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Case and region	Issue	Type of tool	Description	Economic benefits	Environmental benefits	Social /poverty alleviation benefits	Governance changes	Scaling up and relevance for developing/ transition countries	Concerns
(1) Improvement of water supply through a GIS-based monitoring and control system for water loss reduction in Ouagadougou, Burkina Faso **Africa** *Source: Case study paper, Zaragoza Conference*	Cities	Water technology	Pilot project to reduce water losses in the distribution system of the municipal utility, with leak detection devices, pressure and flow control sensors with real-time and online data transmission, and automated pressure valves, all controlled by a GIS-based computerized system. Implementation was supported by intensive capacity development programme to secure the necessary change process.	Local jobs created from the investment in and operation of the water loss reduction program. Wider job creation from the knock-on effect of improved water supply on the local economy and public and environmental health. Transparent structures and reduced water theft.	Following improvements in water efficiency, the environmental situation will improve step by step, provided that the development in sanitation will follow the development in water supply efficiency.	Improved water supply, where before the project there would be no supply in certain town areas and at certain times. Improved attitude amongst customers, awareness of the importance of protecting water resources and caring for public water supply property.		The scaling up of such water loss reduction technologies and programmes in other developing and transition countries could be done. Lessons learnt from project have been disseminated to other utilities through an African Water Association conference and through UN-Water DPC.	Implementation was successful for a limited zone within the city and service area of the utility. Due to instable political situation in the country, and due to other issues gaining higher priority over water loss reduction (politically as well as financially), implementation could not yet be completed throughout the whole service.
(2) The Role of Water Technology in Development: A Case Study in Gujarat, India *Source: Case study paper, Zaragoza Conference*	-	Water technology	'State Wide Water Grid' and water filtration treatment plants to provide assured drinking water to 10501 villages and 127 towns in Gujarat suffering from water scarcity or water quality problems. Creation of the Water and Sanitation Management Organisation (WASMO) and a new water governance model, empowering village level institutions and extensive capacity building of women for recovery of water charges. Sardar Patel Participatory Water Conservation Project for Micro Water Harvesting and creation of over 350,000 theckdams, village ponds etc. Jyotigram (lighted village) Scheme for pioneering a real time co-management of electricity and ground groundwater for the agriculture.	Reduction in number of villages under tanker water supply from 3961 in 2002-03 to 326 in 2008-09 and reduction in costs of tanker water supply from 10 million US$ to just 0.25 million US$ 96% saving. Tremendous increase in agricultural production around 10% growth rate in agriculture as against 4% growth rate of the country. Substantial income increase in Animal Husbandry, Fisheries and Horticulture sectors. Creation of hundreds of thousands of jobs in rural form and non-form economy.	Reduction in fluoride contamination of water. Reduction in carbon footprints in water supply due to substantial electricity savings. Increase in Ground Water Tables.	Safe and secure water supply for about 65% of the State's population in drought-prone and poor water quality areas. Increase in opportunities of women education and self employment. Reduction in household drudgery of women.	Creation of the WASMO shifted the role of governance from provider to facilitator, providing an enabling environmental for communities to take ownership of their water service delivery and water resources management at a decentralised level.		

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(3) Web-based system for water and environmental studies **MENA** *Source: Case study paper, Zaragoza Conference*	-	Water technology	EU-funded web-based Learning Management System (LMS) for water and environmental studies, initiated by a partnership of institutions from Germany and Egypt. Online courses on sustainable water management, and the interrelationship between technical, social, economic and environmental aspects. The LMS offers communications tools to ensure social learning Provides training to professionals from Egypt's Ministry of Water Resources.	Knowledge of environmental and water management supports newly created green jobs. Students have started businesses for decentralized water treatment units for rural areas.	Developed online modules included many environment related courses which helped thousands of people to enhance their environmental capacities and knowledge.	eLearning systems include social networking tools that bring not only people from the same country to communicate and work together but also people from all over the world who have common interests.		Developed LMS and training materials of this project were used by different other Egyptian universities. The Ministry of Higher Education realized the acceptance of such technologies for education and capacity development. The government started to promote using such technologies for the undergraduate students by motivating the professors to develop their undergraduate courses using web-based techniques	
(4) Three Gorges project **Asia** *Source: Case study paper, Zaragoza Conference*	Watersheds	Water Technology	The Three Gorges Hydropower Complex Project, commonly known as the Three Gorges Project (TGP), rectifies and develops the Yangtze River, producing significant integrated benefits, including flood control, power generation, and navigation facilitation.	Since July 2003, 450 billion kWh of electricity (as of the end of 2010) was produced, equivalent to one-tenth of China's total power production in 2009. Water storage in the Three Gorges Reservoir strongly facilitates navigation along the Yangtze River and the development of the regional economy. In 2009, the area's GDP hit RMB 276.466 billion, representing a 515 percent growth from 1996 and an average annual growth of 12.1 percent; and per	Hydropower helps reducing Greenhouse Gas Emissions The project includes systematic geological hazard prevention and mitigation works, and joint monitoring and prevention systems. Water pollution prevention and treatment programs launched. 49 % of household sewage and 70 % of waste in the towns in the reservoir area receives treatment, higher than the national average Various biodiversity	Opportunities for transforming the mode of economic growth in the reservoir area and for lifting local residents out of poverty and improving their living standards through funding for the resettlement of residents relocated for the TGP. Resident resettlement and town reconstruction upgraded and optimized the structure of the economic sectors of the Three Gorges Reservoir.			

