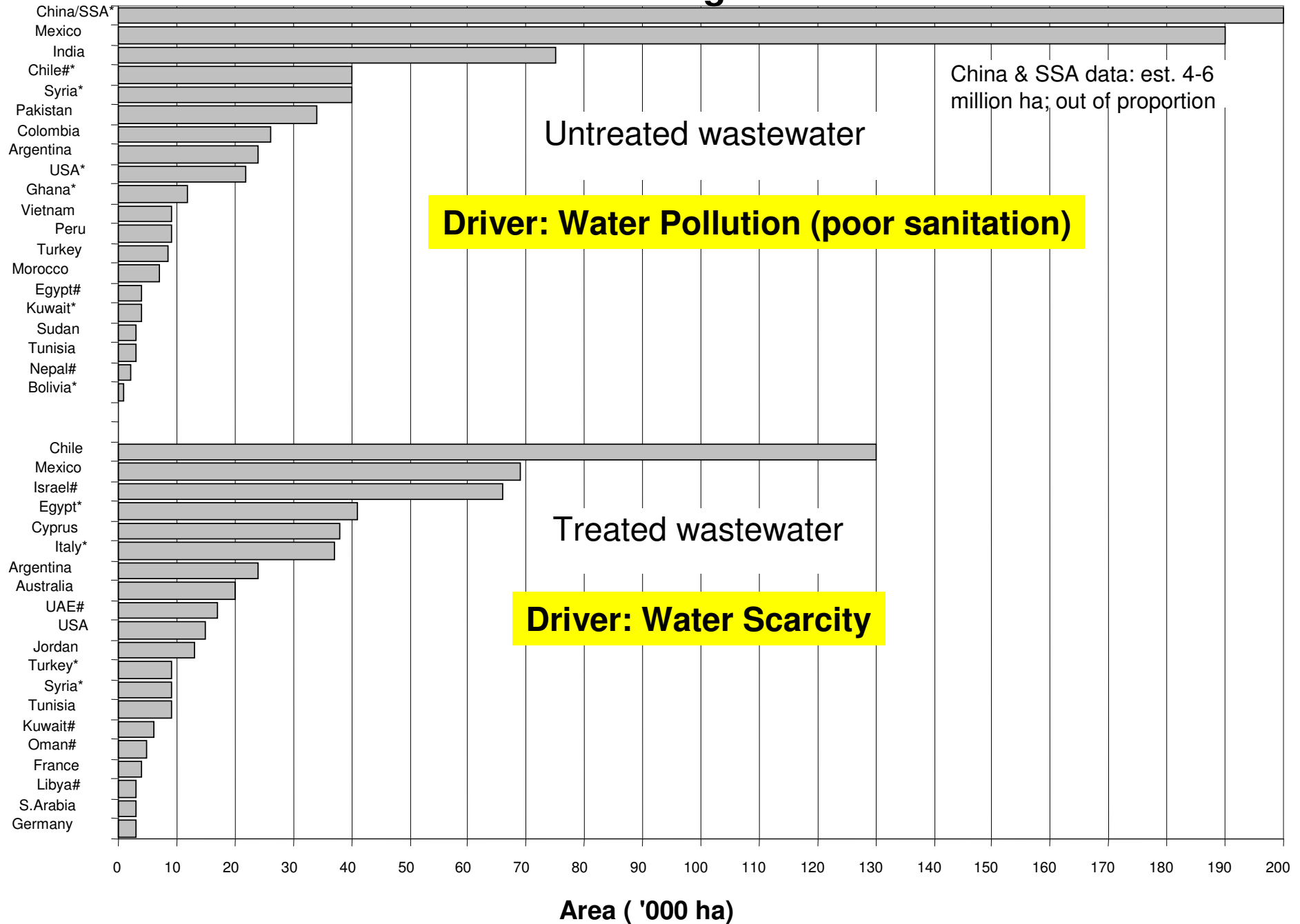


"Reality, drivers and potential (challenges?) of wastewater reuse in urban and peri-urban agriculture"

Liqa Raschid-Sally
l.raschid@cgiar.org

Wastewater irrigated area



China/SSA
Mexico
India
Chile#*
Syria*
Pakistan
Colombia
Argentina
USA*
Ghana*
Vietnam
Peru
Turkey
Morocco
Egypt#
Kuwait*
Sudan
Tunisia
Nepal#
Bolivia*

Chile
Mexico
Israel#
Egypt*
Cyprus
Italy*
Argentina
Australia
UAE#
USA
Jordan
Turkey*
Syria*
Tunisia
Kuwait#
Oman#
France
Libya#
S.Arabia
Germany

Area ('000 ha)

