Draft Deliverable D.3.1.2: REGIONAL WORKSHOPS AND SEMINARS ON INNOVATIVE DEMAND MANAGEMENT, INCLUDING GOOD PRACTICES OF REDUCING UFW IN WATER SUPPLY SYSTEMS.

This paper presents brief proceedings of three workshops that have been held as part of the consultative and dissemination process on demand management by SWITCH WP 3.1. These workshops were either held at the back of, or mainstreamed within relevant international conferences. The conferences were:

1. 4th IWA Specialist Conference on Efficient Use and Management of Urban Water Supply (Efficient2007), held in Jeju Island, South Korea in May 2007.
2. 33rd International WEDC Conference on "Access to sanitation and safe water: global partnerships and local actions", held in Accra in April 2008.
3. 34th International WEDC Conference on "Water, Sanitation and Hygiene: sustainable development and multisectoral approaches", held in Addis Ababa Ethiopia in May 2009.

The first workshop was jointly facilitated with the IWA Task Force on International Demand Management Framework, and its overall objective was to consult with participants on how the SWITCH WP 3.1 research on demand management could benefit from the synergies with the IWA Task Force on International Demand Management Framework.

The second workshop introduced concepts of integrated resource planning and demand management to participants, and sought to find out from participants how these concepts could be adapted to the typical situations existing in cities of developing countries.

The third workshop focused on how tariff structures could be used as economic instruments for initiating behavioural and structural changes for water conservation in premises in households.

The proceedings for each of these workshops are presented in the next sections.

The EU-SWITCH Project and the IWA International Demand Management Framework: Briefing and Consultation

Workshop held during the 4th IWA Specialist Conference on Efficient Use and Management of Urban Water Supply (Efficient2007),

Date: 22 May 2007, Jeju Island, Korea.

Summary Report on Workshop Proceedings

Objectives of the Workshop

- To brief Efficient2007 delegates on two linked international research projects related to water efficiency: The EU-SWITCH Project, and the IWA International Demand Management Framework
- To facilitate a discussion on how researchers and practitioners, utility and government staff can participate in the further development of these projects
- To identify user needs and gaps in what is underway and proposed to assist in strengthening training and capacity building components of the projects.

Activity 1 – Briefing on the IWA International Demand Management Framework by Andrea Turner, Institute for Sustainable Futures, University of Technology, Sydney.

This project is being undertaken by Task Force 7 of the IWA Specialist Group on Efficient Operation and Management in collaboration with Canal de Isabel, a water utility in Madrid (Spain). Its key objective is to develop a set of well designed guidelines to enable utilities in developing countries to collect and utilize end use data for accurately forecasting and managing demand. The work is divided into five stages:

- Stage 1 – carrying out a preliminary literature review and developing a basic framework for the study and criteria for best practice.
- Stage 2 – carrying out more detailed literature search to identify good international case studies in the various aspects of International Demand Management Framework (IDMF), and producing a draft IDMF process outline.
- Stage 3 – trialling the application and use of the draft framework in different regional contexts.
- Stage 4 – facilitating regional workshops to enable stakeholders provide inputs, and to carry out capacity building.
- Stage 5 – development of a second draft of the IDMF and manual based on inputs from the previous stages.
- Stage 6 – development of manual, database of useful references and end use model

Activity 2 – Briefing on the EU-SWITCH Project, Work Package 3.1- Demand Management by Ian Smout, WEDC, Loughborough University

A brief introduction was made about the SWITCH Project, its scope and objectives:

- An EU-funded Framework 6 research project with 33 partners in 13 countries
- Demonstration activities in 9 cities.
- Application of a set of scientific, technological and socio-economic solutions that will ensure that urban water management in the 'City of the Future' which is sustainable, effective, and with minimum risks.

