oppressed (TO)" tool have been carried out by SAPIENZA and ARU staff in Dar es Salaam in March/April and in August/September 2012.

The formula used for both cycles was the same and it consists of three phases.
The first phase is a five-day workshop involving around 15 people including few students from ARU. The workshop is conducted by a PT expert as a trainer. Various participatory techniques are used, such as games (as daily starting activity with the role of "de-mechanization" exercise), image theatre and FT. After some introductory exercises, the trainer starts by asking the participants to form small groups and to create a scene on the leading question: "Which oppression do you (or people you know) experience in your daily life?". Each group has few minutes to discuss and define the scene before performing it on the stage in front of the other participants. This allows for a first exploration of possible CC related issues. Then the trainer selects the issue among those emerged that is more related to CC expected effects. The issue chosen will become the focal topic for the final scene to be performed in the FT public events. The focal topic selected during for the first participatory cycle has been "access to water", while "access to land" has been the one for second cycle.. Each group is invited to create a scene showing one or more problematic dimensions of the focal topic chosen. The groups perform their scenes in front of the other participants and, at the end of each performance, the trainer asks the participants: "What change is possible?". The last day is dedicated to Forum Theatre's technique. The participants are asked to choose one of the scenes created in the previous days for testing a FT session, moving from the question: "Which of those stories do you think can change".

The second phase only involves some of the participants of the first phase, selected on the basis of their commitment and suitability for performing the scene chosen. Among them, two are trained as facilitators and the others as actors. During five days, the trainer introduces them to the basic principles of TO and guides them to create the final scene to be performed in the FT public events.

Once the scene is well defined and all the characters and challenges are effectively performed, the third phase starts: the Forum Theatre public events. The performances take place in open spaces as

streets or markets for attracting a greater number of people. When people start to move close to the scene, the facilitator introduces the show through a short presentation. After the scene has been played by the actors, the facilitator starts to animate the FT session asking the audience "Is there a problem in this story?"; when someone from the audience identifies a critical moment which needs a change, it is given her/him the chance to do so, going to the scene and "performing" the change he/she has in mind. If the proposed option/solution is accepted by the actors as plausible for the story and the characters profile, they will modify the scene according to that change, if not they will resist to change.

Photo 1 people acting during one of the scenes developed in the participatory cycle

The first cycle held in March included also a training of some selected students from ARU to act in the role of facilitators to allow the ownership of the tool and to assure the sustainability of the methodology use after the end of the project.

Achieved results

The first PT cycle was held in March 2012 in Kunduchi ward. Five FT public events were performed in Mtongani, Tegeta and Ununio subwards. The focal topic around which the final scene has been built was "access to water", as change in water availability resulted to be of great concern to participants as well as one of the most relevant environmental impacts expected from CC .

The second PT cycle has been carried out in August/September 2012 in Kigamboni area. The focal topic in this case was "access to land", as it is the major concern for people living in Kigamboni because of the development project announced by the government. Meanwhile, "access to land" results to be a key component of people adaptive capacity from the household questionnaire survey.

The main results of the whole activity are as follow:

- improved knowledge of the two focal topics dealt with during the preparatory workshops and the FT events,

- increased awareness of people about climate change related issues and their link with problems they experience in their daily life,
- enhanced methodology for FT and TO applied to CC related issues, and
- built capacity of students and inhabitants to perform and facilitate PT.

As regards "access to water", the following problematic dimensions were highlighted by the participants:

1) Environmental dimension: exploitation of the natural resources at the primary source provokes damages in terms of stock capacity of water bodies, thus leading to a decrease in water availability (for example the cutting of trees in Morogoro region). In addition, they indicated charcoal making and agriculture as the activities responsible for water scarcity.
2) Technical dimension: the infrastructure planning and water services need to be further improved. Some of the infrastructures are old and lacking of mantainance.
3) Political dimension: political leaders at all levels have to face the mismanagement of the funds related to water supply and guarantee a more equitable access to water. Indeed, conflicts among inhabitants and local leaders frequently raised due to imbalanced power relationships. Participants reported also the problem of lack of economic resources to invest in water management.

As regards "access to land", a number of concerns arose from the participants:

1) Land Security: the difference between "security de jure" and "security de facto" emerged. During the scenes it appeared that the possession of a "formal title" is not an one-sided and exclusive guarantee for assuring that people will not be moved from their place. Seemingly the national government often makes unilateral decision on future projects and land use changes, compelling people to move to new locations regardless existing land titles.
2) Conflicts on use: some scenes have showed problems caused by the coexistence of different land use practices such as the conflict between pastoralists and farmers taking place in rural areas. Another example proposed is the settlement of industrial activities and the subsequent environmental changes (such as air pollution, soil deterioration, contamination of water bodies) which can lead people to leave.
3) Conflicts on formal/informal property rights: disputes on formal and informal land titles emerged in the scene linked to conflicts among family members, claims on borders, gender imbalances (difficulties faced by women in obtaining recognition of their land rights, especially for widows).
4) Governmental and power dimension: several times during the workshop and within the scenes it has emerged that the decisional process on land issue (such as the selling of the land to investors for new development projects) do not properly involve local communities which seems to be powerless in front of government decisions (from Ministry Level to local leaders). In this perspective it frequently emerged that the lack of communication, information and involvement of the people about their property rights can causes injustices like unequal and not well-informed compensations. Some critical questions arose from the workshop: which role could the local government have in the process of negotiations (in case of investors or new projects)? for example which kind of services should the investors guarantee? How the people could be properly informed about their compensation's rights? How to protect the rights of the tenants?

Photo 2 People attending the FT at Mtongani

The methodology of the FT through the TO has been consolidated on the base of the results obtained in the specific context, demonstrated by the strong participation of the inhabitants not only in terms of numbers but also in terms of involvement within the play. The two cycles collected almost 400 people in March and 500 in September during the public events, and an enormous number of input came up from them.
Main steps of the methodology could be summarized as following: 1. Setting; 2. Imaging; 3. Acting; 4. Questioning; 5. Estethization; 6. Rehearsal; 7. Forum.

A working paper about the methodology as tool for action-research is under elaboration.

Furthermore, both cycles included a period of training about the methodology and techniques. During the first cycle some personnel and students from ARU have been trained, in particular to act as directors and facilitators and about the whole organization and process. During the second cycle a group of local artists, Club Wazo, have been trained in particular to create and carry out the performances.

Links with other project activities

The two PT cycles contributed to strengthen the results from the activity 1.1 in two ways.
Firstly, a valuable knowledge has been acquired about the factors influencing people's ways to access water/ land and the autonomous strategies they adopt in front of changes in water/land availability and access conditions. The improved understanding of these factors will be used to inform the assessment of vulnerability scenarios under activity 2.2.

Secondly, the information coming out from the analysis of data gathered through the household questionnaire has been complemented as the FT technique allowed social and cultural implications of diverse adaptation strategies to be unveiled. Knowledge of these implications will be crucial to

ensuring that future adaptation initiatives planned in the WP3 and foreseen for the end of this year will not aggravate gender, age and class imbalances in social relationships

Furthermore, the development of methodologies for the design of community based adaptation initiatives (activity 2.3) will benefit from the lessons learned from the two participatory cycles, as the participatory methodology developed based on TO approach proved to be an effective tool to explore possible options for autonomous adaptation to future CC impacts.

Activity 1.4 "First annual international workshop"

Objectives

As part of the implementation of the ACC Project three international workshops are planned with the twofold aim of evaluating results achieved by the project for each work package and providing an opportunity for disseminating and sharing information, exchanging ideas among researchers, and stimulating initiatives for international networking. The three workshops foresee the same main formula, including restricted sessions for the evaluation and an public event for dissemination and debate on the key issues. The workshops involve the project team and a number of invited experts coming from EU and EAC/SAD universities.

Description of the activity

The first international workshop, held in Dar es Salaam from 6th to 8th of June 2012, was titled "Sub-Saharan cities under climate change. Exploring the adaptive capacity of peri-urban settlements in coastal Dar es Salaam, Tanzania". The workshop focused on the evaluation of the results – both in terms of knowledge and methodologies - achieved through the audit exercise on the adaptive capacity of peri-urban households and local institutions CC awareness carried out during the first year project under the activities 1.1 and 1.2. Two driving questions were identified to frame the whole workshop:

- How to assess people's capacity to adapt to environmental change in peri-urban areas of Sub-Saharan cities, starting from the case of Dar es Salaam?
- How to assess local institutions' capacity to support peri-urban people in their effort to respond to environmental change?

The first two days of the workshop were restricted to the core research team from ARU and SAPIENZA, representatives of Dar City Council, the two selected evaluators and the ad hoc invited local and international experts coming from EU and EAC/SAD universities. Two half days were dedicated to presentation and discussion of the results of the activities 1.1 and 1.2. The indoor meetings were complemented by a field visit to a peri-urban site, Ununio in Kinondoni Municipality.
In the third day a public event took place at ARU, opened to ARU staff and students. Lectures were held by two invited international experts along with the presentation of the project activities and results by the project coordinators. The programme of the whole event and the list of participants are available at http://www.planning4adaptation.eu/Docs/newsInfoMaterial/06-2012/06-08/01_Program_1st_international_workshop_june_2012.pdf

Achieved results

In occasion of the international workshop two background papers have been prepared by the project research team and available on the project web site: "Investigating the livelihoods of the population dependent on natural resources and their concerns regarding climate change" and "Investigation of Dar es Salaam's institutional activities related to climate change".
The discussion was started by the two evaluation papers prepared by international experts external to the project team, Those papers are available at:
http://www.planning4adaptation.eu/Docs/monitoringEvaluation/Evaluation_report_activity_1.1.pdf
http://www.planning4adaptation.eu/Docs/monitoringEvaluation/Evaluation_report_activity_1.2.pdf
The following questions arose from the first day:

- What is missing in the methodology for the assessment of people's capacity to adapt to environmental changes and local institutions' capacity to support them?
- What needs to be strengthened or qualified?

- How should this methodology be modified in order to be utilized in other geographical context - e.g. sub-Saharan cities, peri-urban areas, etc.?
- What could be used from these working papers for developing policies in other sectors than CC adaptation?

Those questions framed the discussion in the second day, when the participants were asked to form two working groups.