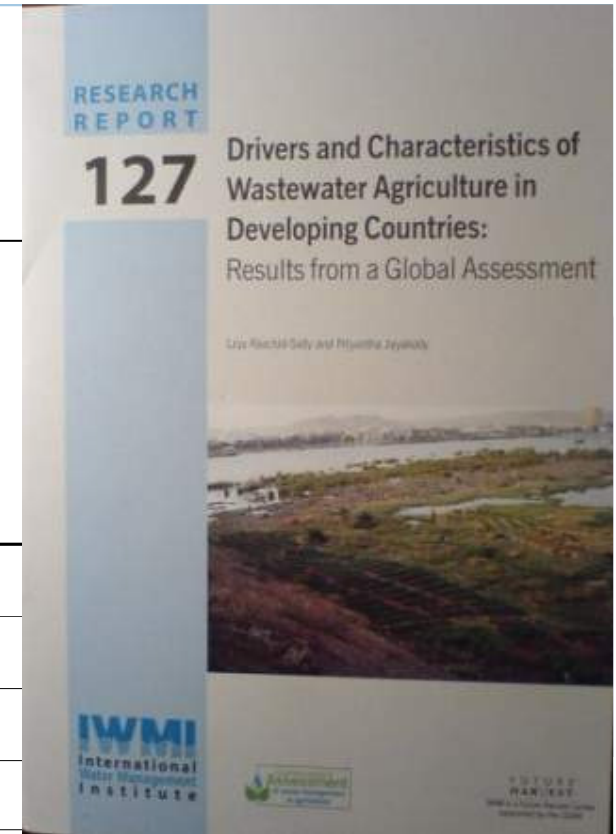
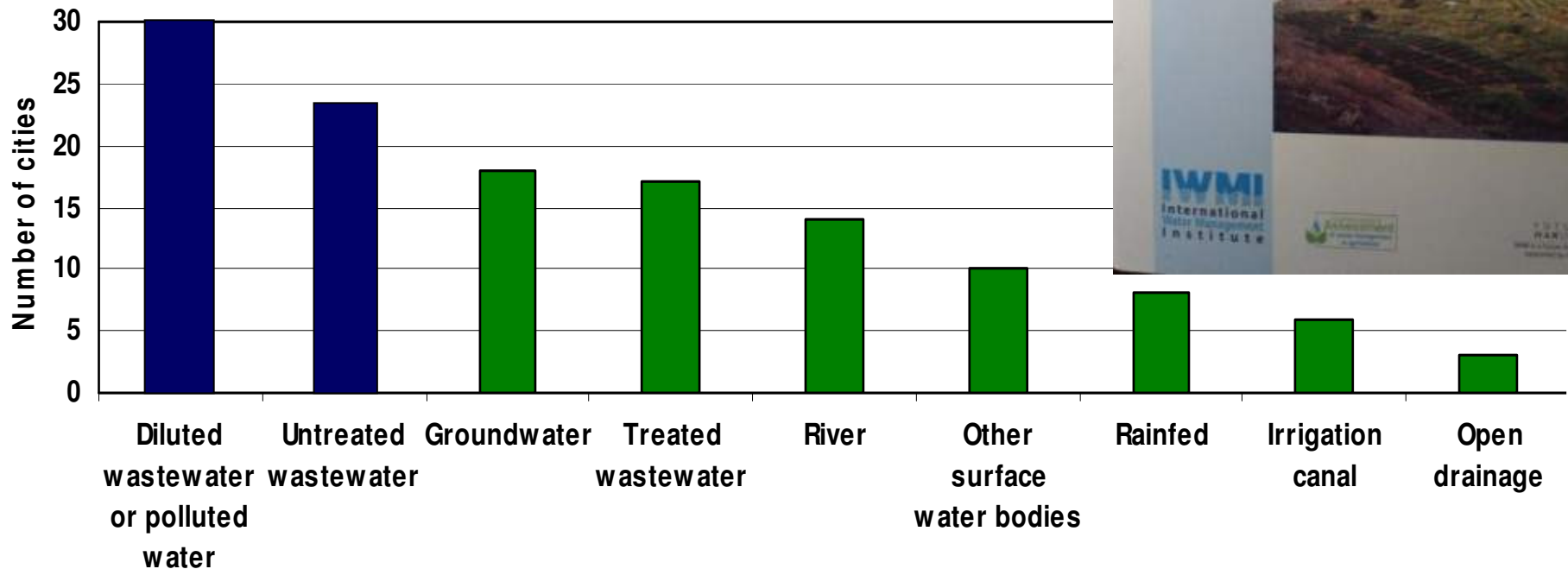
China/SSA
Mexico
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Egypt#
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Sudan
Tunisia
Nepal#
Bolivia*

Chile
Mexico
Israel#
Egypt*
Cyprus
Italy*
Argentina
Australia
UAE#
USA
Jordan
Turkey*
Syria*
Tunisia
Kuwait#
Oman#
France
Libya#
S.Arabia
Germany

18 x

Area ('000 ha)

In and around **three** of **four** cities in the developing world farmers use polluted irrigation water for the production of high value crops



In some countries, like Ghana, we have 10 times more hectares under such “informal” urban and peri-urban irrigation than in official rural irrigation schemes in the whole country

In response to pollution as a driver

- Target: Minimising health risk through WASH and FH
 - Global and national assessments
 - Health risk assessments (farmers, consumers)
 - Health risk mitigation (w & w/o treatment)
 - Cost effectiveness analysis

