WATER FIGURES

TURNING RESEARCH INTO DEVELOPMENT

QUARTERLY NEWSLETTER OF THE
INTERNATIONAL WATER MANAGEMENT INSTITUTE

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Wastewater: From Flush–to-Farm–to Fork

A cross country analysis of case studies on wastewater use in 53 developing countries, was authored by Liqa Raschid–Sally and Priyantha Jayakody of IWMI and commissioned by the Comprehensive Assessment of Water Management in Agriculture. The report, released at Stockholm Water Week, generated widespread interest from both the media and the public.

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EDITORIAL

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The Link Between Lettuce and the Loo…

Many of us have no way of finding out if the salad on our plate is grown with wastewater! The fact is that irrigating crops with wastewater remains a common practice in and around many cities in Africa, Asia and Latin America. IWMI's 53-city study which examined the trade-offs and risks of wastewater use in cities in developing countries showed that 20 million hectares of land are cultivated with wastewater. This report, released at Stockholm Water Week in August, sent shock waves around the world as the international media traced the murky path of raw sewage to on-farm vegetables which end up in urban markets and finally on our plates. The good news is that thanks to research, there are ways of making this practice safe, because the livelihoods of hundreds of farmers depend on wastewater. There is no way of eliminating the practice. This issue of Water Figures looks at the realities of wastewater use and highlights recommendations to make wastewater use safer for both farmers and consumers.

Going from "wastewater" to "wasted water", a recent report by SIWI, FAO and IWMI, said that almost 50% of the world's food is wasted… and wasted food is also wasted water. This was the lead story in the June issue of Water Figures. This report also generated a lot of interest at Stockholm Water Week along with other water issues. In a world facing a food and water crisis, is such waste justifiable? Some food for thought!

Communicating important new research requires efficient knowledge management skills. IWMI's Knowledge Sharing in Research Project (KSinR) uses innovative knowledge sharing approaches to communicate the institute's research to diverse stakeholders, from farming communities to extension managers, to municipalities and policy makers who can use the knowledge to make better choices and implement best practices. There is still a big gap, however, between knowledge generation and knowledge application and the KSinR project, seeks to close this gap, making impacts on the lives of poor communities and urban dwellers through communities of practice, capacity building and awareness campaigns. For example, showing you how to ensure that the salad on your plate is safe even if it is grown with wastewater!

Dawn Rodriguez
Editor

Cover image: Samples of wastewater from the Musi river, Hyderabad, India. Water closest to the city is the most polluted. At a distance of 40 km from the city the water is considerably cleaner as seen in the samples. Photo credit: IWMI- India

EVENTS

World Food Day

October 16th

This year's theme is World Food Security: the Challenges of Climate Change and Bio-energy.

Sanitation and Water Conference

Oct 27 to 29, Melbourne, Australia

Hosted by World Vision and with support from the Australian Government AusAID, the conference will be a significant event in the International Year of Sanitation.

10th Meeting of the Conference of the Parties to the Convention on Wetlands (Ramsar, Iran 1971)

28 October to 4 November in Changwon, Republic of Korea.

Annual Meeting of KnowledgeHubs Network

Oct 15 -18 in Zhengzhou, China.

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New Research Agenda for IWMI

The challenges of physical water scarcity, economic water scarcity, the impacts of climate change on water resources and deteriorating water quality set the backdrop of IWMI's new research agenda. Three strategic objectives have been identified: Food for People, Environment for People and Policies for People. While continuing to improve the management of land and water resources for food livelihoods and the environment, IWMI's vision is "Water for a Food Secure World". In keeping with its revised strategic plan, IWMI's new research themes and theme leaders are:

Theme 1: Water Availability and Access: Theme Leader: Dr. Vladimir Smakhtin
Theme 2: Productive Water Use: Theme Leader: Dr. Deborah Bossio
Theme 3: Water Quality, Health and the Environment: Theme Leader: Dr. Pay Drechsel
Theme 4: Water and Society: Theme Leader: Dr. Mark Giordano

A Tale of 53 Cities

Research carried out by IWMI and partners across 53 cities in Africa and Asia showed that in many developing countries, untreated wastewater is used to grow crops in urban and peri-urban areas. To date, no comprehensive datasets have been analyzed to understand the drivers and characteristics of wastewater agriculture and its trade-offs. This report provides fresh insights into the phenomenon of wastewater use and the associated risks and benefits.