As regards the third day, around 40 academics and students from ARU attended the public event. They received project material and workshop indoor session presentations in USB flash drives.
All the presentations discussed during the workshop are available at http://www.planning4adaptation.eu/043_News_Information_Materials.aspx

The international workshop has been the occasion to identify several networking opportunities among the participating universities. To this regard, the participation of ARU and SAPIENZA researchers to the International Workshop "*Bearing the brunt of environmental change: understanding climate adaptation and transformation challenges in African cities*", to be held at the Royal Holloway, University of London, on April 2013, shall be considered an achievement.

Links with other project activities

Some of the conclusions from the discussion held during the two days restricted session provided valuable inputs for improving the project approach and adjusting the activities foreseen for the following project years.

The workshop also provided a great opportunity to have in depth discussion on the project concept and expected results with Dar City Council representatives, strengthening their willingness to collaborate and facilitating the preparation of the training program to be implemented under WP3.

WORK PACKAGE 2: "DEVELOP METHODOLOGIES FOR DESIGNING ADAPTATION INITIATIVES"

The activities foreseen within the WP2 of the project are addressed to the specific objective of developing methodologies for integrating adaptation activities into strategies and plans for Urban Development and Environmental Management (UDEM) in coastal unplanned and underserviced settlements.

Activity 2.1 "Develop methodologies for monitoring changes in peri-urban settlements"

Objectives

The main objective of the activity 2.1 is to develop methodologies to monitor changes in Dar's peri-urban settlements and improve knowledge on peri-urban dynamics, which is crucial for the assessment of vulnerability scenarios related to CC. In fact, urban sprawl has been recognized as a major non-climatic factors leading to an increase in the vulnerability of people living in coastal areas. It contributes in several ways to the deterioration of the shallow aquifer while increasing the number of people dependent on boreholes. Furthermore, urban sprawl is fuelled by people migration which is one of the major adaptation strategies adopted by households to respond to changes in their living environment. In other terms, a vicious cycle exists between urban sprawl, environmental changes and people's adaptation strategies.
More in particular, this activity aims to provide DCC planning unit with tools suitable for generating reliable Land Cover maps with little cost and effort, which will allow them to monitor Land Change over time easily and autonomously.
It is worth noting that the availability of constantly updated information on the urban sprawl will also contribute to increase the efficiency of DCC and municipalities services related to Urban Development and Environment Management while enhancing the capacity of LGAs for effective decision-making.

Description of the activity

As already stated the activity mainly consists of the development of methodologies for monitoring Land Cover changes in Dar region, with a special focus on the peri-urban dynamics over the coastal plain. To this aim, several techniques have been applied, including remote sensing, Geographical Information Systems (GIS), spatial analysis and modelling. As concerns data source, imageries from Landsat and SPOT satellites were chosen because of their spatial and spectral resolution, availability of multi-temporal images and, above all, very low (or free) data acquisition cost.

The activity is composed by the following main steps:

- Assessment of data sources and software for image analysis and development of the methodology for semi-automatic Land Cover classification.
- Image acquisition and data analysis for generating multi-temporal Land Cover maps.
- Validation of Land Cover maps.
- Assessment of change in built-up areas over time (urban sprawl).
- Investigation of links between Land Cover Change and people's vulnerability to Climate Change

In addition, some supplementary steps were carried out to allow Dar's technical services to take further advantage from this activity for improving their capacity to monitor urban sprawl and related population distribution over the region. Indeed, rapid population growth and continuous change in land use pose a challenge for public technical services in African cities, since the financial means for

updating maps and residents register are poor. Consequently, it was decided to devote some efforts to develop the followings:

- an open-source software for the semi-automatic classification of remote sensing images;
- a methodology for estimating the population in between census time drawing on land cover maps.

Achieved results

The methodology for the semi-automatic classification of Land Cover, using remote sensing images has been developed by SAPIENZA. It allows to monitor Land Cover changes in Dar's settlements with an high quality/effort ratio and an acceptable approximation error. The use of free satellite images (i.e. Landsat provided by USGS and SPOT provided by ESA) makes the methodology inexpensive. Technical details are provided in the following working papers: "Development of a Methodology for Land Cover Classification in Dar es Salaam using Landsat Imagery" and "Development of a Methodology for Land Cover Classification in Dar es Salaam using SPOT Imagery".

Land Cover classification maps have been generated from Landsat images (30m resolution) for the years 2002, 2004, 2007, 2009 and 2011. These maps cover the whole Dar es Salaam region and are available on the project website at http://www.planning4adaptation.eu/042_Maps.aspx). Also, a Land Cover classification was performed for year 2011 using SPOT images, although it was not possible to classify the whole area of Dar, because of the lack of useful SPOT images acquired over the Southern part of Temeke Municipality.
A methodology for validating Land Cover classifications was defined and implemented. It consists of the photo-interpretation of high resolution reference images and field validation of photointerpretation through an on-site survey of 100 randomly chosen locations.

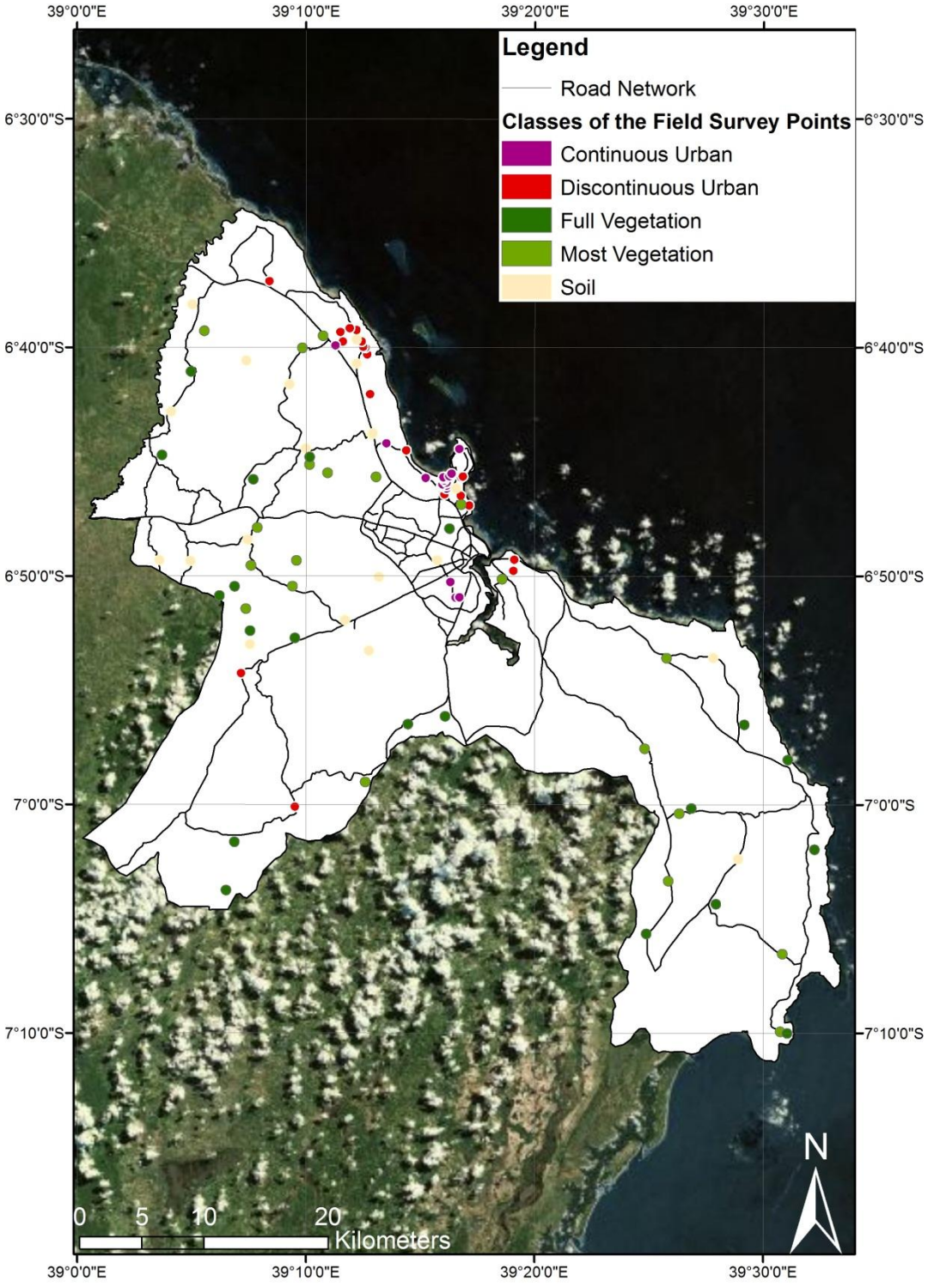

Figure 9 Location of the land cover validation field survey activity

The accuracy assessment allowed the comparison of Landsat and SPOT classifications, demonstrating the reliability of the developed classification methodology, both for Landsat and SPOT classifications, with high accuracy levels, especially for the identification of built-up classes.
The results are well described in the Working Paper "Development of a Methodology for Land Cover Classification Validation".