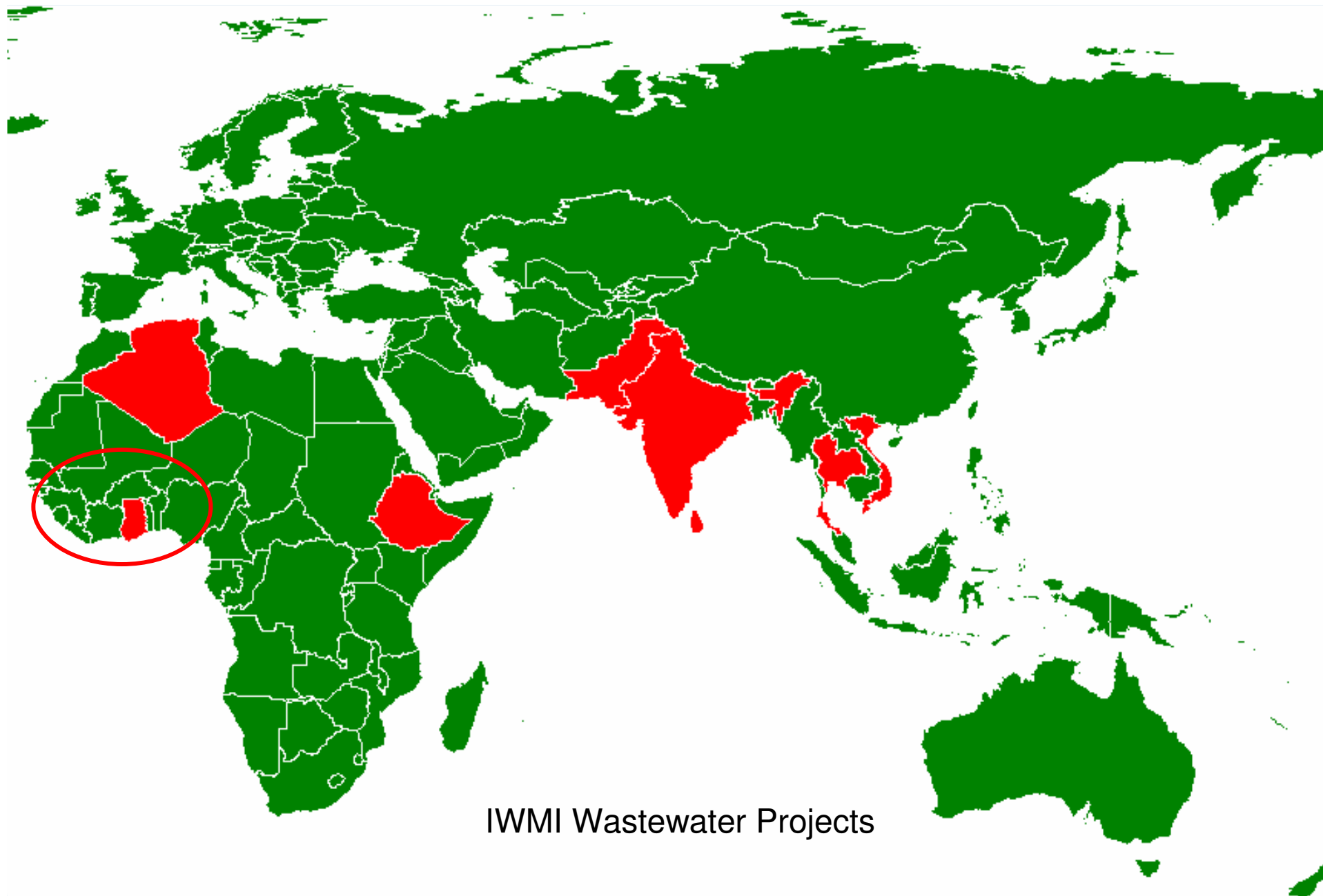
Partner: WHO, FAO, Universities of Copenhagen, Leeds, Melbourne, etc. www.iwmi.org

- Target: Wastewater Governance
 - Multi-stakeholder dialogues (sanit.<--> agric.)
 - Capacity building

“Treatment for disposal”

→ *“Treatment for reuse”*

Partner: Universities of California, Durban, Wageningen, Melbourne etc.



IWMI Wastewater Projects

Improving water and land resources management for food, livelihoods and nature

Highlights from a few IWMI projects in Asia

- Pioneering work in Pakistan on the economics of high value cash crop cultivation with sewage in formal irrigation schemes – farmers purchasing ww from municipal authorities.
- National assessments in Pakistan and Vietnam on ww use in agriculture followed by more in depth research with farmers in on farm.
- More recent work in Bangladesh and Sri Lanka on wastewater for livelihoods (WASPA program) through participatory action planning for risk minimisation, with local authorities farmers and polluters for improving governance.
- IWMI is the focal point for RUAF activities in Asia with a major program on UPA in India.

In Africa focus on Ghana – many in depth studies

RUAF From Seed to Table (FStT)

The value chain approach in urban vegetable production in Accra, Ghana (Dzorwulu, Roman Ridge and Plant pool urban farmers)
Improved production and marketing of lettuce and other strategically selected vegetables for sale in producer owned shops and restaurants and hotels”.