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				capita GDP surged to RMB 19,518, up 524 percent from 1996.	protection programs launched, including the replenishment of water in the lower reaches of the river during dry seasons improving water quality and reducing salinization at the estuary.				
(5) International Hydropower Association's Hydropower Sustainability Protocol *Source: www.hydrosustainability.org*		Water technology	The Hydropower Sustainability Assessment Protocol provides a globally-applicable framework for assessing the sustainability of hydropower projects according to over twenty vital topics. Developed through multi-stakeholder initiative over 2008-2010 including developed and developing country governments, social and environmental NGOs, Equator Banks, the World Bank and hydropower industry. Now endorsed by leading NGOs and financial institutions, and governed by a multistakeholder governance structure. Provides an unprecedented framework for stakeholder dialogue on sustainability performance of hydropower projects assessed using the Protocol. Consists of four separate tools corresponding to four stages of hydropower project development. Builds on lessons learnt from previously existing tools as well as from an extensive trialling period.	Promotes improved performance in financial and economic viability of hydropower projects, and sharing of project benefits. By providing a common platform for dialogue on sustainable hydropower, the Protocol promotes the contribution that sustainably developed hydropower will make to economic development.	Promotes improved performance in environmental and social assessment and management, hydrological and sedimentation management, and water quality and biodiversity.	Promotes improved performance in a wide range of social issues, e.g. project-affected communities, resettlement, indigenous people, working conditions and cultural heritage. Assessment will score the performance of a project in relation to basic good practice, and proven best practice.	The Protocol has been developed in a multi-stakeholder process. Protocol implementation is governed by a multi-sectoral Governance Council, which is currently chaired by an environmental NGO.	Demand for Protocol application is already very high from the hydropower industry in all parts of the world. Very high relevance to Asia and Africa which have the largest untapped hydropower potential, but also where sustainability is critical.	
(6) Industrial wastewater	Industry	Water technology	Wastewater reclamation plant based on cost- and energy-efficient	Increase in land value in project area (dry	Reducing the quantity of water	The project does not directly focus low	Without cooperation of professional technology	Good potential for scaling up once project	

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reclamation technology for urban irrigation in Windhoek, Namibia **Africa** *Source: Case study paper, Zaragoza Conference*	Agriculture		technologies to purify urban and industrial wastewater which may not be suitable for drinking water, for reuse in irrigation. The technical components of the process are conventional mechanical treatment (buffer tank, robust type screening and sand trap), advanced biological treatment (membrane bioreactor, equipped with instrumentation for remote control, automation and easy operations onsite), compact final settlement tank and post-disinfection through UV (with additional chlorination on request). Implemented through a BOOT-type contract (build, own, operate and transfer) with a contractors consortium of companies from Africa and Europe	land with no water resources for irrigation is worth little, whereas irrigated land has higher value). Additional land will be ready for utilisation, after reuse water is available for irrigation. This land will generate business activities, contributing to the economic development of the City of Windhoek.	abstracted leaves more to meet environmental requirements. Ecosystems benefit from a reduction in discharge of contaminated wastewater.	income settlements or poverty alleviation. Anyhow, it will generate a considerable social benefit, as the stimulation of the local economy will serve the public budgets, including those for social welfare. River contamination will be reduced after the reuse plant comes into operation. This will decrease the pollution of the drinking water (raw water), which the poor downstream use.	providers from the private sector, and a very active public utility as employer, both focusing on greentech business development in their local water sector, the scheme could not have been realised. Technological progress, as well as BOOT and good municipal governance and national finance, were essential to go forward with this greentech project.	demonstrates success and once water tariffs and wastewater charges reflect a reasonable proportion of real costs (whereas a scale-up would be difficult wherever water and wastewater are free of charge, and represent no or little value to the consumers and decision makers).	