While posing serious health risks, the practice of irrigating with wastewater also supports livelihoods and is an important source of food supply to cities. Across the 53 cities, 1.1 million farmers sustain 4.5 million family dependants with wastewater contributing as the primary or secondary source of income. For this reason in many cities the practice is unofficially "tolerated".

In Sub-Saharan Africa, approximately 80 to 90% of the urban supply of leafy vegetables is grown using wastewater.

What is wastewater?

- Domestic effluent such as kitchen and bathroom wastewater
- Water from commercial establishments and institutions including hospitals
- Industrial effluent including chemicals and dyes
- Storm water and other urban runoff

Study findings

The main drivers of wastewater use in irrigated agriculture are in most cases a combination of 3 factors:

1. Increasing urban water demand and the related return flow of used water treated or untreated back into the environment and nearby water bodies causing pollution of traditional irrigation water sources.
2. Urban food demand and market incentives which favor growing food crops closer to cities where water sources are usually polluted.
3. Lack of alternative (cheaper or safer) water sources.

The up-side

- With wastewater, it is possible to grow food in places where there is water scarcity or where alternative, clean water sources are unavailable.
- Income derived from wastewater agriculture raises the living standards of farming families who now have better nutrition and access to education.
- Farmers do not have to pay for fertilizers as wastewater is nutrient-rich.
- Using wastewater in agriculture is also seen as a form of land treatment where other options are not viable and this provides environmental benefits.

The down-side

- Health risks such as skin and worm infections for farmers as well as exposure to a variety of pathogens found in infected faeces.
- Accumulation of heavy metals and other pollutants in soil.
- Impact from extensive use on catchment hydrology and salt transport.
- Microbiological contamination risks for surface water and groundwater.
- Transfer of chemical and biological contaminants to crops.

How can the practice be made safer?

Policies and decisions on wastewater use must be made at local level because socioeconomic, health and environmental conditions vary across countries.

1. Urban and peri-urban agriculture can enhance food supplies to cities and provide a cost–effective source of nutrition.
2. The WHO Guidelines (for 2006) for the safe use of wastewater should be extensively applied as it allows for incremental and adaptive change which is cost–effective in reducing health and environmental risks.
3. The implementation of the Millennium Development Goals (MDGs) should closely link policies and investments for improvements in the water supply sector with those in the sanitation and waste disposal sector to achieve maximum impact.
4. Addressing risks: a) State authorities should plan, finance and maintain a sanitation and waste disposal infrastructure that supports wastewater reuse and is designed with agricultural end-use in view. b) Outsourcing water quality improvement and health risk reduction to the user level and supporting such initiatives through farm tenure security, easy access to credit for safer farming and social marketing to improve farmer knowledge and responsibility can lead to reduced public health risks while maintaining the benefits of urban and peri-urban agriculture.
5. Countries must develop policies and practices for safer wastewater use to maintain the livelihood benefits but reduce health and environment risks.

From Flush-to-Farm-to Fork

Ghana: Salad days?

In Accra, **200,000** urban consumers are unaware that the salad they consume daily is grown with wastewater.

Bangladesh: Wormy wastewater

In Dhaka, there is a high prevalence of intestinal parasites ranging from **26 to 76%** in the general population who also consume products grown with wastewater, including fish, illegally reared in wastewater ponds.

Cambodia: Fashion fallout

The garment sector in Cambodia contributes **36%** of the GDP and employs 230,000 workers but also represents the main polluter of water in the country.

