

# URAdapt

Managing Water at the Urban-Rural Interface: The key to climate change resilient cities

## SECOND RE-SAP MEETING REPORT



## **URAdapt Accra**

### **Second Re-SAP Meeting**

**Tuesday, July 20<sup>th</sup>, 2010**

**Coconut Grove Regency Hotel, Accra**

#### **1. Opening session**

The URAdapt project leader, Dr. Liqa Raschid-Sally, opened the meeting with a short Islamic prayer. She expressed her hope that the meeting would take place in an informal atmosphere that is conducive to learning and sharing. Dr. Raschid-Sally went through the programme briefly, acknowledging the contributions of the presenters and the facilitators. She invited Ms. Charlotte Engmann from the Community Water and Sanitation Agency to facilitate the project update session. Ms. Engmann expressed her gratitude at being asked to be part of the meeting, and called upon Dr. Raschid-Sally to proceed with her presentation.

#### **2. Project update**

##### *2. a. Project metamorphosis and highlights*

Dr. Raschid-Sally began by welcoming the new members of the platform. These included representatives of the National Disaster Management Organisation, the Association of Ghana Industries, Aqua Vitens Rand Limited, the Institute for Statistical Social and Economic Research and the Regional Coordinating Council. In addition, a sizable delegation from the Accra Metropolitan Assembly – a key stakeholder group, given the project's focus on cities – was in attendance. She attributed the expanded membership to the project's networking activities, which have succeeded in generating interest. She also welcomed representatives of URAdapt's 'sister project' on climate change and health, led by Dr. Samuel Codjoe from the Regional Institute for Population Studies.

Dr. Raschid-Sally proceeded with a brief re-cap of the project. She emphasised that the project is examining its case study cities – Accra and Addis Ababa – within broader basin contexts. Its main interest is to understand the consequences of climate change on water resource availability, and wastewater disposal. There is an inability to meet current water demands and wastewater management needs; the situation is expected to worsen under the influence of climate change.

As a core feature of the project, the concept of the 'urban-rural interface' – particularly as it relates to water and food for cities – called for closer attention. Dr. Raschid-Sally set the context by explaining that the water system is often anchored in rural areas outside of formal city limits; the boundaries of water basins rarely coincide exactly with administrative jurisdictions. A further factor connecting cities and their surroundings is cities' reliance on peri-urban and rural areas for their food supplies. Yet, food production in these outlying areas can sometimes compete with cities themselves for access to the same water (or wastewater) resources. A further connection between urban and

rural spaces is migration. Severe climate variability and change may accelerate population shifts from rural areas to urban centres.

According to Dr. Raschid-Sally, the vulnerabilities associated with these urban-rural linkages are rarely addressed, since 'urban' and 'rural' continue to be treated as distinct categories. The solution to what may be deemed 'urban problems' can actually be found in rural areas. Mechanisms to coordinate the urban-rural interface become critical in reducing vulnerabilities.

Indeed, the URAdapt project adopts a more holistic perspective. It situates itself at the nexus of water, sanitation, climate change and urban development, with the intention of forging closer ties between these areas of activity. Moreover, the project makes an explicit attempt to look beyond the city boundaries in understanding urban problems and seeking solutions. URAdapt also fosters research-policy dialogue by organising learning and uptake events. The project recognises that contextually relevant and sustainable solutions can only arise out of activities that bring together a multiplicity of expertise – both research-based and non-research-based. The URAdapt project team is cross-disciplinary in nature, and the Accra and Addis Ababa platforms draw their members from a number of different stakeholder groups.

The URAdapt project seeks to reduce the vulnerabilities of cities to climate change through improved and integrated urban water management. It does so through two, continually interacting work packages: empirical research and stakeholder engagement. URAdapt will downscale global circulation models to the levels of basins and cities in order to understand their exposure to climate change. Downscaling specifically to the level of Accra has not yet been done. The project will then model water availability and allocation under different climate change scenarios at the basin level. This will complement city-level analyses to understand urban water and wastewater interactions. Climate change impact scenarios will shed light on the 'water supply side'. Urban development scenarios, in turn, will help to articulate the 'water demand side' by forecasting different futures of growth, water use and sanitation practices. If feasible, the project will generate investment scenarios through which the demand and supply sides could be balanced.

The outcomes of empirical research form the basis of discussions with stakeholders. Stakeholder engagement is understood as a two-way process of mutual learning between the project team and project stakeholders. It occurs at multiple levels, including platform meetings, small advisory group meetings, and targeted engagement with key stakeholder groups. The project seeks to carry out continuous process documentation in order to draw lessons from its experiences.

The ultimate product of the joint efforts between the project team and stakeholders will be a series of strategic recommendations for Accra. These are timely, given the ascendance of climate change onto global-, national- and city-level agendas. Indeed, Ghana is currently in the process of developing policy frameworks for climate change and urban development. At the city-level, the mayor of Accra is committed to improving flood control, sanitation and health. The URAdapt project can advise in 'climate proofing' water and sanitation upgrading.

Dr. Raschid-Sally noted that the project has evolved considerably since its inception. The platform meetings are opportunities for stakeholders to assess these evolutionary directions and to define alternative courses, if necessary.

The URAdapt Research into Strategic Action Platform (Re-SAP) is a source of technical information and a means of 'ground-truthing' project activities. Out of the Re-SAP emerged a smaller Consultative Group, which is tasked with deliberating around some of the conceptual questions of relevance to the project (such as the future of decentralisation and privatisation in the water and sanitation sectors). URAdapt has also begun targeted policy engagement in order to determine the needs of policy communities and to respond to them in a timely manner. To date, URAdapt has forged closer interactions with the Accra Metropolitan Assembly. The project plans to subsequently strengthen its ties to institutions managing the urban-rural interface, as well as sector Ministries, Departments and Agencies in order to raise national-level awareness of its research.

