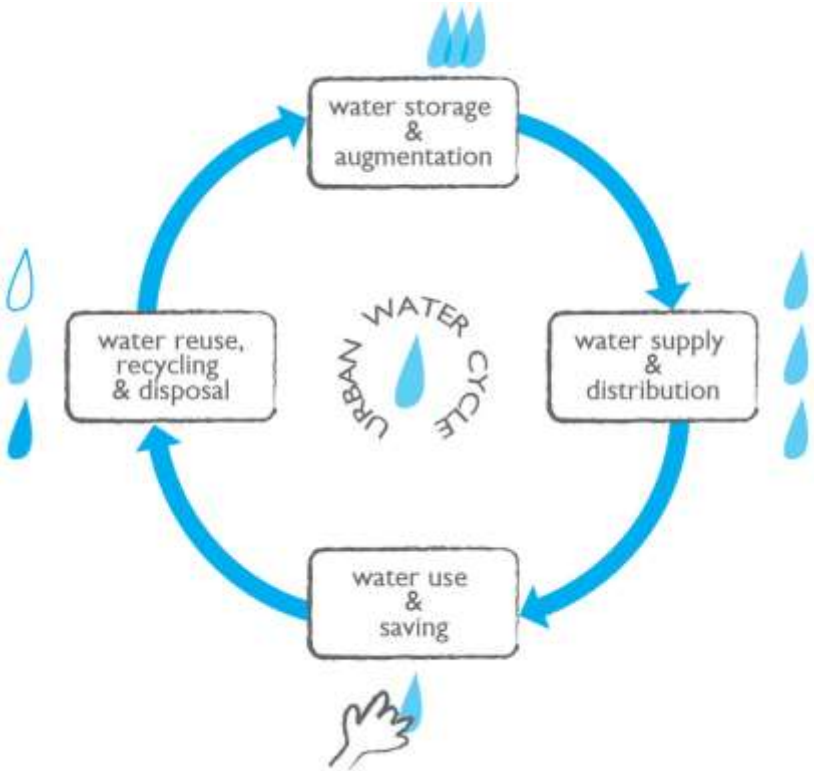
Wastewater Management in Developing Countries



Dr. Mushtaq Ahmed Memon

(mushtaq.memon@unep.or.jp)

Programme Officer , UNEP IETC

Overview

- Paradigm shift and technology needs
- Assessment of demand
- Challenges and opportunities
- UNEP IETC work

Paradigm Shift and Technology Needs

20th CENTURY

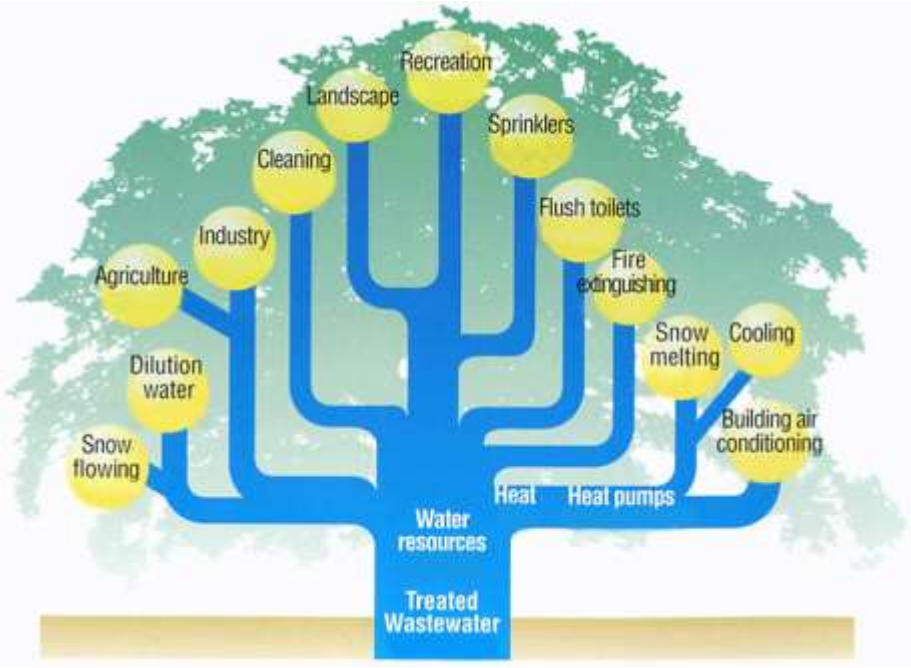
WASTEWATER MANAGEMENT

"How do we get rid of our wastewater efficiently with minimum damage to public health and the environment?"

