



018530 - SWITCH

Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

Deliverable 5.2.2 - (Replaces the original deliverables 5.2.2 and 5.2.4

City working groups on Urban Agriculture

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RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

SWITCH Documents (with RUAF Cities Farming for the Future)

Deliverable 5.2.2. Working Groups on Urban Agriculture are identified and initiated, linked to the City Learning Alliances, and will meet on a regular basis.

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Author(s) and Institution(s)

Various

The aim of Work package 5.2 is to contribute to a paradigm shift in wastewater management and sanitation towards a recycling-oriented closed loop approach, by identifying and integrating appropriate productive re-use of urban freshwater, storm and waste-water for agriculture into the policy, legislative and regulatory, planning and decision-making frameworks of cities. The Work package is being implemented in three cities; Accra, Beijing and Lima.

The deliverables of the work package follow a sequence of implementation. Based on a situation and stakeholder review (del. 5.2.1), working groups are formed, meet and are linked to the Learning alliances (del. 5.2.2), they receive training in multi-stakeholder action planning (del. 5.2.3 A), and are involved in, and informed on, specific research by consultants, MSc and PhD or action research linked to the demonstrations, (all under del. 5.2.4). Information has been disseminated in publications, magazines and newsletters (del. 5.2.5), and guidelines and related training material has been developed (del 5.2.3 B and C). The leading institutes here are ETC (WP coordinator), IWMI (Accra), IGSNRR (Beijing) and IPES (Lima), other institutions involved were WUR, IRC and NRI-GUEL.

Contributing products to this deliverable:

Various meetings held of which some reports below. Good overviews of the process are presented in the LA Assessment reports and summaries of these in the forthcoming book under WP 6.2.

5.2.2 Accra

5.2.2 Aa Workshop on the Use of urban water for agriculture and other livelihood opportunities in Accra

Ernest Abraham and Bertha Darteh . Accra, 15th May, 2007

5.2.2 Ab1 WG report November 2007

5.2.2 Ab2 Demo site selection by WG, November 2007

5.2.2 Ac Summary report on working group (see Learning Alliance Assessment on Accra under WP 6.2)

5.2.2 Beijing

5.2.2 Ba Summary report on working group (see Learning Alliance Assessment on Beijing under WP 6.2)

5.2.1 Lima

5.2.2 La Minutes of the Launch of the Learning Alliance and working group on UA

5.2.2 Lb Paper on the LA Methodology in Lima, presented in Belo Horizonte. 2008.

5.2.2 Lc Covenant letter between IPES and the Ministry of Housing, Construction and Sanitation.

5.2.2 Ld Summary report on working group (see Learning Alliance Assessment on Lima under WP 6.2)

Main and summarizing paper: See also 5.2.4 Gb; briefing note on Resource Recovery and Use for Urban Agriculture.

<p>Publication date: -Various, see above</p>
<p>Audience : UA working group and LA members in Accra, Beijing, Lima, and Hamburg, WP 5.2 participants, and SWITCH wide audience (SC meeting).</p>
<p>Purpose : The working groups have been involved from the onset in the development of research and demonstration and meet on a regular basis to discuss main findings, facilitated by the SWITCH partners IPES, IWMI, IGSNRR and the city coordinators in Lima, Accra and Beijing respectively. Institutes that are part of the working group also participate in the learning alliance, and as such are exposed and involved in activities of other work packages, but the purpose for these working groups is to guide research and upscaling under WP 5.2.</p>
<p>Background (one to two paragraphs describing the research and why it was needed):</p> <p>Urban agriculture contributes to a wide variety of urban issues; it provides multiple benefits for urban inhabitants and can have many different functions. There are three challenges to the work in this SWITCH WP 5.2. The first challenge is to address the diversity and variety of urban farmers and livelihoods. A second challenge is to seek to involve, and undertake appropriate research with, the stakeholders who represent this diversity of functions. The third challenge is to facilitate integration of (water for) urban agriculture into city planning and policy making.</p> <p>A learning alliance consists of a group of institutions, which seek to take a relevant innovation to scale (Morris, 2007). SWITCH aimed to foster alliances of institutions in order to facilitate scaling up of innovations in urban water management. Individual researchers or (working) groups of researchers operate under these learning alliances. Under the WP 5.2, <i>Multi Stakeholder Working Groups on productive use of urban water for urban agriculture</i> were established in the three cities, Accra, Beijing and Lima. These working groups involve several relevant stakeholders, like farmers, civil society, research institutes and universities, and municipal agencies. Most of them were already involved to a certain extent in the multistakeholder platform on urban and peri-urban agriculture under the RUAF Programmes (www.ruaf.org).</p> <p>These working groups members have been involved from the onset in the development of research and demonstration and meet on a regular basis to discuss main findings, facilitated by the SWITCH partners IPES, IWMI, IGSNRR and the city coordinators. Institutes that are part of the working group also participate in the learning alliance, and as such are exposed and involved in activities of other work packages. The working groups are platforms for dialogue, but its members are to different degrees involved in (action) research: problem definition, agenda setting and identification of priorities, joint action planning and budgeting (including the opportunity to obtain grants).</p> <p>In the three cities, WP 5.2 was the main work package involving field research. As such the working groups function as the learning alliance (in reality in Beijing) or assured the involvement of all (Lima) or a large part (Accra) of the learning alliance members in SWITCH field activities, thus assuring involvement in decision making on research, in sharing of knowledge and decision making.</p> <p><i>Beijing</i> In China the Learning Alliance consists of stakeholders from Beijing and Chongqing. A first LA meeting was held in May, where ongoing lines of research, proposed research activities and SWITCH demonstration projects in Beijing and Chongqing were discussed. The major actors in both cities met, and it was agreed that under the LA, relatively independent working groups would operate</p>

in both cities. In that sense the WP in Beijing acted like a city learning alliance. In a first meeting an overview was made and discussed of ongoing research related to SWITCH, the proposed research by SWITCH, and suggestions of the Beijing LA members for linkages to other SWITCH research. In fact, this was a first form of joint action planning.

The linkages between Beijing and Chongqing did not evolve as foreseen. The broader (Beijing and Chongqing) Learning Alliance met only three times with all members participating in this. However, many informal meetings between LA partners did take place.

The Beijing WG/LA has been facilitated formal and informally by IGSNRR, through all kinds of (bilateral) meetings, mini-conferences, and interviews in which one or more members of the working group participated (live or using telephone and internet).

Lima

Although Lima was not yet acknowledged as a SWITCH demonstration city initially, the main SWITCH partner, IPES decided to design and structure a learning alliance to enable the formulation of policy guidelines and to coordinate different government sectors and civil society. IRC and ETC conducted a training workshop with IPES and selected institutions in Lima in June 2007 on this.

At the end of this meeting, representatives of 26 institutions declared their willingness to participate, and took the responsibility to further integrate other partners under this umbrella. The Environmental Department of the Ministry of Housing and Sanitation has taken the lead in organizing follow-up meetings for this LA. In addition a working group has been working on the review and has been trained in action research. This working group became the LA at municipal level. Next to the abovementioned research a stakeholder analysis cum needs analysis (of information and training) has been undertaken and an analysis of the legal and policy framework.

So SWITCH Lima developed learning alliances at two levels (national and local) to support research activities, involve actors in the process and set a basis for disseminating action-oriented research products. The National Learning Alliance (Peru) is made up governmental organisations linked directly or indirectly to the formulation and approval of policy guidelines for the use of domestic treated wastewater. The Local Learning Alliance (Lima) integrated local government, the private sector, academic/research institutions, producer organisations, etc. with experience of treating or using treated wastewater for irrigation of green, forestry and agricultural areas, and related research or academic institutions. All the local learning alliance members contributed to the identification of constraints and potential for use of treated wastewater, information that was used in the elaboration of the National Policy Guidelines. IPES as facilitator of both platforms supported exchanges between them, by publishing information and organising joint meetings of both platforms.

Accra

The Accra learning alliance has had several meetings and became quite well established. The working group related to WP 5.2 consisted of some members of the LA and several members of the Accra Working Group on Urban Agriculture (AGWUPA). This working group has been actively involved in the research and demonstration activities. A first start up workshop was organised to assure the participants involvement in the multi-stakeholder process, to discuss the current use of water, identify constraints and opportunities; prioritize issues for water intervention; and formulate action plans for implementation, based on the situation analysis on urban water use for agriculture in Accra, and related to three thematic areas: water for livelihood; water for urban agriculture; and urban agriculture for livelihood. In a second meeting, the working group members were trained in action research and developed a research framework, using micro scenario's, focusing on improved management (local practices and improved options for treatment) and awareness raising.

Potential Impact

Based on the initial reviews (see under deliverable 5.2.1, research in WP 5.2 started, closely linked to the identified demonstration projects. The situation analysis has been discussed with the working

groups in the three cities, and a joint action plan on livelihoods-water-agriculture in the city has been developed, which includes ongoing research activities (which are already funded and undertaken by the stakeholders) and those (research) activities for which funding is sought, of which the (research) activities under SWITCH are part. For each city the linkages between livelihoods-water-agriculture, innovation and institutional support has been looked at.

Recommendations (Direct at target audience above).



Workshop on the Use of urban water for agriculture and other livelihood opportunities in Accra

(picture)

Georgia Hotel, Airport Residential Area, Accra

15th May, 2007

By

Ernest Abraham and Bertha Darteh

Draft

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LIST OF ACRONYMS

AMA	Accra Metropolitan Assembly
AVRL	Aqua Vitens and Rand Limited
AWGUPA	Accra Working Group on Urban and Peri-urban Agriculture
CSIR	Council for Scientific and Industrial Research
DA	District Assembly
GBC	Ghana Broadcasting Corporation
IWMI	International Water Management Institute
GWCL	Ghana Water Company Limited
IUWM	Integrated Urban Water Management
KNUST	Kwame Nkrumah University of Science and Technology
LA	Learning Alliance
MoFA	Ministry of Food and Agriculture
SWITCH	Sustainable Water Management Improves Tomorrow Cities Health
UA	Urban Agriculture
WW	Wastewater
WP	Workpackage

Summary

Sustainable Water management Improves Tomorrow's Cities' Health –SWITCH, is a project which aims at achieving a sustainable healthy and safe urban water environment through the creation of a paradigm shift in water management. The workshop had as its objective to: gain participants involvement in multistakeholder process on urban water use for livelihood support, discuss current use of water, identify constraints and opportunities; prioritize issues for water intervention; and formulate action plans for implementation. It was expected that action plans will be formulated for short term implementation; and a task force formed towards integrating productive use of urban water into city plans. Mr. Theophilus Otchere Larbi, the facilitator for the workshop welcomed participants after which, they were accorded the opportunity to introduce themselves with focus on name of participant, institution, role or responsibility in urban water use, stake in urban water use, and expectations for the workshop. The role of participants included enforcement of laws relating to wastewater management, applied research in integrated urban water management (IUWM), water supply and developing water resources for agriculture and fisheries. Participants expected action to be drawn to address relevant issues of urban water use for agriculture.

There were two presentations, the first focused on background issues to SWITCH. It reiterated the key elements of the objectives of the SWITCH LA including sharing knowledge within the city of Accra on urban water management, linking activities in urban water management within the city to increase effectiveness, linking planning across the urban water cycle and testing and implementing new technologies at scale.

The second presentation gave the current situation in the use of urban water for agriculture and other livelihoods in Accra. A preliminary study on urban water use for agriculture and other livelihood opportunities identified several issues, which were also discussed in the presentation. The focus of the work package 5.2 of SWITCH is to identify options for efficient (re-) use of urban water for urban agriculture and other livelihood opportunities to be assessed, tested and applied at city level; to develop a better understanding of and promote benefits associated with the role, contributions and potential of urban agriculture and other productive uses of water (along the water chain) to people's livelihoods. The emerging issues from the preliminary study on urban water for agriculture and other livelihood purposes were characterized under the following three thematic areas for group discussion: water for livelihood; water for urban agriculture; and urban agriculture for livelihood. Discussion on the presentations emphasized the need to consider

ground water as an option of alternative water source for agriculture, harness rainwater for productive uses and encouraged the AMA to support the acquisition of lands for urban agriculture UA. The main output of the workshop was the development of action plans on three thematic areas on urban water use for agriculture and other livelihood activities. Participants were happy about the output of the workshop and pledged their commitment to be part of the UPA group for the SWITCH LA.