(7) Water harvesting project for water supply and agriculture in rural districts of the Republic of Djibouti **Africa**	Agriculture	Water technology	Construction of hydraulic structures including 14 underground storage tanks, surface reservoirs and diversion works. Improved knowledge of the hydrogeologic conditions in the project zone. Capacity building of government water resource engineering departments. Sector assessment and preparation of bankable projects for funding.		Study on the initial environmental status of the project area completed.	Expected: Improved access to water for multi-purpose uses by the rural nomad populations (2,400); better knowledge of the available water resources in the project area. Achieved: 37 rain water harvesting structures constructed and utilized for drip irrigation and water supply for vulnerable populations and sites for construction of new structures identified; feasibility study on the use of solar energy for pumping completed;		Expected: Increased investments through scaling-up of the new technologies in water harvesting at the country level.	

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						two farmers associations trained on irrigation technologies.			
(8) Improved Sanitation and Water Supply Service Delivery to the Urban Poor in Ghana through Tripartite Partnerships **Africa** *Source: http://www.africanwaterfacility.org/fileadmin/uploads/awf/projects-activities/Appraisal%20report%20TPP%20Ghana%20v5%2041.pdf*	Cities	Water technology	Test a range of different innovative management models, approaches and technologies for providing WASH services to the urban poor. Innovative technologies and approaches tested, including: multi-purpose water / sanitation / washing facilities, EcoSan, biogas; micro-financing for household latrines; social marketing for sanitation; intensive hygiene education, franchised management of public facilities; private sector entrepreneurs and facility operators, re-use of treated excreta by farmers; Capacity developed for sustained management of the facilities. Provide infrastructure in three pilot areas (two small towns and one urban slum) under the new management models. Support development of a more enabling environment by undertaking knowledge and advocacy activities.	Demonstration of more cost effective approaches will lead to increased output from available funds. Improved financial management and effective cost recovery. The project will learn from the community water and sanitation sector in Ghana which has a long history of applying policies for sustainable cost recovery.	Three pilot project target towns / slums provided with improved infrastructure for sanitation, solid waste and water supply (including public, institutional and household latrines; improved drainage and waste disposal facilities; new waste containers and collection points).	Baseline surveys conducted, designs prepared and WSS infrastructure put in place in the 3 pilot zones, impacting 15,000 people in an urban slum and 30,000 in two small towns. The projects will impact the transient population, farmers who will make use of the by-products from EcoSan facilities and conservancy labourers.	The study was sponsored by the NGO Platform of the Netherlands Water Partnership (NWP) and conducted by a Team of institutions comprising the Training, Research and Networking for Development Group (TREND), a local NGO, WaterAid and the Private Utility Service Providers Association (PRUSPA).	Enabling environment improved for replication and scaling up of pro-poor WASH service delivery in Ghana.	There is a risk that replication and up-scaling may be hampered due to attrition and turnover of local Government staff. The TPP approach will widen the available pool of skilled support staff from Community Based Organisations (CBOs) or NGOs that could be recruited into MMDAs so that experience gained will not be lost.
(9) Kisumu District primary schools water and sanitation project**.** **Africa** *Source: http://www.africanwaterfacility.org/fileadmin/uploads/awf/publications-*		Water technology	Construct rainwater harvesting systems, EcoSan toilets and solid waste management systems in the 6 selected schools Train pupils, teachers and parents in hygiene and environmental sanitation; Increase the capacity of the schools, local Governments, artisans and other stakeholders to manage and maintain the facilities.	Savings in medical bills due to reduced incidences of diseases especially those related to water and sanitation. Reduced burden of frequent constructions of pit latrines at school.	Contribute towards improved health and better environment, and at the same time contribute to meeting the water supply and sanitation needs of the schools in a sustainable manner	Improvement in the quality of life in the community, where the drudgery of fetching water of doubtful quality daily from long distances (mostly by women) is replaced by easily accessible water sources, even if available to only children and teachers in some of the	The presence of several actors in Kenya"s WASH sector means that small interventions must be implemented through partnerships with other senior actors and the key ministries if they are to be visible in a way that will inform national policy. The Kisumu Project' s lessons had a better	Serve as a demonstration for scaling up of the project model in nearby districts and throughout the country. One of the international NGOs working in the Kisumu area planned to use the ECOSAN designs in their interventions.	Challenges posed by natural characteristics such as swamps, floods and rocky conditions makes reliance on traditional pit latrines unsatisfactory. Adaptations for more appropriate technologies for household level toilets need to be explored. The toilets are suitable for school going children of

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reports/Kisumu%20Case%20Study.pdf						communities. In respect of sanitation, the near absent open defaecation not only raises the dignity of the beneficiaries but more importantly reduces the incidence of sanitation-related diseases within the communities.	chance of informing policy if key national level ministries and agencies had been brought on board at its inception.		about 10 years and above. They are unsuitable for very young pupils, physically and mentally challenged and the elderly.