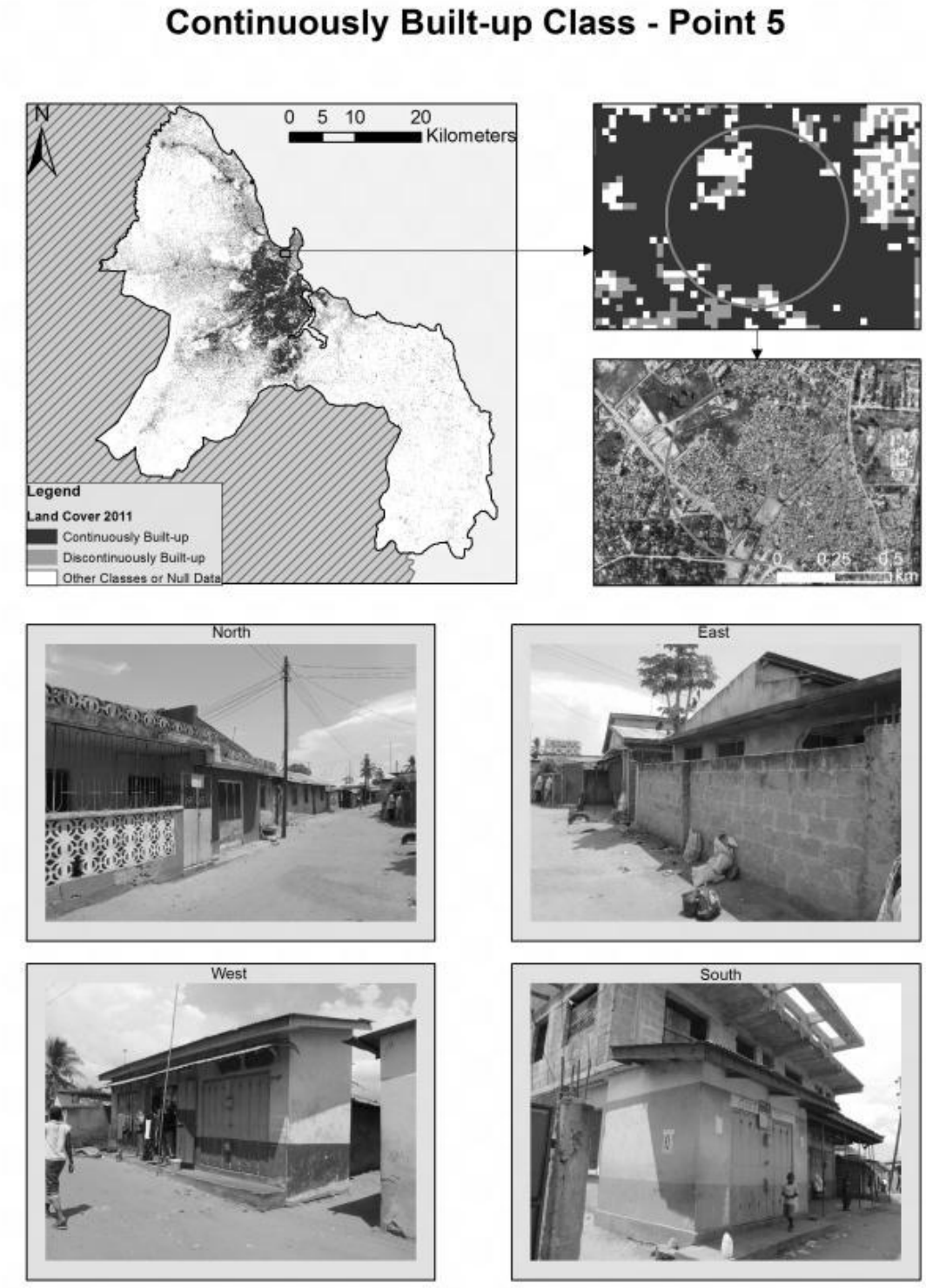

Figure 10 Example profile of an area classified as "Continuously Built-up", produced during the LC validation activity

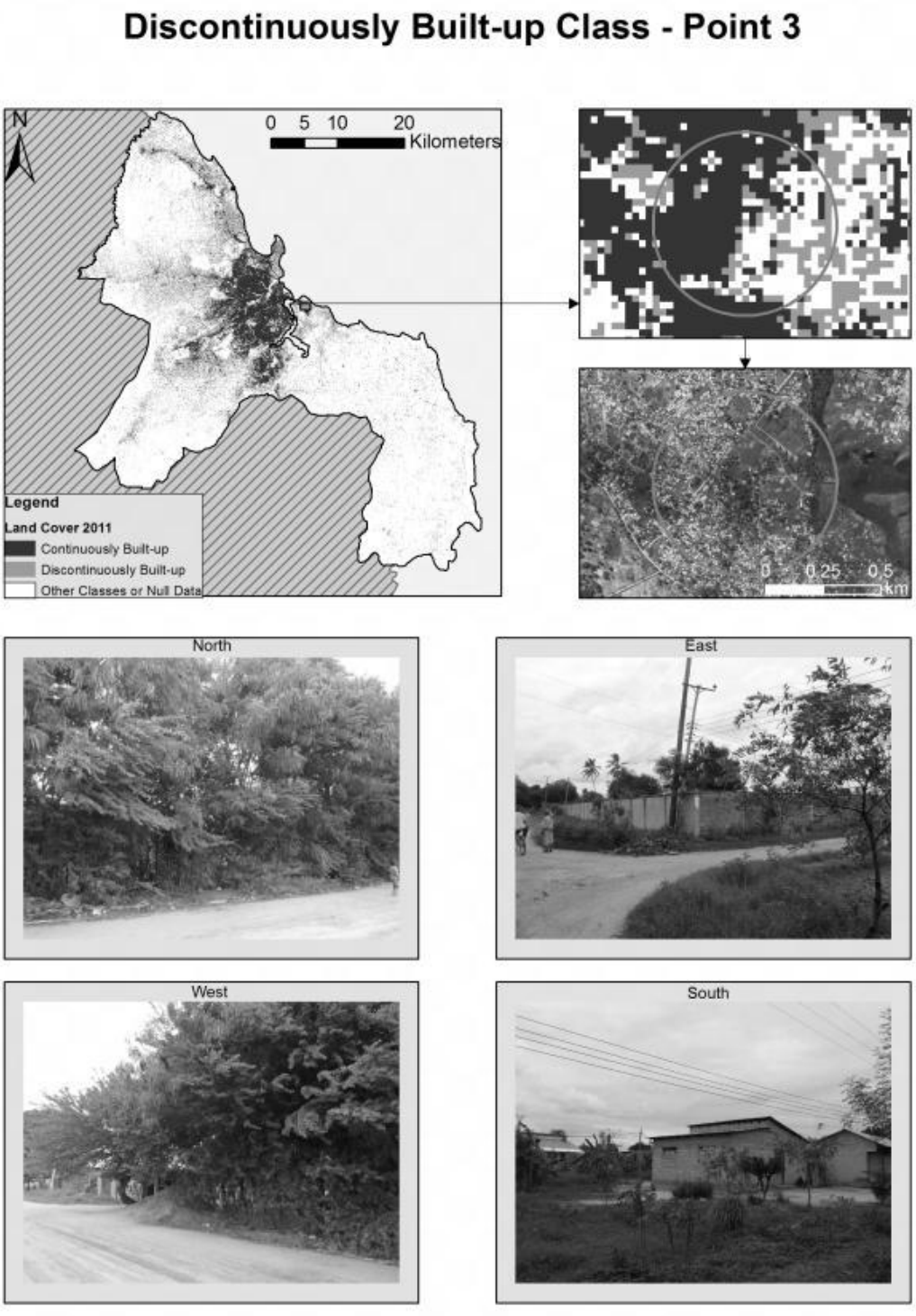

Figure 11 Example profile of an area classified as "Discontinuously Built-up", produced during the LC validation activity

Special attention has been paid to changes in the impervious surface for estimating trends in urban sprawl. To this aim, firstly built-up areas were classified into two categories: "Continuously Built-up" and "Discontinuously Built-up". Secondly, the analysis of the class variation of each pixel over time was performed and statistics on Land Cover Change were calculated during the time intervals: 2002-2004, 2004-2007, 2007-2009 and 2009-2011. Criteria and methods used for the assessment of Land Cover Change, along with the achieved results, are described in details in the working paper "Assessment of Land Cover Change Using Remote Sensing: Objectives, Methods and Results".
In addition, Landscape Metrics for SPOT-based classification of 2011 have been calculated and compared with Landscape Metrics of Landsat-based classification of the same year, allowing for the assessment of Land Cover fragmentation.

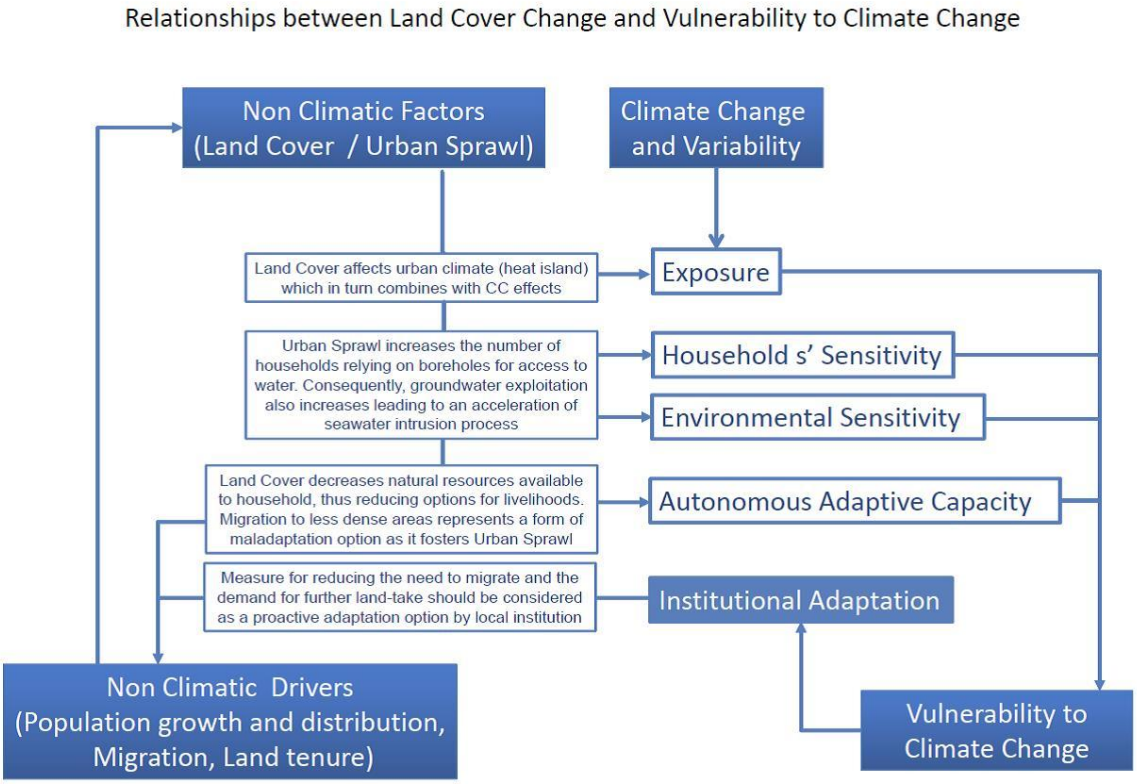

Figure 12 Relationships between Land Cover Change and Vulnerability to Climate Change

Two important and unexpected results were also achieved.

