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From world cafés to road shows: using a mix of knowledge sharing approaches to improve wastewater use in urban agriculture

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This paper documents the application of several innovative knowledge sharing approaches and some of the lessons learnt in a project addressing food safety concerns deriving from wastewater irrigated vegetables in Ghana. Knowledge sharing activities received particular attention in the project to facilitate its impact pathway, in particular to (i) verify preliminary research messages on good practices, (ii) raise awareness and build capacity, and (iii) equip various stakeholder groups with knowledge, skills and materials. Key approaches and tools applied were the *world café* approach for the verification of research messages. The approach brought together farmers, traders and street food vendors to openly discuss proposed improvements in current practices and their potential for wider uptake. For target-oriented message dissemination multi-media training materials were prepared following recommendations from the intended users, like extension agents, catering and farmer field schools. The materials made use of local-language radio broadcasts, training and awareness videos, illustrated flip charts showing good and bad practices for wastewater use and improved teaching materials. Finally, for enhanced mutual learning so called *road Shows* were used to facilitate knowledge sharing between researchers, end-users, policy- and decision-makers. These allowed all stakeholders to follow the pathogen pathway from farm to fork while learning about the importance of well-identified intervention points and mutual responsibility. All applied approaches added significant value to the research work and facilitated its impact potential as first feedback shows. However, the applied tools do not come for free. They require careful preparations, the ability to listen and skillful facilitation.

Introduction

In urban and peri-urban sub-Saharan Africa most exotic vegetables, typically consumed raw in fast food dishes, are produced with polluted irrigation water (Raschid-Sally and Jayakody 2008). The availability of good quality water for vegetable production is constrained, as drinking water is in short supply, and farmers have often no alternative than to rely on streams and drains which carry highly polluted water, since no or little wastewater treatment takes place (Keraita *et al.* 2003). This situation has generated public health concerns among many stakeholders, including city authorities, non-governmental organisations (NGOs), farmers, food sellers and others. To address these concerns, four projects were initiated in Ghana over the last years: two of the Challenge Program on Water and Food (CPWF 38 and 51) (www.waterandfood.org/newsletter), and two supported by the World Health Organization

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(WHO), Food and Agricultural Organization (FAO) and the International Development Research Centre (IDRC), Canada. These projects tested a number of so called non- or post-treatment interventions which complement the lack of conventional wastewater treatment to enhance food safety from farm to fork (Drechsel *et al.* 2008). Typical examples of such interventions are safer irrigation practices or effective washing of vegetables in kitchens.

The projects were supported by the 'Knowledge sharing in Research' (KSinR) project of the Consultative Group on International Agricultural Research (CGIAR) in order to facilitate its impact pathway by increasing stakeholder interaction and the dissemination of the findings. The objective was to prevent a situation where the project results are only published in international journals which are probably not even available in the country.

Compared to the already planned conventional training seminars and workshops, the KSinR subproject supported another dimension of interaction. Three related research objectives can be distinguished:

(1) To test alternative ways of communication which enhance a free expression of the stakeholders on the preliminary research results.
(2) To analyse jointly options how best to package verified research messages that they are of direct use, e.g. for the extension service, farmer field schools or food catering schools.
(3) To enhance awareness, mutual learning and joint responsibility to address the invisible threat of water contamination.

In this paper, some examples from the resulting work and the lessons learnt will be described.

Study area

The project was conducted in three Ghanaian cities namely Accra, Kumasi and Tamale. All three cities have larger urban open spaces used for irrigated vegetable farming with highly polluted surface water sources (Obuobie *et al.* 2006). The cities are located in the southern, middle and northern parts of the country in different agro-ecological zones (Figure 1). Accra is the capital city of Ghana with a population of approximately 1.7 million inhabitants. It is located at the Gulf of Guinea in the coastal savannah belt. Kumasi is the capital town of the Ashanti region and the second largest city in Ghana with a population of about 1 million, while Tamale is the third largest city, with a population of about 300,000 inhabitants (Ghana Statistical Services 2002).

In contrast to Accra and Kumasi, Tamale Municipality is poorly endowed with water bodies; there are only a few seasonal streams except for wastewater. In Accra, depending on the season, between 47–162 ha are cultivated with irrigated vegetables, in Kumasi about 40 ha and in Tamale 33–40 ha in the city and 70 ha in the urban fringe. The cultivation takes place on all unused open spaces, usually along urban streams or drains or in inland valleys in these cities (Obuobie *et al.* 2006).