Dr. Raschid-Sally wrapped up her presentation with a mention of some of the project highlights that had taken place since the first platform meeting in February. These included the Addis Ababa platform inception meeting; the setting up of climate change downscaling and hydrological modelling research; input into Ghana's draft National Urban Development Policy and National Climate Change Policy Framework; the presentation of the project to the advisory board of the donor (the Climate Change Adaptation in Africa programme of the IDRC and DFID); and a monitoring visit by the IDRC project officer. Both the advisory board and the project officer offered positive feedback in terms of the approach that the project has taken and the progress that it has made.

Dr. Raschid-Sally concluded by saying that once the empirical research models are finalised and the scenarios developed, the platform discussions will also change in terms of format and content.

Ms. Engmann thanked Dr. Raschid-Sally for her presentation, and invited Dr. Barnabas Amisigo to update the platform on the hydrological modelling activities that had taken place.

### 2. b. Hydrological modelling update

Dr. Amisigo began by saying that the hydrological modelling component of the project was being carried out by CSIR/ WRI. Since the first meeting in February, modellers in both Addis and Accra came to an agreement on the types of models that the project will use. Dr. Amisigo's presentation would focus on what the project will do with those models.

The project's hydrological modelling was guided by three objectives: firstly, to assess the impact of various climate change and other scenarios on flooding in Accra; secondly, to assess the impact of these scenarios on water availability in the Densu Basin; and thirdly, to simulate the impact of various water demand and allocation scenarios on water use in the Densu Basin.

The project will use the HEC-HMS model. The first task will be to calibrate and validate the model to reflect local conditions at the study sites. For that, the project will require various inputs, including historical data on the climate, historical flow data and data on watershed parameters. Once the calibration and validation exercise has been completed, the HEC-HMS model can be used to carry

out impact assessments under different climate change and land use scenarios. These scenarios will have to reflect conditions at the city and the basin levels.

The HEC-HMS impact assessment model is expected to provide two types of outputs: information on future storm water levels and flooding in Accra, and information on water availability in the Densu Basin, both under different climate change and land use scenarios.

Dr. Amisigo explained that these outputs will be further fed into water management models. At the level of the Densu Basin, the project has chosen WEAP to model future water allocation, among others, to meet the needs of Accra. At the level of Accra, the team will complement information on water allocation to the city, as well as that on future storm water levels and flooding, with urban and industrial growth scenarios. These serve as inputs into an urban water management model, VENSIM, which will determine future uses of water in the city, the extent of wastewater generation as well as levels of flooding.

The hydrological modelling will produce a simulated hydrological output, in terms of flood or storm water, or the water available in the basin. For the HEC-HMS model to be run in simulation mode, the team requires three basic inputs. These include a basin model that will indicate, among others, the division of the basin into sub-basins. This basin model will be constructed using a utility model (ArcGIS and HEC-GeoHMS). The ArcGIS, in turn, will make use of a digital elevation model (which includes information on the stream networks), a digital soil map and a digital land use map. These will provide the real characteristics of the Densu Basin.

The second basic input is a meteorological model. This is crucial, since rainfall drives hydrology. The third input involves control specifications that determine the simulation dates and time intervals. Dr. Amisigo noted that all of these activities will depend on information that stakeholders are likely to have – in particular, the land use and soil maps – and that the project will be contacting them in the upcoming months.

The project would use WEAP to evaluate the use of water from the Densu Basin under different water demand scenarios and allocation criteria. This will allow the project to determine water abstraction according to specific streams in the basin, and for particular uses. Ultimately, the project will be able to quantify the water reaching the Weija Dam. Although the WEAP has not yet been set up for the Densu Basin, it has been constructed for the Volta Basin. This provides an indication of the kinds of outputs the WEAP modelling is expected to yield.

Ms. Engmann thanked Dr. Amisigo for his presentation, and invited participants to ask questions. Dr. Delali Dovie from the Water Resources Commission prompted Dr. Amisigo to scale down some of the technical terms that he used in his presentation. He would have liked to hear more about the definitions of 'forecasting' and 'simulation', the use of scenarios, as well as more thorough descriptions of some of the models that the project will use.

Dr. Amisigo remarked that the first platform meeting had dealt in more detail with the utility of the models and types of scenarios that the project would be using. In short, these provided alternative forecasts of the future in terms of the world economy, energy use, fossil fuel emissions and their collective influences on the climate. The project will complement climate change scenarios with land use scenarios. These – along with meteorological data on rainfall – will reveal water availability and allocation for various water-dependent land use practices, how these are expected to evolve in the future, and their impacts on downstream – including city-level – water availability.

Daniel Ayuivie from the Regional Town and Country Planning Department noted that a focus on the Densu Basin would only capture the water availability and allocation dynamics in Accra-West. He queried whether the project would extend the scope of its analysis to Accra-East. He also asked project team members to clarify their definition of Accra. Dr. Amisigo agreed that Accra sources its drinking water from various sources, including the Densu Basin and the Volta Basin. A considerable amount of information already exists on the various uses of water from the Volta Basin. However, given the focus of the AMA on the Weija Dam as a source of urban water supply, the project opted for this focus. The project will determine the amounts of water that can be supplied from this dam to the city under various scenarios (of upstream water use in the Densu Basin; of climate change; etc.) in order for the city to plan its future water management strategy in a sustainable manner (that balances supply and demand).

Dr. Raschid-Sally added that all projects must delineate those activities that they can realistically carry out given the resources available to them. The project team feels that the Weija Dam is likely to be more sensitive to fluctuations in water availability than the Akosombo Dam, which has larger water storage capacity. Moreover, understanding how urban-rural linkages influence decisions and actions on water management is very much a pilot project: it is the first time that such a study has been attempted. At a later stage, once the methodology has been established, the study can be expanded to other basins.