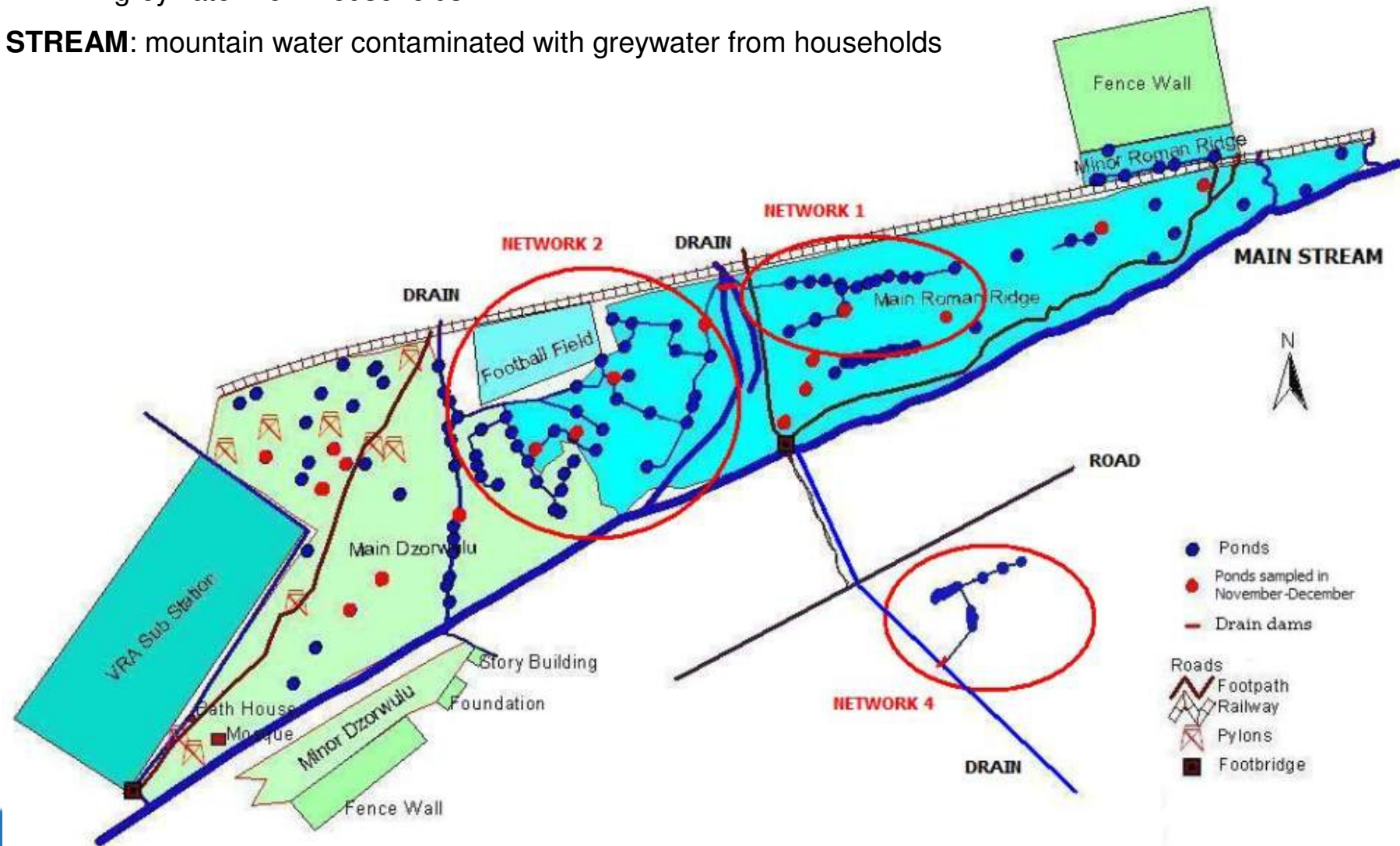


More work on field sites in Accra

- Turning dug-outs into sedimentation ponds.
- Turning cascades of dug-outs (or reservoir) into an on-farm “treatment” system
- Wastewater filtering to remove organic human waste
- Ongoing investigation on Urine use -
Link to productive sanitation- collaboration with a private entrepreneur