(10) Pilot project for the introduction of water harvesting techniques in Bugesera **Africa** *Source: www.rema.gov.rw*	Agriculture	Water technology	Introduction of appropriate low cost systems for the collection of rainwater for irrigation and drinking water. Increase productivity of the land through proper management and sustainable conservation. Reinforce the capacities of local farmers and support agencies to implement and manage techniques for RWH and protection of natural resources.	Productive use of rainwater for vegetable gardening (small scale irrigation). Productive use of rainwater for home-based economic activities such as livestock, beer brewing, brick making etc. Money saving for concerned schools and households due to water availability by the pilot CUEP project in Bugesera District. Income generating activities may also be the result of the utilisation of time saved in collection of domestic water. Improvement of vegetables cultivation through irrigation by harvested rainwater.	Direct and indirect environmental benefits include runoff management, soil and water conservation and agro-forestry trees planting.	Direct and indirect capacity building (skill development, knowledge building, organisational development), reduction of vulnerability, strengthening of social and physical infrastructure, all have helped to alleviate poverty in CUEP project intervention zone. Children and particularly young girls may be deprived of education due to the need to assist their parents in collecting water from far-away sources. The time saving in collection from the close to home source will allow them to attend school.	The project intervention areas ware specified to be in Bugesera and Rwamagana Districts of the East Province and Nyaruguru in the South Province for activities supported by FAO-MINITERE agreement while only Bugesera District was covered by ADB-MINIECOFIN Agreement.	Beneficiaries from CUEP project in Bugesera District are now well informed on the practice of rainwater, water harvesting and environmental protection, it is highly recommended that these practices are up scaled and replicated throughout Rwanda, in particular in the Eastern province where water scarcity problems mainly are encountered.	The quality of rainwater harvested from rooftop does not usually meet the WHO guidelines for drinking water quality, particularly for bacteriological quality. One adverse social impact concerns the risk of accident for children, domestic animals and livestock if the ponds are not properly fenced to keep them off. The potential serious environmental problem is the erosion of catchments leading to increased sedimentation, which reduces the storage capacity of the reservoirs and periodical excavation is becoming necessary.
(11) Ecological sanitation in		Water technology	Ecological sanitation uses recycled human waste as fertilizer for	Supply of cheap fertilizer (mainly	Prevent of groundwater	Access to adequate sanitation for	Kazakhstan still receives foreign aid,	Experience in Kazakhstan has shown	The successful introduction of such a

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Central Asia **Asia** *Sources: http://www.unece.org/env/documents/2011/ece/cep/ece.cep.s.2011.l.2.e.pdf* *http://www.afghan-web.com/environment/sanitation.html* *http://www.wecf.eu/english/about-wecf/issues-projects/countries/kazakhstan.php*			agriculture. Ecological sanitation implemented in form of dry toilets in 5 schools in villages of Kostanai and South Kazakhstan oblasts and under the program 'empowerment and local action' carried out by Women in Europe for a Common Future.	among farming-orientated households).	pollution with nitrates and bacteria from use of pit latrines.	populations in remote areas.	while 55% of the population are supplied with drinking water through a central water and sanitation system (CWSS). The rural population in particular suffers from poor access to safe drinking water and sanitation.	that dry latrines are especially useful for rural schools and in the recovery of destroyed housing after disasters.	new technology requires a change in behavior and must be accompanied with awareness raising, training and motivated local partners
(12) Drip irrigation technology in Israel **MENA** *Sources: http://www.worldwatch.org/node/6544* *http://www.nesc.wvu.edu/pdf/WW/publications/pipline/PL_WI99.pdf* *http://www.biu.ac.il/Besa/waterarticle7.html*	Agriculture	Water technology	Over half irrigated area is now under drip irrigation in Israel. Modern drip technology includes computerized systems, fertigation by applying fertilizers directly to plant roots, and pressurised drippers enabling stable distribution of water.	Drip irrigation has played a major role in improving water use efficiency. Drip irrigation technology forms a major part of Israeli water technology exports (estimated that by 2017, Israeli companies will control about 50% of the global market).	SDI allows manipulation of root distribution and soil conditions in arid climates to better manage environmental variables, e.g. nutrients, salinity, oxygen and temperature. conserves water, controls weeds, ; minimizes runoff and evaporation, increases longevity of piping and emitters.	Sub-surface drip irrigation (SDI) accounts for 5-10% of irrigated area, and eases use of heavy equipment in the field, prevents human contact with low-quality water.	In the future, the amount of water consumed for the irrigation of agricultural crops will be first and foremost affected by the government's policy on agriculture. A policy of an unsubsidized market economy, which does not protect agriculture, will result in a decline in the area of farmed agricultural land and a clear decrease in the amount of water for irrigation of agricultural crops. The government can decide upon extensive agriculture, which will	Israeli institutions are leading the way by showing that sharing expertise and replicating innovative strategies can be a powerful tool in helping to sustain livelihoods of small farmers in dry areas.	Emitters can potentially clog, affecting the uniformity of application. Temporary use of sprinklers or other surface irrigation may be necessary during plant germination period. It is difficult to monitor and correct potential emitter clogging. Effects of freezing temperatures on drip systems and applying wastewater to frozen ground is still the subject of study and debate.