Christian Siawor from the Ghana Water Company Limited recommended that the project contact the Water Resources Commission for recent information on modelling in the Densu Basin. Dr. Amisigo thanked him for this suggestion, and noted that the Water Resources Commission has also drafted an Integrated Water Resources Management plan for the Densu Basin. This is based on WEAP. Some of the components of this work will be relevant for URAdapt.

J. Wellens-Mensah from the Hydrological Services Department addressed the question raised by Mr. Ayuivie regarding coverage of water supply from the Weija Dam. There are plans to build an interconnection between the Weija system and the Kpong system (which channels water from the Volta Basin to the city). In the future, the Weija Dam will not only be supplying Accra West. Once the connection is done, the project should be mindful of the contribution of potable water supply from Weija to the whole of Accra.

Major Awuah from the AMA asked about the timeline of the hydrological modelling. He queried what progress had been made since the last platform meeting. The Accra Metropolitan Assembly is undertaking various efforts in the water sector under the Millennium City Initiative. Projects such as

URAdapt should pick up the pace to ensure that their findings can be pooled to inform the Millennium City Initiative. Dr. Amisigo replied by saying that now that the project had settled on the types of models that it would use in both Accra and Addis Ababa, it could go about collating the various types of data that the models will use. The project already has some of these, and while finalising the collection of data, can proceed with setting up the ArcGIS.

George Owusu from ISSER also queried the project's definition of Accra. He noted that the city is expanding rapidly towards the east and the west, and that the city's population is fast becoming concentrated in these areas. If the project is using population data from the AMA area only, it may not capture water demand peaks. Dr. Amisigo agreed that the project would have to be careful in its use of population data. The basin-level modelling will capture the expansion of the city and the 'floating population' that enters it temporarily.

Stephen Ackon from the Accra Sewerage Improvement Programme (ASIP) of the AMA queried the purpose of digital soil maps, asking whether it was to better understand groundwater abstraction. Dr. Amisigo explained that the soils in the catchment provide parameters for determining water flow. The curve number, for instance, indicates how much water can infiltrate into the soil. The digital soil maps will allow the project to understand the different soil types and their curve numbers, and therefore, levels of runoff.

Samuel Codjoe from the Regional Institute for Population Studies reiterated the need to look at the use of population data very carefully. The last census took place in 2000, and most of the information provided by it is now outdated. Dr. Amisigo referred to his presentation of the hydrological modelling framework at the platform inception meeting in February. He noted that stakeholders will input into defining water allocation criteria. Water allocation will depend on population, industrial growth, and other factors that stakeholders have expertise in.

N. Dokurugu from the National Disaster Management Organisation (NADMO) noted that housing developments in Accra are rapidly displacing the city's wetlands. He asked what impact the disappearance of wetlands would have on the city's groundwater levels. Dr. Amisigo pointed out that he can only speculate on potential impact. He highlighted that wetlands provide a recharge mechanism for groundwater. If wetlands are destroyed, groundwater potential is likely to be reduced.

Dr. Raschid-Sally added that there can be water quality issues related to the loss of wetlands. If upstream wetlands are destroyed, the quality of the water that eventually reaches downstream users may be diminished. Whether the project should address this is something that the platform should decide upon collectively at a later date.

Honourable Archibald Cobbine from the AMA contributed to the discussion on what constitutes Accra, and the population figures that the project should use. He maintained that although the city was expanding, the population remained concentrated within the administrative boundaries of the AMA during the business hours on weekdays. As such, a focus on the AMA is justified.

B.K. Addo from the Greater Accra Regional Coordinating Council felt that the platform was jumping the gun in its focus on population issues. He reiterated that the project's initial interest was in determining water availability at the level of the Basin. There will be an opportunity for stakeholders to contribute their expertise on projected population dynamics at a later stage in the project.

Dr. Raschid-Sally contributed a final comment to end the discussion on hydrological modelling. She expressed her satisfaction at the platform having identified the importance of using accurate population figures in the empirical research. These will have an important bearing on future water management strategies. Dr. Raschid-Sally suggested that the project convene a small working group of experts, who understand population dynamics, to advise research activities.

Ms. Engmann thanked the contributors for their comments, and invited Dr. Kasei to give his presentation on climate change modelling

### 2. c. Climate change modelling update

Dr. Raymond Kasei, from the University of Development Studies in Navrongo, has recently joined the URAdapt team as a climate change modeller. In his presentation to the platform, Dr. Kasei provided an overview of global and regional climate models; downscaling from the global to the regional and local scales; as well as the climate change downscaling strategy that the project has adopted.

Dr. Kasei explained that global circulation models do not provide a high enough resolution to understand the impacts of climate change on regional – let alone more local – levels. Global circulation models are based on a 250x250 km grid. There is a 'mismatch' in resolution between these models and the local climate. A direct inference of local climatic conditions from global circulation models would provide imprecise information. Even if the global climate were to be modelled in higher resolutions, it would still be necessary to 'ground' the information to reflect actual climate-influencing conditions (such as relief and land use patterns) in the area of interest.

Dr. Kasei explained that regional downscaling is motivated by two factors. On the one hand, numerical weather or climate simulations with large domains and high grid resolutions are associated with high costs. On the other, using low grid resolutions reduces the quality of the information that is obtained. Regional downscaling is an acceptable compromise between the two options.

Dr. Kasei provided examples of regional climate models that have been produced for West Africa. These include MM5 for the Volta Basin, and REMO for the West African region as a whole. URAdapt, in turn, will generate a RegCM3 model for Accra, which is expected to provide a 20 x 20 km grid. The project will use statistical downscaling to zoom in further on the city.