DRAIN: greywater from households

STREAM: mountain water contaminated with greywater from households







Co-composting Pilot Station, Kumasi



COMLIZER development

Fortification of fertilizer with excreta based compost

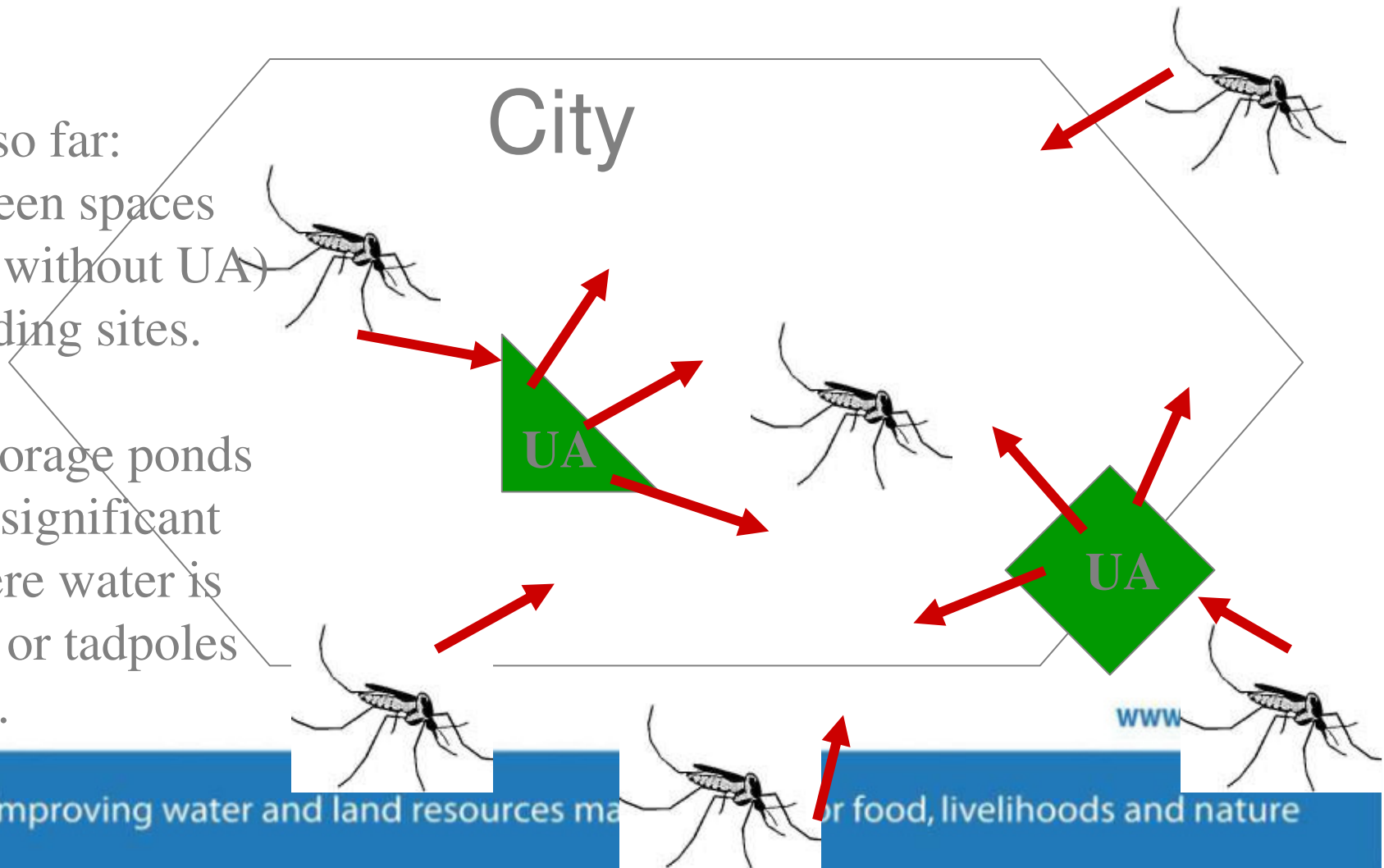


Does irrigated UA open the city door for *Anopheles* and lead to urban malaria ? (Kumasi, Accra)