1 Introduction

1.1 Background of Workshop

Sustainable Water management Improves Tomorrow's Cities' Health –SWITCH, is a project which aims at achieving a sustainable healthy and safe urban water environment through the creation of a paradigm shift in water management. This is to be achieved through a consortium of 32 partners from 13 countries. Ghana is the only country south of the Sahara to be part of this project, which is being implemented in Accra by the International Water Management Institute (IWMI, West Africa) and the Kwame Nkrumah University of Science and Technology, Department of Civil Engineering (KNUST, Kumasi). The SWITCH has adopted six thematic areas that are aimed at addressing various issues in the respective cities (in this case Accra). The Learning Alliance (multi-stakeholder platform) approach is being used by SWITCH to facilitate the exchange of knowledge and experiences among stakeholders with the aim of scaling up a range of tested scientific, technological and socio-economic solutions which will contribute to the achievement of a sustainable and effective water management in the city of Accra. One of the problem areas in which SWITCH will respond to in Accra is Urban Agriculture and other water dependent livelihood opportunities (Workpackage 5.2) and as part of activities which will contribute to the Accra LA, a one-day workshop was held at Hotel Georgia in Accra to come up with plans for implementation in WP 5.2.

The participants for the workshop were drawn from Government Departments and Agencies, Research institutions and Universities.

1.2 Objectives

The workshop set to achieve the following key objectives:

1. to gain participants involvement in multistakeholder process on urban water use for livelihood support
2. discuss current use of water, identifying constraints and opportunities for integration into the urban economic and ecological system.
3. to prioritise issues for intervention
4. to formulate action plans for implementation

1.3 Expected outcome of workshop

It was expected that at the end of the workshop, the following would have been achieved:

1. increased understanding of the topic
2. action plans formulated for short term implementation
3. a task force formed towards integrating productive use of urban water into city plans

1.4 Methodology

The workshop method involved the use of a participatory approach: discussions, brainstorming sessions, group work, plenary sessions and the use of moderation cards to capture views from participants.

2 Opening

Mr. Theophilus Otchere Larbi, the facilitator for the workshop welcomed participants after which, they were accorded the opportunity to introduce themselves (Annex 1) with focus on name of participant, institution, role or responsibility in urban water use, stake in urban water use, and expectations for the workshop.

2.1 Introduction of participants

Each participant received five moderation cards on which to indicate the categories mentioned above. Details of the self-introduction can be found in Annex 1, highlights are provided below.

2.1.1 Role/responsibility of participants

The participants saw themselves as playing diverse roles in urban water use which could be placed under one or more of the areas indicated below.

- Teaching, research and service to community
- Provision of information
- Facilitation
- Policy decision making and support
- Capacity building and training
- Enforcement of laws relating to waste water management
- Applied research in integrated urban water management (IUWM)
- City co-ordination
- Water supply
- Managing the environment together with other stakeholders
- Monitoring of waste management activities at the sub-metropolitan area
- Developing water resources for agriculture and fisheries

2.1.2 Stake in urban water use

Highlights of the stake of participants in urban water use are also provided below.

Research

- Research and advice/ make recommendation to the public and government
- Education and public awareness

Water development

- Development of urban and Peri-urban Irrigation for safe vegetables around AMA
- Give “hidden” water use recognition, in the larger context of urban water
- Wastewater (ww) use in urban agriculture
- Productive use of urban water for urban food supply
- Sustainable use of urban water
- Ensure that water which is available for use is safe

Stakeholder platform

Bringing people together for IUWM

Farmers and Associations

- Support general farming activities in Accra
- Educating farmer Associations on safe use of wastewater

Urban water management

- Integrated management of urban water with special focus on access
- Institutional networks, information sharing with software-maps creation
- Water supply
- Awareness creation and management

3 Expectation of Participants

Participants' expectations of the workshop were also captured during the process of self-introduction, details of which are provided in Annex 1. Excerpts of participants' expectations from the workshop are provided below.

Understanding SWITCH

- Come out with right direction for SWITCH urban agriculture
- Learn more about UA and Livelihood opportunity, and linkage with other Work packages (WPs) of SWITCH and the Learning Alliance (LA)
- Have a better understanding of the SWITCH and how to contribute to any action planned
- Learn more about LA Accra [partners]

Action plan formulation

- A good action plan to be formulated
- Action plan on relevant urban water issues
- That we come up with some actions for implementation
- Future of urban agriculture in the city outlined. Very good deliberations

Improvement of water for agriculture

- To improve the agriculture/water management and its safety for farmers in Accra in order to produce more food
- To have better ideas on health risk reduction in relation to ww use in UA
- Improving understanding and collaboration on productive use of water issues
- Wastewater is well treated for agriculture or other uses
- The workshop will contribute to the quest for improving urban water for agricultural use

Others

- Full participation of all. Learn from others experiences
- All participants will stay till 5:00 pm
- Ideas would have been shared, new experiences learnt and consensus built
- Strategies to educate farmers in proper water management
- Research and offer advice/recommendation to the public and government

4 Summary of Presentations and Discussions

4.1 Background of SWITCH and Workshop Objectives

SWITCH is an acronym which stands for Sustainable Water management Improves Tomorrow's Cities' Health and it is a response to the pressures of global change; urbanization, rural-urban migration and the development of slums etc. and the effect on sustainable urban water management. The thematic areas (from urban water management, storm water management, efficient water supply to all, water use, sanitation and waste management, planning of urban water environment to governance and institutional change.) are related to the problems in the city (Accra). The approach adopted by SWITCH focuses on a "Learning Alliance" (LA) considering its structure, elements, and role in the wider SWITCH context. The key elements of the objectives of the SWITCH LA include sharing knowledge within the city of Accra on urban water management, linking activities in urban water management within the city to increase effectiveness, linking planning across the urban water cycle and testing and implementing new technologies at scale. The Keys to making the Learning Alliance work include making sure that: issues and priorities are determined by city stakeholders, there is a focus on action research and demonstration and all research linked to a clear plan for uptake based upon the LA. The research areas that Accra will focus on are SWITCH WPs 5.2- Urban Agriculture for livelihood, 5.3- Use of Natural Systems for Wastewater treatment, and 6.3- Social Inclusion as well as other areas to be identified by the Accra LA. This workshop focuses on Urban agriculture and the role WP 5.2 is expected to play in effecting significant changes in agricultural production and other livelihood activities using freshwater, storm water, wastewater as well as reducing risk to the environment and health of producers and consumers. The workshop objectives are as indicated above (section 1.2).

Discussion

Question: Is GWCL not represented?

Response: Miss Maryse Martins said that she is representing Aqua Vitens Rand Ltd. (AVRL), which is working as the operator on behalf of GWCL.

Clarification: There is a larger LA forum but for this particular workshop, the group has been selected to focus on urban agriculture. This group will feed back into the Learning Alliance.

Question: The LA concept is very interesting. In bringing stakeholders together what will be the most important motivation factor?

Response: The most important motivation should be what we could achieve for our cities. The part of the LA being owned by us also should get our commitment. Beyond that we should look at the opportunities for networking and capacity building both for the individual and our organizations. But then since the situation in Accra is peculiar, individuals can give suggestions as to the best way they think they can be motivated to be a part of the LA. Once we know we have a stake we should show commitment.

Comment: Defining action plans will involve actions that we can mainstream in the (institutions) programmes. What can we do together? How can the institutions contribute more? Since most people

want to see action (expectations), they are looking for things they can do. Once it (action plans) is institutionalized it can serve as a motivation for individuals.

Once we come together we are already committed to thinking together and working together. We are forced to think differently once we come together. We start in this group; there is a larger group (Accra LA) if we believe that this is the way forward.

4.2 Urban water use for Agriculture and other livelihood opportunities in Accra

This presentation gives the current situation in the use of urban water for agriculture and other livelihoods in Accra. A preliminary study on urban water use for agriculture and other livelihood opportunities identified several issues, which are also discussed in this presentation. The emerging issues from this preliminary study are indicated in Annex 2 .

The focus of the work package 5.2 of SWITCH is to identify options for efficient (re-) use of urban water for urban agriculture and other livelihood opportunities to be assessed, tested and applied at city level. To this end it seeks:

- to develop a better understanding of and promote benefits associated with the **role, contributions and potential of urban agriculture** and other productive uses of water (along the water chain) to people's livelihoods
- to **establish multi-stakeholder working-groups towards the** integration of productive use of water in urban planning
- to **train members of the working groups and other key players in multi-stakeholder approaches**, and to develop local skills and capacity in key agricultural (& other livelihood activities) and water management areas
- to **identify and integrate** acceptable and appropriate **urban water management approaches and strategies** into the policy, legislative and regulatory, urban planning and decision-making frameworks of each city
- to **initiate and monitor at least two pilot projects** on productive use of water including freshwater, storm and wastewater:
- to **disseminate and promote the lessons learnt** within the cities and on national and international levels.

The identified sources of water are streams, drains, pipe-borne water, shallow groundwater and rainfall. It is estimated that 81% of water supplied by GWCL is consumed by domestic, 17.5% by industry and 1.5% by public institutions. It is evident from this that piped water supply was the source that was commonly used with households consuming the highest amount of water (average of 50 million m³) per year. Some of the livelihood opportunities of urban poor (most of which depended on domestic water supply) were food and drinks, hairdressing, car washing and irrigated vegetable farming. In most cases, these livelihoods contributed 100% to the income of households. There is however insufficient information on the amount of water used in Accra by certain livelihood activities (restaurants, hairdressers, golf courses etc). Water enterprises contribute to the livelihood of the poor as small scale enterprises can access water from informal water enterprises for their activities. The water is supplied in smaller quantities making it possible for the poor to afford.

There are various forms of urban agriculture with irrigated crop cultivation occurring on some 7 major sites in Accra. The opportunities identified in UA included source of livelihood for the poor, high demand for vegetables and the contribution to urban greening, flood control, land reclamation and protection.

The risks and the challenges of urban agriculture include post production contamination (especially vegetables) from handling and water that is used to wash the vegetables. The UA in Accra is equally constrained by a number of factors including competition for land use, lack of access to good quality water for production, use of polluted water, and contamination of vegetables. Some amount of studies has been done on the situation of UA in Accra by IWMI. The UA in Accra is presently dominated (90%) by men.

The emerging issues (Annex 2) from the preliminary study on urban water for agriculture and other livelihood purposes are characterized under the following thematic areas/interfaces for group discussion:

- (a) water - livelihood
- (b) water - urban agriculture
- (c) urban agriculture - livelihood

Discussion

Clarification:

The study on urban water for livelihood was more on domestic water. Trying to look at people who depend on domestic water for their livelihood support. A lot of domestic water is not only for personal use but also for livelihood purposes, sometimes (100%) household income comes from this. People who are using this do not have easy access and also they pay a lot more for water. At the city level it is an important aspect of domestic water use that has to be addressed. These are ideas to give to urban water managers to help people who have poor access to the water and who really need it.

Comments

Losses in the GWCL pipeline have been estimated (by KNUST) to be less than 5% with major losses attributed mostly to people not paying for the water they are using, and they are the ones using it for commercial purposes.

The problem with groundwater and salt intrusion prevents the farmers from investing in groundwater systems (it becomes a constraint). Treatment of saline water is very expensive. On the world water demand, considering areas where there is crisis – Ghana is not one of them. We just have to manage our water resources well.

In some parts of Accra, individuals' harvests rain at household level. Individuals rush home to harvest water when it rains (in Ga East District). In some new areas those who can afford are beginning to install rainwater systems in their houses. More observations should be done rather than assume that people are not using alternative means of accessing water resources. In peri-urban AMA for instance, people harvest rainwater. It is an expensive system to have though. Rainwater harvesting on its own is a process and we have to make allowance for it in our infrastructure development. Once the structure is in place, one could have water for the whole year. The question is how many people can afford it?

New buildings can incorporate rainwater harvesting in the design. How can old buildings (in areas such as Jamestown, in Accra) have rain harvesting technologies incorporated? It is important to look at

rainwater harvesting beyond domestic activities and consider other productive uses for it. Further, in the Akwapim area, Eastern Region of Ghana, rain harvesting has been practiced since time immemorial.

The practice (rain harvesting) has been there and with urbanization, things changed. Now, how do we adapt rainwater harvesting technologies to the city context to make it potential solutions for people. Not just how to collect it but how to finance it has to be considered.

The concept of rain harvesting is not only from roof water. We could also harvest storm water and channel it into ponds, which could be used for urban agriculture..

Another constraint is land insecurity for urban agriculture. Support to vegetable farmers and investment in land and water management by farmers themselves are often constrained by the land tenure system. Some examples are areas around Ghana Broadcasting Corporation (GBC), Council for Scientific and Industrial Research (CSIR), main campus, and Independence Avenue. SWITCH project should link up with the Accra multi-stakeholder Working Group on Urban and Peri-urban Agriculture (AWGUPA) which serves as an advisory and advocacy group for UA towards its integration into city development plans

The Metropolitan Agricultural Development Unit (MADU) had also tried to sink boreholes in Dzorwulu for some farmers. Activities have to be co-ordinated therefore, regarding provision of facilities for farmers. Three boreholes have already been sunk, a polytank and meters have been installed, however it is not yet in operation because farmers are unwilling to pay for the cost of electricity.