Addressing the three objectives

1. To test alternative ways of communication which enhance a free expression of the stakeholders on the preliminary research results

Based on the studies of the Kwame Nkrumah University of Science and Technology (KNUST), the University of Development Studies (UDS) and the International Water

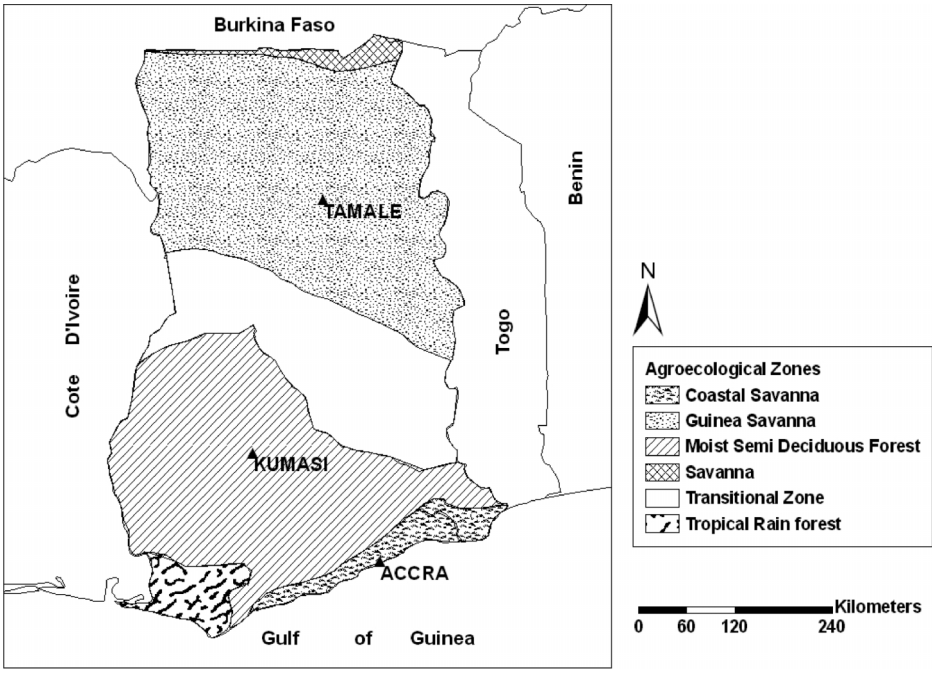

Figure 1. Map of Ghana showing the locations of the three study cities.

Management Institute (IWMI), to mention only the key partners, about 15 'good practices' ('messages') to enhance food safety along the farm-to-fork pathway were tested with farmers and street food kitchen staff for their efficacy, adoption potential and cost effectiveness (Drechsel *et al.* 2008). The accompanying KSinR project supported the interaction with those stakeholders supposed to adopt the recommended best practices.

IWMI's philosophy is to work with and through partners aiming wherever possible at participatory research for development. In this sense IMWI is trying to link stakeholders upstream (policy-makers) and downstream (users) in its research activities. This was matched by the objectives of the KSinR agenda. The stakeholders were nominated by their institutions. Personal motivation however plays always a role. Institutional buy-in is best achieved through addressing the institutional agenda, not a superimposed one defined by the project, i.e. the buy-in has its key moment at the problem identification stage of the proposal development. Such lessons are addressed, e.g. in Drechsel *et al.* (2008).

The KSinR project suggested a *world café* approach to compile feedback on the preliminary messages before they are finalized.

World café, described, for example by Brown and Isaacs (2005), was adapted as an approach to bring various stakeholders together and allow them to openly discuss research messages and their potential for uptake among themselves. There was no 'we know better' scientist in the room, and no representative of any authority. The overall discussion was led by a facilitator assisted by students who were asked to keep a low profile. This approach was to create a relaxed café-like atmosphere where people

could feel comfortable to openly discuss their opinions in smaller groups sitting at a table, with their tea or coffee.

In each city, two world cafés were organized, one for farmers and one for food vendors and caterers of wastewater irrigated vegetables. The aim was to compile honest feedback on the developed 'good practices'.

Each of the messages was discussed using the following guiding questions:

(1) Could you apply these 'good practices' from now on?
(2) Which of them is easier?
(3) What would restrict you from using the method?
(4) Which one would you not use and why?
(5) Under which circumstances would you do it?
(6) What are your concerns?
(7) Which action from the authorities would help change your practice from normal to 'good'?

The world café events were held between 2007 and 2009 in all three cities. During the events, the participants were randomly selected to sit at a table. Each table focused on a specific set of 'good practices' (Box 1) discussed by 4 to 5 participants (Figure 2). To encourage innovation in the participants (but not the facilitator) would rotate after a certain time to another table to get a chance to contribute to other topics as well.

