



018530 - SWITCH

Sustainable Water Management in the City of the Future

Integrated Project
Global Change and Ecosystems

Deliverable 5.2.3 - (replaces original deliverables 5.2.3 and 5.2.7

Training and guidelines on multi-stakeholder platforms and action research, and on selected technical topics

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Dissemination Level		
PU	Public	X
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 Documents (with RUAF Cities Farming for the Future)

Deliverable 5.2.3 Training and guidelines on multi-stakeholder platforms and action research, and on selected technical topic

Deliverable reference: D.5.2.3

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.

This deliverable contains products related to training the UPA working groups in multi-stakeholder action planning and research (del. 5.2.3 A), and the development of other material such as guidelines and related training material (del 5.2.3 B and C).

Contributing products to this deliverable are the following:

A number of these products have been bundled in one file under the titles in bold.

5.2.3 A: Training of multi-stakeholder working groups and LAs in pilot cities

5.2.3 Accra

5.2.3 AA1 Training Plan for SWITCH-Accra (Nov 12-14. 2007)

5.2.3 AA2 Accra_Session plan -2 Action Research (Nov 12-14. 2007)

5.2.3 AA3 Accra_Objectives and Micro Scenario's (Nov 12-14. 2007)

5.2.3 AA4 Accra_UA Research questions (Nov 12-14. 2007)

5.2.3 Beijing

5.2.3 AB (*linked to Learning Alliance training*).

Training on Visioning and Scenario based Planning, for the LA / Working Group

5.2.3 Lima

5.2.3 AL1 *Agenda and instructions for SWITCH training course on LA facilitation*

5.2.3 AL2 Session Plans and full material for training course in Lima (in Spanish)

5.2.3 AL3 Report of the training on Learning Alliances for the SWITCH Lima team in June (in Spanish and English)

B- On Technological and Organisational Innovations in Wastewater Reuse, and related Guidelines Lima:

5.2.3 Accra

5.2.3 BA 1: See **5.2.4 Ae2 Report of Demonstration: Design Considerations and Constraints in Applying On Farm Wastewater Treatment for Urban Agriculture**

5.2.4 BA 2: See **5.2.5 Ac Guidance note for National Programme Managers and Engineers; Options for Simple On-Farm Water Treatment in Developing Countries: Third edition of the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater in Agriculture and Aquaculture. IWMI, FAO, WHO, IDRC** (IWMI contributed to this using SWITCH experiences also).

5.2.4 BA 3 Training Report of MoFa and Farmers on Urine storage and use (see demo report under deliverable 5.2.4 Ad2).

5.2.3 Beijing

5.2.3 BB: A Handbook on Beijing's Rainwater Harvesting Technology of Greenhouse Agriculture (in Chinese, is being translated).

5.2.3 Lima

5.2.3 BL1 Policy Guidelines to promote treatment and use of domestic wastewater for irrigation of green areas and other uses in urban and peri-urban areas.

In Spanish: Lima Lineamientos de Política 2009

5.2.3 BL2 Training Module (National Course) on the treatment and use of wastewater for parks and (urban) gardens (2009).

C: General Training Material and Modules for the SWITCH Training KIT

Based on research, demonstrations and guidelines under WP 5.2, inputs were given in the SWITCH training KIT: Managing Water for the City of the Future, coordinated by ICLEI. Text was developed and edited for Sub Module 3C: Managing Wastewater in the City of the Future, including cases on Lima, Beijing and Accra.

Publication date:

-Various, see above

Audience :

A: UA working group and LA members in Accra, Beijing, Lima, WP 5.2 participants, and SWITCH wide audience.

B: City and national (and in some cases international) stakeholders involved or interesting in the specific topics.

C: International audience: focus on city authorities and technical staff.

Purpose :

A) Training on multi stakeholder processes and action research of the city working groups in Accra, Beijing and Lima.

B) Specific training material on technologies and methodologies, both of farm as well as with specific stakeholders later.

C) Development of general training material. Contribution to texts and uploading of material of A and B in the SWITCH global training package (ICLEI coordinated)

Background (one to two paragraphs describing the research and why it was needed):

A: Under WP 5.2, Multi Stakeholder Working Groups on productive use of urban water for agriculture, operated under the learning alliances, were established in Accra, Beijing and Lima (see deliverable 5.2.2). These working groups involve several relevant stakeholders, like farmers, civil society, research institutes and universities, and municipal agencies. These working groups were **trained in multi-stakeholder processes and action research**.

B: Based on the findings of research and demonstrations in the three cities (see deliverable 5.2.4), **training material and guidelines** have been prepared on (use of) selected technologies by IPES, IWMI and IGSNRR, all supported by ETC and where necessary by WUR, and linked to other work packages. These are:

BB, Beijing

A Handbook on Rainwater harvesting, Storage and Use for Beijing (guidelines in Chinese for farmers and technical staff on the background and how to develop the developed rainwater harvesting system using greenhouses, and improved storage and production). One training has been given and the material will be published later. It has been designed in such a way that farmers can decide on adapting their own systems in the most optimal way.