The Issue of land tenure has to be addressed. Land is becoming very scarce in Accra and therefore expensive. If we want to continue putting up boreholes for farmers' we may lose the investment since the ownership might change. What Ghana Irrigation Development Authority (GIDA) wants to do is to have people give land and provide them with facilities. You don't go round to give the facilities and lose them later. Rain harvesting is not new. It is the use of water through pipes that have made this go away. Tanks were demolished and eaves were removed. We can look at these things. If AMA can support in the acquisition of land that will be good.

The AMA through the first workshop is putting the departments that are concerned together and when there is a zoning and there is an area for agriculture AMA will acquire that parcel of land through government so that the land will be used for that purpose. The La (a sub-metropolitan area of Accra) chiefs and elders are already selling land regardless of the zoning. If the land is properly acquired and paid for then the purpose of using it for UA through AMA will be achieved.

We could investigate whether there are places that have already been zoned for the purposes of urban agriculture and maintain them before they are rezoned for other purposes. Maps have to be acquired to show areas that are for UA. It has to be noted however that the proposed greenbelt for the city was not legislated and therefore did not work.

Some government lands that have been acquired for irrigation were not properly acquired and now they are being lost. Presently real estate developers give value for land and chiefs sell land to them. If government has land available it will be the easiest option but if they are to buy land now it will be very difficult since the real estate agents pay more for land than we can afford to pay for agricultural purposes.

Land has to be valued environmentally and we have to look at the values of agriculture e.g in flood control etc. This rest with the planning authorities. In summary it is important to link institutions who are in charge of zoning land in the AMA.

Issues arising from the discussion

- *Consider ground water as an option of alternative water source*
- *Ghana needs prudent water management system*
- *Rainwater harvesting has been practiced for sometime now, and it is a viable option of accessing water*
- *There is the need to incorporate rainwater harvesting into the building code*
- *There is the need for investigation on how to finance rainwater harvesting technologies for households*
- *AWGUPA should take up the advocacy on the issue of farmers' legitimacy on institutional lands*
- *The AMA should support the acquisition of lands for UA. The Greenbelt concept in AMA did not work because it was not backed by the appropriate legislation. Eg. The GIDA is losing some lands acquired which were not properly legislated*
- *Investigate areas that have already been zoned for UA before they are rezoned for other purposes*
- *Land should be valued with respect to use and environmental services*

5 Workshop Outputs

5.1. Development of Action plan

Three groups were formed to discuss the 3 thematic areas of urban water use: Water for Livelihoods; Water for Agriculture and Urban Agriculture for Livelihood. Each group was presented with the emerging issues (Annex 2) from the main presentation, for discussion and development of action plans. In the group work, participants were asked to:

- **validate** the issues presented by updating the information provided or elaborating on it;
- **Analyze** the issues to get to the core in terms of its **relevance** and **importance**
- **prioritize** them based on institutional mandate, willingness to mainstream (take up as part of institutional activities) and the expertise available in the various institutions.

The first activity should then lead into an action plan (specific things to do to address the issues) in terms of research and other activities (e.g. advocacy, networking, information sharing, and awareness creation). There was plenary session after the group work.

5.2. Group 1: Water for livelihood

The detailed action plan is presented in Annex 3. The main issues considered by this group were: institutional arrangement, price regulation, and research for optimizing urban wastewater re-use in household context. The objectives, timeline and responsibilities as well as the budgetary implications have all been defined in the action plan.

5.3. Group 2: Water for urban agriculture

The detailed action plan is presented as Annex 4. This group discussed drain and stream water treatment as the main issue. With main objective as minimizing the health and environmental risks associated with the use of wastewater for urban agriculture. The timeline, the responsible institutions as well as the budgetary implications have been defined in the action plan

Discussion after plenary session

Question: In reference to the action plan, is the first point just a desk study?

Response: There will be field visits as well.

Question: Can EPA play a part in the standards and practices? To find linkages with RUAF? (on the 3rd point of public awareness).

Response: There is no information on that in AWGUPA so if SWITCH can provide information on that, it could be used for public awareness in AWGUPA. It could be a joint endeavor between SWITCH and (Resource Centres on Urban Agriculture and Food Security) RUAF/ AWGUPA.

Question: The Group did not explore the option of boreholes?

Response: Farmers are already using the drain water and it is more readily available.

5.4. Group 3: Livelihood from Urban Agriculture

The detailed action plan is presented as Annex 5. The main issue, which was discussed by this group, was on awareness creation and public education. The objectives, indicators, the timeline and the budgetary allocations are also indicated.

Discussion

Comments

Recontamination of crops is real: for lack of education there could be recontamination of crops
Minimizing environmental risk has to be done
There could be some restrictive byelaws, which inhibit livelihoods
There should be increased awareness on the use of bio-degradable pesticides etc
There should also be value addition through processing which is important

Clarification on Action plan

Question: Why is the group considering only pesticides in minimizing negative health impacts?

Response: There could be other sources such as manure. The emphasis is on pesticides because it has appeared in the dailies several times that pesticides were causing impotence among male farmers

Possibility of Linkage to RUAF

The LA refers to other stakeholders like RUAF who are part of it.
Actions for minimizing risks will include information sharing, use of the print media, and the electronic media such as radio and television talk shows.

Question: Are there no field experiments for the awareness creation:?

Clear or particular activities to achieve the objectives are also missing.

Other comments

(1, 2) Instruments and activities to be used for public awareness are missing. The group intends to use various tools and methods to do public awareness (Talk shows, and other media).
What subjects will be addressed? Treatment, contamination or a mix?

Response:

The list of issues is the major things that will be addressed through public awareness.
Activities: 3 is achieved through training; 4, through advocacy and lobbying activity; 5, through advocacy,

Question: Were the opportunities within AMA considered?

Response: Yes but the amount is the new physical cash that needs to be added which is the amount of money that have been indicated in the table in Annex 5

General comments

Priority action that this urban agriculture (i.e. all of us) group will propose to carry out since there is a limited amount of funding is:

1. drain and stream water treatment
2. rainwater harvesting including runoff, and stormwater harvesting

3. shallow groundwater
4. pipeborne water use for agric

For group 2, Water for livelihood), there is one activity that is already being undertaken.

There is the need to link up the three thematic areas of urban water use from the three groups and find one or two that can be prioritized. The action plans will be shared with the group representatives to obtain clarification of what was decided in each group. The representatives are: for group 1, Miss Maryse Martins; group 2, Mr. Moses Ansah; and group 3, Dr. Irene Egyir.

We will find out if there is the need for training (we could not finalize the programmes and therefore could not do training needs assessment). A questionnaire to do needs assessment could be sent by e-mail to find out what could be done.

6 Workshop Evaluation

At the end of the workshop, the facilitator led the participants through a brief exercise to document their impressions in three areas, namely what was good and should be maintained; what was bad and should be avoided; and suggestions for improvement in future workshops. This was to enable the organizers to capture the views of participants and be fed into any such workshop in the future. The responses presented below were captured on moderation cards given to participants:

6.1. *What was good and should be maintained*

a) Content and Presentations

- The presentation and the subsequent validation and upgrading of issues was good and must be encouraged

b) Stakeholder Involvement

- The brainstorming session
- Bringing people of diverse backgrounds to interact
- Excellent discussion, and good interaction

c) Facilitation

- The moderation or discussion

d) Food and general organisation

- General organization of the workshop
- The food, good coffee, good lunch,
- The timing of the workshop was good and relates to future plans of the urban agriculture group
- Hotel location and number of participants

e) Others

- Individual contributions to the discussions
- Everything was good
- The concept of enabling urban folks to improve on their livelihood.

In summary the participants indicated that the presentation, food, organization, brainstorming session, discussion, facilitation, participatory process, and the choice of location were good and should be maintained.

6.2. What was bad and should be avoided

Time

- Too long for this lively discussion,
- Late closure of meeting
- Two days would have been ok

Food preparation

- Half cooked Tilapia/ French fries too oily
- Lack of coffee break to refresh minds and /limbs in the afternoon

Others

- Nothing (7 persons)
- Can not tell
- Hall not spacious enough
- Seating arrangement and type of meals
- No break during group work

In summary a greater percentage of participants saw nothing bad. Others were of the view that more time for discussion was needed, meal preparation was bad, and the size of the auditorium quite small.

6.3. Suggestions for improvement in future workshop

Group work

- Include activity section during group work
- Maintain same Group members for continuity

Issues for discussion

- Reduce number of issues for discussion
- There is the need for more precision in the topics
- Group work methodology somewhat unclear and could be improved

Time factor

- There was not enough time; we were rushing through getting to the end of the workshop.
- Two days would have been good
- Close on time

Others

- A more central location should be considered for future workshop
- Maintain the process
- There should be more workshops to update our knowledge

In summary participants would like to see improvement in group work, have more time for discussion, streamline issues for discussion, see more workshops held in the future, and a more central location chosen for workshops in future

7.0. Conclusion

The workshop, which was well attended, offered opportunity for stakeholders to deliberate on several issues relating to urban water use for agriculture and other livelihood opportunities. Participants saw themselves as playing several roles in urban water use. The expectations of participants indicated the need for action oriented research or intervention in this area. Issues emerging from the presentation and deliberations included the need to treat wastewater for agriculture, consider ground water as an option of alternative water source, and also to harness rainwater for domestic and other livelihood activities. Institutional networking and collaboration was stressed as paramount in order to avoid re-inventing the wheel. The AMA has a crucial role to play in land acquisition for UPA. Efforts must also be made to value land in relation to its use and environmental functions. The workshop was able to achieve its main objective. Action plans for the three thematic topics of urban water use presented, were drawn. Issues that were not discussed (such as Training Needs Assessment) would be done at a later date. The role of the UPA group in the whole SWITCH context is now clear. It was agreed that the linkages with the other work packages in Accra should be looked at. At the end of the workshop, participants expressed satisfaction for the whole process and expressed their commitment to be part of the UPA group of the SWITCH LA. It was also agreed that feedback from the action plans will be sent to the selected group leaders.

List of Annexes:

- 1
- 2
- 3

ANNEX 1: INTRODUCTION AND LIST OF PARTICIPANTS PRESENT

Number	Name	Institution	Role/ Responsibility	Stake in Urban Water Use	Expectation
1	Ebenezer Mensah	KNUST	Teaching/Research and service to community	Researcher	Come out with ri direction for SW. urban Agriculture
2	John Bewuiah	MoFA, Regional Agric. Directorate	Regional crops officer	Development of urban and Peri-urban Irrigation for safe vegetables around AMA	A good Action pl be formulated
3	Daan Van Rooijen	IWMI	Providing Information, capacity building, policy support	Give “hidden” water use recognition, In the larger context of urban water	Understanding of situation. Agree on the way forward
4	Bertnha Darteh	KNUST	SWITCH LA Facilitator	Bringing people together for IUWM	Learn more about and Livelihood opportunity. Link with other WPs a LA
5	Hon. Nii Amarh Ashietey	AMA, Assembly Member	Chairman: Food and Agriculture sub-Committee, AMA	Support general farming activities in Accra	Is to improve the Agriculture/water management and safety for farmers. Accra in order to produce more food
6	Irene Egyir	CACS/ University of Ghana	Lecturer: Agriculture Economics and Agribusiness	Farmer Associations Education in Safe use of Waste Water	Have a better understanding of SWITCH and how can contribute to Action planned
7	Philip Amoah	IWMI	Research officer, PhD student working on contamination pathway and identification and risk reduction	Wastewater use in urban Agriculture	To have better id health risk reduction relation to WW u UA
8	Olufunke Cofie	IWMI	Researcher/Project Leader	To see its productive use for urban food supply	Full participation Learn from other experiences
9	Ernest Mensah Abraham	IWMI	Knowledge Management and information	Researcher	Action plan on re urban water issue

			/research		
10	T.O.Larbi	IWMI	Capacity building /Training officer I	Sustainable use of urban water	All participants stay till 5:00 pm
11	William Lomo-Tetty	Metro Public Health Department (AMA)	Enforce Laws relating to waste water management, Ensure that safe water is only made available	Ensure that water available for use is safe	Ideas would have shared, new experiences learned, consensus built
12	Liga	IWMI	Applied Research in IUWM with national partners	More integrated management of urban water with special focus on access	That we come up with some actions for implementation
13	Esi Ewuah	KNUST	City Co-ordinator	Research & training	Future of urban Agriculture in the outlined. Very good deliberations
14	Mulon Adrien	IWMI	Student internship-EFPFL-(Master thesis)	Institutional networks, information sharing with software-maps creation	Improving understanding and collaboration on productive use of issues
15	Maryse Martins	Aqua Vitens Rand Ltd.	Proper water supply	Water supply	Learn more about Accra [partners]
16	Florence Agyei	EPA	Managing the environment together with other stakeholders	Awareness creation in management and treatment of wastewater	Waste water is well treated for Agriculture or other uses
17	Collins Tay	CSIR, Water Research Institute	Research Scientist/ researching into the quality of the potable and wastewater from all the sectors of the economy and offer advice on these resources	Research and offer advice/recommendation to the public and government	Expect that the workshop will contribute to the for improving urban water for Agriculture use
18	Frank Chinbuah	AMA, Waste Management Department	Monitor waste management activities at the sub-metropolitan area	Education and public awareness	Strategies to educate farmers in proper management
19	Daniel L. Lamptey	GIDA	Develop water resources for agriculture and	Development	Research and offer advice/recommendation to the public and

			fisheries		government.
20	Ansah Moses	AMA Planning and Coordinating Unit	-	-	-

ANNEX 3 : WATER FOR LIVELIHOOD (GROUP 1)