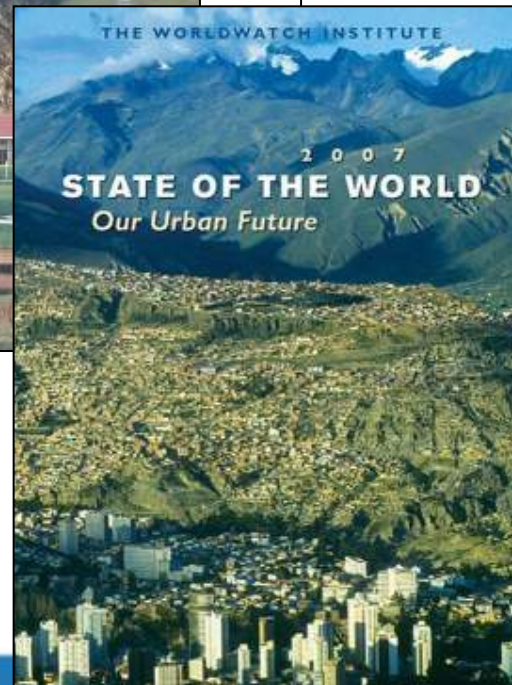
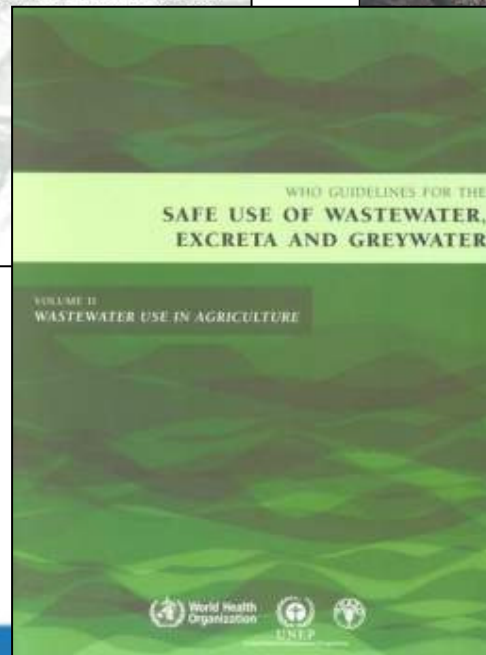
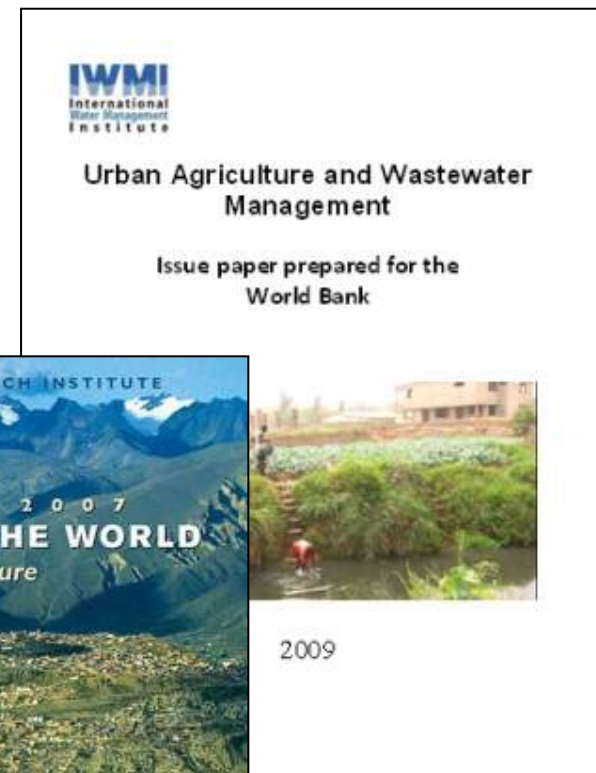
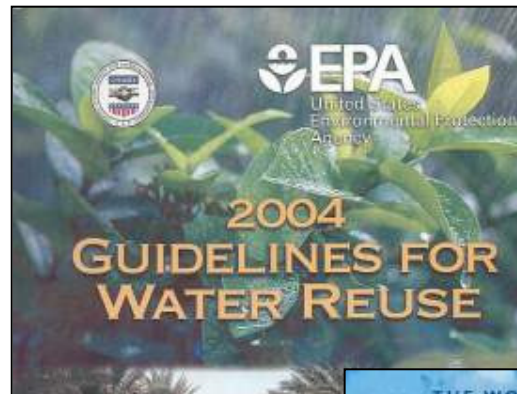
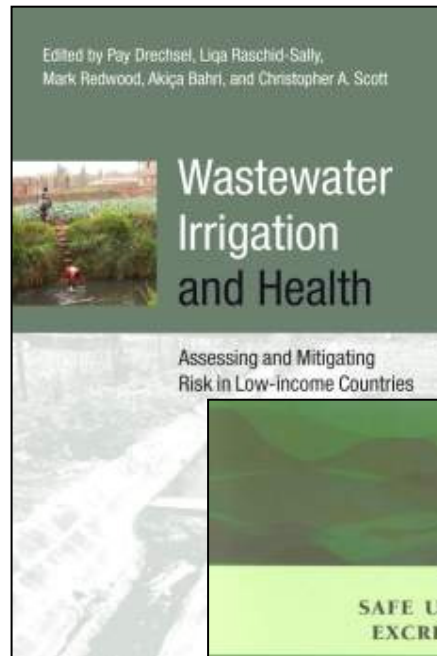
Results so far:

Open green spaces
(with or without UA)
are breeding sites.

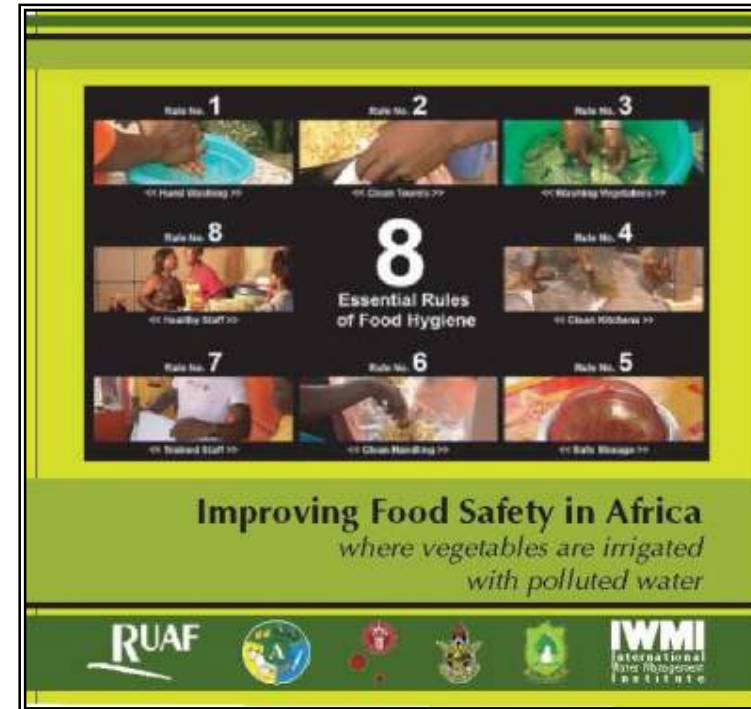
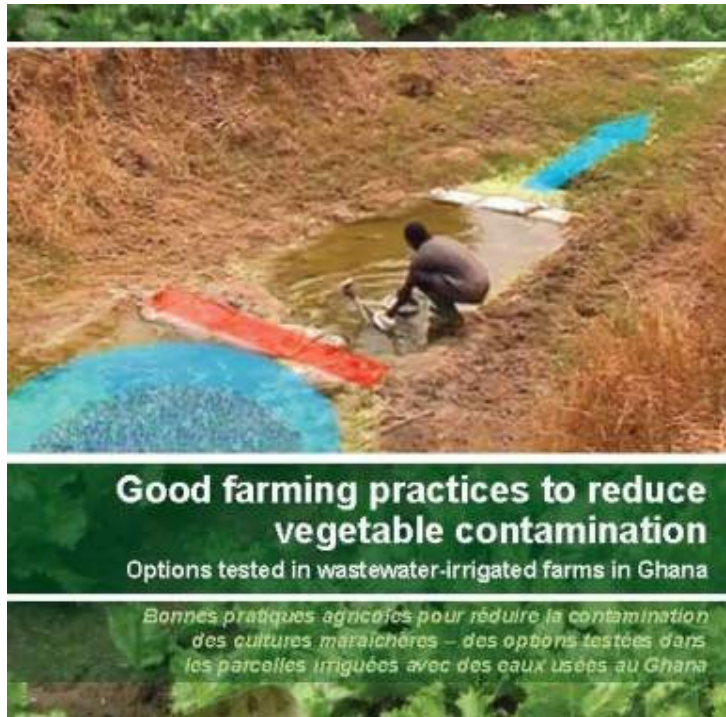
Water storage ponds
have no significant
role where water is
polluted or tadpoles
frequent.