The project's objective will be to nest a fine-grid Accra area atmospheric model within a coarser global circulation model. URAdapt will draw upon the latest data that are available for Accra, and modify the outputs into user-friendly forms for hydrological modellers. The project envisions that its outputs will be flexible, and of relevance to a range of further modelling platforms.



Dr. Kasei also presented the sequence of activities for climate change downscaling. The first step is to set up a platform in Linux for the modelling activities. The next step will be to collect all available relief information, and to set up the dynamics and physics of the area. These will include a land surface model, and information on sea surface temperature as well as atmospheric-land interactions. The team will then pre-process this information with boundary conditions and, finally, simulate the inputs according to specific IPCC projections. Once the 20 x 20 km grid has been obtained from RegCM3, the project will use statistical downscaling to obtain a higher resolution of future climatic conditions in Accra. This is expected to provide a 1 x 1 km grid.

URAdapt intends to use projections based on A1B and B1 scenarios (of global surface warming over time), which the IPCC maintains are the most plausible. At a later date, the project will also model the regional and local climates under extreme flooding scenario(s).

Ultimately, the RegCM3 simulated output will yield a range of climate input data for the URAdapt hydrological modellers, including precipitation, temperature, wind, relative humidity, and radiation/sunshine duration. These outputs – along with data on the basin’s relief, land use, land cover and soil properties and flow networks – will allow the hydrological modellers to obtain information on surface runoff, evapotranspiration, infiltration, interflow and groundwater flow. Dr. Kasei concluded by saying that the project was working hard to make progress, but noted that the conditions in Accra – particularly in terms of internet connectivity – could cause delays.

Ms. Engmann thanked Dr. Kasei for his presentation, and invited questions and comments from the platform. Dr. Delali Dovie from the Water Resource Commission was pleased to see the inclusion of sea surface temperature in setting up the model. This is something that has largely been omitted in regional climate modelling in West Africa. Dr. Dovie queried the reason for including this parameter in the current work. Dr. Kasei explained that the El Niño and La Niña weather phenomena have highlighted the link between global climate patterns and sea surface temperatures. More recently, El Niño was found to have a direct influence in the climate of West Africa. These factors make it imperative to consider sea surface temperatures in forecasting the future climate of the region.

J. Wellens-Mensah from the Hydrological Services Department asked for clarification of climate modelling terminology. He queried whether ‘GCMs’ refer to ‘global circulation models’ or ‘general circulation models’. Dr. Elaine Lawson from the Centre for Social Policy Studies at the University of Ghana, in turn, noted that climate change downscaling often omits local climate data. She asked whether (and at what point) the eventual fine resolution climate models would make use of local climate information. Dr. Kasei responded that local data will be used to calibrate the model. In addition, once the regional models will actually be run, the outputs will be tested against local data, particularly on rainfall. The project will make use of meteorological data from 1961 until 2006, which is sufficient for high resolution statistical downscaling to the city level.

Mr. Oppong-Boadi from the Environmental Protection Agency agreed with earlier comments on the importance of using sea surface temperatures. At the same time, he urged the project to also consider the UNFCCC’s convention of using atmospheric temperature in order to ensure that the research conforms to international best practice. Dr. Kasei responded by saying that it is only in

setting up the dynamics and physics of the modelling platform that sea surface temperatures play a role. Once the modelling platform has been set up, the atmospheric temperatures will be used in the simulations. In this way, the project will account for sea-atmosphere interactions.

Christian Siawor from the Ghana Water Company Limited asked whether the impact of particle transfer has been considered in the hydrological modelling. He attributed particle transfer to specific land use practices. One of the consequences is the siltation of drains, which in turn leads to higher levels of run-off. Dr. Amisigo replied that if the drains become silted, their carrying capacity will be reduced; drains have been designed so that there is no siltation. The hydrological modelling may not pick up on the fact that the existing drains are not performing in the way that is expected. That is why the researchers will compare the outputs of the modelling to the real situation on the ground.

Ms. Engmann thanked the presenters and brought the session to a close.

### **3. Urban development**

Dr. Sean Doolan had to cancel his participation in the meeting at the last minute. He will be invited to give his presentation on cities within the global climate change agenda at a subsequent platform meeting. Dr. George Owusu delivered his presentation on urban development in Ghana, followed by questions and comments from the audience.

The facilitator, Mr. Farouk Braimah from the People's Dialogue, opened the session by inviting Dr. George Owusu to give his presentation. Dr. Owusu had structured his presentation into three parts. The first part focused on Ghana's macro-urban environment. The second part addressed the growth of Accra and the resulting peri-urban management challenges. The final part dealt with the institutional and policy framework for urban development in Ghana.

Dr. Owusu began by explaining that Ghana's macro-urban environment is characterised by a rapid pace of urbanisation and urban growth. Population projections indicate that Ghana will become an urbanised country – with over 51% of its total population living in urban areas – by 2010. A slowdown in urbanisation is likely to occur in 2030. Of all the regions in Ghana, the Greater Accra Region and the Ashanti Region have experienced the highest levels of urbanisation since the 1960s.

According to data from the 2000 census, most urban centres have between 5000 and 20 000 inhabitants. There are very few large urban centres, and an overwhelming number of smaller centres. Dr. Owusu cautioned that there was a misconception that the main contributing factor to urban growth in Ghana was rural-urban migration. Although this does play a role, recent research has shown that natural population growth in cities exerts a stronger causative influence.

According to Dr. Owusu, inadequate urban housing and infrastructure, increasing numbers of slum dwellers and urban poverty (in 2001, there were an estimated 5 million slum dwellers in Ghana, representing approximately 58% of the total urban population. The numbers of urban slum dwellers were increasing at a rate of 1.8% per annum), along with vast and rapid urban sprawl, are symptomatic of Ghana's macro-urban environment. There is currently no comprehensive urban and regional development policy. Overall, Ghana's development strategies have lacked an urban focus.