Issue	*Institutional Arrangement	*Price Regulation	Research for optimizing urban wastewater re-use in household context
Objective	To improve coordination and effect policy change	Improve access and affordability of water for livelihoods, domestic purpose	Provide simple treatment options for individual or communal recycling
Activities	Develop a proposal to address mandates of associated institutions to regulate quality, quantity and price of urban water	Pilot projects in selected communities within AMA (MSc. Research to look at livelihood opportunities for urban water)	Msc. Research
Output	Improved institutional framework	Regulated price system that is affordable	Options for field testing
Indicator	Incorporated into national water policy	PURC regulates all urban water tariffs including private	Demonstration site operational

		vendor	
Who	IWMI, KNUST, AVRL	GWCL/ AVRL/ PURC/ KNUST	KNUST-IWMI
Timeframe	3 years	1 year	3 years
Financial Requirement	\$20,000	\$90, 000	\$10,000
Funding mechanism	SWITCH	AVRL	SWITCH/ IWMI/ KNUST

**For the 1st and 2nd issues it was indicated that there would be a linkage with WP 6.3*

ANNEX 4: WATER FOR URBAN AGRICULTURE (GROUP 2)

ISSUES TO BE ADDRESSED: Drain and Stream water treatment

MAIN OBJECTIVE: Minimizing the health and environmental risks associated with the use of wastewater for urban Agriculture.

How:

- 1) evaluation of indigenous practices (improve where necessary)
 - i. out put: Indigenous practices explored, understood and documented
 - ii. indicator: documented report
 - iii. who?: MoFA, IWMI, WMD, MPHD
 - iv. timeframe: two months
 - v. cost: 10,000,000 (cedis)
 - vi. source of funding:
- 2) Implementation of a known feasible option for treatment (sedimentation, cascading, filtration, plants)
 - i. Output: adoption by farmers
 - ii. Indicator: treated water for agriculture/ reduced health risk
 - iii. Who: MoFA, KNUST, WRI, IWMI
 - iv. Timeframe: 6 months to one year
 - v. Cost: 100,000,000 cedis
 - vi. Source of funding
- 3) Public education on the risk of wastewater for Agriculture
 - i. Output: adoption by farmers
 - ii. Indicator:
 - iii. Who
 - iv. Timeframe:
 - v. Cost

- vi. Source of funding
- vii.

Further details/notes of Group work

On farm treatment of poor quality water for agriculture:

- farmers are doing some treatment by digging and creating ponds (of drain water), block drain water, impoundment at the end of the drain, filtration through gravel and sand,
- series of ponds for treatment, use of plants for treatment such as moringa, chemical treatment
- groundwater, tested before use
- Ghana social marketing company – aquatab for treatment

Household treatment of wastewater, greywater for homestead farming

- treatment through soakaways for gardening
- institutes (hotel) treat before discharging can be used for watering lawns
- decentralize wastewater for use

Adoption of safe irrigation techniques

- technique, watering can poured directly on plant leaves on the same day increasing the risk of contamination
- alternatives, furrow irrigation, drip irrigation
- improvement , technique in water lifting for irrigation (presently, lifting technique enhances mixing with sediment)

Management of on-site and off-site sanitation facilities to minimize pollution of water bodies

- provision of adequate sanitary facilities for public places and homes (slums)
- attitudinal change- public education and awareness to minimize pollution
- enforcement and sanctions
- private entrepreneur (collects urine and discharge into treatment plant)

Public awareness and education on handling crops grown with poor quality water

- washing crops with vinegar, saltwater, develop appropriate measures associated with heavy pollution
- marketing of produce by vendors is another source of contamination, needs more research, education and public awareness
- preventing recontamination of produce especially from water used in washing

How	Expected Output	Indicator	Who	Time
Awareness and Public Education	To have a sensitized public	Minimized negative impact, pesticides	LA (stakeholders)	1 y

ANNEX 5: URBAN AGRICULTURE FOR LIVELIHOOD (GROUP 3)
MAIN OBJECTIVE: IMPROVE URBAN AGRICULTURE FOR SUSTAINABLE LIVELIHOOD

		contamination of food		
Minimize Environmental Risk	Improved health and sanitation and reduced negative impact on water bodies	Good health, environmentally sound environments, safe water bodies	Farmers + LA	1 y
Minimizing contamination and recontamination	Healthy final products and improved handling and packaging	Healthy products and increased public health	Farmers consumers + LA	1 y
Promoting value addition of UA products	Increased UA income	Improved living standards	LA , MADU	2 y
Facilitating Review of By-laws	New favourable by-laws implemented	Document produced	LA, AMA	2 y
Facilitate the improvement of land use planning enforcement	UA lands preserved	Farmers have access to preserved UA land	LA, AMA	2 y

SWITCH SMALL GROUP MEETING – NOVEMBER 15, 2007

Venue: Errata Hotel, Pool Side

Attendance:

1. Prof. Esi Awuah
2. Andrienne Martin
3. Rene van Veenhuizen
4. Olufuke Cofie
5. Irene S. Egyir
6. Esther
7. Collins Tay

Start: 8.30 am

Chairperson: Prof. Esi

Introduction

The meeting was called to firm the selection of Demo site – Dzorwulu area, justify selection and discuss what to do with non-selected sites viz., La, Korle-Bu and Roman Ridge (I). In addition the research issues for each site were to be discussed and prioritized for possible implementation.

Brainstorming was employed. At the end it was agreed that:

1. Demo site:

Dzorwulu area (including Dzorwulu and Roman Ridge (II))

Selection Criteria

- Large number of farmers
 - Secure land for cultivation for a long time
 - Huge range of market crops
 - Secure water source and large range of water sources
 - Theoretical Risk of environment well understood – tension poles
 - Long-term occupation for the farmers
 - Normed group – one group formally registered with Department of Coops.
 - Adoption of improved technology
2. Evaluate the performance of the site: including desk top search for:
- Characterization,
 - Economic, Engineering and Social performance
- and Identification of gaps

3. What to do with:

La : possibly rehabilitation:

- + Desilting of aerobic ponds
- + Removal of weeds from ponds
- + Negotiation for use of secure land

The question of impact on livelihoods still remain

Korle-Bu: investigate issues of social inclusion Case of Korle –Bu

Roman ridge (I): Profile as case study?

4. Analyse time series data on all Demo site if available at metro department:

- Number of farmers
- Number of beds
- Output per month
- Type of crops
- Yield per bed
- Growth rate: output, number of beds and yield

5. Prepare background report on: “Socio-economic and technical study of Dzorwulu vegetable farming Area”. Include:

- How do they manage common assets?
- How do they link with other organizations and individuals?
- Conflicts and conflicts resolution
- Technical elements: Ecology, soil and water, topography
 - Legal situation e.g -Land tenure and use
 - Secondary data analysis

6. The budget implications of the pre-baseline activities were to be discussed by SWITCH team.

7. Feedback from group members on what information already exists on Dzorwulu was to be

obtained by Irene on 16/11/2007 from:

-Andrienne, -Collins, -Irene, -Esther, -Prof. Esi, -Olufunke

8. The Assistant of Irene Egyir to prepare report and send to members by 21/11/2007

9. Next Activity: Think about baseline instruments for Demo sites: SWITCH team to note

10. It is important to use the right name for the Demo sit: Korle-Chemu catchment area or

Dzorwulu area.

Close: 10:45am

Annexes: Irene, Olufunke, Esther, Adrienne and Collins had given feed back on Dzorwulu as expected by 20/11/07.

Pic 1
Small pond in farmers field

Pic 2
greywater from households

**Annex 1: From Irene Egyir
Analysis of the Structure, Conduct and Performance of Dzowulu Vegetable
Cooperative Farmers Society Ltd¹.**

Introduction

The analysis of structure, conduct and performance is important in the determination of sustainable farmer association. The analysis in this study was based on certain expectations of the selected indicators shown in table 1. The indicators were selected following and adapting the suggestions of Adegeye and Dittoh (1985) and comparing them with the fundamental characteristics of cooperatives suggested by Robert Owen (personal communication with Nyarkoh, Metropolitan Cooperative Officer, April, 2006).

Table 1: Indicators of structure, conduct and performance of agricultural producer organisations in Accra

Structure	Conduct	Performance
1. Large number of patrons improved	Provision of share	Use of technology
2. Similar product number	Sharing savings according to patronage annually	Increased of patrons
3. Open membership margins	Relying on personal savings	Positive net of patrons
4. Democratic control savings of	Education of members	Adequate
5. Legitimate (registered linkages with department of Cooperatives/producer Registrar Generals'	Education of community	Effective the organisation
6. Access to resources linkages (inputs, markets)	Regular meetings	Effective with other organisations stakeholders

¹ Summary from "Sustaining Urban Agricultural Producers' Organisations in Ghana: lessons from the Accra Metropolitan Area" by Irene S. Egyir and Edward Ackah-Nyamike Jnr. College of Agriculture and Consumer Sciences, University of Ghana, Legon, Accra

The organisation scores one if it meets the *a priori* expectations; it scores zero otherwise. A total score of 15 (5 for each element) suggests that the association is likely to be sustainable. Such an association has adequate structure meaning that its motives are right and will serve the interest of its members. It also has adequate conduct because it is self-reliant and has social welfare at the centre of its activities. If the high performance is maintained it will succeed in its long-term activities, take advantage of opportunities and survive external threats.

Results and Discussion

The concept of cooperation among urban agricultural producers is known in Accra. Dzorwulu Vegetable Farmers' Cooperative Society is one of the formal cooperative organizations in Accra. It has gained legal recognition by registering with the Department of Cooperatives. It is production-oriented concentrating on irrigated exotic vegetables such as cabbage, carrots, green pepper, spring onions, etc. Occasionally, some members cultivate the local crops (see graphs representing data for AMA in appendices).

Its structure is adequate structure (scoring above the minimum of 5). Apart from being registered, DVFCFS has open membership (admitting both males and females), a constitution to ensure democratic control and functional organizational structure to facilitate information flow on finance, marketing, membership participation, training and resource flow (Table 2). However, the conduct and performance are below expectation. The score (4:6) of DVFCFS suggests that its members do not have shares in the organization although they pay a monthly dues of ₵10,000.00; members rely on personal savings and there is regular education of members (Table 3). Meetings are held once a month and whenever a member is bereaved, marrying or naming a child she is given a gift based on membership contributions.

The performance of DVFCFS is said to be low because, it has low level self-reliance; its capital accumulated as savings for the organization, to meet unforeseen contingencies is low. Since net income of individual members is also low personal savings is not likely to contribute much to reduction in vulnerability (Table 4). Dependence on membership dues alone implies that the planned projects of the association cannot be completed. It also meant that the association could not link up effectively with other vegetable and non-vegetable farmer-based organizations; the linkage with other stakeholders in the sector was likely to be weakened with irregular communication. Indeed, the Secretary complained that:

“we make good plans but we cannot implement them because there is no money”
“what we contributed earlier as dues did nothing for us so the membership is not motivated to continue paying dues”

“the vision and mission of our organization is unclear: most members expect credit from the association or its benefactors so that when that is not forth coming they see the leaders as doing nothing”.

“There is lack of adequate external support and public recognition resulting in low interest and enthusiasm of members”.

“Our achievements are meagre; our ability to sustain external support, employ administrative staff, accumulate assets, have better access to goods and services, ensure better prices and product quality, engage in promotional activities and help form new organisations in other communities is low”.

Table 2: Results of scoring for adequate structure of the DVFCS Ltd.

Structural elements	Description	Score
Number of patrons	Less than 30	0
Similar product	Exotic vegetables	1
Open membership	Open to all	1
Democratic control	Elected executive	1
Legitimate	Registered with	1
Access to resources	Department of Cooperatives, Accra	1
Functional organisational structure	Access to pipe, stream and grey water; government land; labour market; agro-input market	1
	Apart from Executive all members participate in decision making	
Total score	Adequate structure	6/7

Table 3: Results of scoring for adequate conduct of the DVFCS Ltd.