21st CENTURY

RESOURCE MANAGEMENT

"How do we handle wastewater including rainwater to augment water supply?"



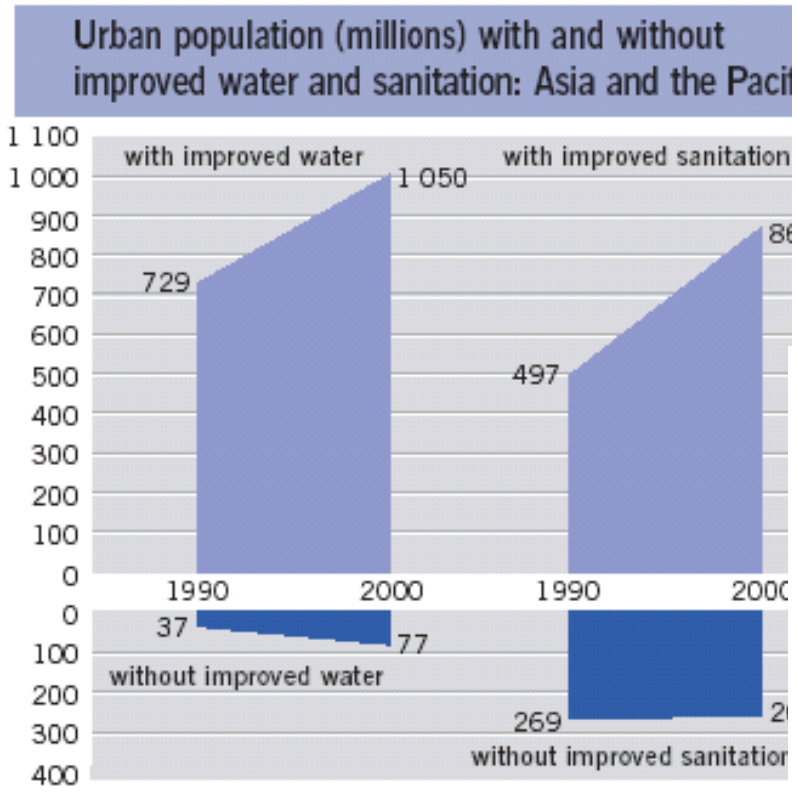
Water and Sanitation in Asia

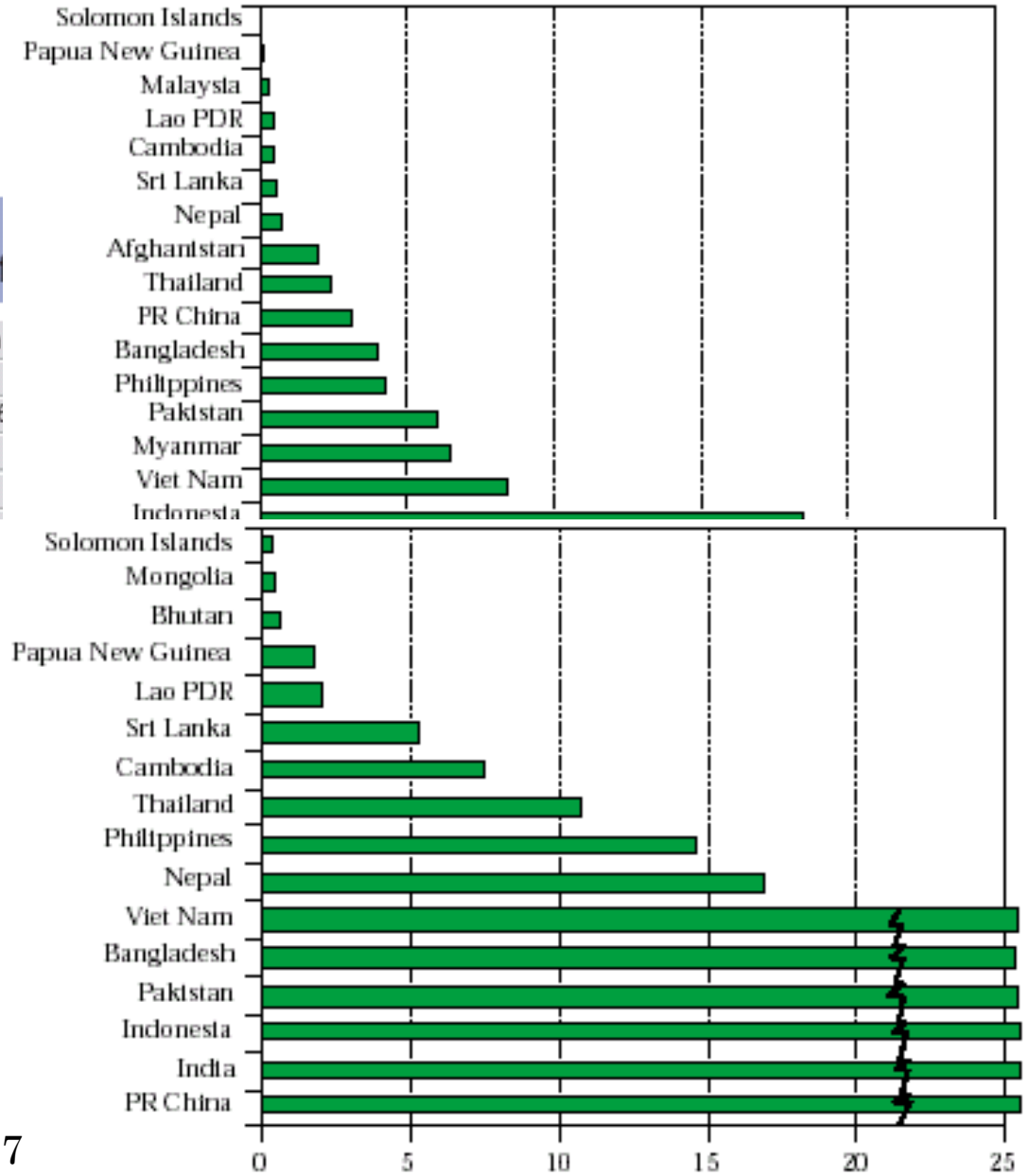
	Year	Population			Water Supply Coverage (%)						Sanitation Coverage (%)					
		Total	Urban	Rural	Total		Urban		Rural		Total		Urban		Rural	
		('000)	(%)	(%)	Total Access	Household Connections	Total Access	Household Connections	Total Access	House Connections	Total Access	Sewer Connections	Total Access	Sewer Connections	Total Access	Sewer Connections
Asia and the Pacific	1990	3,263,921	33	67	74	38	95	70	64	22	34	13	70	33	16	2
	2002	3,838,218	39	61	82	43	94	73	75	24	49	16	75	37	33	3
East and Northeast Asia	1990	1,349,962	33	67	74	55	99	85	62	40	32	10	71	28	12	1
	2002	1,502,315	42	58	80	64	94	92	70	43	50	20	73	43	33	3
North and Central Asia	1990	215,178	65	35	91	71	96	86	82	42	82	64	92	83	63	26
	2002	217,858	63	37	91	72	98	90	79	40	79	63	90	84	59	26
Pacific	1990	26,672	70	30	89	67	100	93	63	6	90	54	99	77	69	0
	2002	31,828	73	27	87	69	99	92	53	8	87	55	98	75	57	0
South and Southwest Asia	1990	1,232,183	28	72	71	21	90	56	64	7	23	9	58	29	9	1
	2002	1,550,605	31	69	85	26	94	54	80	13	39	10	69	27	25	3
Southeast Asia	1990	439,926	32	68	73	14	91	37	65	3	48	2	67	6	39	0
	2002	535,612	41	59	79	23	91	45	70	8	61	3	79	7	49	0

Source: Figures dervived from data in *Meeting the MDG drinking water and sanitation target: A mid-term assessment of progress*. WHO and UNICEF. 2004. United Nations, New York.