One of the challenges has been an absence of robust data for policy formulation. Much of current analysis is based on data from the 2000 census, which is outdated. There is also a lack of data that would allow suburb and neighbourhood level analyses.

Moving onto discuss the growth of Accra and its peri-urban management challenges, Dr. Owusu noted that Accra has experienced rapid growth over the past seven decades. Current estimates put the city's population at approximately 2 million. However, the actual number is likely to be higher, due to the emergence of neighbourhoods that are functionally integrated into the city, but that are not classified as Accra city proper.

Although Greater Accra is the smallest region in Ghana based on its size, the region's share of the total population has grown over the years, and it is home to approximately 15,4% of the total population (the second highest proportion after the Ashanti Region). The proportions of populations based in most other regions have declined since the 1960s (although absolute population numbers have increased); part of the explanation is that these areas are 'emptying' their populations into other regions, including Greater Accra.

According to Dr. Owusu, this population emptying has implications for the population densities in settlements in Accra that are classified as 'high-density' to begin with. However, the population influx into Accra also has consequences for fringe areas around the city. Between 1984 and 2000, the average rate of growth in Accra was 4%. In the neighbourhoods surrounding the city, the average growth rate was as high as 37.5%. This indicates the scale of the spill-over effect from the metropolis into the adjoining communities. Dr. Owusu maintained that the rapid rate of growth in the fringe areas around Accra – which are not necessarily captured in the population figures for Accra proper – would have to be accounted for in the URAdapt scenario development.

What explains such levels of growth in the fringe or peri-urban areas surrounding Accra? The conventional process of peri-urbanisation proposes that various push and pull factors stimulate rural-urban migration and natural increase of the urban population, which in turn drive the growth of city centres. When population influx outpaces a centre's ability to accommodate its new inhabitants, they come to face acute shortages in urban land and housing, high rents and a lack of job opportunities. In response, the population moves to peri-urban areas, acquiring land and engaging in either legal or illegal peri-urban land development. Dr. Owusu argued that in the case of Accra, this typical explanation is insufficient.

An alternative explanatory framework suggests instead that Accra is being influenced by global, national and local factors. On the global level, economic globalisation and capital influx is attracting multi-national corporations to Ghana – and more specifically, to the centre of Accra. International NGOs are also setting up offices in the centre of the city, with the result that the expatriate and foreign migrant populations are increasing. In addition, international return migrants – a demographic group that is frequently overlooked – are setting up households in established neighbourhoods near the city centre, which have existing water, sanitation, electricity and other infrastructure, and that are situated close to cultural and entertainment hubs.

On a national level, economic liberalisation has not translated into a 'de-concentration' of economic activity, much of which remains clustered in the Accra area. Moreover, land titling and registration is a complex process, with the result that land rights are frequently contested. In addition, a policy of compulsory land acquisition for public purposes in the centre further fuels population movement to peri-urban areas. On a local level, higher population densities, continued urban growth, weakened socio-cultural networks, outmoded city planning and building codes, as well as weak urban governance institutions are contributing to the shift out of Accra's centre to the peri-urban spaces.

These factors lead to a shortage of land in the centre, intense land competition, the commercialisation of land, and the privatisation or individualisation of land rights. The only alternative for those excluded by these dynamics is to move towards peri-urban areas, in the process, contributing towards city sprawl.

Moving on to discuss the institutional and policy framework for urban development, Dr. Owusu noted that there have been some interventions to address urbanisation and urban growth. However, these have been piecemeal and fragmented, lacking a specific focus. Dr. Owusu also highlighted that no country has yet gone through the process of industrialisation without a simultaneous process of urbanisation. He emphasised the importance of a comprehensive policy that would allow Ghana to attend to the current challenges of urbanisation, while harnessing the benefits that such development has to offer.

Dr. Owusu noted that Ghana does not have a comprehensive urban development strategy or policy in place at the moment. Until recently, no single Ministry or Directorate within a Ministry was given direct responsibility for urban development. Instead, such functions have been dispersed among several authorities, resulting in a multiplicity of bodies involved in urban development, and little coordination and harmonisation of urban development issues. A further upshot has been a weak pattern of public expenditure, which inhibits effective urban infrastructure growth and service provision.

ISSER, with support from the Ministry of Local Government and Rural Development and GTZ, is currently developing a National Urban Policy (NUP). A draft version has been completed, and will now be presented to stakeholders for their input during regional consultations. The policy provides a comprehensive response to urban development, and includes sections on the urban environment and climate change. According to Dr. Owusu, there is a strong need for a comprehensive urban and regional development policy, which addresses urban and rural development challenges and strengthens rural-urban linkages. This must be accompanied by advocacy on the part of civil society and development partners for a pro-urban development agenda. Finally, local government institutions, particularly sub-district structures, must be strengthened, and decentralization realized in full.

The facilitator, Mr. Farouk Braimah, thanked Dr. Owusu for his presentation, and asked him to assist the platform in identifying urban-rural linkages and how these affect water. Dr. Owusu referred back to Dr. Raschid-Sally's presentation, which indicated that the resources used by urban areas – particularly their centres – are often based in peri-urban or rural surroundings. The NUP document

acknowledges this, and has dedicated a section to peri-urban management. This is in attempts to shift from a reactive policy stance to a proactive future-oriented planning mode for these spaces. Currently, as a result of weak institutions, urban and peri-urban development proceeds with little control or comprehensive planning. Consequently, water courses and greenbelts are destroyed, with implications for the availability and quality of natural resources, including water. Current local government legislation calls for cooperation between district assemblies. What is lacking, however, is an operative instrument, which would prompt assemblies to realise this in practice.