Conduct elements	Description	Score
Provision of shares	No shares floated	0
Sharing savings according to patronage	Never done	0
Relying on personal savings	Always	1
Education of members	Always	1
Frequency of meeting of membership	Regular	1
Public welfare actions	Regular	1
Total score	Fairly adequate conduct	4/6

Table 4: Results of scoring for adequate performance of the DVFCS Ltd.

Performance elements	Description	Score
Use of improved technology	High; quick acting pesticides for weed, insects and other pest management; clean (piped) water use	1
Change in number of patrons annually		1
Mean net margins of individual patrons	Slight increase Low; less than ₵2,000,000/month	0
Savings of Organisation	Some; less than ₵10,000,000.00	0
Linkages with other Producer Organisations	Weak; informal association with other informal vegetable groups in the Dzorwulu area.	1
Linkages with other Stakeholders		0
Improvement in product	Fairly strong; collaborates with Metro agricultural development unit, DOC, IWMI and students of various Universities Low; no change in form product is sold fresh unharvested/ unpackaged	0
Total score	Inadequate performance	3/7

What is of much concern for urban producer organizations is the fact that organizations should specifically pursue environmental soundness motives, and engage or join in any public campaigns that seek to ensure such conditions. The DVFCS has been supported by the International Water Management Institute (IWMI)² to participate in a video that showcase some best and worst practices in urban vegetable farming. Since 2006, the Accra Working Group on Urban and Peri-urban Agriculture (AWGUPA) initiated by RUAF³ has attempted to create a platform for all stakeholders in the urban agricultural sector to step up the education of producers and the general public and to facilitate the formulation of a policy for urban agriculture. The DVFCS has a representative (the Secretary) in the group. The foregoing suggests that the challenges in developing effective and sustainable urban producer organizations in Ghana are both internal and external. The motive

² See box 1

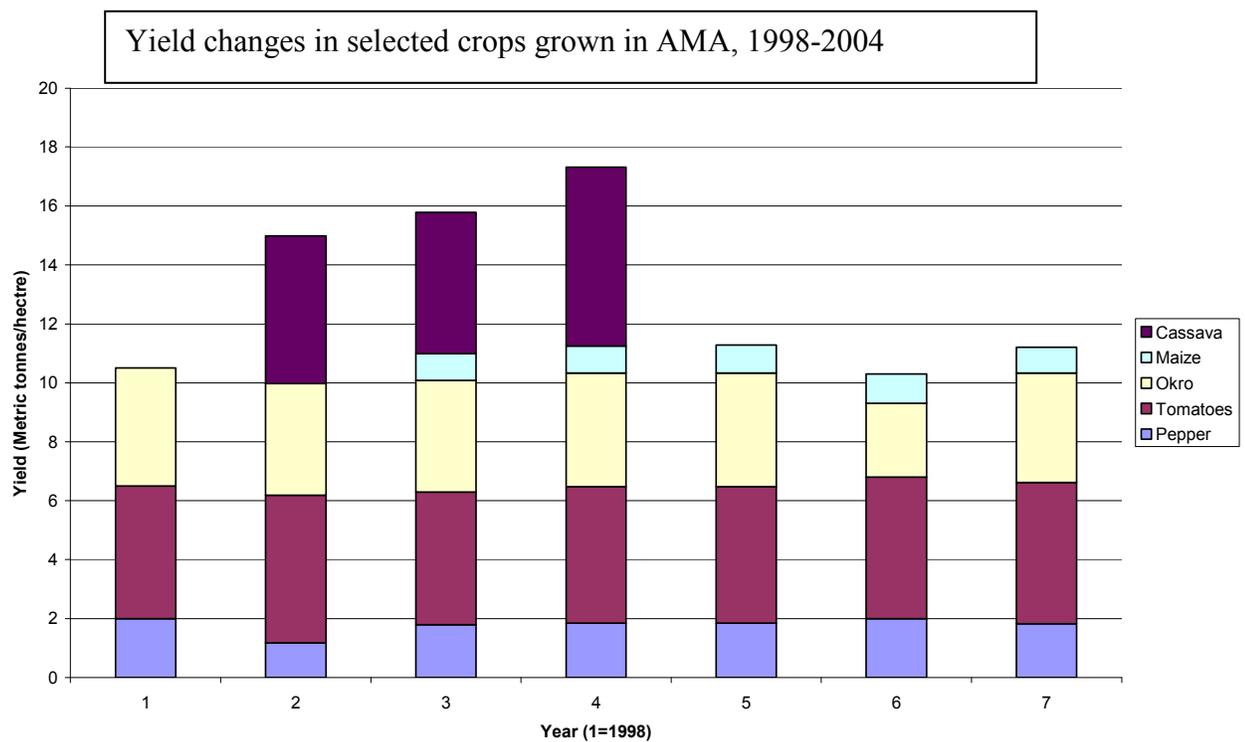
³ Regional Resource Centre on Urban Agriculture and Food Security for Anglophone West Africa, operated by the International Water Management Institute, Accra.

*Box 1: The International Water Management Institute (IWMI)
The IWMI is an international research NGO with focus on poverty reduction and food security through sustainable and efficient agricultural soil and water management. It is closely linked to several institutions and projects ranging from policy development and support to the analysis of technology adoption factors, planning*

of DVFCs may be right but the organisational resources (financial, material and human -patrons) are not adequate. The external linkages are also not effective since there are not many specific projects and programmes lined up with other agencies (governmental and non-governmental) to ensure good group dynamics. Indeed, the general macroeconomic and technological indicators do not also favour the growth of such a low-income producer organisation; not with the double digit interest rates on capital and high inflation for 2006.

Appendix:

Official statistics on selected crops show irregular growth yield (production and area cultivated) for crops such as tomatoes, okro, pepper, maize and cassava from 1998 to 2004



Annex 2: From Olufunke Cofie

From Cofie et al

3.1.3 Land tenure

A brief description of the land tenure system in Accra will be presented in this report. A detailed analysis has been published by Obuobie et al (2003). Most of the land areas cultivated by farmers are either owned by the government, an institution or an individual. The plot sizes (ca.0.2ha per farmer) of most of these sites has diminished over time because of land loss to estate development and widening of drains leading to reduced land reservations along the drains which used to be cultivated. Farmers usually do not pay for the use of such lands and as such there is no security of tenure as they are allowed to farm as long as the owners do not need the land. Generally farmers enter into a form of informal arrangement with landowners to prevent weeds and encroachment by estate developers. Some examples of informal tenure arrangements include:

Land under pylons (eg: Dzorwulu/Plant Pool/North Dzorwulu)

At Dzorwulu, farmers cultivate under high tension (i.e. pylons) lines as per mutual arrangement with the Volta River Authority (VRA) aiming to ensure that the strip along the high tension is kept clean and rid of weeds.

3.1.4 Water resources

Major drains in effect are streams or rivers, which have been lined in the section of the city to enhance easy flow of water, polluted with both industrial and domestic waste. Human activities such as sewage and refuse disposal into the drains are responsible for the domestic sources of pollution.

a. Drains and streams

Most of the farmers use water from drains and streams and do not pay for it. The water is fetched from streams and applied to crops with buckets or watering cans. Some farmers channeled the water to shallow dug wells and fetched with watering cans (e.g: Korle-bu). The advantage perceived is that the level of nutrients in the water increases the production yield but it is labour intensive. All year round flows are guaranteed (e.g.: Stream Nysia, Dzorwulu) within the streams. In the dry season, volume of water in the drains is low at some sites, (e.g.: Marine Drive).

b. Pipe borne water

AMA has provided standpipes to farmers at some sites to serve as alternative sources of water safe for human consumption (e.g. Dzorwulu, North Dzorwulu and La). The volume and availability of water depends on the supply and distribution of potable water by the Ghana Water Company Limited (GWCL). Farmers could either pay a flat rate irrespective of the volume of water used or in terms of per volume of water used. Farmers using pipe water are in groups and share the bill according to the number of beds each farmer crops. Two main application methods can be found: direct application using a water hose or fetched into a pond and drawn with a watering can for use.

From Obuobie et al

“Dzorwulu/Plant Pool”. The site covers an area of 15 ha. It is divided into two sites by a

major road with in total about 60 male farmers and 2 female farmers. One part, “Plant Pool”, next to the high-tension area of Volta River Authority (VRA) has 34 farmers, two of whom are women. The other side has 28 male farmers. A mutual agreement has been formalized with VRA for farming in the area as a way of maintaining it and to prevent any non-agricultural encroachment. River Onyasias cuts across the farming sites. The river is channeled in this part of Accra like a drain and has a similar function. Some farmers use pipe-borne water, most however water from the major drain or smaller drains channeled into shallow reservoirs (dug-outs). There are about 77 of such small ponds on this site.

Some are also filled with piped water.

Table 7.1: Water quality and crops on selected urban farming sites in Accra

Location Sources and quality of irrigation water Crops

Dzorwulu,

Accra

1. River Onyasias with contributions of wastewater from neighbouring settlements (FC up to 105-6/ 100 ml); irrigation with watering cans

2. Piped water; irrigation with drag hoses or watering cans (FC < 101 / 100 ml);

Lettuce, cucumber,

Cabbage, Cauliflower,

onion, Chinese cabbage,

spring onions, radish, spinach etc

Annex 3: From Irene Egyir

5. THE PROFILE OF PRODUCER ORGANISATIONS IN UPA⁴

The actors involved in UPA in Accra are the producers, processors, input suppliers and output distributors. Mougeot (2000) and Obosu-Mensah (1999) reported that most urban farmers have rural backgrounds and had some experience in farming before coming to the urban areas. Many of them principally come seeking good employment opportunities, but when they fail they take up urban agriculture to earn enough money to meet their basic needs and as a source of livelihood (see box 1).

1.1.1 Box 1: The story of Seidu, an Urban vegetable farmer

I am yet to be 30 years. Six years ago I joined my brothers in Madina, Accra, from Bawku in the Upper East Region. I had the hope of learning and practicing a trade in commercial transport operation. I learnt the trade but could not practice due to lack of favourable openings. I decided to join hands with my three brothers (two are night shift security men and the other like me is a full time farmer) to cultivate three plots of land (about 2 acres) that were yet-to-be developed- into residential facilities in North Legon, a few kilometers away from where we live. We are individual farmers now but we consult each other in all matters – crops to be grown, input acquisition and output prices and traders to sell to. We grow spring onions, cabbages, green pepper, carrots and occasionally chilli pepper....Due to the continuous use of the land for 5 years, the fertility has declined and insects have increased. We therefore have to use fertilizers and pesticides (including weedicides, insecticides and growth regulators)....We usually depend on the rain. In dry periods, there is a small reservoirs we depend on, using a pumping machine but the water gets finished and we have to rely water from a big gutter near the farm....the water is not very clean but it is good for gardening....We sell directly to households (who come to the farm) and market women. We have some specific market women we sell to but new entrants are always welcome....The cash flow is good although it is low during August to September when the rural and import supplies increase.....The future is unknown for me because the land owner can claim the plots any time at short notice... I may go back to driving or look for another yet-to-be-developed plot....What external support do I need? ...that government will demarcate land in the city for vegetables only and we will be given some soft loans for bigger farms (1 hectare). In this way our families will be safe, we will employ idle hands in the city and supply the market all the time.
As told to Irene S. Egyir –Principal Investigator

⁴In: Egyir and Nyamike (2007)

5.1 Introduction

Based upon the typology of ‘organisation’, and categorisation of cooperatives, attempts were made to select representative formal and informal large and small organizations within the agricultural production chain in and around the city of Accra to undertake a detailed “Organizational Profile”. Target groups included those in sheep and goat, grass cutter and pig rearing, sheep and goats and vegetable selling, and vegetable, mushroom and flower production. In addition “Queen Mothers” of product groups were also interviewed.

5.2 Producers’ Organisations in UPA in Accra

As expected, there are many more informal than formal associations in UPA in Accra. The formal ones that are large are institutionalised and have gained legal recognition by registering with the Registrar Generals’ Department or Trade Union Congress. The organisations can be categorised into four: production, processing, marketing (input traders and output traders) and credit (Table 5.1). The formal large associations are those of national coverage and recognition.