BA Accra

Awareness raising and through action research and training has been given to farmers, and government staff (AMA-MOFA) on on-farm water treatment for irrigation and re-use of urine in Accra,

BA1/2 In Accra the working group on water use for urban agriculture initiated participatory action research activities on technological innovations to minimise risks associated with urban water reuse for agriculture within the context of integrated urban water management. The purpose of the demo was to demonstrate the potential of on-farm wastewater treatment to minimize health risks associated with urban water reuse for agriculture, and focused on further development of existing farmers' practice of on-farm water storage ponds, for improved irrigation water quality and volume. A **manual** was developed and IWMI contributed to a **Guidance note** for National Programme Managers and Engineers; Options for Simple On-Farm Water Treatment in Developing Countries: *Third edition of the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater in Agriculture and Aquaculture*. IWMI, FAO, WHO, IDRC

BA2

It is estimated that up to 90 per cent of fresh vegetable consumption in Accra comes from intensive production within and around the city. To maintain soil fertility the farmers often use poultry manure and chemical fertilisers. The high cost of these fertilisers is becoming a constraint to farming activities in the city. Hence alternative sources of nutrients are welcome and could enhance productivity.

Meanwhile, 95 per cent of the city's populace uses on-site sanitation facilities (public toilet, bucket latrines, septic tanks) as the main means of sanitation, making these places potential sources of nutrients and organic matter production for urban agriculture in Accra. Many public urinals are located within some of the most densely populated residential areas and public places, and are not subject to proper collection and management. Consequently urine from the urinals is discharged directly into the drains flowing into the lagoon, resulting in pollution. A study carried out (Cofie et al., 2007) on 14 urinals located within the Central Business District revealed that 7.3 m³ of urine is generated per day. This is approximately 2,200 m³ of urine per year. In terms of nitrogen content this volume represents 6.6 tonnes of plant available nitrogen.

There has not been record of urine collection for commercial agricultural use in Ghana but, on-station experiments in some universities show promising results (amongst other studies under WP 4.1 on ecosanitation). Factors such as transport logistics, financial feasibility as well as farmers' and consumers' perception of and willingness to use urine for food production influence the adoption of urine as a fertiliser in agriculture.

A second demonstration and research study by SWITCH, was implemented in Accra, Ghana with the same farmer group in Dzorwulu Farming area in Accra, with the objective to introduce urine use to urban vegetable producers through participatory action research, training and demonstration, and to investigate the farmers' perceptions about and the feasibility of using urine in their farm locations. The demo (see under deliverable 5.2.4) was jointly managed by WP 4.1 and 5.2, in collaboration with Safisana, a private entrepreneur, to introduce urine as a fertiliser to farmers.

BL Lima

Preparation of **National Policy Guidelines** for the treatment and reuse of wastewater in urban areas in Peru has been selected as one of the key areas to work on by the National Learning Alliance (see deliverable 5.2.2). The development of these guidelines was a participatory process, under the leadership of MVCS, including a SWOT analysis, the FIETS analysis, and dialogue between stakeholders.

The National Learning Alliance prioritized one of the key objectives identified in the Guidelines: a **National Training Course** on Treatment and Use of Wastewater. The National Training Course was conducted by IPES and MVCS/OMA in 2010 supported by other members of the learning alliance and jointly financed by SWITCH and the Ministry. It trained 100 representatives of municipal service providers, local and regional governments, producers association, local water authorities etc.

C)

Development of **general training material**. Contribution to texts and uploading of material of A and B in the SWITCH **global training package** (ICLEI coordinated)

Based on research, demonstrations and guidelines under WP 5.2, inputs were given in:

C1: The training package on ecosanitation and urban agriculture (set of powerpoints) developed by WUR and ICLEI (WP 4.1 and 5.2) and presented in Munoz, The Philippines in June 2010.

This material has not been used in Accra, Beijing, and Lima, because these cities had developed their own material for training already, and the target groups in these cities did not require a general introduction on ecosanitation.

C2: The SWITCH training KIT: Managing Water for the City of the Future, coordinated by ICLEI.

Text was developed and edited for Sub Module 3C: Managing Wastewater in the City of the Future, including cases on Lima, Beijing and Accra:

Potential Impact

A. The members of the working groups participated in SWITCH research and demonstration (see deliverable 5.2.2).

B.

BA Awareness raising and through action research and training for farmers, and government staff (AMA-MOFA) on on-farm water treatment for irrigation and re-use of urine in **Accra**.

BA1/2 Based on the demo a **manual** was developed and IWMI contributed to a **WHO Guidance note**. Action research addressed the problem in an integrated manner. It focused on farmers' constraints to propose sustainable and reproducible technical options, and was based on a participatory approach linking field observations and informal discussions with farmers at Roman Ridge farming area, Accra, looking at two different settings: 1) greywater derived from gutters in a ponds-trenches system; 2) individual ponds filled periodically with water pumped from a stream. Design modifications were implemented on-site and were tested. It provided for continued trials by farmers, supported by MOFA, on on-farm pond design modifications.