Fishy business: Around **20%** of the daily supply of vegetables in the Phnom Penh market is grown with wastewater, which is also used for aquaculture.

Colombia: High cost of 'clean and green'

The poor pay the price for eating wastewater products which carry no labels.

"Clean water" labeled products cost **100%** more

"Green" labeled products cost **200 to 300%** more

Pakistan: Wastewater veggies

26% of the total domestic vegetable supply is grown with wastewater

China: Wastewater wisdom

In Zhengzhou, wastewater is used mainly for paddy cultivation, but there is greater awareness among farmers and consumers about the risks of wastewater and a fair proportion of the water is treated before use.

Botswana: Constructive use of wastewater

20% of wastewater is used by the construction industry and for golf course maintenance. The rest is used by poor farmers who are not fully informed on the health risks.

Chile: Adios pollution

Residents in Santiago, may soon say goodbye to wastewater pollution, as more than **70%** of the city's wastewater is already under secondary treatment.

Central Asia: Watered-down wastewater

In Tashkent, Farmers living 5 km downstream of the Bozsu and Salar rivers dilute wastewater with clean irrigation water. There is no direct use of wastewater and treated wastewater is an additional source of potable water in the region.

Improving the Impact of Research through Knowledge Sharing

NADIA MANNING-THOMAS

Alexandra Clemett, Samyuktha Varma and K. Jinapala, from the 'Wastewater, Agriculture and Sanitation for Poverty Alleviation' (WASPA) project, are all seated in a room with community members, farmers, Municipal Council members, NGOs and other organizations talking about putting a garbage trap on a diversion canal that leads to the rice paddies of a group of farmers outside of Kurunegala town, Sri Lanka. Meanwhile, in Accra, Ghana, researchers from IWMI - Tonya Schuetz, Pay Drechsel and Phillip Amoah - together with local partners at the University for Development Studies, Gordana Kranjac-Berisavljevic, the University of Science and Technology and Abubakar Bakang, are organizing a World Café with local farmers, extension agents and caterers, talking about good practices for using wastewater in urban agriculture. These are all IWMI researchers - but what are they doing? They are all carrying out research projects within the IWMI portfolio but are at the same time using some innovative knowledge sharing approaches with stakeholders and partners. But why?

Despite the wealth of knowledge generated by research projects throughout the CGIAR, there continues to be a gap between knowledge generated and the application of such knowledge for the improvement of food production and livelihoods, particularly in developing countries. The key challenge is to make research relevant to people and issues on the ground, to build capacity of others to tackle these issues, and to find appropriate ways to deliver research results to those stakeholders who can make use of this knowledge.

The WASPA project, led by IWMI, is being undertaken in two cities (in Sri Lanka and Bangladesh), where over 300 urban and peri-urban farmers use wastewater to irrigate crops. The use of wastewater in agriculture and its resulting health risks are often not properly addressed due to uncoordinated sectoral planning, poor communication among government officials, no community involvement, lack of knowledge about solutions, and little use of evidence-based solutions for on-the-ground action. WASPA is

Photo Credit IWMI-Ghana

The IWMI Wastewater project has found that improving the sharing of knowledge between the researchers and those using wastewater is necessary to improve relevance and uptake of research messages.