Source: http://www.adb.org/Water/Indicators/MDG-7/Table-02.pdf

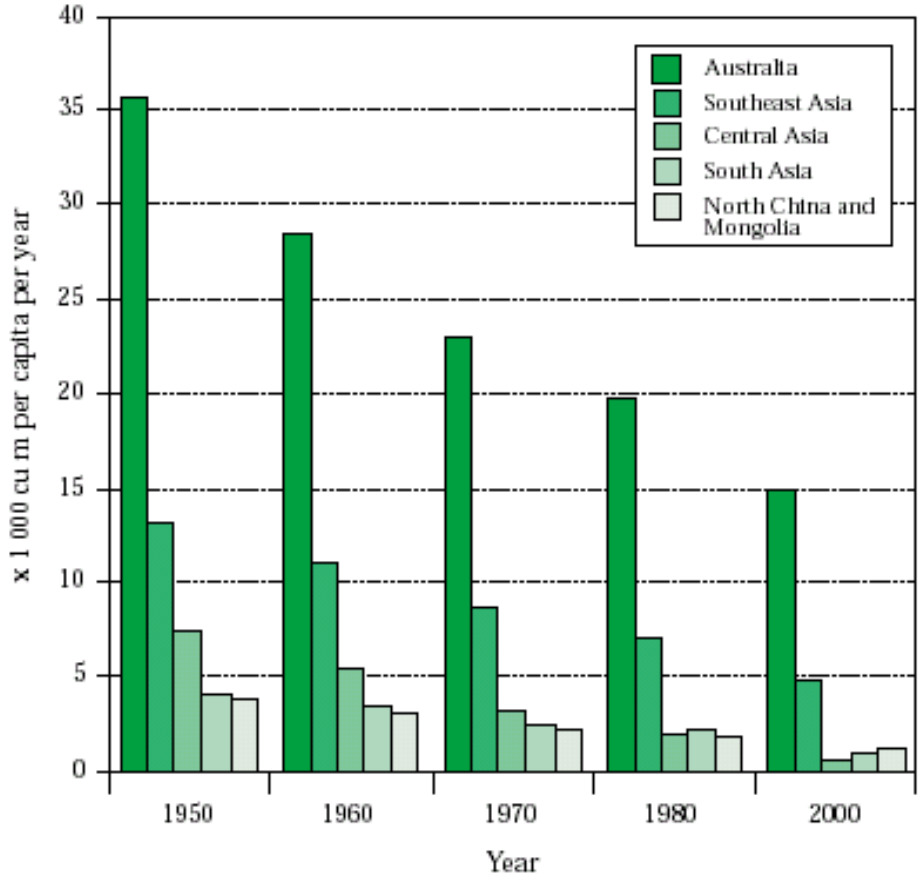
Water and Sanitation Coverage



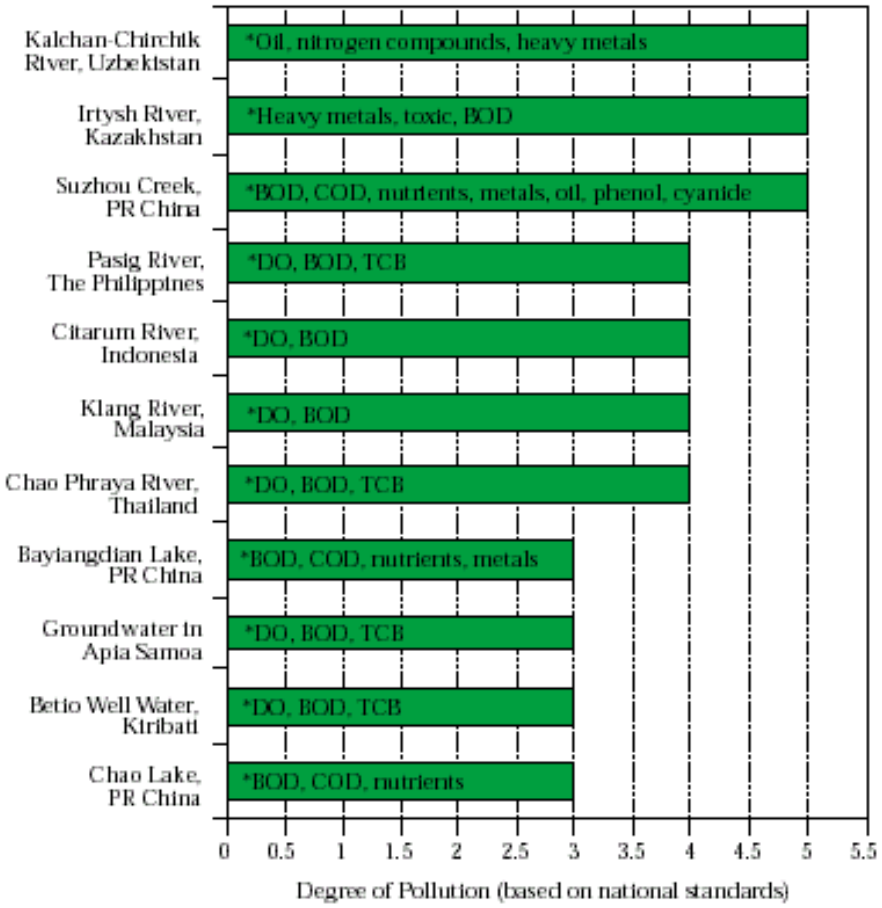


Source: World Bank 1997

