

The WHO logo is a red emblem featuring a central map of the world, surrounded by a laurel wreath. It is positioned in the background of the slide, partially obscured by the text.

Water Safety Plans for developing countries

Dr Roisin Rooney

Water and Sanitation

WHO SEARO

Conference on Health and Environment
March 24-25 2006, New Delhi, India



Outline of talk

- Background information on Water Safety Plans
- Limitations of traditional inspection and testing
- Risk management and WHO guidelines
- Example of implementing a Water Safety Plan



Water safety plans

- Developed by the water industry, international experts and WHO
- Designed to assess risks and identify ways in which risks can be managed
- Based on Hazard Analysis Critical Control Point (HACCP) model



Traditional approach - limitations

- Relies heavily on end product testing
- Wide range of parameters that could be monitored
- Not technically feasible
- Indicator organisms e.g. *E coli*, *coliforms*, provide a common measure of potential risk – do not correlate well with risks from protozoa and viruses



Water sampling – limitations

- Promotes reactive management – corrective actions are initiated after monitoring reveals that the water quality is unsatisfactory.
- Monitoring uninformative about the exact nature, location and timing of problem

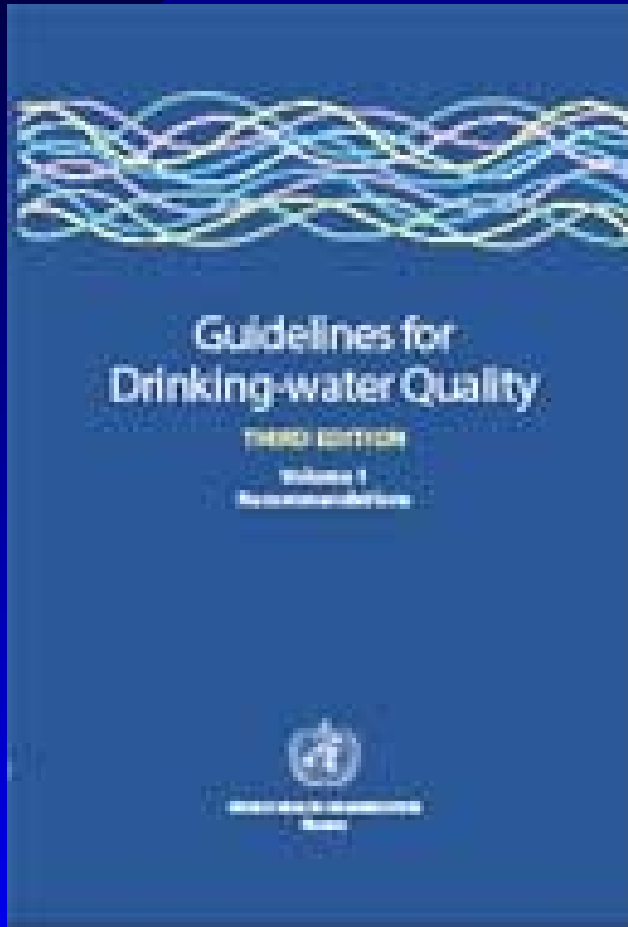


Risk management

- Trend over past 10 years
- Good quality management systems
- Australians incorporated Hazard Analysis Critical Control Point (HACCP) into drinking water guidelines in 2002
- Harmonization of risk management approaches across water and food exposure routes is logical



Third Edition of the WHO Guidelines on Drinking-water quality



- Departure from previous editions
- Place emphasis on risk assessment and risk management
- Less emphasis on analysis of water quality



Guidelines – 5 key steps for water safety

- Health based targets
- System assessment
- Operational monitoring of the control measures in the supply chain
- Management plans
- A system of independent surveillance that verifies that the above are operating properly.



Water Safety framework

- First undertaken by the health sector
- 2-4 typically the responsibility of water supply agencies
- Final component form the basis of regulation



Similar approaches

- Australian risk management framework
- New Zealand Public Health Risk management plan
- Developing countries – Uganda, India, Bangladesh, Maldives
- European Union (EU) preferred approach



Basis of a Water Safety Plan

- Document and describe system
- Undertake hazard assessment
- Identify control measures
- Define monitoring for control measures
- Implement corrective actions – normal and incident conditions
- Verification
- Documentation



Example of implementation











- **Maldives**
- **Water quality deteriorated after tsunami**
- **Rainwater harvesting kits provided**



Document and describe system

- **Flow diagram to identify routes of potential contamination**
- **Water source, water treatment, distribution, storage.**

<u>Code</u>	<u>Step</u>	<u>Description</u>	<u>Responsibility</u>
R1		Source (roof)	Community
R2		Transport (guttering)	Community
R3		Storage (tank)	Caretaker
R4		Tap	Caretaker
R5		Water collected in vessel	Villagers
R6		Water transported in vessel	Villagers
R7		Storage at point of use	Villagers
R8		Use	Villagers



Hazard assessment

- Chemical – e.g. chemicals from roof
- Biological – e.g. protozoa e.g. *toxoplasma gondii* cysts from cats
- Physical – debris from birds nest





Hazardous events

- **Rainfall insufficient, biofilm in tank,**
- **Faecal contamination of roof by vermin and birds**
- **Leaching of chemicals from roof materials**
- **Chemical contamination of water by air pollution, contaminated buckets**
- **Tank – breeding site for mosquitoes**



Control measures

- Control measures are any activities that can reduce levels of hazards within water either by preventing entry or reducing contamination
- Need to prioritize control measures
- Protection of water and treatment

Process Step	Hazardous Event	Hazard Type	Control Measures Current and/or Planned
Rainwater tank	Contamination of tank from contaminated water in first flush	Microbial	First-flush diversion system used to divert first rainwater away from tank
	Ingress of contaminated water through tank or tank base	Microbial	Tank must have a cover and be in good structural condition; base to be protected by proper drainage to prevent undercutting
	Rainwater collection tank becomes a breeding site for mosquitoes	Biological	Ensure vents have mosquito meshing in good condition
	Contamination of stored water through use of buckets to withdraw water	Microbial	Ensure tank has a tap as the outlet for water from the tank





Monitoring of control measures

- Sanitary surveys – condition of guttering etc
- Integrity of filters
- Turbidity
- Chlorine residual



Corrective action

- Backup disinfection
- Change to alternative water source
- Structural repairs
- Reporting to Maldives Water and Sanitation Authority (MWSA)



Verification

- Audit of Water Safety Plans
- Water quality tests





Testing schedule - Risk assessment matrix

Source of Water	Six monthly tests	Monthly tests	Microbiol.	Chemical
Rainwater from community tanks/ schools	Chemical	Micro	Total and faecal coliform	Chlorides Nitrates Ammonia Phosphates EC/TDS
Rain water from domestic houses (designated locations)	Chemical	Micro	Total and faecal coliform	Chlorides Nitrates Ammonia Phosphates EC/TDS



Documentation

- Training of Community Health Workers
- Water Safety Plan records
- Sanitary surveys
- Water quality tests



Advantages of Water safety Plans

- **Systematic assessment**
- **Minimize the chance of failure**
- **Contingency plans for unforeseen events**
- **Greater involvement of staff/ community**
- **Aid inspection by regulatory authorities**
- **More effective use of resources**



Conclusion

- Water safety plans are “risk management tools” based on the Hazardous Analysis Critical Control Model (HACCP) model developed by the food industry
- New WHO Guidelines place emphasis on risk assessment and risk management
- Water Safety Plans have been implemented in a number of countries



Thank You!

**Let us act
together for
Safe
Environments
and Sustainable
Human Health!**