In the long term, and in a perspective of Integrated Urban Water Management (IUWM), the best solution seems to adapt the drains upstream for agricultural purposes downstream (upstream action). This has been discussed in the working group and the learning alliance of Accra. A system of floodgate installed in the drains themselves should allow creating retention ponds during the dry season and letting the water flow freely during the rainy season. From the right beginning, drains should be made much wider upstream from farming areas to be able to store large volumes of water. In addition to this, the IWMI/NRI PhD investigated upstream behaviour and pollution prevention measures (see deliverable 5.2.4).

BA 3

A second demonstration and research study by SWITCH, was implemented in Accra, Ghana with the same farmer group in Dzorwulu Farming area in Accra, with the objective to introduce urine use to urban vegetable producers through participatory action research, training and demonstration, and to investigate the farmers' perceptions about and the feasibility of using urine in their farm locations. The demo (see under deliverable 5.2.4) was jointly managed by WP 4.1 and 5.2, in collaboration with Safisana, a private entrepreneur, to introduce urine as a fertiliser to farmers.

Action research was done to determine the effect of urine and other fertilisers on the yield of cabbage. In addition, training and sensitisation was undertaken with urban farmers, extension staff of the Ministry of Food and Agriculture (MoFA), Ghana, and other key stakeholders, about the possible benefits and risks of using human urine as an alternative source of fertilisation. As part of this programme, a seminar was organised for the extension staff of the Ministry of Food and Agriculture (MoFA) at La in Accra, followed by a meeting with about 42 farmers from Dzorwulu, Plant Pool and Ridge, in Accra.

The farmers and the extension staff of the Ministry of Food and Agriculture expressed different concerns on the use of urine in crop production. Among the issues raised by farmers were: how urine can be supplied on a regular basis, how to get storage facilities for the volume of urine to be supplied, the mode and rates of application for various crops and for different soil types (especially sandy soil), the effect of urine on soil characteristics, e.g. soil salinity. The extension staff on the other hand were concerned about the possibility of collecting urine, how to reduce the potential risk associated with urine before use, guidelines on the use of urine, willingness of farmers to use urine as an alternative source of fertiliser, the hygienic quality of crops produced with urine and consumers' readiness to accept and consume such products. In spite of the numerous concerns raised by both farmers and the extension staff of the Ministry of Food and Agriculture, the idea of using urine in crop

production was highly welcomed. Participants from both groups expressed an interest in seeing how urine is used and its effect on crops.

BB The **Handbook on Rainwater harvesting, Storage and Use for Beijing** (guidelines in Chinese for farmers and technical staff on the background and how to develop the developed rainwater harvesting system using greenhouses, and improved storage and production) has been designed in such a way that farmers can decide on adapting their own systems in the most optimal way. The handbook presents different kinds of RWH systems, storage, irrigation and multifunctional use of the water and the developed infrastructure (using for instance the storage tanks for mushroom farming). It adds to the literature on RWH, but is unique in that it provides a system and analysis for sustainability. The SWITCH system has been copied in several other districts of Beijing and is being propagated elsewhere.

BL The **National Policy Guidelines** for the treatment and reuse of wastewater in urban areas in Peru were approved after a long process in November 2010 through a Ministerial Resolution. The guidelines identify 5 main objectives:

1. Contribute to the national management of water resources, by including the reuse of municipal and domestic wastewater for irrigating urban and peri-urban green areas in the national water and sanitation policy.
2. Encourage the use of effective and adapted water treatment technologies for reusing domestic and municipal wastewater for irrigating urban and peri-urban green areas, and support the implementation of research that contributes to improving sanitary quality and reducing costs.
3. Establish mechanisms that promote the participation of the public and private sector, civil society and international organisations to invest in developing water treatment systems geared toward reusing domestic and municipal water for irrigating urban and peri-urban green areas.
4. Promote social participation and public access to information about stakeholders involved in the treatment and reuse of domestic and municipal wastewater, in order to ensure transparency, control and efficiency.
5. Strengthen the capacities of sanitation service providers, governmental bodies responsible for the sector and users of domestic and municipal treated wastewater.

The guidelines consider the development of a National Strategy for promoting the reuse of domestic and municipal wastewater for green urban and peri-urban areas as a priority. Implementation of the guidelines will be overseen by a Multi-Sectoral Committee, which is the continuation of the National Learning Alliance and which is composed of ministries of Housing, Health, Environment, and other institutes such as ANA and SUNASS.

The **National Training Course** on Treatment and Use of Wastewater is designed for municipal officers and water and sanitation technicians of enterprises managing wastewater treatment systems and oriented towards the reuse of treated wastewater in agriculture, forestry and green areas. It is intended to strengthen the use of SWITCH project findings, support the implementation of the policy guidelines and promote the scaling up of the recommendations at national level. It is expected that this training will be repeated for the Andean and Amazon cities in Peru.

Recommendations (Direct at target audience above).