At the end of all rounds, the main facilitator asked each of the table facilitators to give feedback on the discussions held at their table. This was recorded on a central flipchart. Internal feedback showed that the participants felt confident at the end of these peer discussion meetings and felt ready to address the discussed practices also with other stakeholders who might either be required for implementation or should know (e.g. authorities) what the group (e.g. farmers) is doing to address the food safety issues. This suggestion was the starting point for the 'road shows' which we discuss below.

2. To analyse jointly options how best to package verified research messages so that they are of direct use e.g. for the extension service, farmer field schools or food catering schools

After the world café sessions, suggestions obtained from the meetings were carefully analysed to see how far the original messages on good practices could be improved. This resulted in the following key questions:

(a) How will the messages reach the individual user groups, such as farmers?
(b) Who will translate the tested good practices in extension material?
(c) How should this material look and be packaged to be most useful?

To answer these questions round tables, e.g. with the agricultural extension service, were organized. Following these discussions, the adjusted messages were transferred into a number of multimedia materials and local languages, such as posters, training videos for extension officers and food safety trainers (Figure 3), and illustrated flip charts (Figure 4). The flip charts showed good and bad practices, and included discussion guidelines for extension officers on the back of each illustration.

Box 1 'Good practices' discussed by farmers during the café session

Table I

1. Plan in advance with your vegetable traders on which day to harvest your crop. If possible do not irrigate two to five days before harvest day.
   (Reason: Bacteria will die in the sun without new water)
2. Apply poultry manure not too late. And when applying, be careful to apply to the soil and roots, but not on top of the crop. Best: Use matured manure.
   (Reason: Not only water but also fresh manure contains certain pathogens)

Table II

3. When using watering cans or a hose, do not lift them too high. Apply water from the lowest height feasible. Always use a capped can or shower cap on the hose.
   (Reason: This will lessen splashing of pathogens from the soil back on to the crop)
4. For farmers using bowls, cups, etc. for watering, apply as close as possible to the roots, not on the leaves.
   (Reason: This reduces bacteria on those parts of the crop which people will eat)

Table III

5. Attach a cloth or mosquito netting to the big hole of the watering can.
   (Reason: This will remove some debris in the water with attached pathogens)
6. Test *drip irrigation kits* which help to reduce crop contamination + water needs + labour input. Work with us on kits without clogging and appropriate number of holes for your normal cropping density.
   (Reason: Through 'drip kits' water goes only to the roots, not the green part)

Table IV

7. If you fetch from a water channel, canal or drains, interrupt the water flow before the point where you fetch water through stones or shallow depressions.
   (Reason: At these 'barriers' some pathogens will settle in the sand and not reach your place of water fetching)
8. Avoid stepping into ponds or shallow wells when collecting water. Avoid at least scratching with your feet and watering can the bottom of the well or pond. This is easier when you make your pond at least 2 feet deep.
   (Reason: Some pathogens sit in the sand at the bottom of the pond. Do not whirl them up in your can or bowl)

Table V

9. Protect shallow wells and ponds from run-off and inflow. You can leave a small edge with some grass or stones around the pond.
   (Reason: Many pathogens are washed from the soil surface into your pond)

The video designed for the street food restaurants was developed in a participatory manner where the concerned stakeholders co-directed the script and shooting to create as realistic as possible scenes and to convey recommended messages matching to local perceptions.

Figure 2. Changing tables in regular intervals during the world café events in Tamale, Ghana.

These and other videos produced by IWMI and partners can also be found in the intranet (Box 2).

Box 2 IWMI videos on wastewater irrigation and food safety on the Internet

http://video.google.com/videoplay?docid=-8395461859469738471&hl=en
http://video.google.com/videoplay?docid=-3530336707586348166&hl=en
http://video.google.com/videoplay?docid=-788126851657143043&hl=en
http://video.google.com/videoplay?docid=-6891955003003280662&hl=en

Given their limited number, urban farmers can easily be reached through training workshops and by extension officers. However, where farmers are located more remotely, or the target group too big for localized events, like the street food sector, radio and in part television can be very effective media. The use of radio across Africa (excluding South Africa) has grown significantly over the last decade (FAOSTAT 1998, Mytton 2000). The strength of radio as an extension tool is widely regarded to lie in its ability to reach illiterate

Figure 3. Awareness and training videos on good practices where wastewater is used for vegetable irrigation targeting farmers and street restaurants.