Outputs & Impacts



Videos for trainers



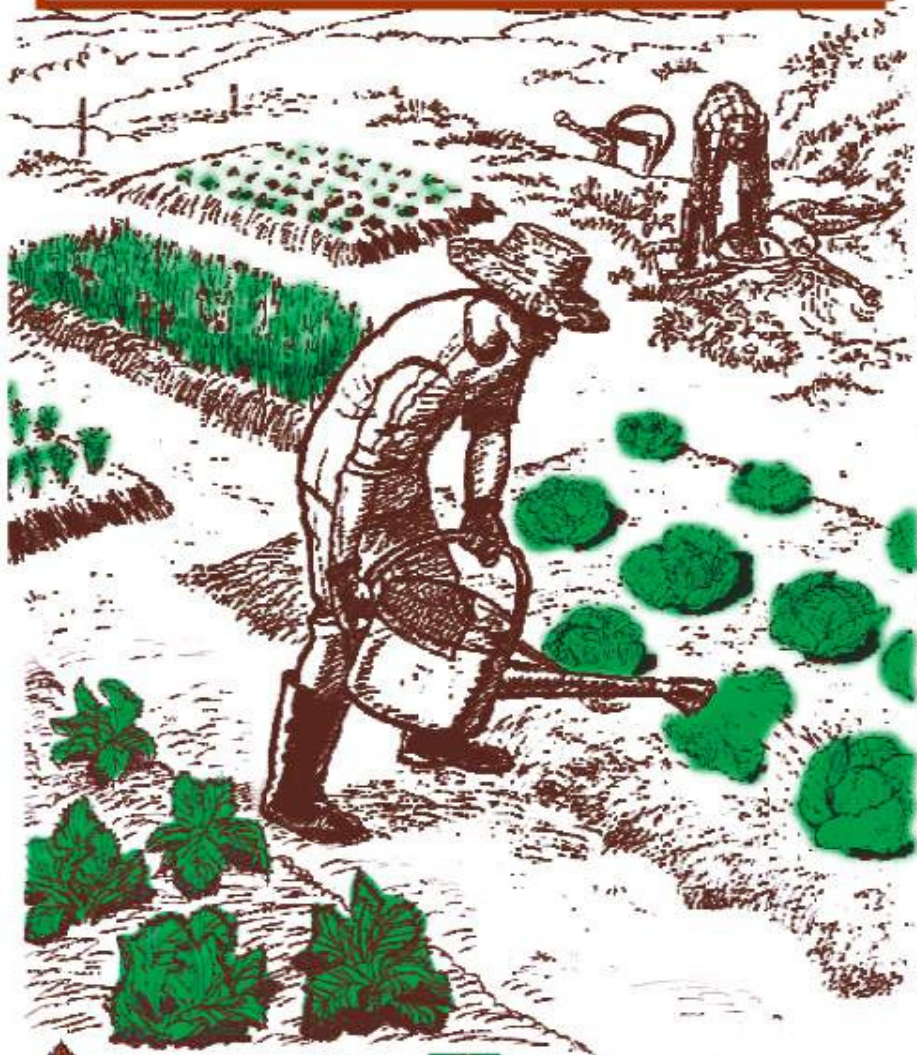
All videos available online

video.google.com/videoplay?docid=-3530336707586348166&hl=en
(good farming practices)

video.google.com/videoplay?docid=-6891955003003280662&hl=en
(good practices for street food restaurants)

video.google.com/videoplay?docid=-8395461859469738471&hl=en (introduction into the wastewater irrigation challenge)

**SAFER IRRIGATION PRACTICES FOR REDUCING VEGETABLE
CONTAMINATION IN SUB-SAHARAN AFRICA
AN ILLUSTRATED GUIDE FOR EXTENSION OFFICERS**