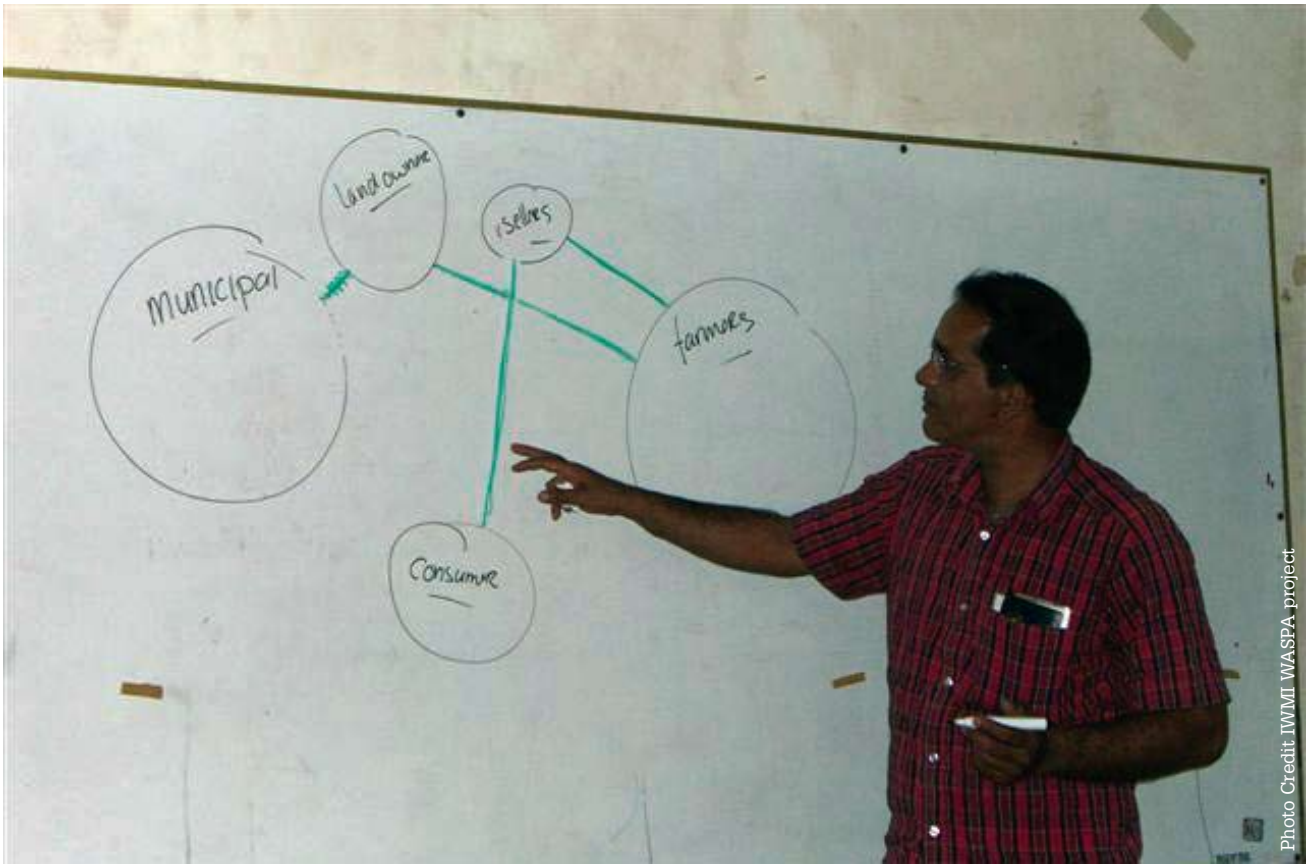
using a Learning Alliance approach to create platforms to bring multiple stakeholders together to identify problems and research needs, plan for and collaborate on research activities, share knowledge and experiences, and coordinate actions to be undertaken using research results. The aim is to bring about holistic learning, planning and management of sanitation and wastewater for improved agricultural end-use.

The IWMI 'Safe food despite wastewater' Project is working across a number of IWMI and CPWF-supported wastewater projects in Ghana. These projects are testing a number of interventions from farm to fork to enhance food safety and the institutionalization potential of proposed interventions derived from research findings. The main aims of this umbrella project are to encourage greater uptake and adoption of the research results, recommendations and practices around wastewater use and to pilot a diverse set of methods for research delivery. The project has been facilitating knowledge sharing between researchers, end-users, and policy makers to discuss appropriateness, viability, constraints and required incentives regarding the adoption potential of suggested innovations using the World Café approach. The World Café approach is a method which facilitates more open and comfortable discussion of particular topics amongst a group of people. Through mimicking an informal setting- a café- small groups of people sit at small tables to discuss openly and write and draw on the paper 'table cloths' for a certain amount of time before moving on to another table to discuss another topic with a different group of people. The project has also, undertaken a number of knowledge sharing activities and produced some outreach materials, like participatory filming of good practices for farmers and caterers, radio programs in local languages, information to be included in catering schools and farmers' field school curricula, and jointly with other projects and departments of the local authorities and the Ministry for Food and Agriculture, developed flip charts with visuals depicting good wastewater use practices for extension agents to use with farmers as additional dissemination approaches.