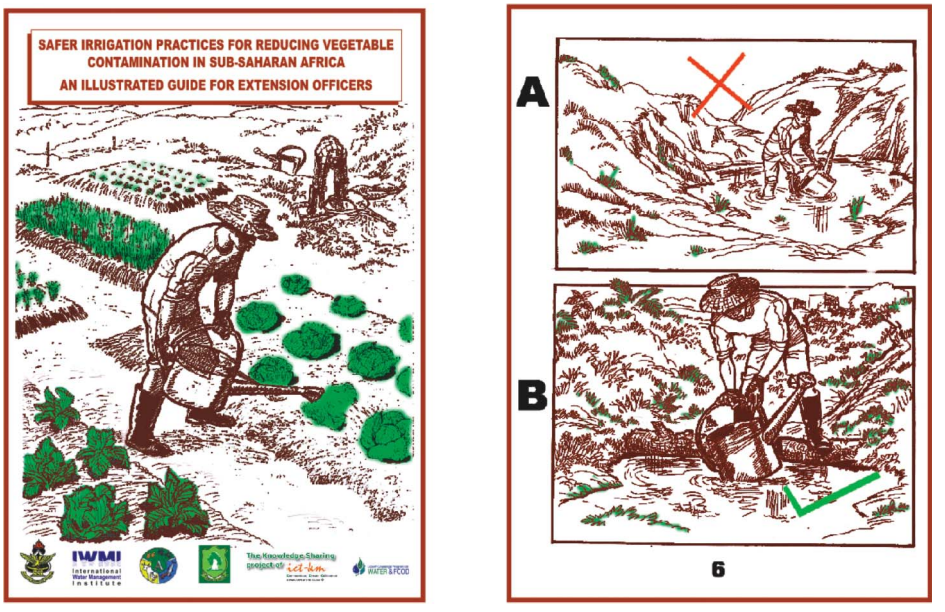

Figure 4. Cover and example page of the illustrated flip charts (A2 format) for farmers and agricultural extension agents (a complete chart comprises 14 pages).

farmers and provide them with information relating to all aspects of agricultural production in a language they understand (Chapman *et al.* 2003). In Ghana with a literacy rate of below 60% (UN Human Development Report 2007/2008), the government supported the set-up of a large number of independent FM stations where programmes are broadcast in local languages (Ansu-Kyeremeh 1992).

For the KSinR project, 'Radio Justice', based in Tamale, was selected because it is broadcasting in the Dagbani and Gonja languages which cover almost all the northern regions of Ghana where vegetable farmers are more difficult to reach than in Kumasi and Accra.

The radio programme was broadcast in two sessions with two different panels including agricultural extension officers, farmers, traders, university experts and street food vendors. The discussions were accompanied by a phone-in component to allow listeners' active participation in the programme. This was an effective strategy because it did not mean simply reading technical information over the airwaves in local languages, but understanding the way farmers and caterers themselves discuss their problems in the community and providing relevant information in the local agro-ecological and cultural context.

The discussions on food safety in the street food sector centred on the 'five keys' to safe food production, as developed by the WHO. The keys address (i) How to keep hands clean, (ii) Separate raw food from cooked, (iii) How to cook thoroughly, (iv) How to keep the food at safe temperatures, and (v) The use of safe water and raw materials. The wording of the keys was locally adjusted and the last key modified to 'Use treated water and wash vegetables the right way' by incorporating research results from the project after obtaining permission from the WHO (Figure 5).

Transferring key messages into television is, in general, a very challenging task given the high cost of airtime. However, due to the large public interest in food safety and wastewater