Samuel Appenteng from the Association of Ghana Industries asked Dr. Owusu to clarify the definition of urbanisation. He also noted that policy-makers in Ghana continue to describe population distribution between rural and urban areas as a '70-30 split'.

Dr. Owusu explained that urbanisation is defined as the proportion of the total population of a country or a region that is living under conditions that are considered urban, or a persistent increase in this proportion. In Ghana, any settlement that has 5000 or more inhabitants is considered urban. The draft NUP questions this definition. It calls for an alternative, which accounts for, among others, the prevalence of certain functions or services.

Samuel Codjoe from the Regional Institute for Population Studies expressed his surprise at the continued pervasiveness of the notion that Ghana was only 30% urban. Ghana's population trends are in tune with global dynamics. Global data suggests that for the first time in history, the percentage of people living in urban areas is greater than the percentage of people living in rural populations. He also added that it is not only the rapid growth rate of the fringe settlements indicated by Dr. Owusu that is striking; it is also the short timeframe during which they emerged.

J. Wellens-Mensah from Hydrological Services Department commented on the facilitator's question about the impact of population on water. There is an information gap in terms of the impact of population on water *quality* specifically; this despite the causal link between the rate of urbanisation and the degradation of water bodies. He also queried whether the NUP makes provisions for greenbelts, particularly those that allow for urban agriculture. There seems to be a clear need to involve the Town and Country Planning Department in the development of the urban development policy; the department has a mandate to regulate the development of urban areas. Finally, Mr. Wellens-Mensah called for innovativeness in redefining urbanisation. He insisted on a definition of urban areas, which indicates the uses of urban lands.

Mr. Braimah responded on the involvement of the Town and Country Planning Department in the preparation of the NUP. The exercise is being sponsored in part by the Ministry of Local Government and Rural Development. When the formulation of the policy first began, the Town and Country Planning Department was part of that Ministry, and their inputs were incorporated into the draft policy. Mr. Braimah also recalled that at the time of the 2000 census, several stakeholders expressed concern with using a population cut-off point of 5000 as a definition for urban. He was pleased to see that this definition was being revisited in the new policy and ahead of the upcoming census.

Dr. Owusu added that changing the definition of urban will have to be done on a consensual basis together with all relevant stakeholders. Responding to the question on particular uses for urban lands, Dr. Owusu explained that the NUP has a section on the urban environment, which addresses issues related to water and sanitation, greenbelts and open spaces, as well as urban agriculture.

Dr. Raschid-Sally agreed that definitions of urban should indicate the types of activities that take place in urban areas. This information would provide a direct link to urban water needs, and assist in investigating water availability and allocation under climate change. She noted that further platform discussions on urban development were needed in order to establish connections to water and climate change.

Mr. Ayuivie from the regional Town and Country Planning Department urged the NUP to not only make recommendations for action, but to think about mechanisms for implementing those recommendations. Dr. Owusu replied that the team had taken note of the various plans and strategies that have already been developed, but that simply sit on the shelf unused. The NUP emphasises the issue of enforcement.

Mr. Braimah thanked Dr. Owusu and all of the contributors, and brought the session to a close.

#### **4. Water: making the urban-rural link (group work)**

The objective of the final session of the meeting was to establish the urban-rural links related to water. This would be done through group work.

Having asked the participants to break up into four groups, Dr. Raschid-Sally presented the questions that each group would tackle. Groups 1 and 2 were asked to capture the main water users and sectors at the level of the basin and at the level of the city. In addition, the two groups were asked to consider which sectors and user communities are most vulnerable to resource limitations at both scales. The questions are presented in the box below.

##### Questions for groups 1 & 2

- A. *What are the existing linkages between water users and/or sectors, firstly, at the level of the Densu Basin and, secondly, at the level of Accra?*
- B. *Which groups and/or areas are most vulnerable to resource limitations? Which are presently affected? Think about both the city and the basin.*

Groups 3 and 4, in turn, were asked to situate Accra within its broader rural context. They were asked to identify the water resource linkages between Accra and its surrounding areas, and to consider in their discussions the issue of flooding. The groups were also asked to pinpoint the institutions and mechanisms through which cross-sectoral and city-basin linkages are managed, and to consider their effectiveness and capacities in this regard. The questions for these two groups are presented in the box below.

### Questions for groups 3 & 4

- C. *What are the existing linkages in terms of water resources and sanitation between Accra and its surrounding areas?*
- D. *What are some of the existing institutions or mechanisms for managing cross-sectoral and basin-city linkages? To what extent are they able to manage these linkages?*

Having deliberated the questions for 45 minutes, the groups were asked to present their findings to the platform. Dr. Raschid-Sally noted that several groups had requested the project team to clarify the questions. She explained that the purpose of the exercise was to introduce new concepts and ideas for discussion by platform members. As such, the project team was reluctant to provide groups with pre-defined definitions, and instead prompted the individuals themselves to articulate their own meanings. Ultimately, the exercise was expected to allow the platform and the project team to develop a common understanding of these issues to guide the research activities. Their conclusions are summarised in the following boxes.

### Group 1 findings

Group 1 presented its findings in tabular format. The group first identified the main water use sectors and users; classified them according to whether they operate at the level of Accra (A), the Densu Basin (D) or both (B); indicated their overall vulnerability to resource constraints as high (H), medium (M) or low (L); and finally, the extent to which they are currently affected by resource constraints (H, M or L).

<b>Water use sector</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Current vulnerability</b>
Agriculture	D	H	L
Water bottling companies	D	H	L
Breweries	A	H	M
Soap manufacturers	A	M	L
Hospitality	A	M	L
Health care	A	H	M
Education	B	M	M
MDAs	A	M	M
Construction	A	L	M
Water sector (urban water supply)	A	H	M

The group broke down the sectors into specific user groups, and characterised them using the same categories.