SWITCH's Work Package 3.1 for which WEDC is responsible, is concerned with demand management (DM) for optimization of urban water management, and aims to provide holistic DM tools to reduce water wastage. The specific objectives of WP 3.1 are to:

- Assess innovative methodologies of reducing non-revenue water in utilities' pipe networks.
- Assess innovative methodologies of mainstreaming DM within utility management
- Disseminate good practices of DM including reduction of non-revenue water in water supply systems

WEDC is working with Institute for Sustainable Futures (ISF) of University of Technology, Sydney and IWA Specialist Group on Water Efficient and Management in reviewing good practice cases studies in DM methods/experiences, carring out demonstration/research activities in Zaragoza, Spain, and facilitating regional workshops for capacity building in DM.

Activity 3 – Key Views from Participants, facilitated by Prof Stuart White, Institute for Sustainable Futures, University of Technology, Sydney and Sam Kayaga, WEDC, Loughborough University

- There is need to emphasize the role of pricing in managing demand.
- The softer techniques of managing demand need to be considered as well.
- There is need to have the various DM end use models synchronized.
- Emphasis should be placed on programme assessment and project evaluation in the IDMF model.
- There is need to validate the savings made from the DM programme.
- Regular DM activities should be separated from emergency drought activities.
- Tariffs need to be progressively designed to encourage installation of smarter plumbing systems in new buildings.
- There is need to identify key people in organisations who will champion DM.
- Top managers in organisations need information on DM that will enable them to make the necessary decisions.
- The IDMF need to take into account DM measures for different market segments.
- There is need to emphasize the benefits of DM compared to its costs.

- Use of different terminologies, e.g. DM, water saving or water efficiency could trigger different reactions from different listeners.
- It is important to link DM to other benefits – e.g. need to link water efficiency to energy efficiency.
- There is need to target conferences that are involving other stakeholder groups, such as plumbers and regulators.
- There is need to share information about the insignificant risks from rainwater harvesting.

33rd WEDC International Conference, Accra, Ghana, 2008

ACCESS TO SANITATION AND SAFE WATER:
GLOBAL PARTNERSHIPS AND LOCAL ACTIONS

Demand Management for Sustainable Urban Water Services in Cities of Developing Countries

By S. Kayaga & I. Smout [UK]

Whereas the world population is increasing at a high rate, the water resources have not only remained constant, but they are also being polluted at a high rate, which inevitably results in fresh water scarcity. The situation will get worse in urban areas of the developing countries where it is estimated that 95% of the world's urban population growth will occur in the next two decades. The current urban water management concepts and practices cannot adequately respond to these changes. There is need for water professionals to change the way they manage water resources in urban areas if we are to ensure economic and environmental sustainability. In addition to consideration of supply-side options, we need to apply demand management (DM) tools both on the utility and end-user sides. DM is one of the sub-themes being explored under SWITCH, an integrated EU-funded research project, in which Zaragoza (Spain) acts as the demonstration city. Clearly, the conditions existing in developing countries vary from the research setting for the SWITCH Project. This discussion session explored the application of DM tools and instruments in order to achieve sustainable urban water services in cities of developing countries.

Summary of Session Proceedings

Introduction to the concept of Demand Management (DM) and the SWITCH Project Work Package 3.1 on DM (By Ian Smout)

DM was defined as the promotion of policies & measures to control/restrict demand for, use or waste of water supply/other water services, and pointed out that DM could be done either at utility level or at end-users' level. Studies have shown that currently many DM measures are fragmented, ad-hoc and cannot create sustainable solutions. In response to this situation the SWITCH Project Work Package 3.1 aims at grounding DM into the Integrated Resource Planning (IRP) concept. IRP is a process in which a full range of both supply-side and demand-side options are assessed against a common set of planning objectives or criteria.