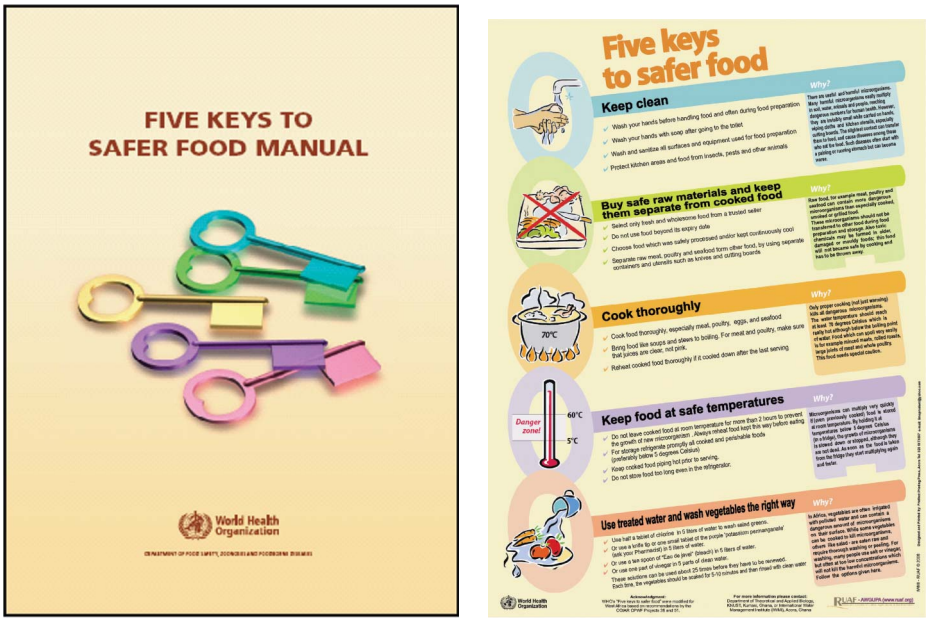

Figure 5. WHO manual and its related poster on 'five keys to safer food'. Both products were locally adapted (inlay in the manual, changed text of the poster) and distributed to food catering schools as teaching aids.

use, the topic was picked up by a local film company (Creative Storm) for Ghana's 'Environmental Channel' which is the first national television series about the environment. The episode was prepared in close collaboration with IWMI and its associated Resource Center on Urban Agriculture and Food Security (RUAF) and also shown in the 2009 Ghana Environmental Film Festival.

3. To enhance awareness, mutual learning and joint responsibility to address the invisible threat of water contamination

Following the recommendation of farmers and street food vendors to show the authorities what they are contributing to the food safety challenge, representatives of all stakeholder groups were invited for a joint *road show* event. Participants were taken on a bus tour starting from the farm with poor irrigation water through the market and ending at a food preparation point with about 10 minute drives and one hour stops for each entry point. At each entry point, participants learned first-hand about the actual health threats and risk reducing methods. The opportunity was given to each group to present good practices and share their knowledge.

The objectives of the road shows were to:

- raise awareness on the presence of germs (*Message: germs are invisible and yet real*)
- allow 'upstream' stakeholders to see the source of the vegetables and related health risks, and 'downstream' stakeholder (farmers) the remaining pathogen pathway from farm to fork

- create a better understanding for each group of identified methods used at each level from the production, processing and up to the consumption what is involved and what is needed to jointly ensure the reduction of health risks
- show the impact of different health reducing practices, alone and cumulative as well as draw-backs when certain measures fail
- create a platform for exchange of related questions, and to elaborate challenges and opportunities to enhance the adoption of good practices
- see if a feeling of joint responsibility among the participating groups can be strengthened by knowledge sharing activities.

The diverse group of participants which included vegetable producers, sellers, street food caterers and food vendors, researchers, and authorities (i.e. representatives from the Metropolitan Directorate of the Ministry of Food and Agriculture, Agric Extension, Food and Drugs Board, Environmental Protection Agency and the Metropolitan Health Directorate) introduced themselves to the whole group. After the rationale of the event had been explained, the group boarded a bus and followed the farm-to-fork pathway of pathogens as it is common reality in Ghana. The bus stopped first on a major vegetable production site, then at the vegetable wholesale market, then in the street food restaurant. At each of the stops, pre-identified farmers, traders or sellers demonstrated common bad practices and selected locally fitting good practices. This was followed in each case by an interactive question and answer session and discussion (Figure 6).

Visualization of germs

There are not many ways how to visualize invisible threats outside laboratories. A well known tool is the so called 'GlitterBug' lotion (www.glitterbug.com) which was used by the project in Kumasi. GlitterBug is a fluorescent lotion that is used with a UVA lamp, making it possible to see otherwise invisible dust and dirt ('germs proxy') on hands. This lotion is widely used in schools; especially in the USA. In the road show, a different approach was used: participants were shown two locally available petri-dishes

Figure 6. Participants discussing sources of risks and risk reduction options at a wastewater irrigated vegetable production site in Accra, Ghana. (*Photo*: Philip Amoah)

Figure 7. Participants observing bacterial colonies growing on nutrient agar.

(plastic plates) which contain media to grow bacterial cultures if inoculated. The participants learned that one of the plates was inoculated 48 hours ago with wastewater from the point where the bus stopped and showed now significantly growing bacterial colonies, while the other was inoculated with piped water showing no bacterial growth (Figures 7).

Demonstration of joint responsibility in risk reduction

A transparent 10 litre bucket which was filled with foam pellets (representing a typical load of germs/bacteria on vegetable leaves) was used to visualize the contribution of different good practices towards risk reduction. Participants realized that not all pathogens can be removed from a farm environment since a certain share of pellets still remained which was still to be removed at the market and/or kitchen before the food gets to the table. At the market and the kitchen the additional challenge, however, was to avoid new contamination through unhygienic practices. The bucket game demonstrated the need for mutual efforts and responsibility.