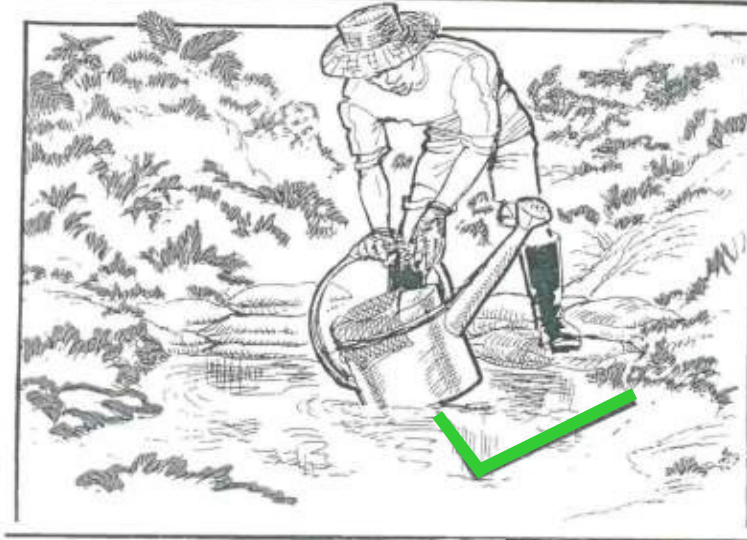
IWMI
International
Water Management
Institute



The Knowledge Sharing
project of **ict-am**
International Center for Agricultural
Knowledge and Innovation



Supporting FFS Guidelines



Regional adaptation of educational materials



Five keys to safer food



Keep clean

- Wash your hands before handling food and after doing food preparation.
- Wash your hands with soap after going to the toilet.
- Wash and sanitize all surfaces and equipment used for food preparation.
- Protect kitchen areas and food from insects, pests and other animals.

Why?
Keep clean is a basic recommendation. Dirty hands are a major cause of foodborne illness. Washing your hands with soap and water kills germs that can cause illness. Washing surfaces and equipment used for food preparation kills germs that can cause illness. Protecting kitchen areas and food from insects, pests and other animals helps prevent food contamination.



Buy safe raw materials and keep them separate from cooked food

- Store raw meat and other raw food from a trusted source.
- Do not use food beyond its expiry date.
- Choose food with no visible signs of spoilage and keep consistently cool.
- Separate raw meat, poultry and seafood from other food, by using separate containers and separate tools to handle and cutting boards.

Why?
Raw food, the bacteria that, multiply and spread on surfaces, such as packaging material, surfaces. Food prepared, cooked or sealed is safe to eat. These raw materials can be contaminated with germs that can cause illness. If you use the same tools to handle raw and cooked food, you can spread germs. It is important to keep raw and cooked food separate to avoid contamination.



Cook thoroughly

- Cook food thoroughly, especially meat, poultry, eggs, and seafood.
- Bring food like soups and stews to boiling. For steaks and poultry, check with a thermometer.
- Reheat cooked food thoroughly if it's cooked once after the first serving.

Why?
Cooking kills germs that cause illness. The water temperature used to cook food should be high enough to kill germs. If you use a thermometer, you can be sure the food is cooked thoroughly. Reheating food thoroughly kills germs that may have survived the first cooking.



Keep food at safe temperatures

- Do not leave cooked food at room temperature for more than 2 hours to prevent the growth of raw microorganisms. Always reheat food kept for any future eating.
- For storage refrigerate promptly at cooled and preferably below 5 degrees Celsius.
- Keep cooked food piping hot after to serving.
- Do not store food for long time in the refrigerator.

Why?
Microorganisms can multiply very quickly at room temperature. If you leave food at room temperature for more than 2 hours, you can increase the risk of foodborne illness. Refrigerating food slows down the growth of germs. Keeping food piping hot after to serving kills germs that may have survived the first cooking.



Use treated water and wash vegetables the right way

- Use only a gallon of chlorine in 5 liters of water to wash vegetables.
- Do not use hot water to wash vegetables. Hot water can damage the texture and taste of vegetables.
- Do not use a hot water to wash vegetables. Hot water can damage the texture and taste of vegetables.
- Do not use a hot water to wash vegetables. Hot water can damage the texture and taste of vegetables.

Why?
Using treated water helps prevent foodborne illness. Washing vegetables with treated water kills germs that can cause illness. Using hot water to wash vegetables can damage the texture and taste of vegetables. Using hot water to wash vegetables can also kill the beneficial bacteria on the surface of vegetables.



Accra: from Arrest to Award

thank you

Influencing municipal and national policies and regulations



Irrigation reality, es used for v unaware of bring. Nor d now available sustainable wit technologies alc from many angle harmonize with ne



Key partner:



Recognition of CPWF38 & CP51

- CGIAR approves linked *Knowledge Sharing* project 2006
- WHO & FAO selected our field trials to test their new wastewater use guidelines (multi-barrier approach) 2007
- Our team becomes member of Global Expert Panel *CODEX ALIMENTARIUS Fresh fruits & Vegetables*” 2007
- FAO selected our field trials to develop *FFS modules* on wastewater use 2007
- Best Policy Paper prize at IWA Specialist Conference on Wastewater 2007
- WHO approves our adaptation of their food safety poster 2007
- Results influenced Ghana’s National Irrigation Policy 2008
- WHO is asking us for fact sheets for extension officers and national policy makers explaining their new guidelines 2008
- Google Foundation is asking for a feasibility study on how to translate the research into impact at national scale 2008