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							be supported by water prices that are lower than production costs.		
(13) Sustainable water management in Singapore **Southeast Asia** *Sources: http://www.workingwithwater.net/view/934/water-management-learning-from-singapores-water-success-/* *http://www.cost.esf.org/download/5350* *http://english.peopledaily.com.cn/90001/90781/6247476.html* *http://hdr.undp.org/en/reports/global/hdr2006/papers/cecilia_tortajada_singapore_casestudy.pdf*	Industry	Water technology	Historically, Singapore has been dependent on external sources of water because it has a limited amount of land area to store rainfall. In order to reduce its dependence on external sources of water, Singapore has developed and implemented extremely efficient demand and supply water management practices. Singapore's approach involves integrating a water demand management program that emphasizes the proper handling of the transmission and distribution network, with water conservation measures. This strategy is a combination of rainfall storage, desalination and very sophisticated technology for recycling used water.	Federal investment in desalinization, reuse of wastewater, catchment management, public education programs, water-related recreational activities. Supply and demand water management policies. Water conservation fees Water conservation tax for domestic and non-domestic water users Water-Borne Fee is levied to offset the cost of treating used water and finance the maintenance and extension of the public sewerage system. Sanitary Appliance Fee (SAF) is also levied per sanitary fitting per month.	Improvements in water quality.	Improvements in water security. Education/training in water conservation for Singapore's citizens. Decreased reliance on foreign water supplies. Increase in recreational water activities.	It is very important to have correct policies and good leadership, otherwise the policies won't be consistent or last long.	PUB has initiated numerous innovative approaches to manage the total water cycle in Singapore. Many of these approaches can be adopted by developed and developing countries to improve their water management systems. If the MDGs that relate to water are to be reached, the example of Singapore needs to be seriously considered for adoption by developing countries concerned and the donor community, after appropriate modifications.	Alternative sources of water such as seawater desalination have a high energy footprint. Future water supplies and treatment will probably be more energy intensive.
(14) ZINNAE: Zaragoza Urban Cluster for Efficient Water Use **Europe**	Cities	Water technology	The city of Zaragoza has made important collective efforts for the efficient use of water to all social sectors. The combined process of institutional and technological change and adoption has lead to the creation of specialised companies and to accumulating important	Allow economic resource savings both to the citizens, the public administrations, big companies and consumers.	Expected: To boost efficiency and sustainability in water use and management as well as in the associated energy consumption	Expected: To turn the efficient use of water into a driver of quality employment for the city.	ZINNAE integrates in 2011 twenty six public and private entities which take part of the hydrological cycle management in the urban area. They are all part of the Water	Both the cluster development and Waterlabs project increase the innovation potential of business sector, and identify RTD projects for Research Centers. This	

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			experience. The city has become a space of permanent demonstration and innovation from the creation of projects related to the use of urban water. Two external global trends guarantee the timeliness of this initiative: 1. The water market is one of the first five markets of the world, with a turnover reaching US$400 billion and an annual growth rate of 7%, according to data disseminated by Watertech Online. 2. The amount of water demanded in the world will have an ongoing increase, largely due to the growth of urban population (in 2020 "over 50% of the population in developing countries will be urban").		of the city of Saragossa.		efficiency Sector in Zaragoza.	is relevant for developing countries in two ways: Launching Research and Technology Development projects for water solutions. Favouring the cluster working methodology which involves joining efforts between Research sector, business sector and local and regional authorities.	