Group discussion during lunch

Seating arrangements resulted in each table having a cross-section of all stakeholder groups to avoid that farmers sat amongst themselves etc. Each group discussed lessons learnt in the joint effort to reduce risk. Questions discussed in the groups included, for example, how can the bucket (containing foam pebbles representing bacteria) be emptied without residual risk? What happens if one of the groups in the chain fails to remove their share of risk? And what incentives are needed to achieve safe vegetables for consumption. Each group also made a short presentation of key lessons learnt after lunch, by selecting one member from the group to give a presentation.

Figure 8. Caterer demonstrating some good washing methods.

Video demonstration and quiz

After the last stop and demonstration of recommended vegetable washing procedures in kitchens (Figure 8), the training video for the street food sector was shown, followed by a quiz which had been announced earlier. Quiz questions asked included (i) which four practices for vegetable washing were named, (ii) what is the local name of certain sanitizers, (iii) which method is the cheapest, etc. Winners and runner-ups were given small containers of an effective sanitizer as a prize.

In the final discussion, wider issues were addressed, i.e. (i) which food safety challenges were not mentioned in the film? (ii) what can environmental health officers control and what not? (iii) which 'measures' are more effective than control?

The road show ended with an evaluation and lessons learnt summary by each participant.

Benefits and lessons learnt

World café

The café approach was considered a success. Participants visibly enjoyed the event and many more spoke up and got involved than in any other group meetings the facilitators experienced so far. Also the feedback on the suggested messages was very helpful. Suggestion from the participants led to better formulated ways of how to explain and present the tested good practices, e.g. in the videos, modules of farmer field school, radio programme, or the road shows. Participants' contributions revealed that several of the current 'bad' practices are only in place because they are not aware of the dangers associated with them. Therefore they suggested that education on the invisible risk and 'good practices' should be extended to other farmers and street food vendors in the cities. Participants also showed interest in sharing their new knowledge with their own peers. A lesson for the facilitation part was to find the right balance between an informal atmosphere and some discipline to maintain a focused discussion. Ideally, the table host should have a certain control of the discussion and also of the time allocated for each round. Too often, participants spent a lot of time discussing only a few issues and missed out on others.

Multi-media materials

The illustrated flip charts designed together with representatives of the agricultural extension agents of the Ministry of Food and Agriculture (MoFA) provided an interesting way for extension workers to reach their clients without a medium that needs electricity. The design of the flip charts came with some technical challenges, such as finding low-cost but water resistant carton and strong spiral binding.The training videos (11–16 minutes in length) were generally appreciated although some participants asked for extended versions covering also other food safety aspects. A very positive experience was the participatory filming and feedback on early version from food caterers to further improve the way the messages were conveyed. This approach should be mandatory for any training or awareness material as those making films might not know how to locally convey emotions related to punishment, joy, etc. (Figure 9). The reader might think of the different styles of Indian, Asian and European films.

Contacts with the private sector were also established and resulted in the uptake and use of the training videos at their marketing-cum-training events. For example, Nestle supported Maggi™ Fast Food Association of Ghana (MAFFAG) incorporated the video for the street food sector into their national training campaigns for food sellers while Ghana's Food and Drugs Board (Food Safety and Management Unit) showed the videos during annual food safety week. Posters and manuals on food safety were distributed through Ghana's Trade Hub to a large number of catering schools. For the Ministry of Food and Agriculture, a few hundred flip charts were produced but at the time of writing had not yet been handed over as a follow up project would require a controlled targeted use and non-use for comparative impact assessments. For such a follow up, leading to a national food safety campaign, a proposal has been written but funding has not yet been secured.

Sharing the initiative described above with the water, sanitation and hygiene (WASH) sector, for example is only passive but this could be improved. The project was eager to learn from previous hand-wash campaigns in Ghana and toilet studies, e.g. in Benin, to develop, in particular, an appropriate social marketing framework. This link is highlighted

Figure 9. The director of the training videos (Manuel Henseler, left) carefully listening to a street food seller.

in Karg *et al*. (in press). But it is only feeding its results now back through articles like the one cited above and also this paper.