Paper Presentation 1:

*Integrated Resource Planning – a vital tool for utilities in low-income countries, by **S. Kayaga** & I. Smout.*

The paper presented challenges that contemporary water utility managers in developing countries face, and how Integrated Resource Planning (IRP) could be adapted to respond to these challenges. The key challenges are (i) increasing urban populations, leading to increasing demand for water; (ii) competing demand for water, such as for municipal services, agricultural services and environmental requirement;

(iii) increasing uncertainty in supply, mainly due to climate change; (iv) increasing risk of water pollution from sewage effluent; (v) increasing seasonal demand for water for tourism; (vi) growing need for cost-effective and low-risk ways of providing water; (vii) growing need for water efficiency due to constrained water resources; and (viii) growing disparity in levels of affluence between different urban dwellers. The IRP process helps water professionals to

- Forecast water demand more accurately
- Think differently in terms of 'water service provision' not just water supply
- Design and compare a broad selection of options (water efficiency, reuse, supply)
- Use same financial basis ($/m^3) to compare costs and benefits of all options supplying or saving water

The IRP process is comprised of 5 major steps; (i) planning the overall process and agree on the purposes, form and scope of the IRP framework; (ii) analysing the situation by identifying regional issues and determining the supply-demand balance; (iii) developing the response by identifying, designing and comparing various options; (iv) implementing the preferred option(s), and (v) monitoring, evaluating and reviewing the key IRP steps. The IRP process could be adapted to create sustainable urban water systems for developing countries by incorporating unique characteristics, such as

- Mobilising customer groups to participate in the process, in addition to professionals
- Grappling with inadequate data by aiming at incremental improvements in quality and quantity
- Incorporating the concept of equitable distribution among customer groups
- Incorporating the whole range of sanitation options with varying environmental impacts
- Incorporating hygiene education
- Considering Ability-To-Pay and Willingness-To-Pay for the service levels
- Seeking political buy-in for implementation

Paper Presentation 2:

Domestic water consumption – A field study in Harbin, China, by Tingi Lu & ***Ian Smout***

The purpose of the case study was to find out the characteristics of household water appliances and water saving behaviours in Harbin, a medium-sized city in China. This study was conducted in the Summer of 2007, using a questionnaire to selected households and conducting a data logging experiment in four households. The findings showed that a smaller percentage of the sampled households use water saving devises, other than dual flush toilets: Only 8% use water-efficient showers, 10% use automatic front-loading washing machines, compared to 43% who use dual flush toilets. Use of dish washers and bath tubs was uncommon in the study area. On average, the daily per capita usage (number of times) for various water devices was 0.57 for showers, 9.3 for basin taps, 6.4 for toilet flushing, 2.8 for kitchen taps and 0.07 for washing machines.

The average per capita water use in Harbin was computed to be 136 litres per day, broken down as follows: kitchen taps – 35%; showers – 27%; basin tap – 17%; toilets – 17%; and washing machines – 4%. The study showed that owing to inadequate information, most households in Harbin had low knowledge about water saving devices other than dual flush toilets. A key finding of the study is that there is scope for reducing water consumption in Harbin through the promotion of water saving appliances and change in behaviour.

Key Points from the Parallel Discussion Sessions

A. Demand Management (DM) at the utility level

What are the issues in cities of developing countries?

- Lack of priority at the leadership level
- Lack of incentives for utilties to apply DM measures
- Some utilities have a high level of non-revenue water, at the expense of inadequate supply to some parts of the cities
- Lack of understanding of the benefits of water loss management strategies
- Intermittent water supplies
- A big proportion of customers not metered
- Inaccurate meters
- Disparity of service levels between low-income settlements and well-planned residential areas
- Lack of technical capacity
- Old pipelines
- Inadequate financial resources

What could be done in the short-term?

- Advocating for DM measures to utility leadership
- Promoting DM to the utility as a means to convert water loss into money, and as a way for paving financial sustainability
- Carrying out a water audit to confirm the effectiveness of DM measures

What could be done in the long-term?

- Capacity building for technical staff
- Correcting imbalances of service levels between the rich and the urban poor
- Create a networking platform among water utilities in developing countries to exchange knowledge & skills on DM
- Set up a benchmarking scheme of DM activities

B. Demand Management at end-use level

What are the issues in cities of developing countries?