Table 5.1: Formal and informal producer organisations in UPA in Accra

	Formal	Informal
Producers	<ol style="list-style-type: none"> 1. Ablekuma Grass Cutter farmers 2. Nungua Zongo livestock farmers 3. Marine Drive 4. Dzorwulu Vegetable farmers 5. Ga-Adangbe Pig farmers 	<ol style="list-style-type: none"> 1. Ornamental plant producers 2. Mushroom producers
Processors	Association of Ghanaian Industries	<ol style="list-style-type: none"> 1. Plantain roasters 2. Fish mongers association
Input retailers	<ol style="list-style-type: none"> 1. Ghana Feed Millers Association 2. Timber Market Feed Millers, Ashaimang 3. Agroinput dealers association? 	<ol style="list-style-type: none"> 1. Bamboo sellers 2. Water vendors 3. Awudome sheep and goat sellers
Output traders	<ol style="list-style-type: none"> 1. Horticultural Association of Ghana 2. Vegetable Producers and Exporters Association of Ghana (VEPEAG) 3. Sea Freight Pineapple Exporters of Ghana (SPEG) 4. Assorted Foods Exporters Association 	<ol style="list-style-type: none"> 1. Product Market associations – Agbobloshie Market Exotic Vegetable Sellers Association Madina Market Plantain sellers Association 2. Street food vendors
Credit	1. Mutaul Assisted Susu Groups,	Micro finance groups for different NGOs

5.2 The Working of Producers' Organisations

Producer organisation ought to be voluntary non-profit business operating at cost. The incentives and guarantees provided by both the external and internal forces greatly motivate the initiation and organising for such associations. The current survey results suggest that, individuals must push for a start but stronger organisations and institutions are needed for grounding (Table 5.2).

We see that even the formal associations have internal relations problems due to lack of external support with respect to shaping of vision and mission, financing and programme planning to sustain interest of members.

Table 5.2: Summary of responses from formal producer associations in UPA in Accra

Question	Summary response				
	AGF	DVF	GPF	MDVF	NZLF
Year of Idea (who by?)	1999 by Current Chairman	1999 Agric. Extension agent	1950s; traders	1986; pastor	Long ago by our fathers
Year of Registration/Acceptance	2005 DOC	2001 DOC	1960 DOC	2002 Registrar Generals	2004 Registrar Generals
Mission?	Capacity building of farmer to employ others	mutual support for each other and solicit external support	Rear and market pigs	External assistance.	Feed the nation and home
Vision?	Poverty alleviation	well organized association that is recognized and receives needed support	Improve living conditions of members	None	Poverty reduction
Constitution?	Yes; based on DOC Byelaws	Yes; based on DOC Byelaws	Yes; based on DOC Byelaws	Yes	Yes; guided by MoFA
Entry and Exit Requirements	Interest and share purchases of up to ₵2.5M	Interest	Interest; interview	Interest	Interest; pay up to ₵100,000.
Numerical Strength (Male: female, young: old)	200 males and 70 females	23 males and 3 females. Average age- 35 to 40 years	80 males and 20 females.	I female; young men and a few Pensioners	50 female, 30 male

Patronage – how is it sustained? Meetings and activities	50 regular at meetings; training programmes and external support fro Heifer Int. (NGO)	Regular meetings; members contribute	Regular meetings; training programmes	“Meetings are seldom organized, and members seldom attend meetings”	Weekly meetings and MoFA training; Monthly dues
Leadership (how is it maintained?)	Executives have two years term of office	Executives have two years term of office	Executives have two years term of office	Two year term but not done since 2002	Executive elections; yet to decide term
Annual Plans?	Yes. 2006 to build Abatoir, cold store; traing in processing	None	To fence piggery	No	-

Achievements? -External support and Training -Access to assets, -Employment, -Access to goods and services (education, nutrition, etc.) -Control over prices and product quality, -Promotional activities, -New organisations (branches)	Yes Yes Yes Yes No Yes Yes	Yes Training from Input suppliers. A knapsack sprayer; 2.5million cedis in its account No Yes No No	Yes Training From external Training Centre Yes Yes No No No	Not much- only training from Agrimat No No Yes No No No	Yes MoFA loan and training Land at Prampram Award No Yes No No No
Challenges/Constraints	Finance Seasonal Feed problems	lack of external support; drudgery of activities	Urban encroachment of land; Harassment from city authorities; etc	Very low commitment from members	Customer complaints of prices
New Plans	Yes: Abatoir; cold store	New farm lands, etc	Intensify waste supply to crop growers	None	None

5.3 Promising Practices in UPA Producer Organisations

The current practices of most UPA producer organisations are not promising in that they are overly dependent on external support. However, the annual planning of associations such as Dzorwulu Vegetable farmers, Pig Farmers and Ablekuma grass cutter, need commendation. Strategic thinking is good and everything should be done to encourage such practices. Hear the Secretary of the Dzorwulu vegetable farmers association

“i. The Association has contacted the Dawhenya Irrigation Project for farm lands. The request has received some attention but the capital needed to make it possible is way beyond the budget of the Association.

ii. Embark on proposal writing to solicit external support

iii. Find new ways to get members to pay their dues”

Another practice, which needs commendation, is gender mainstreaming and training of members. There appear to be a lot of effort to include both sexes in the organising of all associations. There is open membership and promotion of education in most associations. Religious and political neutrality is being observed although associations like the Dzorwulu Vegetable farmers have only Moslems but “we will not bar non-Moslems only that where we are farming was first acquired by Moslems from the North of Ghana”

Entry based on share sales is also a recommended practice. It commits members as long as the moneys yield returns and these are distributed equitably after the payment of all debts.

5.4 Major Socio-economic, Institutional and Organisational Constraints

The following categories of constraints/problems have been identified by both the current study and the IWMI-RUAF study:

Socioeconomic constraints

Economic conditions such as the low-income situation of most members prevent them from expanding enterprises and contributing dues and ideas regularly. In addition the high and increasing prices of inputs and poor rainfall regime results in low yields

Demographic conditions such as dependence on manager labour for all activities tells on the physique of producers.

“We get discouraged by customer complaints of high product prices and neighbours complaints of pollution due to poor handling of pesticides, feed, livestock waste and poor management of wastewater”.

“Sometimes our produce are stolen; theft cases on farms are increasing”. “there is poor financial management among producers which results in seasonal poverty “

Seasonal competition from outsiders

Due to lack of property rights operations cannot be expanded. There appears to be so much insecurity but there is for the job they always hope for a future which looks bleak anyway. *“There is no security over the land on which the Association members farm. The land is not under any specific tenure, hence any future development can disrupt the farming activities” Madam Beatrice, Marine drive Vegetable farmers’ Association*

5.4.2 Institutional constraints

The effect of UPA on environmental conditions such as, pollution and food hygiene results in various “subcultures” of groups with beliefs that UPA activities must not be encouraged at all. The relationship between us and City Planners is not the best...the media highlight mainly the negative aspects of UPA...so the political events at all levels - international, national and local – does not seem to push for us”

The legislation and regulations defined by national development policies limits our activities to peri-urban yet the city is growing so fast that what has been approved today by the authorities is disapproved tomorrow by the same authorities.

“...this land was acquired in the 1960s by our fathers for pig farming but now it is suffering for urban encroachment.. people complain of stench....we have been find by the authorities and asked to move from the area in the long term....”

5.4.3. Organisational constraints

There is low level finance for planned activities of most associations

The non-payment of membership dues and apathy shows in most of the associations and slows down organisational plans

It appears that the vision and mission of association is not clear to most members. Most members expect credit from the association or its benefactors so that when that is not forth coming they see the leaders as “not doing anything”

External support and recognition is waning the interest and enthusiasm of members

Non-democratic control of leadership.

“...leadership is undemocratic because they call themselves King and Queen and are not subject to change....our main challenge is how to transform the Association into a democratic organization where the existing ‘monarchy’ will be replaced by elected executives. I foresee a possible division of the association if the transformation is not pursued....our major plan is the transformation of the Association into a democratic organization and subsequent registration as a Cooperative” (Member, Exotic Vegetable sellers association, Agboblosjie).

**Annex 4: From Esther
Statistics on Dzorwulu vegetable farmers, 2007**

Sample Of Farmers	Total Population Of Farmers	Number Of Beds In Area	Crop Cultivated	Average Bed Size 1-3m * 5-19 M	Output Per Month
Huseini Yusif	76 Farmers	2085 (Total)	Spring Onion, Cabbage, Lettuce	1.65m * 10.65m	
Mohammed Seidu	-	30	Cucumber, Lettuce, Spring Onion	2.10m * 9.90m	
Alidu Ginko	-	40	Lettuce	1.65m * 8.25 M	For Lettuce 1 Bed will be (¢ 100,000)- (¢ 150,000)
Ahmed Musah	-	31	Lettuce, Cabbage	1.15m * 5.75 M	For Cabbage 1 bed will be (¢ 250,000)- (¢ 300,000)
Eric Adzator	-	36	Cabbage, Cucumber, Spring Onion	1.35m * 8.55m	Output Ranges between (¢100,000-¢ 3,000,000)
Ali Yusif	-	103	Lettuce, Tomatoes, Spring Onion	1.00m * 9.70m	
Ismaila Issah	-	74	Cauliflower, Beetroot, Lettuce, Parsley	1.10m * 15.95 M	
Mumuni Issaka	-	33	Spring Onion, Cabbage, Lettuce, Beetroot, Mint	1.70m * 12.80m	

**Annex 5: From Collins Tay, CSIR-WRI
THE QUALITY OF WASTEWATER USED IN URBAN VEGETABLE
FARMING AT DZORWULU, ACCRA.**

INTRODUCTION:

Background

Water is an important resource in food production and its quantity and quality is vital to ensuring food security. However, the greatest challenge of our time is the use of wastewater in the production of vegetables in urban centers especially in developing countries. It is imperative to monitor the quality of water used in food production to ensure quality health and safety of consumers.

This work assesses the quality of the wastewater used by urban vegetable farmers at Dzorwulu.

1.2 Objectives

The objective of the study is to assess the quality of wastewater used in urban vegetable farming at Dzorwulu, Accra.

Scope of work

The scope of work comprised the following:

Sampling of wastewater at three selected sites (namely A, B and C) along the drains at Dzorwulu

Field measurement of pH, temperature and conductivity

Laboratory analysis of wastewater parameters, and

Preparation of report describing the quality of the wastewater.

2.0 WORK CARRIED OUT

This comprised fieldwork, laboratory and data analysis

2.1 Fieldwork

Wastewater samples were taken at three different locations (A, B and C) along the drains between March and August, 2007. Temperature, pH and conductivity were measured *in-situ*.

2.2 Laboratory Analyses

The analyses were carried out at the CSIR Water Research Institute laboratories in Accra. The following parameters were determined:

Biological Oxygen Demand (BOD)

Dissolved Oxygen (DO)

Ammoniacal Nitrogen (NH₃-N)

Phosphate Phosphorus (PO₄³⁻-P)

Nitrate –Nitrogen (NO₃-N)

Nitrite-Nitrogen (NO₂-N)

Total Suspended Solids (SS)

Total Dissolved Solids (TDS)

Sodium

Potassium

Calcium
 Magnesium
 Total Iron
 Chloride
 Sulphate
 Manganese
 Total Hardness (as CaCO₃)
 Calcium Hardness (as CaCO₃)
 Magnesium Hardness (as CaCO₃)
 Total Alkalinity (as CaCO₃)
 Bicarbonate (as CaCO₃)
 Fluoride

Standard Methods for the Examination of Water and Wastewater (APHA, 1998) were followed and briefly presented in Appendix A.

3.0 RESULTS AND DISCUSSION

The results of the wastewater at sites A, B and C along the Dzorwulu wastewater drain were compared with the Ghana Environmental Protection Agency (EPA) guideline value in Table 1.

Table 1: Summary statistics of wastewater quality at sites A, B and C (at Dzorwulu)

Parameter	Site A	Site B	Site C	EPA (2003) Guideline Value
pH	8.05	7.65	7.90	6.0-9.0
Conductivity μS cm ⁻¹	1037	1150	1216	1500
Temperature	27.4	28.2	29.5	-
BOD	12.4	14.6	16.5	50
DO	12.2	7.5	5.2	
Tot. Suspended Solids (SS)	14.0	43.7	63.5	50
Tot. Dissolved Solids (TDS)	642.0	715.5	812.5	1000
Sodium	138	196	235	
Potassium	12	11.6	13.9	
Calcium	50.1	44.5	68.1	
Chloride	241	257	288	250
Sulphate	46.2	53.5	68.0	
Phosphate-Phosphorus	2.02	1.05	0.94	2
Magnesium	30.3	31.6	32.7	
Tot. Iron	0.505	0.412	0.237	
NH ₄ -N	20.2	11.7	7.4	1
NO ₂ -N	0.150	0.092	0.088	
NO ₃ -N	0.904	0.946	0.983	10

Tot. Hardness (as CaCO ₃)	250	298	305	
Tot. Alkalinity (as CaCO ₃)	150	156	144	150
Calcium Hard.(as CaCO ₃)	125	148	170	
Magnesium Hard (as CaCO ₃)	125	150	135	
Bicarbonate (as CaCO ₃)	183	180	176	
Fluoride	0.66	0.55	0.49	

Units are in mg/l, unless otherwise stated.

3.0 QUALITY CHARACTERISTICS OF WASTEWATER AT DZORWULU

3.1 General Characteristics

The pH of the wastewater at Dzorwulu ranged from 7.65 to 8.05 pH units, Temperature ranged from 27.4 to 29.5°C and conductivity ranged from 1037 to 1216 $\mu\text{S cm}^{-1}$. These values fell within the EPA (2003) guideline values.