Radio programme

The involvement of farmers and caterers in the panel discussion and phone-in sections allowed listeners' participation in the programme. This was an effective strategy because it did not mean simply reading technical information over the airwaves in local languages, but understanding the way farmers/caterers themselves discuss their problems in the community and providing relevant information in the local agro-ecological and cultural context. This was evident from the large number of people who called-in during the programme with most of them pleading that such programmes should be aired more often on radio and even on TV to reach a larger audience. This, in their opinion, would educate key players in the use of wastewater and options available to reduce the associated health risks to farmers and consumers.

The impact of the programme assessed through the collection of 'Most Significant Change' (MSC) stories six months after the event revealed its likely effectiveness. Below are excerpts from a story told by a randomly selected vegetable trader who listened to the programme:

> I used to wash vegetables with wastewater after harvesting but I stopped after listening to the programme. I have also informed some of my colleague urban vegetables sellers to stop using local water for washing vegetables after harvesting. Now, I no longer use the same water to wash/refresh many vegetables after bringing it to the market because of the education received during the radio discussion. There has also been a slight increase in sales and this may be due to the education on how the vegetables are handled during production, selling and preparation. I believe that when several of such radio programmes are organized, they would play a key role in public education on activities that would ensure the provision of good quality vegetable products for improved health. (Ms. Mashuud Attu, vegetable vendor, Tamale)

The cost (about US $1200 including evaluation) of the radio programme was kept low by using established collaborative agreements between the local university and the radio provider. However, to effectively reach out, the sessions will have to be repeated. The live call-in component might however not allow reusing the original sessions.

Road shows

The road show required a high level of planning and facilitation to ensure its successfulness. But the input works out as the traditional separation between 'active teachers' and 'passive audience' disappeared during the actual event. By using the various knowledge sharing approaches, stakeholders became trainers, 'champions' and mediators to share good practices and showing how to work successfully in a network to achieve safe consumption of wastewater irrigated vegetables in their cities.

The road show had also a dialogue-supporting component: farmers, vegetable sellers and caterers/food vendors rarely meet city authorities on a common platform to discuss issues related to their livelihood. This platform created by the Knowledge Sharing project promoted exchange of ideas and challenges on the adoption potential of the identified risk reduction options were discussed. Key in all of this is that all stakeholders of the food chain observe, discuss and learn together. The discussions and demonstration were also required to avoid uninformed decision making. Authorities became aware of some of the realities on the ground

and now have a better understanding of the fact that urban and peri-urban farmers seldom have a livelihood alternative to the polluted water sources. This is because either clean irrigation water is not available, or farmers cannot afford the high cost, or the reliability of wastewater is just much higher as a regular tap water supply is facing many challenges in every city. Farmers would in fact appreciate other plots with safer water supplies such as from wells, a call taken up by the Ministry of Food and Agriculture. Authorities also appreciated the research efforts invested in reducing risk where use of wastewater in vegetable production is unavoidable and gave useful suggestions for further implementation of simple risk reduction methods (e.g. cessation of irrigation prior to harvesting, lowering of watering can during irrigation to avoid splashing of soil on crops etc) to ensure that contamination is reduced.

Before the event, most participants (especially farmers and vegetable sellers) felt that no matter how high the pathogen levels were, they could be removed completely at the food preparation point. This notion changed after the road show, and now participants see the need for cumulative efforts. The sense that there is a joint responsibility for the participating groups can be further strengthened in a much broader campaign (awareness creation), targeting a larger audience and bringing many people on board to ensure greater impact. This was expressed by participants several times during the meetings.

As mentioned before, much time is needed to prepare the road show well. For example, the demonstrations of good and bad practices should be well planned and rehearsed to ensure that the message gets to the target audience in a form they will understand.

The absence of some invited participants, especially the press, was greatly felt as participants noted that this important event should have been reported either in the print media or on TV to inform others who did not take part in the meeting. The concern was that the media prefer presenting negative issues but do not give sufficient credit to efforts at addressing them.

Conclusion

In Ghana, the new extension policy of the Ministry of Food and Agriculture aims at pluralism in extension delivery and also the introduction of innovations in delivery methods and effective dissemination of technologies to farmers. Realizing the weakness in common research-extension linkages, where no end has the mandate or capacity to actually reach out and bridge, the Knowledge Sharing in Research Pilot (KSinR) project tried to facilitate knowledge sharing. This involved learning components for both researchers and its stakeholders. The project used some innovative and effective means of communication, based on recipients' preferences for receiving information. The project also facilitated exchange between stakeholders along the food chain with a strong common interest who however hardly meet. An immediate impact was that authorities appreciated the efforts put in place to reduce risks addressing the challenges of water contamination. Another outcome was that the dissemination materials developed from the research results will now have a significantly increased impact potential.