<b>Water use group</b>	<b>Location</b>	<b>Vulnerability</b>	<b>Current vulnerability</b>
Small-scale farmers	D	H	L
Household	B	M	H
Restaurants	A	L	M
Irrigation	D	H	L
Schools	B	L	L
Hospitals	A	H	H
Aqua culture	D	H	L
Livestock	D	H	M
Small-scale miners	D	L	M

### Group 2 findings

Group 2 set about the task by identifying user groups and sectors in the Densu Basin. They pinpointed households, industries, and agriculture as the main water-use sectors in the basin. The group also saw forward and backward linkages in terms of activities in these sectors, and what happens in the Densu River. Household-level water use, for instance, could impact the overall availability of basin water, while household-level water use practices could also impact its quality. The group considered the impacts of water use by one sector on water use by another according to four parameters: water quality, water quantity, access to water and sustainability. Unbridled water use by agriculture, industry and households would ultimately lead to lower water availability (and lower water quality) for uses such as livestock keeping and forestry.

At the level of Accra, the group identified commercial uses, urban agriculture, services (such as the fire service), households (sanitation, drinking, washing and construction) and industries (specifically, real estate, construction firms, as well as manufacturing or production firms) as the main water-use sectors. Here, it is no longer only cross-sectoral, but also city-basin linkages, that influence water quantity, quality and access. The group noted that the intensity of activities that occur upstream along the Densu Basin will affect the quantity and quality of water that reaches the city. The group also considered whether households were being 'water wise' in terms of the quantity of water that they use (for instance, do they have water-intensive sanitation systems). In addition, the group identified water pricing as exerting a burden on some household economies. Indeed, domestic and low-income users were said to be particularly vulnerable to resource limitations, although currently, the group felt that all water users are affected by resource shortages.

Several platform members commented on the first group's contention that water resource limitations would have little impact on education. They felt strongly that a lack of water at schools, and its consequences for sanitation provision, would lead to the exclusion of girls – and female teachers – from the education system. Platform members cited evidence from past studies that suggested that a lack of adequate sanitation facilities made female pupils less likely to attend regular schooling. They were surprised that neither group had explicitly mentioned women or children among the vulnerable groups.

### Group 3 findings

Group 3 found a strong, two-way linkage between water resources and sanitation. The group focused its attention on the Odaw and Densu Basins in order to identify city-basin linkages. According to the group, water quality in these basins, and at the city-level, can be adversely affected by pollution as a result of poor solid and liquid waste management, agricultural waste (from agrochemicals), as well as garages and car washing bays. In terms of management of the cross-sectoral and city-basin linkages, the group first identified the institutions that would be expected to play a management role. These include the Environmental Protection Agency (EPA); the Ghana Water Company Limited (GWCL) and the Aqua Vitens Rand Limited (AVRL); Community Water and Sanitation Agency (CWSA); Water Resources Commission (WRC); the Ministry of Food and Agriculture and the Ghana Irrigation Development Authority; the municipal, metropolitan and district assemblies (MMDAs); as well as various non-governmental organisations.



*(Group 3 findings continued)*

According to the group, the current linkages between these institutions are weak. Coordination between them is lacking, and their interactions were often complicated by overlapping roles and, at times, conflicts of interest. The group also noted that their activities were hindered by a lack of political and legal will in implementing policies, as well as limited logistics and resources. According to the group, stronger coordination and collaboration should be promoted by the following 'nodes': the Ministry for Water Resources, Works and Housing; the Ministry for Local Government and Rural Development; the Board of Municipal Services; statutory planning committees; and the Regional Coordinating Councils.

Group 4 findings

The group centred its discussions on the Densu and Volta Basins (the Kpong system), and agreed that human activities upstream affect water quality in Accra and its surroundings. The group drew particular attention to the detrimental impacts of open defecation, inappropriate waste disposal as well as the application of inorganic fertilisers and other agro-chemicals along river banks to water quality downstream.

The group also considered, which institutions should be responsible (or exert a stronger role) in managing the situation. These include the Ministry of Environment, Science and Technology and the Environmental Protection Agency; the Ministry of Local Government and Rural Development, and the metropolitan, municipal and district assemblies; the Ministry of Water Resources, Works and Housing and the Water Resources Commission, Ghana Water Company Limited/ Aqua Vitens Rand Limited and the Community Water and Sanitation Agency; the Ministry of Food and Agriculture; as well as civil society organisations.

The group characterised the existing linkages between these institutions as weak. It proposed strengthening the policy, implementation, monitoring and evaluation units – both within these authorities, as well as at the level of the Office of the President. It also called for proper resourcing of the metropolitan, municipal and district assemblies.

Platform members suggested that traditional authorities and community-based organisations also have a role to play in managing such cross-sectoral and city-basin linkages. Ms. Engmann also questioned whether lack of political will or financial resources was an actual cause projects and programmes failing to meet their targets. She suggested that most projects succeed in identifying technical issues and drawing up action plans. These are sometimes developed into full-scale proposals for implementation, and eventually presented to the relevant authorities for action. However, they often fail to secure the commitment of a sufficiently broad constituency of stakeholders, including politicians and those identified as the 'ultimate beneficiaries'. Moreover, where financial resources are constrained, implementation should occur incrementally, thereby avoiding a large, one-off expense.

Dr. Amisigo pointed out that the exercise had succeeded in generating a range of water-use groups and sectors, as well as institutions that have a role to play in water resources management. He called for further attention to the linkages between them. For instance, is there an established channel through which the Ghana Water Company Limited regularly interacts with the Ministry of

Food and Agriculture on water management matters? He also queried whether the Densu Basin Board that is expected to operate under the Water Resources Commission could play a role in managing some of the linkages. Dr. Dovie replied that the Densu Basin Board is not yet in place.