First, a plugin for the open-source software Quantum GIS has been developed. It relies on other open-source software (Sextante plugin, Orfeo Toolbox and SAGA) and can replace commercial software in the Land Cover classification process, making the methodology developed under this Project more affordable. The plugin has been uploaded on the Quantum GIS Plugin Repository at http://plugins.qgis.org/plugins/SemiAutomaticClassificationPlugin/

Second, drawing on data from land cover classifications and the households' survey conducted under the activity 1.1., a method to estimate the number of households for years inbetween census time has been defined and tested. . The methodology used to select the households sample for questionnaire administration in 2011 provided the data for calculating an average of the households' density per

pixel for each land cover class identified. Based on these household/pixel density rates, the number of household was calculated for year 2002. The estimate thus obtained resulted largely consistent with data from 2002 Census at both Dar's region and district levels. A further test will be performed for year 2012 as soon as new Census data will be available. Nevertheless, the validity of the methodology developed might be considered proven by the tests made on year 2002. The result obtained confirms the hypothesis made that a strong correlation exists between population density and land cover classes in Dar region. Under the same hypothesis, the methodology developed can provide a valuable alternative for demographic estimation to traditional census in fast growing African cities. It is worth notice that census is expensive for poor countries, and its frequency (usually 1 census every 10 years) is too low, compared to the pace of growth of some cities, for being useful in the planning of basic services and urban development. Both the method and results will be presented in a working paper under preparation.

Links with other project activities

A very strict link exists between the results of the activity 2.1 and the activity 2.2. The analysis conducted are crucial to explore the relation between land cover change and seawater intrusion and to develop future scenarios on boreholes' salinization, combining trends in urban sprawl with predicted CC effects on local climate parameters.

Methodologies developed under this activity will be part of the training programme in the capacity-building addressed to Dar's LGAs under WP3.

Activity 2.2 "Develop methodologies for exploring CC vulnerability scenarios"

Objectives

The activity 2.2 has the main objective to develop methodologies for exploring the vulnerability of coastal peri-urban population under climate change in a scenario approach. As a study case for this activity, the seawater intrusion into the shallow aquifer has been selected, since there is evidence that this environmental phenomenon is already contributing to the degradation of the coastal watershed upon which rely a large part of peri-urban inhabitants for access to water.

Description of the activity

A technical team from SAPIENZA and ARU is developing a methodology for exploring future scenarios of people's vulnerability to groundwater salinization under climatic and non-climatic changes.

To achieve its goal, the following subtasks have been defined:

a) to study the seawater intrusion's temporal evolution over the past years and assess the current condition of salinization in the coastal watershed
b) to understand the local dynamics ruling the environmental phenomenon for developing future scenarios of seawater intrusion under changes in climatic and non-climatic factors
c) to assess current vulnerability of coastal peri-uban population to access to water, drawing on a methodology previously developed for a case study in Kinondoni district
d) to develop and test a scenario-based methodology for assessing the vulnerability of people's future aspirations under changes in climatic and non-climatic factors

As regards the subtask a), the methodology designed for the analysis of the salinization processes in Dar es Salaam coastal aquifer consists of the following steps:

- Assessment of chemical evolution of groundwater through the analysis of major ions correlation degree and the groundwater facies classification, for different time frames.
- Assessment of electrical conductivity (EC) temporal evolution through the reconstruction of the isoconductivity contour variation over time (interpolation of the available EC boreholes values for different time frames).
- Assessment of piezometric level temporal evolution through hydrogeological maps building and analysis (analysis and interpolation of the standing water level - SWL - boreholes values for different time frames).

To date, the collection of existing data on coastal shallow watershed have been completed and the monitoring of current condition is on-going. Also, the analysis of data from the first monitoring campaigns has already started to ensure that a preliminary interpretation of the seawater intrusion phenomenon in Dar's coastal plain will be available on-time to feed into the training program under WP3.

Under subtask b), the joint team will develop a model of the local dynamics ruling the seawater intrusion into Dar's coastal watershed, based on the analysis of data related to climatic factors (rainfall and temperature) and urban sprawl (land cover) over the past years. Such data analysis will provide a better understanding of the interplay between climatic and non-climatic factors in influencing seawater intrusion into the shallow aquifer. The knowledge thus acquired will allow for developing the model to be used for generating future scenarios of seawater intrusion under conditions of continuous urban sprawl and climate change. Local reference conditions for both urban sprawl and climate change will be defined by downscaling the predictions formulated by international agencies at a larger scale.

The methodology for assessing current vulnerability of coastal peri-uban population to access to water (subtask b) draws on the approach developed by the IPCC (Intergovernmental Panel on Climate Change). According to the IPCC, the vulnerability of individuals or communities results from the interaction of physical factors and socio-economic factors. Physical factors represent the potential of that an environmental system to be damaged by the consequences of a harmful event, thus identifying the degree of human exposure to disruption (connection between livelihoods and ecosystems). Socio-economic factors, in turn, represent the ability of individuals and communities to cope with the disturbance, absorb the impact, recover or adapt to change.

Lastly, a methodology will be developed and tested for assessing the vulnerability of people's future aspirations under changes in climatic and non-climatic factors (task d). The idea is to use theatre forum combined with back-casting scenario technique to exploring possible impacts of expected urban sprawl and climate change on those groundwater related issues which people consider strategic for achieving their aspirations for the future. By doing so, the project is expected to succeed in including people's wishes for change in the vulnerability assessment,. In other word, what will be assessed is the vulnerability of lifestyles which people value as desirable rather than considering actual lifestyles as deserving to be maintained regardless to people's aspiration.

A preliminary framework of the whole workflow from land cover mapping and groundwater monitoring to goal formulation has been defined.

An International Workshop to evaluate the methodology for developing vulnerability scenarios will be held in Rome on April 2013.

Achieved results

The methodology for the assessment of the seawater intrusion phenomenon has been defined by SAPIENZA. It is based on the spatial analysis of the temporal evolution of the main parameters related to seawater intrusion phenomenon. According to the availability of groundwater historical data, different time intervals are considered, starting from 90's to the actual data collected in the recent hydrogeological field activity.

The groundwater monitoring activities (long term and monthly) have started in June 2012.
Three teams of two members each were formed at ARU. Each team was assigned an area of the coastal plain to survey (Kinondoni North, Ilala and Kinondoni South, Temeke) and was provided with the equipment necessary for monitoring (i.e. 1 handset GPS, 1 contact meter, and 1 multi-parameter probe).

Two major monitoring campaigns (long term activity) over the whole boreholes network have been carried out: the first one in June 2012 (after the "long rainy season"), and the second one in December 2012 (before the "short rainy season").

Due to well condition related problems (inaccessibility, missing or broken pumps), the number of wells selected for the monitoring network has been reduced from 90 to 79, while nevertheless maintaining the same uniformity in spatial distribution.

Photo 3 Static water level measurement

Photo 4 Sampling at a stand pipe

Photo 5 Sampling after opening the borehole pipe

Two minor monitoring campaigns (monthly activity) with in situ physical-chemical analysis have been conducted in September 2012 and October 2012 over a sub-set of 33 boreholes mainly located close to the coastline in Kinondoni Municipality. . These 33 boreholes have been selected on the basis of data for seawater contamination indicators (EC values assessment, ion correlation, Piper Diagram) from the first campaign.
A further minor monthly monitoring campaigns is planned for February 2013.

The whole monitoring activity was very challenging due to several obstacles to be overtaken. Firstly, the existence and operation of the boreholes was very dynamic since some of the boreholes which were working at the beginning afterward were no more in use or broken thus hampering the monitoring process. Secondly, the locations of many boreholes were not easily accessible. Thirdly, monitoring involved the removal of pump for most of the boreholes, and since most of them were old and not maintained to open them takes a very high risk, and sometimes required to pay back some broken facilities associated with the cover or even the pumping system itself. Lastly, to monitor some boreholes, especially those which are publically owned and those from institutions, it was necessary the support of the technicians from the municipality who are usually very busy.

Photo 6 a damaged borehole after opening

Photo 7 Opening an old borehole

The Boreholes Monitoring Database has been already populated with historical groundwater data and the current groundwater data obtained from the monitoring campaigns already executed. As soon as the remaining campaigns will be carried out, database population will be completed.

As regards the other three subtasks, preparatory activities have been completed for all of them.

The conceptual framework for investigating and modelling the local dynamics ruling seawater intrusion has been defined and the required background information has been collected.

Also the methodology for assessing current vulnerability of coastal peri-uban population to access to water has been developed and will be implemented as soon as the previous subtasks will be completed.

Lastly, it is worth noticing the effort made to innovate approaches to vulnerability scenario development. A review has been conducted to explore the existing literature on back-casting approaches. It will provide the basis for conducting a participatory workshop aimed at exploring scenarios for CC impacts on people's future aspiration in a backcasting perspective. The pilot location for the workshop will be representative of places which in future will be highly exposed and sensitive to groundwater salinization caused by seawater intrusion.

Links with other project activities

Methodology will consider both the physical and socio-economic factors that combine to determine community vulnerability to CC. For this reason the results of the activity 2.2 are strictly related with the ones from:

- the activity 1.1 in order to identify the household socio-economic characteristics relevant to the dependence on groundwater for access to water
- the activity 1.3 as lessons learned in conducting the participatory workshops will be crucial to the development of the methodology for assessing the vulnerability of people's future aspirations to CC
- the activity 2.1 in order to understand the relationship between seawater intrusion and urban sprawl, in terms of effects of Land Cover change on direct aquifer recharge and effects of change in population spatial distribution on pumping rates.

Furthermore the methodology developed as results of the activity 2.2 to conduct the hydrogeological monitoring campaigns will be part of the tool kit necessary to perform the capacity-building and the design of sustainable adaptation measures by Dar's Municipalities under the WP3.

Activity 2.3 "Develop a methodology for designing community based adaptation initiatives"

Objectives

The activity aims at developing a methodology for the participatory design of LGAs' adaptation initiatives. Rather than preparing "new" plans, those initiatives will address the need for integrating CC issues into the existing Urban Development and Environment Management strategies. Moreover, special attention will be paid to ensuring the involvement of local communities in the decision-making process, drawing on lessons learned from the participatory activity conducted under WP1. The methodology will be used for preparing the four adaptation initiatives expected by the end of the Project.