For example, at the start of the wastewater projects in early 2005, project participants and key stakeholders in Ghana were interviewed during a joint project inaugural workshop on their knowledge on options for health risk reduction where wastewater is used for irrigation and on their attitudes towards irrigated urban agriculture. The same questionnaire survey was conducted during the final project workshop in 2008. The applied analysis did not intend to replace more complex monitoring and impact assessments, but tried to give a first feedback on intangible changes in participants' knowledge, attitudes, skills and aspirations (Asante-Mensah *et al.* 1998).

A key result was a shift in knowledge on health risk reduction options from 'modest' to 'good' and 'very good'. The percentage of participants indicating very good knowledge nearly tripled from 14% in 2005 to 38% in 2008, while the number with 'modest' knowledge dropped from 28 to 10%.

The knowledge of options to reduce health risks on farms nearly tripled from 22 to 64%. This also changed the attitude of the stakeholders towards irrigated urban agriculture. While in 2005 still 35% had a negative or more negative than positive attitude, this changed throughout to positive or positive with hesitation. Indeed, 83% of the 2008 participants indicated that they see today a brighter future for irrigated urban farming than before the different projects started (Drechsel and Karg 2008). This positive change was strongly supported by the KSinR project. However, the applied tools and approaches do not come for free. They require careful preparations, significant listening skills and competent facilitation as the various examples showed.

Notes on contributors

Philip Amoah is a researcher working with IWMI since 2001. Starting as a data manager and trained microbiologist he moved on to become one of the best trained knowledge sharing experts in IWMI's Africa Office. A milestone in Philip's development was his leading role in IWMI's study on the contamination pathway component of the CPWF project (no. 38) on wastewater irrigation and safer vegetable production which led to his PhD. In the frame of this project and three follow-up projects, he supervised ten MSc and 17 BSc students. Philip received twice the IDRC's Agropolis award in support of his projects and led together with Tonya Schuetz the 'Knowledge Sharing in Research' project in Ghana. He is currently coordinating multi-stakeholder processes on urban and peri-urban agriculture.

Pay Drechsel has 20 years of working experience as environmental scientist in projects aiming at integrated natural resources management and sustainable agricultural production in developing countries. Pay has a rich background in applied participatory on-farm research which strongly influenced his perception of development-oriented and multi-disciplinary research. In 2001, he joined the International Water Management Institute (IWMI), first as Head of their West Africa Office, then as Global Theme Leader in charge of water quality, health and environment. He also led several projects mostly on urban and peri-urban agriculture, solid and liquid waste management and related environmental and health impacts in the agriculture-sanitation interface.

Tonya Schuetz has five years experience in the private sector before she joined the International Water Management Institute (IWMI) at the Ghana Africa Regional Office. She was among the first to pioneer knowledge sharing in IWMI research projects since 2003. She has worked across a range of interdisciplinary research projects with multi-cultural teams. She combines professional expertise in communications, training and change management with extensive experience in development, outreach, monitoring and evaluation. She has led and worked on knowledge sharing projects in West Africa, Brazil and South East Asia. For the last two years she has relocated to the South East Asia region and works as an independent consultant on outreach, knowledge sharing, as well as monitoring and evaluation for a number of CGIAR centres.

Gordana Kranjac-Berisavljevic is currently an Associate Professor with the Department of Agricultural Mechanisation and Irrigation Technology at the University for Development

Studies (UDS) in Tamale, Ghana. Gordana has over 25 years of working experience, with about 19 years in Ghana. Apart from teaching and administrative duties for UDS, she has been working on many national and international assignments and projects, among others CPWF projects 38 and 51, WHO/FAO/IDRC project on 'Minimising health risks from using excreta and grey water by poor urban and peri-urban farmers in the Tamale Municipality' and CPWF 'Knowledge Sharing in Research'. In collaboration with both local and international research partners, she has been involved and led several research projects.

Nadia Manning-Thomas is currently the project leader for the global Knowledge Sharing in Research (KsinR) Project and based in IWMI Nile Basin and East Africa office, ILRI Campus, Addis Ababa, Ethiopia. The CGIAR through its system-wide programme on Information Communication Technology and Knowledge Management (ICT-KM) initiated a two-year project starting in 2007 entitled 'Improving the effectiveness of the CGIAR through knowledge sharing' with a major component focused on Knowledge Sharing in Research (KSinR). The KsinR led by Nadia, is aimed at helping to improve the effectiveness and impact of CGIAR research through providing options and lessons around good practices of knowledge sharing in research. KSinR's main learning vehicles between 2007 and 2009 were six CGIAR research projects, several of them being presented in this issue of *Knowledge Management for Development Journal*.

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