These two projects are part of a wider two-year project of the CGIAR ICT-KM Program, started in 2007, entitled Knowledge Sharing in Research (KSinR) which is being hosted by IWMI. The goal of KSinR is to improve the effectiveness and impact of CGIAR research by providing options and lessons around good practices of knowledge sharing in research. KSinR's main learning vehicle is six ongoing CGIAR research projects, including the two IWMI-led projects described above. The other four pilot projects and their lead centers are:

1. CIFOR's Pilot Project on 'Shared Learning to Enhance Research Priority Assessment Practices'
2. The ICARDA 'International Farmers Conference' Pilot Project
3. IRRI's Pilot Project on 'Knowledge Management Harmonizing Research Output in the Northern Uplands of Laos PDR'
4. The WorldFish Center's 'Application of KS tools to impact monitoring and project M&E to a community-based fish culture project in Vietnam'

Synthesis of the results across KSinR and all of its pilot projects and other activities will be documented in a variety of media including the KS website (www.ks-cgiar.org), the KSinR blog, and through the development of practical how-to documents to be made widely available and presented at upcoming CGIAR and other fora.



The IWMI WASPA project is using a Learning Alliance approach, with support from the KSinR project, to bring together multiple stakeholders to jointly identify problems, decide on research needs, plan and undertake collaborative action.

Straight Talk:

Wastewater: What Happens Next?

An interview with Dr. Liqa Raschid-Sally & Dr. Pay Drechsel of IWMI, Ghana

Liqa Rashid-Sally is one of the authors of the recent 53-city wastewater report and Pay Drechsel is Theme Leader of IWMI's new research theme "Water Quality, Health and the Environment".

Q: The 53-city report generated a lot of interest, especially since it was launched at Stockholm Water Week. What do you see as the next step in this research?

A: The report gives only a global overview and to get to the point of managing health risks, one needs much more detailed studies at a country level, to assess the extent of the problem in the country and to understand attitudes, perceptions, and the social dimensions, so that the right measures can be applied. For instance, assessment-wise, we still have large gaps, like on the situation in China, or in some of the Latin American countries. We could probably learn a lot from our colleagues there, also in view of health risk reduction. So, we need to team up with partners.

Policy-wise, the report is reconfirming that wastewater use a common reality. We could take this as an appeal to invest more in sanitation, but in the meantime authorities have to address the related potential health risks. The new WHO Guidelines for the safe use of wastewater in agriculture, tell us how, by recommending measures for health risk reduction from farm to fork. Over the last 3 years we had a pilot project in Ghana where we tested about 15 different options for risk reduction on farm and in kitchens, and realized that we can indeed reduce the risk for consumers drastically. It is now time to see which of these measures can also be applied in other countries or what kind of good practices are possible there. A special challenge is appearing in emerging economies where increasingly, industrial wastewater is adding heavy metals to the domestic wastewater. Addressing industrial pollution is a whole new 'ball game', with a different approach to be applied. Here governments have to partner with the producers of the waste, i.e., the industrialists, and support measures to help them address the problem of treating their wastewater; but this should be accompanied with stricter planning controls and regulations. The impact on irrigation water from these sources of pollution has still not been sufficiently studied or addressed.

Liqa Raschid-Sally with partners on the field.

Q: How do you see the lessons learned being put into action and how would you approach policy makers, for example, in Ghana?

