

# WATER SAFETY PLAN: A TOOL FOR EFFECTIVE WATER QUALITY MANAGEMENT

BONIFACIO B. MAGTIBAY  
WHO CONSULTANT  
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Hue City, Vietnam

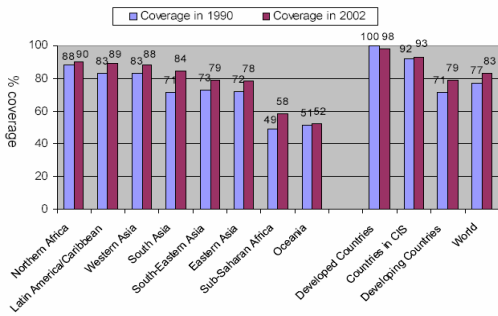


## Outline

- Water and Health Statistics
- WHO Guidelines on Drinking Water Quality Framework (3<sup>rd</sup> Edition, 2004)
- Water Safety Plan
  - Objectives
  - Components
  - Processes
- Examples
- Conclusion



Drinking water coverage by region in 1990 and 2002



Source: Meeting the MDG on Drinking Water and Sanitation, 2004; Joint Monitoring Programme, 2005

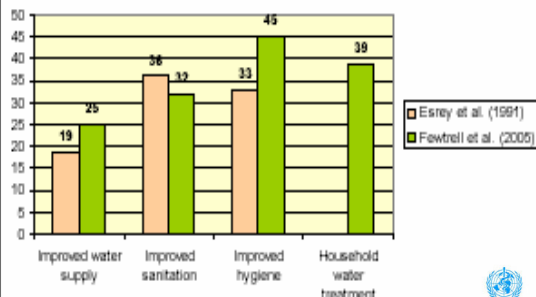


## Health statistics

- 2.4 Million deaths/year due to poor water and sanitation
- Diarrhea: 6<sup>th</sup> global killer, 3<sup>rd</sup> in morbidity
- > 73 Million DALYs (lost opportunities)



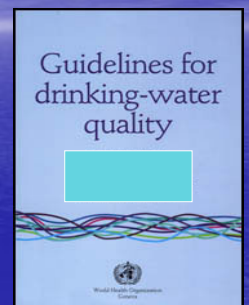
% reduction in diarrhoeal diseases morbidity from improvements in water supply and sanitation services



## WHO Guidelines for Drinking Water Quality

Previous emphasis:  
- Output monitoring: measuring parameters in product water  
- Monitors compliance to standards

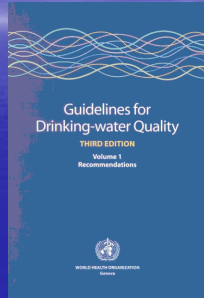
- Reactive rather than proactive
- Absence of indicators does not mean absence of risk
- In 1978-1986, 502 outbreaks of waterborne disease in the USA - most had no total coliforms or *E. coli* (Sobsey 1987)



# WHO Guidelines for Drinking Water Quality

## Present emphasis:

- **Input monitoring: measuring parameters to show that the system is working**
- Meeting health-based targets
- Use of risk management
- Use of multi-barrier approach (HACCP principles)
- Application of water safety plan
- Independent surveillance



## Health-based targets?

- Targets based on public health protection and disease prevention
- Established by high-level authority on health

Ex. Reduction of cases of diarrheal diseases due to drinking water



## What is risk management?

- Systematic assessment of risks
  - from catchment to consumer
- Identification of ways to manage the risks
- Ensures control measures work effectively
- Deals with day to day management
  - how to address failures



## What is independent surveillance?

- It verifies if the system operates properly
- Could be done by water supplier or surveillance agency



## What is Water Safety Plan?

- a management tool
- uses a comprehensive risk assessment and risk management approach encompassing all steps in water supply
- from water source (catchment) to consumer.



## WSP Objectives

- minimize contamination of source water
- remove contamination thru treatment
- prevent re-contamination during storage, distribution and handling of drinking-water



## WSP Components

- System assessment
- Monitoring of control measures
- Management plan



## WSP Part 1 System Assessment

*Ensures that water quality meets health-based targets*

- Identifies and assesses risks
- Identifies control measures
- Validates processes
- Considers system improvements



## WSP Part 2 Monitoring Control Measures

*Detects any deviation in the system*

Parameters for monitoring reflect effectiveness of control measures

e.g. Residual Chlorine, Turbidity, pH



## WSP Part 3 Management Plan

*Describes response mechanisms to any deviation in the system*

Documents the following:

- system assessment
- control measures
- monitoring plan
- corrective actions
- communication plan
- support programs



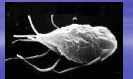
## Procedures for Developing a WSP

- Organize a team
- Describe the drinking water system
- Identify hazards and risks
- Assess and prioritize hazards
- Determine control measures
- Establish monitoring of control measures
- Establish management responses
- Establish validation and verification
- Establish record keeping, documentation and communication



## Hazard and risk characterization

- Hazard – something that can do harm
- Hazardous event – incident or situation which can lead to a hazard
- Risk – likelihood of hazard causing harm  
likelihood x severity



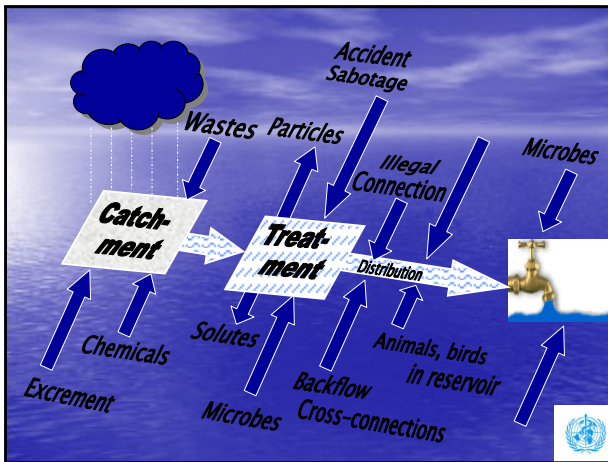
## Likelihood and Severity

Item	Definition
<b>Likelihood categories</b>	
Almost certain	Once per day
Likely	Once per week
Moderately likely	Once per month
Unlikely	Once per year
Rare	Once every 5 years
<b>Severity categories</b>	
Catastrophic	Potentially lethal to large population
Major	Potentially lethal to small population
Moderate	Potentially harmful to large population
Minor	Potentially harmful to small population
Insignificant	No impact or not detectable



## Ranking the Risks

	Insignificant	Minor	Moderate	Major	Catastrophic	
Almost Certain	Medium	5	Medium	10	Undesirable	15
Likely	Low	4	Medium	8	Undesirable	12
Possible	Low	3	Low	6	Medium	9
Unlikely	Very Low	2	Low	4	Low	6
Rare	Very Low	1	Very Low	2	Low	3



## Example 1 - Source water

- Event – Source water receives faecal contamination
- Hazard – pathogenic micro-organisms
- Level of risk – moderate? high?
- Cause – People active in catchment
- Control measure – education of people in catchment to prevent contamination of source water



## Example 2 - Treatment

- Event – Not enough free available chlorine
- Hazard – Micro organisms are not destroyed
- Level of risk – High
- Cause – power failure
- Control measure – install standby generator
  - turn off supply until power restored



## CONCLUSION

- WSP demonstrates the shift of strategy from output monitoring to input monitoring of water quality
- WSP is proactive rather than reactive
- WSP is more preventive rather than corrective
- WSP ensures better water safety



THANK YOU  
AND  
GOOD DAY!!!