Description of the activity

As a preparatory phase for the methodology development, a literature review have been conducted focussing on approaches for adaptation mainstreaming into policies and planning. Three types of sources have been considered: academic journals, development agencies publications and grey literature available online.

Using the results from the literature review as a background material, the approach for adaptation mainstreaming to be adopted within the Project will be defined during the training course addressed to the LGAs officers. Indeed, the feedbacks provided by the training participants are essential to identify clear priorities in the demand for change as well as weaknesses and strengths of the local institutional system. The final version of the methodology will be defined and a toolkit will be prepared to guide users on how to apply it.

Achieved results

Some already consolidated approaches for mainstreaming have been identified through analysing research and review papers on adaptation mainstreaming with a special focus on urban and environmental planning and management, research reports and working papers by development and government agencies, tool books and guidelines addressed to policy-makers and institutions. The decision was made to consider only the approaches which conceptualizing adaptation mainstreaming as the integration of adaptation concerns and objectives into LGAs decision-making process and already existing plans rather than the integration of specific adaptation measures previously decided. During the next semester a methodology for mainstreaming adaptation to CC at the local level tailored to Dar's LGAs and population needs and capacities will be defined.

Links with other project activities

The methodology to design adaptation initiatives for mainstreaming adaptation concerns and objectives into the LGAs' existing plans and programmes will be built on the results achieved under WP 1 and activity 2.1 and 2.2.

However, the activity is overall linked with the LGAs' capacity-building process. A mainstreaming approach will be presented during the training sessions to the participants. The whole training course will work as a laboratory for developing possible applications, allowing for testing and gathering feedback.

The mainstreaming methodology will be implemented in the activity 3.4, for the design of the four adaptation initiatives expected by the end of the Project.

WORK PACKAGE 3 "BUILD THE CAPACITY OF DAR'S MUNICIPALITIES "

The whole WP3 aims at building the capacity of Dar's local authorities for the design of community based adaptation initiatives as part of the implementation of the NAPA action of the United Republic of Tanzania.

The activities under WP3 specifically aim to enhance the capacities of Dar es Salaam's Local Authorities in understanding CC issues related to Dar's coastal plain and peri-urban livelihood systems; in identifying effective measures for supporting the coastal peri-urban inhabitants in their efforts to adapt to CC; and, in integrating them into existing urban development and environmental management strategies and plans.

Activity 3.1 "Prepare a capacity-building strategy"

Objectives

The aim of the activity 3.1 is to design a strategy to carry out the capacity-building involving the main stakeholders in LGAs in Dar es Salaam. Main issues of work under this activity have been to answer to the following questions: which framework to choose to carry out the capacity-building? Which other stakeholders involve in addition to the DCC and the three municipalities already involved within the survey under activity 1.2? Which are the key issues related to climate change and adaptation for the LGAs representatives in Dar? Which is the more effective modality to carry out the capacity-building involving a strong number of officials? How to select the trainers and the participants?

All those issues have been studied, discussed and planned between the two partners to arrive to define a common effective strategy.

Description of the activity

The steps composing the whole capacity-building strategy could be summarized as following:

- to select an approach for the capacity-building
- to decide the institution to involve in the capacity-building
- to assess the training needs related to climate change and adaptation main issues within the LGAs
- to decide modalities to conduct the training sessions
- to select the training
- to select the participants

Achieved results

The capacity-building is considered within the project as a process developed during a period of six months involving the representatives of the local authorities in Dar es Salaam. The approach chose to carry out the capacity-building programme is based on the key concepts of strengthening existing capacities, build desired capacities to achieve participants' own objectives and over time.

To understand and identify the already existing capacities within the local authorities, the capacities to be strengthened, the target group, the level of knowledge and skills to transfer, constraints and opportunities at institutional and personal level, a needs assessment has been designed and carried out by ARU staff on the basis of a structured questionnaire. A total of 49 officials were interviewed in the area of climate change and adaptation. Heads of departments and other two randomly selected officials from the following departments were interviewed at Dar es Salaam City Council:

a) Urban Planning, Environment and Transportation

b) Waste Management
c) Works and Fire Rescue

In the municipal councils, officials from the following departments were interviewed:

a) Waste management,
b) Works and Water Department
c) Lands and Urban Planning
d) Natural resources and tourism
e) Agriculture and Livestock Development

In addition, three officials from Dar es Salaam Water and Sanitation Authorities (DAWASA), four officials from Drilling and Dam Construction Authorities (DCCA), two from Tanzania Meteorology Authority (TMA) and six from the Wami/Ruvu Basin Water Office were interviewed.
Information sought from the questionnaire survey included the areas of competency of the officials, opinions on the causes, effects, ways to mitigate as well as ways to adapt to climate change and people vulnerability to climate change. Awareness on policies and legislations pertinent to climate change issues was determined. Also knowledge on GIS and Remote Sensing was gauged from the interviews.

Based on the approach chosen and the results achieved by the assessment the capacity-building strategy has been decided by the project scientific committee including: 3 residential training sessions, the exercise of designing of adaptation initiatives to be mainstreamed within their plans and to be implemented during their daily job activities and a final conference during which the most relevant solutions will be presented to the wide public.

It was decided by the project scientific committee to hold three residential training sessions in Morogoro. The residential modality has been chosen to avoid possible turn over and loses of participants and to overcome possible delays in the beginning of each session due to the difficult mobility in Dar es Salaam. Furthermore the long training will be divided into three weekly sessions to facilitate the attendance of participants without leaving their daily activity for a long period and at the same time to allow them to work on the design of adaptation measures to be mainstreamed in their plans between a training session and the other.
Training delivery methods will be: interactive lectures, short movies relevant to the subject matter, group discussion, working group, brainstorming, physical demonstration on the use of hardware (measuring instruments) and computer software.

The target of the capacity-building will be officials of Dar es Salaam LGAs and water utility and water resources management organizations who are dealing with issues pertinent to climate change adaptation and environmental planning and management. Specifically, participants from Dar es Salaam LGAs have been drawn from the following departments:

- Agriculture and Livestock Development,
- Health
- Lands and Urban Planning
- Natural Resources and Tourism
- Waste Management
- Works and Water
- Works and Fire Rescue

The selection of the participants has been already finalized and took into consideration the following criteria:

- staff dealing with activities pertinent to climate change issues including urban planning, environment, waste management, water, infrastructure development, natural resources management, agriculture and health;
- preference to qualified females;

- already existing basic knowledge on climate change;
- preferably not older than 50 years.

Within the three municipalities the selection has been carried out through the support of the Municipal Directors.
The list of participants is annexed to this report.

Responsible for the training will be ARU. Furthermore a training director and 2 external trainers with a consistent experience in working with Dar's LGAs has selected to be involved in the training activity

Links with other project activities

The contents and the approach of the capacity-building comes from the knowledge gained by the surveys and by the analysis performed within the whole working packages 1 and 2.

The training foreseen under activities 3.2, the conference to present to a wide public the adaptation measures proposed by the participants under activity 3.3 and the design of 4 pilot adaptation measures to be mainstreamed in local plans foreseen by activity 3.4 are all steps of the capacity-building strategy.

Activity 3.2 "Develop and implement a training programme"

Objectives

The objective of the LGAs capacity-building is to foster changes within their own existing plans to mainstream adaptation initiatives enhancing their capacities in understanding CC issues, in developing of methodologies supporting adaptation in coastal unplanned and under-serviced settlements and avoiding maladaptation practices. To comply with this aim the programme of the training will include a wide range of information about CC and adaptation issues, will provide skills to reach autonomously information and methodologies to analyse them, will include tools for understanding adaptive capacities and monitoring changes in peri-urban areas, and methodologies for exploring CC vulnerability scenarios.

Description of the activity

The activity 3.2 foresees the development of the programme of the training sessions, the preparation of the training and learning materials, the coordination, the logistic and the implementation of the three weekly sessions as planned in the capacity-building strategy.

Achieved results

The programme of the training has been developed on the basis of the results achieved by need assessment performed under activity 3.1 and on the basis of the results obtained by the methodologies developed and the knowledge acquired under the WP 1 and 2 activities.

As already explained in the previous paragraph the training will be implemented in three residential and not consecutive weeks divided as following.

- Week 1 will be dedicated to: CC and adaptation principles; policy, legal and institutional framework in Tanzania; adaptive capacities, methodology to survey, analyse and monitor them.
- Week 2 will focus on: participatory methodology based on Forum Theatre; land cover mapping and analysis; methodologies to monitor urban sprawl.
- Week 3 will be centred on: borehole monitoring and sea water intrusion analysis; CC Implications for local plans and programmes; mainstreaming approaches.

Training materials will be prepared by SAPIENZA on the following list of topics to allow a wide selection of contents to fit the specific needs of the participants.

Topic: Adaptive capacity
- Module 1: Introduction to Household Survey for Adaptive Capacity Analysis
- Module 2: Monitoring of Adaptive Capacity
- Module 3: Design of Household Questionnaire Survey
- Module 4: Data Analysis and Interpretation

Topic: Land Cover Mapping and Analysis
- Module 1: Urban Sprawl and Climate Change
- Module 2: GIS Analysis
- Module 3: Image Processing and Land Cover Classification
- Module 4: Land Cover Fragmentation

Topic: Borehole monitoring and sea water intrusion analysis
- Module 1: Borehole salinization in Dar es Salaam
- Module 2: Understanding Seawater intrusion
- Module 3: Borehole Monitoring

Module 4: GIS Analysis
Module 5: Introduction to Relational Database Management Systems

Topic: Assessing Current and Future Vulnerability to CC as regards salt water intrusion phenomenon
Module 1: Structuring the Vulnerability Assessment: Definitions, Framework and Objectives
Module 2: Assessing Current Vulnerability to Seawater Intrusion Phenomenon
Module 3: Assessing Future Vulnerability to Seawater Intrusion Phenomenon

Topic: Adaptation Mainstreaming
Module 1: Introduction to Mainstreaming Approaches
Module 2: Climate Change Implications for Local Plans and Programmes
Module 3: Mainstreaming Adaptation Objectives into Local Plans and Programmes

Learning materials are under preparation on the basis of the specific needs of the trainees already selected.

The training will be coordinated by a training director. Each session will be covered by trainers experts for each module. Two persons will be dedicated for logistic and tutoring issues.

The first week of training will start at the end of February.