- For many cities, the problem is more of lack of reliable water supply, rather than high usage
- How could DM measures be instituted in cities of developing countries so as to improve allocative efficiency?
- There is a lot of water wastage in households because of defective water devices

- The water bills for some public buildings are grossly increased by the continuously leaking water devices such as ball valves, taps, toilets etc.

What could be done in the short-term?

- Utilities could work with government and public institutions to reduce water leakages in their premises
- Promoting DM on the customers' side as a way of reducing water bills, and making water services available to other users
- Utilities could provide public information and education to households on how to reduce leakages
- Utilities could provide water audit services as an incentive to demand management in customers' premises

What could be done in the long-term?

- Utilities could use economic instruments to provide incentives for demand management in customers' premises, e.g. replacing flat rate charges by volumetric-based tariffs
- Utilities could also provide technical assistance for retrofit replacements of wasteful water devices
- Utilities could press for by-laws that work towards water efficient plumbing systems in new customer premises
- Policy makers should revisit regulations on standards for imported fixtures

SWITCH Specialist Session on 'Water Demand Management'

Part of the 34th WEDC International Conference held at the United Nations Conference Centre, Addis Ababa, Ethiopia, on Tuesday 19 May 2009, 16-17.30pm.

Chair: Dr. Sarina Prabasi, Water Aid, Ethiopia

Key points from papers presented

1. **Using tariff structures as a demand a management instrument: The case of Kampala, Uganda (by Sam Kayaga, WEDC).**
   - Demand management is a key element for managing urban water for the city of the future, due to the expanding urban populations amidst dwindling water resources
   - Tariff structures, if well designed, could be an effective economic instrument that can persuade users to change water-wasteful habits and/or change water-wasting fixtures and faucets.
   - Use of tariffs for water saving requires a knowledge of price elasticity of demand (with respect to water services) for a given society.
   - Real billing data for households in Kampala City (Uganda) (population 1.5m) were obtained for the period 2006-2007. A random sample was obtained and an Excel-based model developed for a water-saving tariff structure.
   - If the tariff is increased by 58% for Block 3 (high consumption), and 13% by Block 2 (middle level consumption):
     - 2,535 Mm3/year would be saved
     - The water savings could be used to serve an extra 19,209 households in the low-income, low-usage bracket
     - The utility would increase its revenue by 1.7 billion Uganda Shillings.

2. **Water tariff rationalisation in Kerala Water Authority (KWA), (by V.K.Girijavallabhan, KWA).**
   - KWA, formed in 1984, had last revised their tariff structure in 1999, but the revenue collection fell far below the O & M costs, to the extent that by March 2008, the utility had accumulated power costs of Rs 7.74 billion.
   - A rationalised tariff structure was introduced in 2008 with the following properties:
     - Recovering costs for O&M and capital expenses
     - Increasing block tariff with lifeline water use attracting minimal rates
     - Cross-subsidies were be so high as to drive away high income consumers to alternative but non-potable sources of water
     - Demand management objectives were considered in the design of the tariff.

- The level of outstanding debts has been brought down, but the challenge is to ensure that all consumers are fitted with working meters, and the meters are well maintained.

Key Discussion Points

- There is a danger for the poor to be grossly affected by the high tariff rates, raised as part of the water demand management. The tariff structure should be well designed so that it promotes social equity.
- Many cities in developing countries operate intermittent water supplies, in which case water demand management is not applicable.
- Utilities in cities of developing countries should put their emphasis on leakage management (for water distribution systems) rather than demand management in consumers' premises.
- Design of tariffs should consider how the price of water compares with the cost of water.
- Water demand management measures would require the political will at government and utility levels.
- Water demand management can only contribute to the MDGs only if it addresses the needs of the poor. There should be a deliberate linkage between water saved and extension of service coverage to low-income settlements of cities of developing countries.
- Users in peri-urban areas and rural areas should instead be encouraged to use more water for productive purposes and better livelihoods.
- Demand management is more applicable in the agricultural sector which uses a lion's share of available global water resources.