3.1.1 Biological Oxygen Demand (BOD)

The organic content of wastewater can be assessed from the Biological Oxygen Demand concentrations. BOD concentrations in the wastewater from Dzorwulu ranged from 12.4 to 16.5 mg/L. These values fell within the EPA (2003) guideline value of 50mg/L.

3.1.2 Dissolved Oxygen (DO)

Dissolved Oxygen concentrations ranged from 5.2 to 12.2 mg/L.

3.1.3 Total Suspended Solids (SS)

Total Suspended Solids concentrations ranged from 14.0 to 63.5 mg/L which, fell outside the EPA (2003) guideline value of 50mg/L.

3.1.4 Total Dissolved Solids (TDS)

Total Dissolved Solids concentrations ranged from 642.0 to 812.5 mg/L. These values were within the EPA (2003) guideline value of 1000 mg/L.

3.1.5 Nutrients

The ammonia (NH₄-N), nitrate (NO₃-N) and phosphate (PO₄-P) concentrations of the wastewater were determined to assess the nutrient contents of the wastewater. NH₄-N range of 7.4 to 20.2 mg/L, fell outside the EPA (2003) guideline value of 1.0 mg/L and therefore, unsatisfactory. Nitrate concentrations ranged from 0.904 to 0.983 mg/L, and therefore fell within the EPA (2003) guideline value of 10 mg/L. Phosphate values ranged from 0.94 to 2.02 mg/L, and therefore, fell within the EPA(2003) guideline value of 2 mg/L.

3.1.6 Hardness

The wastewater at Dzorwulu had hardness which ranged from 250 to 305 mg/L.

3.1.7 Alkalinity

The Total Alkalinity of the wastewater at Dzorwulu ranged from 144 to 156 mg/L. These values were fairly satisfactory relative to the EPA (2003) guideline value of 150 mg/L.

3.1.8 Major ions

Major ions included: Na⁺ (ranged from 138 to 235 mg/L); K⁺ (ranged from 11.6 to 13.9); Ca²⁺ (ranged from 44.5 to 68.1 mg/L); Mg²⁺ (ranged from 30.3 to 32.7); Cl⁻ (ranged from 241 to 288 mg/L), which fell outside the EPA (2003) guideline value of 250 mg/L; SO₄²⁻ (ranged from 46.2 to 68 mg/L); Fe²⁺_{Tot} (ranged from 0.237 to 0.505 mg/L) and F⁻ (ranged from 0.49 to 0.66 mg/L).

4.0 Conclusions

The following conclusions are made from the wastewater quality studies at Dzorwulu

The Total Suspended Solids (SS) level of 63.5 mg/L at site C was unsatisfactory.

The ammonia (NH₄-N) levels of 7.4, 11.7 and 20.2 mg/L at all the sites were unsatisfactory, compared to the EPA (2003) guideline value of 1.0 mg/L

Chloride value of 257 and 288 mg/L at sites B and C respectively were unsatisfactory, compared to the EPA (2003) guideline value of 250 mg/L.

REFERENCES

- APHA, (1998). Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, NY, USA.
EPA, (2003). Guidelines for the Discharge of Wastewater into Receiving Water Bodies, Environmental Protection Agency, Accra.

APPENDIX A

Analytical methods (Physico-chemical)

The following analytical methods were employed for the physico-chemical analysis.

<u>Parameter</u>	<u>Method Employed</u>
pH	Schott Gerate pH meter CG 818
Conductivity	Cyberscan Model 510 conductivity meter
Ammonia-Nitrogen	Direct Nesslerization
Phosphate-Phosphorus	Stannous Chloride Method
Nitrite-Nitrogen	Diazotization Method
Nitrate-Nitrogen	Hydrazine reduction Method
Chemical Oxygen Demand	Potassium dichromate reflux method
Biochemical Oxygen Demand determination	Dilution and dissolved oxygen after incubation at 20°C for 5 days.

Total Suspended Solids (SS)
Total Dissolved Solids (TDS)

Gravimetric method
Gravimetric method

Annex 6: Towards report writing on “Socio-economic and technical study of Dzorwulu vegetable farming Area”: A Gap analysis

Issues to discuss	Data available	Gap: data needed
Social-economic: Farmer organisation- -How do they manage common assets? -How do they link with other organizations and individuals? -Conflicts and conflicts resolution -Legal situation: <i>Land tenure and use</i>	Common asset Linkage with non-vegetable farm organizations as businesses or for external support Organisational structure; meetings Agreement with VRA to use and protect area	Arrangements and control over common asset use. Linkage with other farm organisations Nature of conflicts and process of resolution Evidence of agreement: documents and VRA Officers-in-charge of arrangement
Secondary data analysis	For 2007: Names of farmers; total population of farmers; number of beds; crops cultivated; average bed size; output/month; price; revenue	Data on previous years say, 2000-2006

Technical: Topography	Nil	Description of topography
Climate	Nil	Description of rainfall pattern- amount; rainy days, sunshine days. Temperature and humidity
Water	Quality, sources and types; mode of use; availability	Range of appropriate and affordable waste water treatment technologies
Soil	Nil	

Annex 7

From Adrienne: Demo site selection criteria

	Roman Ridge 2	Dzorwulu (some information from Social inclusion field visit Aug 2007))
1) Is there local interest and willingness to participate?	Interest expressed	Interest from group leader
2) Is the site accessible and visible?	Yes	Yes
3) Numbers of people (male and female) engaged in UA at the site?	About 20 farmers (all men) plus helpers/labourers.	26 farmers, 23 men and 3 women
4) What types of crop are grown – leafy vegetables for market?	Lettuce, cabbage, onion, spring onion, carrots, beetroot, pepper, mint, parsley, radish, coriander amaranthus.	Cabbage, lettuce, onion, spring onion, cucumber.
5) What are the different water sources used? Is water available all year round? Any risks are associated with these water sources and their quality at different times of the year?	Each farmer has his own pond (s). They also use a pump; individuals wanting to use it, contribute the fuel. Water is available all year round. Sometimes the field floods for a few hours after heavy rain, (around once per year). No real concerns on water quality from the stream. They also use grey water from nearby houses. No tap water used.	Three sources - drain, stream and piped water. Up to 1998/9 farmers were using piped water for irrigation but were then disconnected and turned to using drain and stream water. Commercial rates are paid for piped water with some negotiations on amounts.
6) Does the site have potential for implementation of the technologies discussed – e.g. sand filtration, macrophyte based system, sedimentation ponds. Consider the land area and topography.	Yes	Yes – filtration of drain and stream water. Pond treatment.
7) What is the land availability for UA? Is there security of tenure and land use? What are the trends & threats relating to land access and future land development? How is their relationship with the land owner?	A long established site, with cultivation since the time of their fathers (30-40 years). Originally from chiefs/traditional authorities.	Long established site in continuous cultivation. Originally a state farm from 1963-1977, then continued under individual cultivation. The land belongs to the Volta River Authority and is next to a power station. The group have no connection with the VRA but because of the proximity of the land to the power station and overhead cables, they are fairly confident of their land security as they say it cannot be built on.
8) Are farmers organised into	No organised group. Were once	The Dzorwulu Plant Pool Cooperative

a group with defined objectives, leadership roles and responsibilities? What are the criteria for membership? Have there been any disputes or conflicts?	organised but not now. They are in a business which makes profits and losses. People contributed but the group made little profit and about 10 years ago they became discouraged and stopped contributions (20,000 cedi). <i>'Now everyone is on his own'</i>	Vegetable Farmers Society was formed in 2001. It has a defined leadership structure (chairman, secretary, vice chair, treasurer and 2 exec committee members, one of whom is a woman. The group is registered with the Cooperative Society of Ghana. Members must live within a 3 km radius, be regular attending meetings and paying their dues. There is a waiting list of 10..
9) What functions does the group perform for its members? E.g. joint savings, investments, negotiation on water payment, purchase of equipment and inputs, transport, marketing etc.	None	Membership fee is 20,000 and monthly contribution 10,000. Contributions used for buying sprayers and saving in their bank account. Members provide support on social occasions .
10) Is there evidence of farmers' own innovation in existing practices, e.g. water and crop management?	Ponds on site. Water lettuce and duck weed grew spontaneously and were considered weeds.	Ponds on site.
11) What is the interaction between the UA group and other groups and institutions, e.g. the surrounding community, the city authorities, organisations providing advice and information etc. Any problems?	The main relationship between the different farmers groups on this site and Dzowulu is the exchange of information about to meetings. No public concern about their activities	An initiative to combine with the adjacent group was proposed by the extension officer but they could not agree. Links with MoFA, IWMI, Cooperative Society and the University. Neighbours come to buy vegetables. Farmers think they are perceived positively as they prevent the area from squatters and rubbish dumping.

Annex 8

From Adrienne and Rene :Notes on research questions on the korle - Chemu catcment

The formulation of research questions and the intended areas of impact will guide the baseline study and the definition of indicators and indicator targets. Involvement in the baseline will lead to involvement in research. Regular monitoring will track changes in comparison to the baseline. The local knowledge of people involved in UA and water use for livelihoods is important to contribute to the action research process.

- What objectives?
- What research questions?
- What do we expect to change?
- Baseline designed accordingly
- Indicators developed for areas of change.

The **research questions** relate to the three main research areas:

- On farm water treatment (also farm level awareness among farmers' groups)
- Awareness creation
- Minimisation of pollution

1) Research on safe use of waste	Outputs	Outcomes	Impacts
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<p>water and minimisation of health risks</p>		<p>Here: further develop the micro scenario's</p>	
<p><i>Fill gaps in previous work in relation to water use, cropping, soils, water contamination levels – include seasonal variations and water management practices?</i></p>			
<p>Action research to test on farm water treatment options</p> <p>Crop management and irrigation techniques</p>	<ul style="list-style-type: none"> • Treatment options evaluated (technical, social, economic criteria) • Water quality improved • Volume of water maintained or increased 	<p>Contamination on vegetables reduced</p> <p>-Farmers aware, improved skills and applying....</p> <p>-Extension and Research aware and improved skills</p>	<p>Increased productivity and incomes.</p>
<p>Analysis of farmers and market traders' perceptions in relation to water sources, water use and contamination.</p>	<ul style="list-style-type: none"> • Field schools for farmers and market women. • Information materials developed for farmers and market traders and consumers (link to work Pay/Philip, WHO/FAO) 	<p>Improved water management and crop management</p> <p>Safer handling of marketed produce</p> <p>Changing farmers perception, knowledge and technical skills</p>	<p>Decreased incidence of water borne diseases</p>
<p>Access to UA opportunities</p>	<ul style="list-style-type: none"> • Inclusivity and eligibility for membership 	<p>Strategies to increase access to UA opportunities facilitating contact between farmers groups and institutional bodies</p> <p>-linked to legislation and flexible arrangements made.</p>	<p>Mutually beneficial agreements on land and water use between UA farmers and land owners (on different types of land ownership). Representation and inclusion in city planning processes</p>
<p>How can the organisation and capacity of farmers organisations be strengthened?</p>	<ul style="list-style-type: none"> • Increase in solidarity, leadership roles and management, joint decision making. Awareness of land rights. • Improved organisations (through Farmer Groups and contacts 	<p>Increase in capacity to represent group in policy fora</p> <p>Increased support to farmers in access to water, improved water treatment, etc.</p>	

	→ link also to RUAF)		
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2) Awareness creation	Outputs	Outcomes	Impacts
What are the perceptions of consumers, city authorities and policy makers on UA?	<ul style="list-style-type: none"> Media events - Information for consumers Briefs for policy makers and city planners 	Changes in public perceptions and acceptability of UA	More acceptance of UA and more security for UA producers UA integrated into city planning processes
How can these perceptions be influenced?	<ul style="list-style-type: none"> Standards for vegetable production established and communicated <p>Link to work of Philip / WHO and FAO. Link to LA work, and seek the best opportunities Our WP focuses on (1) and (3: through PhD)</p>	Products are more highly valued	
How can the voices of UA groups and interests in UA be strengthened to influence perceptions of policy makers and planners?	<ul style="list-style-type: none"> By laws reviewed Link and Learn RUAF pilot project! This cannot be an output of the SWITCH research, but we can seek to link to it. 	Favourable by laws implemented Consultation processes mandatory before planning and re-development of UA sites.	