Links with other project activities

All the topics of the training programmes are results of the activities under working packages 1 and 2 implemented during the first two years of the project.

DISSEMINATION

Since the start of the project, a considerable effort has been put into the dissemination of its activities and results in order to spread information about the ongoing activities, to enlarge networking, to involve new stakeholders interested, to share knowledge about the scientific findings.

The project web site http://www.planning4adaptation.eu has been improved in terms of contents and in terms of tools. A new session has been developed and called "DISSEMINATION". It includes all the outputs elaborated by the project activities; in particular papers and working papers, maps, all the materials produces for training, workshops and other kind of events during which the project contents and results have been disseminated, and ROM, narrative and evaluation reports.

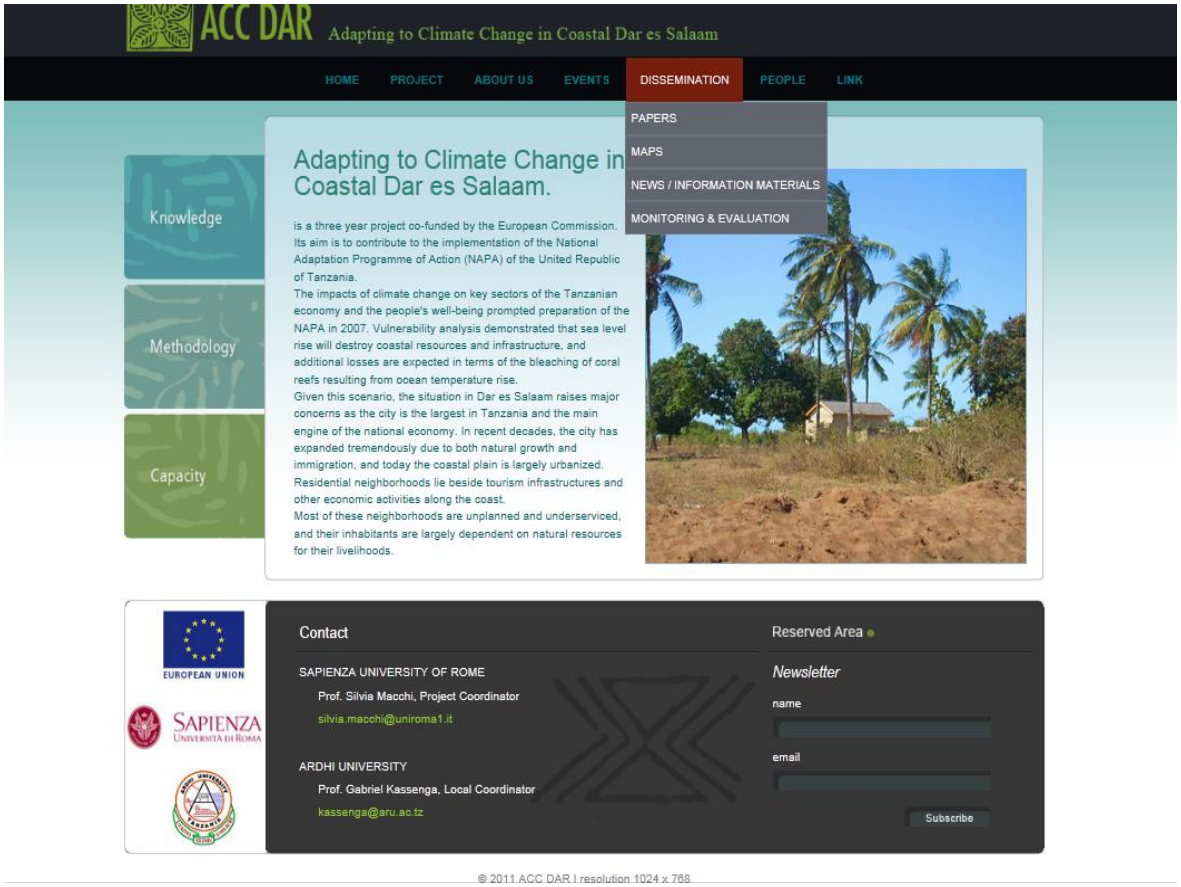

Figure 13 Project web site "dissemination"

A new dynamic part of the web site is under developing to spread results of the project to the wider public under the vertical menu called "Knowledge", "Methodology" and "Capacity".
At the state of the art the page called "Knowledge" is available at
http://www.planning4adaptation.eu/Knowledge.aspx

Land cover maps and the whole database of the survey about households' adaptive capacities conducted under activity 1.1 have been uploaded on the web site to allow sharing and free access of those data.

The project activities and the results achieved during the second year of the project have been disseminated by the team of researchers presenting scientific papers and dissertations in some national and international events:

- Regional Planning Course at the SAPIENZA, Environmental Engineering Master Program. 70 students were asked to elaborate a poster about the mainstreaming of adaptation issues into an actual plan.
- International Workshop, "Sub-saharan cities under climate change. Exploring the adaptive capacity of peri-urban settlements in coastal Dar es Salaam", Dar, 6-8 June 2012.
- Conference "Sapienza Millennium University", Rome, 21 June 2012
- Ricci L. "Vulnerability and Adaptive Capacity in Peri-urban Areas: Investigating Autonomous Adaptation in Dar es Salaam. Presented at the 26th Annual Congress of the Association of European Schools of Planning (AESOP), Ankara, TK, 11-15 July 2012.
- Faldi G., Rossi M., Sappa G. "Anthropogenic and climate change effect on seawater intrusion in Dar Es Salaam coastal aquifer". Presented at the 39th Congress of the International Association of Hydrogeology (IAH), Niagara Falls, CA, September 2012.
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- Macchi S. "Pianificare l'adattamento al cambiamento climatico: questioni aperte per la ricerca nelle città sub-sahariane. CONTESTI. Città, Territori, Progetti. Vol. 1-2, p. 109-114, ISSN: 2035-5300, November 2012.
- AA.VV. "Development of a Methodology for Land Cover Classification in Dar es Salaam using SPOT Imagery". Submitted to ESA Earthnet (https://earth.esa.int) in November 2012.
- Philip Mwakyusa, from DCC, presented the project during the workshop on "Resilient Cities" in the framework of the 6th World Urban Forum, Naples, September 2012.

Working papers related to the activities 1.1, 1.2 and 2.1 have been elaborated:

- "Investigating the livelihoods of the population dependent on natural resources and their concerns regarding climate change"
- "Investigation of Dar es Salaam's Institutional Activities related to Climate Change"
- "Development of a Methodology for Land Cover Classification in Dar Es Salaam using Landsat Imagery"
- "Development of a Methodology for Land Cover Classification in Dar Es Salaam using SPOT Imagery"
- "Assessment of Land Cover Change Using Remote Sensing: Objectives, Methods and Results."
- "Development of a Methodology for Land Cover Classification Validation"

A project brochure has been designed and distributed during the first international workshop in Dar es Salaam in June 2012 and during the 6th World Urban Forum held in Naples in September 2012.

WP0 Project management

The administrative unit responsible for the project at SAPIENZA changed from CIRPS (Interuniversity Research Centre for Sustainable Development) to DICEA (Department of Civil, Building and Environmental Engineering) due to new internal rules for contracting research personnel. The change was discussed and agreed with the International Relation Office at the central level of SAPIENZA , among the project partners and authorized by the EU Delegation.

The whole project staff and the coordination and management structure remained the same.

The Project Coordination Team has met several times in Dar es Salaam to validate results and to agree planning for the upcoming activities. DCC has been also involved in the decision-making process. All project meetings have been organized to coincide with the project milestones.

The Joint Working Groups' results have been evaluated jointly by the Project Coordinator and the Local Coordinator; their interim reporting and their missions in Rome and in Dar es Salaam have been supported and monitored by the Project Manager.

The internal communication flow between the two partners and among the working group members has been on almost weekly basis through internet tools and by phone. Exchange of documents took place mainly by email and by uploading them in the reserved area of the project web site.

Internal monitoring of the project activities has been carried out by the project manager through analysis of documentation and meetings with the project staff and has been reported to the EU Delegation through the bi-annual ROM and the annual Interim Report.

A financial audit has been carried out at the end of the first project year, in February-March 2012.

Evaluation of the results achieved by the activities 1.1 and 1.2 have been performed by external international experts in the framework of the first international workshop held in Dar in June 2012 and through the evaluation reports.

2.3. Activities planned and postponed to the third year.

As regards the project work plan few changes have arisen during the reporting period no relevant for the successful project implementation and the achievements of the results.

The first International Workshop "Addressing climate change adaptation in coastal areas of fast growing African cities" (activity 1.4) has been held in June (instead of April) to allow the project team to complete the data analysis and to select the two external international experts for the evaluation.

Because of the delay in the beginning of the groundwater monitoring activity, due to bureaucratic problems in customs clearance of the chemical reagents purchased for instrument calibration and chemical analysis, the duration of the entire monitoring activity was reduced from 9 months to 7 months and, at the end, it will include two major and four minor monthly monitoring campaigns.

The whole Working Package 3 has been postponed of almost 4 months for several reasons. Firstly the contacts with the 50 officials for the needs assessment questionnaires took more time than planned. Secondly the selection of the participants from the municipalities required the support and authorizations by the municipal Directors. Thirdly, it was decided as part of the capacity-building strategy to deliver the training in a residential modality outside Dar es Salaam. This decision required stronger efforts in terms of logistic and coordination for the organization of the activity. As a consequence of this postponement and due to the new aim foreseen for the next mid-term conference it was decided to hold it at the end of the training course.

2.4. Assessment of the results.

Project objectives and expected results planned in the logframe remained relevant during the reporting period. Many achievements have been reached as already described in details in the paragraph 2.2. The updated table of the results-indicators is annexed to this report. The whole development of the action did not encounter any relevant obstacles because there have been no changes in the project operating context since the start of the project. All the assumptions described in the logframe have been fulfilled.

The results achieved by the two cycles of the participatory activity carried out during 2012 deserve to be mentioned. The methodology used was the "Participatory Theatre (PT)" through the "Theatre of the Oppressed (TO)" technique. The outcomes in terms of participation and professional growth of ARU students and junior researchers, in terms of community leaders and residents involvement from the target area and in terms of knowledge for a better understanding of the findings from activities 1.1 and 1.2 have been beyond expectations. For these reasons it was discussed the possibility to integrate the TO technique in the methodology for the participatory design of institutional adaptation initiatives under development within the activity 2.3.as part of the training programme in the capacity-building activity with the aim to transfer it to the LGAs officers.