Christian Siawor also called for stronger ties between the research organisations and laboratories that could provide empirical facts for decision-making.

Dr. Raschid-Sally concluded the session by thanking the participants for the lively discussions that had taken place. She noted that they had generated a number of different ways of analysing the urban-rural interface. She also highlighted the issue of water quality, and explained that the project would look into ways of incorporating this into its research activities. Dr. Raschid-Sally was concerned that gender risked falling through the cracks, and expressed her intention to commission gender-specific analyses as part of the project's overall research. She had made note of suggestions to proceed with changes in an incremental manner; to ensure full stakeholder buy-in of any recommendations that are made; and the need for reinforcing water resource management institutions and mechanisms. With these comments, Dr. Raschid-Sally brought the meeting to a close.

**2<sup>nd</sup> Meeting of the Research into Strategic Action Platform (Re-SAP)**

20 July, 2010  
Coconut Grove Regency Hotel, Accra  
8:30 a.m. – 3:00 p.m.

<b>Welcome</b>	9:00 a.m. – 9:15 a.m.	<b>Opening remarks</b> <i>URAdapt project team</i>
<b>Project update</b>	9:15 a.m. – 9:45 a.m.	<b>Project evolution &amp; highlights</b> <i>Liqa Raschid-Sally</i> <i>URAdapt</i>
<i>Facilitator:</i> <i>Charlotte Engmann</i> <i>CWSA</i>	9:45 a.m. – 10:15 a.m.	<b>Hydrological modelling update</b> <i>Barnabas Amisigo</i> <i>URAdapt</i>
	10:15 – 10:45 a.m.	<b>Climate change modelling update</b> <i>Raymond Kasei</i> <i>URAdapt</i>
<b>Tea &amp; coffee</b>	10:45 a.m. – 11:00 a.m.	
<b>Urban development &amp; climate change</b>	11:00 a.m. – 11:20 a.m.	<b>Urban development in Ghana</b> <i>George Owusu</i> <i>ISSER</i>
<i>Facilitator:</i> <i>Farouk Braimah</i> <i>People's Dialogue</i>	11:20 a.m. – 11:40 a.m.	<b>Cities and climate change</b> <i>Sean Doolan</i> <i>DFID/ Netherlands Embassy</i>
	11:40 a.m. – 12:30 p.m.	<b>Panel discussion</b>
<b>Lunch</b>	12:30 p.m. – 1:30 p.m.	
<b>Water: making the urban-rural link (group work)</b>	1:30 p.m. – 1:45 p.m.	<b>Introduction</b> <i>Liqa Raschid-Sally</i> <i>URAdapt</i>
<i>Facilitator:</i> <i>Liqa Raschid-Sally</i> <i>URAdapt</i>	1:45 p.m. – 2:25 p.m.	<b>Group work</b>
	2:25 p.m. – 3:00 p.m.	<b>Plenary</b>

## ANNEX II – LIST OF PARTICIPANTS

	NAME	ORGANISATION
1.	Kwabena Gyasi-Doku	Water Directorate
2.	Charlotte Engmann	Community Water & Sanitation Agency
3.	Solomon Tetteh	Great Thinkers Club
4.	Elaine T. Lawson	Centre for Social Policy Studies/ University of Ghana
5.	Graham Sarbah	Drains/ Accra Metropolitan Assembly
6.	N. Dokurugu	National Disaster Management Organisation (CDCO)
7.	Delali Dovie	Water Resources Commission
8.	Cecilia Ofori-Asante	Accra Metropolitan Assembly (representing Lydia Sackey, coordinator of the Millennium City Initiative)
9.	B.K. Addo	Greater Accra Regional Coordinating Council (Economic Planning Officer)
10.	D.A. Ayivie	Greater Accra Regional Coordinating Council (Town & Country Planning Officer)
11.	Caesar Nyadedzor	Ghana Health Service
12.	Busia Dawuni	Ghana Irrigation Development Authority
13.	George Owusu	Institute for Statistical Social and Economic Research/ University of Ghana
14.	Felix Amakye	ILGS
15.	Maj. T.N.K. Awuah (Rtd.)	Accra Metropolitan Assembly (Sewerage)
16.	Christian Siawor	Ghana Water Company Limited
17.	Frederick Logah	Council for Scientific and Industrial Research/ Water Research Institute
18.	Carine van Ravesteijn	Aqua Vitens Rand Ltd.
19.	Farouk Braimah	People's Dialogue
20.	Hon. Archibald Cobbine	Accra Metropolitan Assembly
21.	Raymond Kasei	University of Development Studies (Navrongo)
22.	K.Y. Oppong-Boadi	EPA (National Climate Change Focal Point)

23.	Henrietta Osei-Tutu	SWITCH project
24.	Isaac Mensah	National Disaster Management Organisation/ Accra Metropolitan Assembly
25.	Samuel N.A. Codjoe	Regional Institute for Population Studies
26.	Stephen E.D. Ackon	Accra Sewerage Improvement Project/ Accra Metropolitan Assembly
27.	J. Wellens-Mensah	Hydrological Services Department
28.	Bertha Darteh	SWITCH
29.	S.A. Appenteng	Association of Ghana Industries
30.	Felix Apeti	Ministry of Food & Agriculture
31.	A. Amarteifio	Ministry of Food and Agriculture
32.	G. Nii Teiloo Tagoe	Ga Mashie Development Agency/ Accra Metropolitan Assembly
33.	Ruheyatu Rahman	Water Resources Commission
34.	Edmund K. Akoto-Danso	International Water Management Institute
35.	Barnabas Amisigo	Council for Industrial and Scientific Research/ Water Research Institute
36.	Liqa Raschid-Sally	International Water Management Institute
37.	Maija Hirvonen	International Water Management Institute