3) Minimisation of pollution In Catchment This is research of PhD ???????	Outputs	Outcomes	Impacts
Understanding of stakeholder actions with respect to water management across catchment.	<ul style="list-style-type: none"> Design of information materials to encourage non polluting behaviour 	Awareness (see 2)	Reduction in vulnerability.
Pollution behaviour across the catchment by different social groups, stakeholders and locations etc. understood	<ul style="list-style-type: none"> Community actions to address unsustainable utilisation of water resources. 	Increase community voice in planning processes.	
Measurement of impacts on the environment.	<ul style="list-style-type: none"> Institutional responses monitored. 	Framework for decision making	

<p>Poverty and social dimensions of water and livelihoods across catchment investigated</p>	<ul style="list-style-type: none"> • Patterns of water use in livelihoods analysed, including back yard agriculture and informal enterprise • Understanding of how social inclusion/exclusion affects behaviour, opportunities and responses to change. • Levels of access and benefits from water assessed. • Typology of UA and other livelihood uses of water. 	<p>Measures to increase opportunities for safe water use for improved livelihoods</p>	<p>Increased security of water use for livelihoods</p>
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Ideas on indicators and monitoring

Scenario development and scoring (descriptive ordinal scoring) can be used to establish baselines and to assess -

- Levels of farmer participation in action research process
- Technical, social and economic acceptability of water treatment options.
- Perceptions of change in quality of water
- Changes in farmers' and market women's understanding and practice in relation to safe use of waste water
- The degree to which contact increased between UA groups and institutional bodies.
- The degree to which management and capacity of farmers organisations has strengthened.
- Increased security of water use for livelihoods.
- Differences in access between richer and poorer households, male female headed households etc.

Methods: to include focus group discussions with UA groups, with market women, with groups from surrounding communities and interviews with key informants in neighbourhood.

This is a basis for defining baseline data on these issues (monitoring these outcomes!!).

Demo site selection

	Roman Ridge 1	Roman Ridge 2	Dzorwulu (some information from Social inclusion field visit Aug 2007))
12) Is there local interest and willingness to participate?	One farmer (Moses) only was met – he stressed the need to consult with the others on the site.	Interest expressed	Interest from group leader
13) Is the site accessible and visible?	Yes, on road side.	Yes	Yes
14) Numbers of people (male and female) engaged in UA at the site?	5 male farmers work on this small site.	About 20 farmers (all men) plus helpers/labourers.	26 farmers, 23 men and 3 women
15) What types of crop are grown – leafy vegetables for market?	Cabbages, lettuce	Lettuce, cabbage, onion, spring onion, carrots, beetroot, pepper, mint, parsley, radish, coriander amaranthus.	Cabbage, lettuce, onion, spring onion, cucumber.
16) What are the different water sources used? Is water available all year round? Any risks are associated with these water sources and their quality at different times of the year?	The water is from drains and streams from 'far away'. Flows year round and is sufficient in the dry season – when necessary they use sand bags to block the stream to collect water. At times the water becomes very dirty, they wait for it to settle before watering. The site sometimes becomes flooded in the rainy season. They create ridges and furrows to drain the site. Sometimes they have to clear refuse brought by the water.	Each farmer has his own pond (s). They also use a pump; individuals wanting to use it, contribute the fuel. Water is available all year round. Sometimes the field floods for a few hours after heavy rain, (around once per year). No real concerns on water quality from the stream. They also use grey water from nearby houses. No tap water used.	Three sources - drain, stream and piped water. Up to 1998/9 farmers were using piped water for irrigation but were then disconnected and turned to using drain and stream water. Commercial rates are paid for piped water with some negotiations on amounts.
17) Does the site have potential for implementation of the technologies discussed – e.g. sand filtration, macrophyte based system, sedimentation ponds. Consider the land area and topography.	Yes	Yes	Yes – filtration of drain and stream water. Pond treatment.
18) What is the land availability for UA? Is there security of tenure and land use? What are the trends & threats relating to land access and future land development? How is their relationship with the land owner?	Government land – a minister's house is nearby. They are authorised to farm in order to keep the area clear of bushes. The informant does not pay for land access, but doesn't know about the others.	A long established site, with cultivation since the time of their fathers (30-40 years). Originally from chiefs/traditional authorities.	Long established site in continuous cultivation. Originally a state farm from 1963-1977, then continued under individual cultivation. The land belongs to the Volta River Authority and is next to a power station. The group have no connection with the VRA but because of the proximity of the land to the power station and

			overhead cables, they are fairly confident of their land security as they say it cannot be built on.
19) Are farmers organised into a group with defined objectives, leadership roles and responsibilities? What are the criteria for membership? Have there been any disputes or conflicts?	The informant doesn't know the details, but says there is no formal association. He has been there 1 year.	No organised group. Were once organised but not now. They are in a business which makes profits and losses. People contributed but the group made little profit and about 10 years ago they became discouraged and stopped contributions (20,000 cedi). <i>'Now everyone is on his own'</i>	The Dzorwulu Plant Pool Cooperative Vegetable Farmers Society was formed in 2001. It has a defined leadership structure (chairman, secretary, vice chair, treasurer and 2 exec committee members, one of whom is a woman. The group is registered with the Cooperative Society of Ghana. Members must live within a 3 km radius, be regular attending meetings and paying their dues. There is a waiting list of 10..
20) What functions does the group perform for its members? E.g. joint savings, investments, negotiation on water payment, purchase of equipment and inputs, transport, marketing etc.	Each person farms on their own.	None	Membership fee is 20,000 and monthly contribution 10,000. Contributions used for buying sprayers and saving in their bank account. Members provide support on social occasions .
21) Is there evidence of farmers' own innovation in existing practices, e.g. water and crop management?	Farmers have established ponds with water lettuce growing, having seen this practice in another urban area. It's said to make the water become clean. The excess water lettuce is composted under the plantains.	Ponds on site. Water lettuce and duck weed grew spontaneously and were considered weeds.	Ponds on site.
22) What is the interaction between the UA group and other groups and institutions, e.g. the surrounding community, the city authorities, organisations providing advice and information etc. Any problems?	At times an extension officer may come and promise to assist and collect their names, but never return.	The main relationship between the different farmers groups on this site and Dzorwulu is the exchange of information about to meetings. No public concern about their activities	An initiative to combine with the adjacent group was proposed by the extension officer but they could not agree. Links with MoFA, IWMI, Cooperative Society and the University. Neighbours come to buy vegetables. Farmers think they are perceived positively as they prevent the area from squatters and rubbish dumping.

Learning Alliance Methodology for Policy development on reuse and treated wastewater in Urban Agriculture and Green Areas in the City of Lima

1. BACKGROUND AND JUSTIFICATION

IPES-Promotion of Sustainable Development, in a strategic alliance with the Ministry of Housing, Construction and Sanitation / Office of the Environment (Peru), is leading the implementation of the SWITCH Project in the city of Lima, specifically in regard to work package 5.2 "Use of urban water (fresh and wastewater) for urban agriculture and other livelihood opportunities."

The primary objective of the SWITCH Project in Lima is to formulate policy guidelines and regulations to promote wastewater treatment and re-use systems for urban and peri-urban agriculture and urban greening.

In order to fulfill the main objective of the project, a research project is being carried out. During 2007, an inventory and description of experiences of wastewater treatment and re-use and another description of urban agriculture experiences in the city of Lima were developed.

Based on the characterization of each inventory, the project proceeded to create a typology for the experiences in wastewater treatment and re-use, and another typology for urban agriculture experiences. Based on these typologies, 7 wastewater treatment and re-use experiences and 6 urban agriculture experiences were selected, which because of their importance and relevance have become case studies. In order to carry out the case studies, a participatory research process has been undertaken, looking at 5 dimensions of analysis (institutional, social, technical, economic and environmental). The analysis of the case studies will serve as the primary input for the policy and operational guidelines and regulations that are the main goal of the SWITCH Project Lima.

Launching event and training in June 2007

On June 7, there was a Launching Event for the Lima SWITCH project. The event was attended by 36 institutions involved with wastewater reuse and/or urban agriculture. Representatives from ETC and IRC attended the launching event, and discussed the topics of wastewater treatment and reuse, urban agriculture and the relationship of both issues with the LA methodology. 23 institutions signed a letter of intent to be involved in the SWITCH project and form a Learning Alliance in the city of Lima.

Developing the Learning Alliance in Lima

The SWITCH Project encourages the methodology of learning alliances in its demonstration cities, to create multi-stakeholder platforms at different levels to facilitate the process of innovation and scale up the results obtained in the process. The city of Lima, despite being a "study city", is interested in implementing the Learning Alliances methodology, which helps stakeholders linked directly and indirectly with the issue (incorporating a multi-stakeholder and multi-disciplinary vision) to become involved in the formulation of the guidelines and regulations to be produced.

2. OBJETIVES

General Objective:

Implement the Learning Alliance methodology in the city of Lima, in order to facilitate the development of innovative processes that can contribute in the area of re-use of urban water and waste water for productive uses to scaling up the results obtained from the research efforts of the SWITCH Lima Project and allow the stakeholders involved in the Alliance to build capacity to implement their own experiences based on the policy guidelines and regulations developed.

Specific Objectives:

- a) To create and maintain learning and action platforms for the Learning Alliance for Policy development on reuse and treated wastewater in Urban Agriculture and Green Areas in the City of Lima
- b) To develop common vision for the Learning Alliance
- c) Analysis of policy gaps and implementation hurdles for successful implementation and facilitation of reuse treated wastewater.
- d) Validate the policy guidelines to promote the re-use of treated wastewater for urban agriculture and the irrigation of green areas.
- e) Validate the regulations on the discharging of treated wastewater flows, encouraging their re-use in urban agriculture and the irrigation of green areas.
- f) To facilitate the implementation and monitoring of actions taken by the different stakeholders

3. ACTIVITIES

- a) Stakeholder mapping and analysis of needs for change
- b) Creation of the alliance and its vision, objectives and organization, including formalization of roles and responsibilities
- c) Validation of the policy guidelines and regulations to promote the re-use of treated wastewater for urban agriculture and the irrigation of green areas.
- d) Establishment and maintenance of an information and communications system among members of the LA (website, mailing list, virtual library).
- e) Carry out process documentation and monitoring of the activities and processes

4. BUDGET (for 12 months: 31-42)

a. Stakeholder mapping and analysis of main needs for change for successful fulfilling of required roles

Total = \$2500

b. Formal creation of the alliance, establishment of its vision, objectives and organization

Alliance Creation Workshop
Operational costs

Total = \$1200

c. Validation of the policy guidelines and regulations

2 workshops with 25 participants each
1 workshop with 50 participants
Materials
Transportation
Other related expenses

Total = \$ 2700

d. Establishment and maintenance of an information and communications system among members of the LA (website, virtual library).

Design of a communications and information system among members of the LA
Implementation of an information and communications system among LA members
Maintenance of the LA information and communications system
Translation of materials used and reports
Translation of the website from Spanish to English

Total = \$5000

e. Carry out process documentation and monitoring of the activities and processes

Documenting of change processes at different stakeholder levels

Total = \$2400

f. Person in charge of coordinating the Learning Alliance

Salary: \$600*12 months

Total = 7200\$

Activity	Outputs	USD
a. Stakeholder mapping and analysis of main needs for change for successful fulfilling of required roles	Stakeholder analysis change needs	2.500
b. Formal creation of the alliance, establishment of its vision, objectives and organization	Vision and strategy for the LA	1.200
c. Validation of the policy guidelines and regulations	Workshop reports	2.700
d. Establishment and maintenance of an information and communications system among members of the LA (website, virtual library)	Website updated at least once a month, at least 2 articles and reports published	5.000
e. Carry out process documentation and monitoring of the activities and processes	Change processes documented at least at one stakeholder level	2.400
f. Person in charge of coordinating the Learning Alliance – 12 months		7.200
Contingencies		1.000
Total		21.000

Total for LA = \$ 21,000

Total for LA = € 15,000 (1 Euro = 1.40 USD)

018530 - SWITCH

Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

Covenant between IPES (24) and MHCH (in Spanish)

Due date of deliverable: June 2007
Actual submission date: February 2010

Start date of project: 1 February 2006

Duration: 60 months

IPES – Promoción del Desarrollo Sostenible

Final Document

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	XX
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

SWITCH Deliverable Briefing Note Template

SWITCH Document Covenant between IPES (24) and MHCH (in Spanish)
Audience This letter is a covenant letter between IPES and the Ministry of Housing, Construction and Sanitation.
Purpose The letter of covenant between IPES and the Ministry of Housing, Construction and Sanitation was signed in order to formalize the agreement of mutual support in order to adequately implement the SWITCH Lima project.
Background In Lima, the principal objective of the SWITCH Lima Project is to strength the capacities of the decision makers (national and local government) urban planners (in charge of water management and in the implementation of treated and reuse system in urban agriculture and urban greening. For that IPES and the Ministry of Housing, Construction and Sanitation were interest in work together in order to accomplish this goal.
Potential Impact
Issues <ul style="list-style-type: none">• The Ministry of Housing, Construction and Sanitation and IPES signed a covenant for 60 months in order to become strategic partners in the SWITCH Lima project.
Recommendations Approved