An important and unexpected result came from the methodology used to monitor land cover changes. Crossing data produced by land cover classifications and by the households' survey, and thanks to the methodology by which the household survey was conducted it was possible to calculate an estimate of household density for year 2011. The validity of the calculation has been tested for the year 2002 comparing the results obtained with the results of the census in Tanzania.

It will allow DCC for easily updating land cover and land use maps in the future. It is worthy to be mentioned that the production of updated maps by the DCC GIS unit will not require additional costs for acquiring new satellite imageries as the procedure has been tailored to data provided by Landsat and SPOT for free or at very little expense.

The action pays special attention mainly to three *cross-cutting objectives*: environmental protection, good governance and promotion of gender equality and equal opportunities.
As regards the environmental issues, the whole action is based on the purpose of ensuring the environmental sustainability of adaptive measures and strategies. The target groups of the action are those living in coastal unplanned and underserviced settlements whose livelihood is strictly depending on natural resources. By drawing on people's daily experience, the action ends up in identifying the environmental processes that are in a critical condition and in valuing good practices of natural resources management. Furthermore the protection of natural resources is one of core elements of the "vulnerability" concept. These premises are mainstreamed into all the analysis and methodologies under development.
Findings related to environmental issues are spread across the working papers already available at www.planning4adaptation.eu

The processes of decision-making and the process by which decisions are implemented have been agreed step by step between the project partners and the Dar City Council.
DCC and municipalities' involvement in the project is essential to facilitate the implementation of the project activities and to ensure the action to be consistent with their strategies and the local institutional framework.
Dar's Local Government Authorities at all levels provided their commitment to allow the realization of all the project activities. The two cycles of participatory events with the local community through the forum theatre and the interviews with the residents have been often facilitated by street leaders or mtaa executive officers. The support by the officers of the water division (planning department) of the municipality has been decisive to allow the boreholes monitoring campaign. The availability of all the municipal officers during the needs assessment and their willingness in participating in the next training is especially crucial in this phase of the project, to carry out effectively the capacity-building process. DCC representatives participated actively in the three-days international workshop organized in Dar in June. Their feedback, the general information about the local institutional framework provided and their input have been the premise to build in the most suitable way the capacity-building strategy foreseen under the WP 3.

Women's concern on both CC impacts and planned adaptation initiatives have been taken into account as a fundamental piece of knowledge. Equal participation of men and women in the Forum Theatre events has been ensured. Furthermore the methodology proved to be suitable to highlight gender issues.
Gender distribution has been also taken into account during the survey assessing training needs at the local institutions' level, in the selection of external evaluation committee invited to the international workshop and in the selection of the participants in the next capacity-building activity.
Women hold prominent positions in the action management (i.e. Project Coordinator, Project Manager, research staff member of the working groups).

2.5. Potential risks during the implementation of the activities already tackled.

Some technical difficulties have been encountered during the implementation of the boreholes monitoring campaign and promptly tackled by the project team. Bureaucratic problems in customs clearance of the chemical reagents purchased for instrument calibration and chemical analysis caused

serious delay in the beginning of the groundwater monitoring activities. As a consequence the duration of the entire monitoring activity has been rescheduled and reduced from 9 months to 7 months including two major and four minor monthly monitoring campaigns. the internship period in Rome for the data analysis coming from the campaign and the second international workshop focused on the WP 2 results have been postponed to the third year.
Due to well condition problems (accessibility, lack of pumps or broken pumps) and due to the unavailability of some owners, the number of the wells selected for the monitoring network has been reduced from 90 to 79, nevertheless maintaining the same uniformity in spatial distribution.

As regard the WP 3 all the activities related took a longer time than expected. During the needs assessment a target of 49 officials from LGAs and other relevant stakeholders have been interviewed and the activity took three months due to the availability of the officers. Also the procedure for the selection of participants in the training sessions took long time because it was done in collaboration between Ardhi University and the municipal directors.

The choice to carry out the training of the LGAs' officers in a residential modality required a stronger efforts in terms of logistic and organizational issues.

The mid-term conference has been rescheduled in its timing and objectives. It will be considered an integral part of the capacity-building strategy becoming the opportunity to present to the wide public the most relevant solutions of designing of adaptation initiatives to be mainstreamed within the local existing plans proposed by the LGAs' officers during the training.

2.4 Year 3 Action Plan

Activity	Year 3												Implementing body
	Semester 3						Semester 4						
	Feb	Mar	Apr	May	Jun	Jul	Ago	Sep	Oct	Nov	Dec	Jan	
01 Executive and Financial Management													DICEA & ARU
02 Project Coordination													DICEA & ARU
Preparation Activity 1.1 Investigate the livelihood of population dependent on natural resources and their concern for CC													ARU & DICEA
Execution Activity 1.1 Investigate the livelihoods of population dependent on natural resources and their concern for CC													ARU & DICEA
Preparation Activity 1.2 Investigate Dar's institutional activities related to CC													ARU
Execution Activity 1.2 Investigate Dar's institutional activities related to CC													ARU
Preparation Activity 1.3 Explore local options of autonomous adaptation and raise awareness on CC													ARU & DICEA
Execution Activity 1.3 Explore local options of autonomous adaptation and raise awareness on CC													ARU & DICEA
Preparation Activity 1.4 Organize the 1st International Workshop													ARU

Execution Activity 1.4 Organize the 1st International Workshop													ARU
Preparation Activity 1.5 Disseminate WP1 results													ARU & DICEA
Execution Activity 1.5 Disseminate WP1 results													ARU & DICEA
Preparation Activity 2.1 Develop methodologies for monitoring changes in peri-urban settlements													DICEA & ARU
Execution Activity 2.1 Develop methodologies for monitoring changes in peri-urban settlements													DICEA & ARU
Preparation Activity 2.2 Develop methodologies for exploring CC vulnerability scenarios													DICEA & ARU
Execution Activity 2.2 Develop methodologies for exploring CC vulnerability scenarios													DICEA & ARU
Preparation Activity 2.3 Develop a methodology for designing community based adaptation initiatives													DICEA & ARU
Execution Activity 2.3 Develop a methodology for designing community based adaptation initiatives													DICEA & ARU
Preparation Activity 2.4 Organize the 2nd International Workshop													DICEA
Execution Activity 2.4 Organize the 2nd International Workshop			(*)										DICEA

Preparation Activity 2.5 Disseminate WP2 results													DICEA & ARU
Execution Activity 2.5 Disseminate WP2 results													DICEA & ARU
Preparation Activity 3.1 Prepare a capacity building strategy													ARU
Execution Activity 3.1 Prepare a capacity building strategy													ARU
Preparation Activity 3.2 Develop and implement a training programme													ARU
Execution Activity 3.2 Develop and implement a training programme													ARU
Preparation Activity 3.3 Organize the mid term International Conference													ARU & DICEA
Execution Activity 3.3 Organize the mid term International Conference					(*)								ARU & DICEA
Preparation Activity 3.4 Support Dar's municipalities in designing adaptation initiatives													ARU & DICEA
Execution Activity 3.4 Support Dar's municipalities in designing adaptation initiatives													ARU & DICEA
Preparation Activity 3.5 Organize the 3rd International Workshop													ARU
Execution Activity 3.5 Organize the 3rd International Workshop										(*)			ARU

Preparation Activity 3.6 Disseminate WP3 results													ARU & DICEA
Execution Activity 3.6 Disseminate WP3 results													ARU & DICEA

3 PARTNERS AND OTHER CO-OPERATION

The partnership between Sapienza University of Rome and Ardhi University of Dar es Salaam became even stronger and more effective. The sharing of responsibilities in implementing each one of the project activities and in achieving of all the project results have been required efforts by both partners as described in the above paragraphs.
The internal communication flow between the two partners and among the working group members has been on almost weekly basis; exchange of documents took place mainly by email and uploading them in the reserved area of the project web site.

The institutional commitment remains a strong asset to facilitate the implementation of the project activities.

DCC representatives participated actively in the three-days international workshop organized in Dar in June 2012. Their feedback, the general information about the local institutional framework provided and their input will be the premise to build in the most suitable way the capacity-building strategy foreseen under the WP 3.

DCC and municipalities' officers were available in participating in the needs assessment necessary to develop the future capacity-building strategy; the directors and department heads collaborated actively with the selection of the participants to the next training.

The mtaa leaders provided invaluable assistance during the two cycles of participatory workshops with the local community.

During the boreholes' monitoring campaign the Drilling and Dams Construction Agency (DDCA) officers facilitated data collection, Dar es Salaam Water and Sewerage Authority (DAWASA) authorised the access to the public boreholes and the water units' officers of the three municipalities supported the field work both by identifying and opening the boreholes.

The processes of decision-making and the process by which decisions are implemented have been agreed step by step between the project partners and the DCC. This is crucial to ensure the success of the activities and in order to facilitate the communication between the project staff and municipalities.

Community involvement in the project activities has been demonstrated by their strong and active participation during the ten events performed trough the forum theatre. Almost 400 people have been involved in the first cycle events and almost 500 people attended the second cycle events.

Also during the boreholes' monitoring campaign most of the owners responded positively and participated fully on the process. Sometimes, during insitu measurements and sampling, owners requested information about the quality of their waters (especially on salinity) and they were provided whenever possible. Next year, as soon as the data analysis will be finished, results will be returned to the owners.

4 VISIBILITY

EU visibility has been ensured for each of the above mentioned dissemination activities following the rules of the "Communication and Visibility Manual for European Union External Actions" (Europeaid, 2010)

EU and ACC Dar logos appear in the web site and in all the communication and the dissemination materials described in the paragraph 2.2 of this report. During the public events of the participatory activity held in Dar es Salaam in March and in September 2012 t-shirts were distributed to the participants. During the international workshop in Dar bags with hard copy materials and pen-drive with all the papers and presentations were distributed to the participants. They appear also in all the internal technical reports and working papers developed by the project staff and in the training materials.

The European Commission may wish to publicise the results of Actions. Do you have any objection to this report being published on EuropeAid Co-operation Office website? If so, please state your objections here.