A: The first step is that wastewater irrigation should not be considered an informal activity as this prevents authorities from constructively addressing it. In Cotonou, for example, the authorities offered farmers alternative land with safe groundwater, and in Accra, they helped farmers to drill for safe groundwater. Indeed, in Ghana, the government developed a new National Irrigation Policy which also recognizes informal irrigation in and around urban centers and is encouraging the research sector to develop safer irrigation practices to reduce the health risks for farmers and consumers. This was taken up by IWMI and in collaboration with the local universities we developed and verified what I described above. This has to be replicated everywhere.

Simultaneously working with the government and bilateral donors, to address waste disposal and sanitation at the city level, in innovative ways which include applying ecosan principles, is also being done. IWMI is a partner in an EU funded project (SWITCH), which attempts to create a learning environment for stakeholders from the agriculture and water sectors, to work together towards this end.

Pay Dreschel in conversation with Akissa Bahri, Director, IWMI-Africa.

Q : The reports from the different cities showed varying degrees of awareness of the risks associated and different issues concerning wastewater, relevant to each region. It also showed that some cities were handling wastewater better than others. Do you think there is any reason for this? For example, are these countries more advanced in terms of economic, social and institutional reform?

A: Sure. With increasing economic power and a clear agenda focusing on sanitation, many countries were able to reduce the inflow of untreated wastewater in natural water bodies. A few countries particularly those that are water-short in the Middle East and northern regions of Africa, and even parts of India, have plans for recycling wastewater in agriculture, which means that they make a conscious effort to treat the wastewater and supply it to farmers directly.

Interview by Dawn Rodriguez, IWMI

A farmer in Mexico washes his crops with wastewater from a nearby river.

Recent Publications

For on-line access to IWMI Research Reports and Working Papers, see **http://www.iwmi.cgiar.org/Publications/index.aspx**

IWMI Research Reports

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2. Mekala, Gayathri Devi; Davidson, Brian; Samad, Madar; Boland, Anne-Maree 2008. Wastewater reuse and recycling systems: a perspective into India and Australia. Colombo, Sri Lanka: International Water Management Institute (IWMI). 35p. (IWMI Working Paper 128).

3. Mekala, Gayathri Devi; Davidson, Brian; Samad, Madar; Boland, Anne-Maree 2008. A framework for efficient wastewater treatment and recycling systems. Colombo, Sri Lanka: International Water Management Institute (IWMI). 17p. (IWMI Working Paper 129).

4. Molle, Francois; Hoanh, Chu Thai 2008. Implementing integrated river basin management: lessons from the Red River Basin, Vietnam. Working paper. Chiang Mai, Thailand: Mekong Program on Water Environment and Resilience (M-POWER); Montpellier Cedex, France: Institut de Recherche pour le Developpement (IRD); Colombo, Sri Lanka: International Water Management Institute (IWMI). 51p.

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2. Goddard, T.; Zoebisch, M. A.; Gan, Y.; Ellis, W.; Watson, A.; Sombatpanit, S. (Eds.) 2008. No-till farming systems. Special publication no.3. Bangkok, Thailand: World Association of Soil and Water Conservation; Penang, Malaysia: International Water Management Institute (IWMI), Southeast Asia Office. 544p.

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7. Shah, Tushaar 2008. India's irrigation economy: in the throes of a transition. In Kumar, R.; Sen Gupta, Abhijit (Eds.). India and the global economy. New Delhi, India: Academic Foundation. pp.177-186.

8. Trabucco, Antonio; Bossio, Deborah; van Stratten, O. 2008. Carbon sequestration, land degradation and water. In Bossio, Deborah; Geheb, Kim (Eds.). Conserving land, protecting water. Wallingford, UK: CABI. pp.83-106.

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1. Bharati, Luna; Eriyagama, Nishadi; Smakhtin, Vladimir 2008. Environmental flows: moving from concepts to application. In Japanese. Journal of the Japanese Society of Irrigation, Drainage and Rural Engineering, 76(5): 413-416.

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