Name of the contact person for the Action: Prof.ssa Silvia Macchi

Signature:

Location: Rome, Italy

Date report due: 14th February 2013

Date report sent: 14th March 2013

ANNEX 1

SELECTED PARTICIPANTS TRAINING PROGRAMME ON ADAPTING TO CLIMATE CHANGE				
n°	**Name**	**Position/ Speciality**	**Department**	
1	Jumanne Manji		Works and Fire Rescue	**Dar es Salaam City Council**
2	Anna Kajubili		Works and Fire rescue	
3	Richard Katiti		Waste Management	
4	Enezael Ayo		Waste Management	
5	Robert K. Mageni		Legal	
6	Jacquilie Mosha		Legal	
7	Marth J. Mkupasi		Urban Planning, environment and Transportation	
8	Respicius R. Mathew		Urban Planning, environment and Transportation	
9	Peter Mtaita	Life stock officer	Municipal Agricultural and Life stock development	**Ilala Municipal Council**
10	Mujuni M Churchill	Environment mgt officer	Municipal Environmental mgt	
11	Msongo Songoro	Aquaculture mgt officer	Municipal natural resource	
12	Betson Gilbonce	Heath officer	Municipal Heath.	
13	Charles Wambura	Solid waste mgt officer	Municipal solid waste .	
14	Odena alex	Water Engineer	Municipal works and water	
15	Goodluck Mbanga	Civil Engineer	Municipal works and fire rescue	
16	Emmanuel Richard	Town planning	Municipal Town planning	
17	Edda Kimaro		Agriculture & Livestock	**Temeke Municipal Council**
18	Rehema Sadiki		Health	
19	Photidas A.Kagimbo		Lands & Urban Planning	
20	Mgaya Mtundu		Natural Resources	
21	Ally Hatibu		Waste Management	
22	Eng Prima Damas		Water & Sanitation	
23	Eng Protas Kavishe		Works & Fire Rescue	
24	Seetbertha Pascal		Disaster Coordinator	
25	Mohamed Mkumbo		Environmental Management Officer	

26	Baraba Novat		GIS Expert	
27	Mary Komba	Principal Town Planner	Town Planning	**Kinondoni Municipal Council**
28	Rose Kamote	Town Planner	Ward Executive Officer	
29	Ezra Mabiki	Senior Agricultural Officer	Agriculture and Livestock	
30	Deogratius Minja	Assistant Town Planner	Town Planning	
31	Eng. Immanuel Mwampashi	Environmental Engineer	Engineering	
32	Eng. Ismail Mafita	Highway Engineer	Engineering	
33	Eng. Athumani Kisiwa	Civil Engineer	Engineering	
34	Didas Shirima	Senior Municipal Natural Resources Officer	Natural Resources	
35	Flex Ndebarika	Municipal Forestry Officer	Natural Resources	
36	Mrs. Rosemary Maskini	Eco- Hydrologist		**Wami Ruvu Water Basin Office**
37	Eng. Abdallah Mshana	Environmental Engineer		
38	Mrs. Clarence Paul	Hydrogeologist		

ANNEX 2

RESULTS-TRACKING TABLE

Result Description	Result Indicator (OVI)	Target	Performance Rating (Red, Yellow, Green)	Progress/Arising Issues	Action Required by the which implementing partner/s
1.1 Livelihoods of population dependent on natural resources and their concern for CC investigated	N. households questionnaire administered/ Households questionnaire validated in the data entry	6000/5885	Traffic Light		
	N. people involved in the Data Analysis training course	26	Traffic Light		
	N. Data Analysis Methodologies implemented	3	Traffic Light		

1.2 Dar's institutional activities related to CC investigated	N. officers participating in the kick off meeting	10	Traffic Light		
	N. officers interviewed	48	Traffic Light		
1.3 Local options of autonomous adaptation and raise awareness on CC explored	N. people involved in the feasibility study	28	Traffic Light		
	Participatory cycles realized	2	Traffic Light		
	N. people involved in the participatory cycles	At least 100 people for each cycle	Traffic Light	Almost 400 people involved in the first participatory cycle held in March 2012. Almost 500 people involved in the second cycle held in September 2012	

1.4 1st International Workshop organized	N. Background papers	2	Traffic Light		
	N. papers presented	4	Traffic Light		
	N. people attending the workshop	10 researchers from each university partner country (Tanzania and Italy); 3 seniors from EU universities; and 3 seniors from EAC/SADC universities	Traffic Light	4 senior researchers from EU universities and 2 from EAC/SADC universities	
2.1 Methodologies for monitoring changes in peri-urban settlements developed	N. methodologies developed for monitoring Land Cover changes	1	Traffic Light	2 (two similar methodologies, respectively for LANDSAT images and SPOT images)	

	N. LANDSAT images acquired/ N. LANDSAT classifications/ N. LANDSAT images processed	5 images acquired / 5 classifications/ 5 images processed (period 2002-2010)	Traffic Light		
	N. Landscape Metrics Indices calculated for Land Cover change analysis	8	Traffic Light		
	N. people involved in the training short course on land cover classification and landscape metrics analysis	20	Traffic Light	It will be provided in the 5th semester	SAPIENZA
	N. methodologies developed for Land Cover validation	1	Traffic Light		
2.2 Methodologies for exploring CC vulnerability scenarios, as regards seawater intrusion phenomenon, developed	N. methodologies for conducting groundwater monitoring campaigns in Dar's coastal plain/ N. georeferenced boreholes /	1 methodology/ 133 georeferenced	Traffic Light		

	N. boreholes selected for the monitoring network	boreholes/ 90 boreholes selected for the monitoring network			
	N. groundwater monitoring campaign conducted	1	Traffic Light	The survey activity has started in June 2012. 2 major monitoring campaigns (long term activity) have been carried out. 2 minor monitoring campaigns (monthly activity) have been carried out. 2 further minor monitoring campaigns have been planned for January 2013 and February 2013. 1 short term monitoring activity (weekly campaign) has been planned for January/February 2013.	SAPIENZA is leader of the activity ARU is responsible for monitoring

	N. methodologies for the analysis of seawater intrusion / N. maps produced	1 methodology / 9 maps (SWL maps, EC maps, Seawater intrusion maps for 1997, 2002, 2012)	Traffic Light	The methodology for the analysis of the seawater intrusion has been defined and the evaluation of the evolution of the phenomenon is started.	SAPIENZA
	N. methodologies for exploring vulnerability scenarios under climate change / Number of scenarios explored	1 methodology 3 scenarios explored	Traffic Light	The methodology for exploring vulnerability scenarios under CC has been partially defined. The chosen methodology may be subject to variation in relation to the results achieved in the seawater intrusion analysis. The scenarios will be built once the survey activity has finished	SAPIENZA & ARU
	N. methodologies for investigating Land Cover Change correlation with Climate Change	1	Traffic Light	The scenarios will be built once the survey activity has finished	SAPIENZA & ARU

2.3 Methodology for designing community based adaptation initiatives developed	N. of methodologies for designing community based adaptation initiatives Toolkit for the design methodology	1 methodology 200 copies	Traffic Light	The methodology is under development The toolkit will collect the methodologies from 2.1 and 2.2	SAPIENZA & ARU
2.4 2nd International Workshop organized	N. Background papers	2	Traffic Light	2 working papers are now under development	SAPIENZA & ARU
	N. papers presented	4	Traffic Light		SAPIENZA & ARU
	N. people attending the workshop	10 researchers from universities of each partner country (Tanzania and Italy); 3 seniors from EU universities; and 3 seniors from EAC/SADC universities	Traffic Light		SAPIENZA & ARU

3.1 Capacity building strategy prepared	N. Need assessment report of the training needs of municipal staff	1 need assessment	Traffic Light		
	N. Officers involved in the need assessment	At least 40	Traffic Light	50	
	N. capacity-building action plan	1	Traffic Light		
3.2 Training programme developed and implemented	N. learning curricula / N. evaluation procedures	2 learning curricula / 1 evaluation procedure	Traffic Light	A draft version of the learning curricula has been submitted to the DCC for feedback	ARU & SAPIENZA
	N. Training resource book	1	Traffic Light	Background material has been prepared for the training modules	ARU & SAPIENZA
	N. Officers involved in the training	20	Traffic Light	At the moment the selection includes 38 officers.	ARU & SAPIENZA
3.3 Mid term International Conference organized	N. submitted papers	12	Traffic Light		ARU & SAPIENZA
	N. People attending the Conference	100	Traffic Light		ARU & SAPIENZA

	N. Press release	At least 2	Traffic Light		ARU & SAPIENZA
3.4 Dar's municipalities supported in designing adaptation initiatives	N. Adaptation initiatives designed	At least 4	Traffic Light		ARU & SAPIENZA
3.5 3rd International Workshop organized	N. Background papers	2	Traffic Light		SAPIENZA & ARU
	N. papers presented	4	Traffic Light		SAPIENZA & ARU
	N. people attending the workshop	10 researchers from universities of each partner country (Tanzania and Italy); 3 seniors from EU universities; and 3 seniors from EAC/SADC universities	Traffic Light		SAPIENZA & ARU
Dissemination results	N. scientific papers submitted to academic journals	At least 2 related to the result 1.1; At least 1 related to the result 1.2; At least 3 related to the result 2.1;	Traffic Light	Draft working papers are ready; Draft working papers are ready; Some draft are under development Some draft are under	SAPIENZA & ARU

		At least 3 related to the result 2.2		development	
	N. evaluation reports	6 (2 evaluation reports for each international workshop)	Traffic Light	2 evaluation report already produced for the 1st international workshop	SAPIENZA & ARU
	N. Proceedings (international workshop and conference)	4 proceedings (1 for each international workshop and 1 for the international conference)	Traffic Light	Proceedings of the first international workshop are under preparation	SAPIENZA & ARU
	N. Booklets reporting on designed adaptation initiatives	500 copies	Traffic Light		SAPIENZA & ARU
	N. Posters on the identified adaptation initiative	100 copies	Traffic Light		SAPIENZA & ARU
	N. Web sites	1 web site with a public and a reserved area	Traffic Light	Updating of the contents during the whole project	SAPIENZA
	N. Promotional material kit	1 brochure + 1 bag + 1 CD Rom	Traffic Light	Pen-drive has been produced instead of CD Rom. Also t-shirt and posters have been produced for dissemination and visibility during participatory cycles	