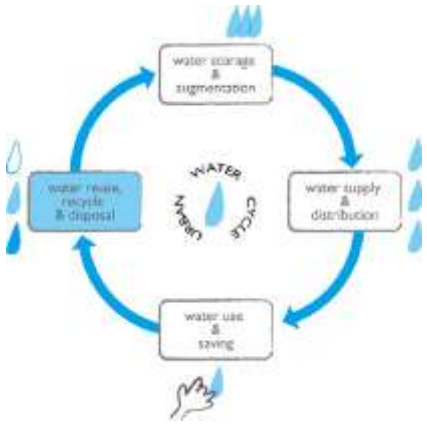
Water Availability and Water Pollution



Source: Shiklomanov 1997



Source: ADB 1998

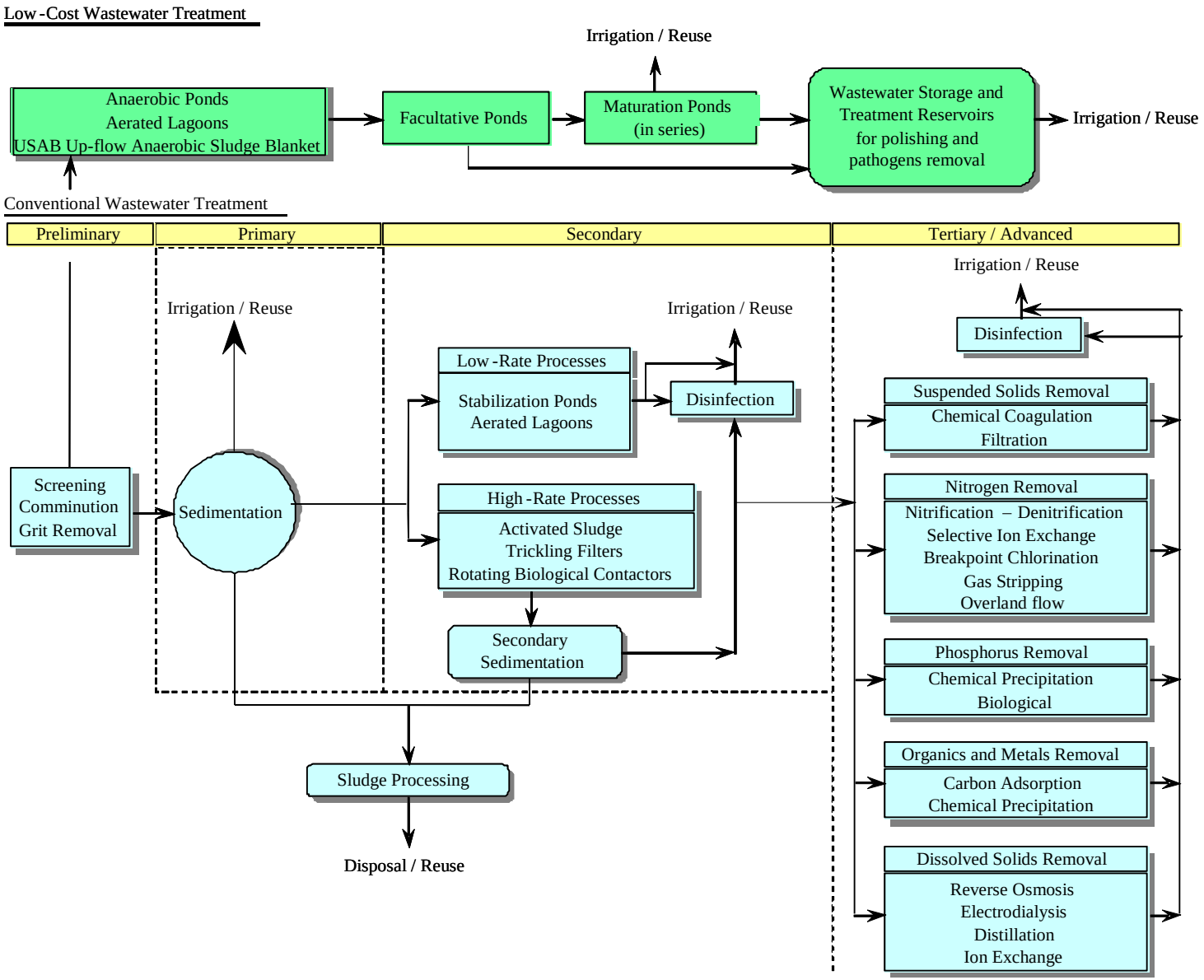


Reuse, recycle & disposal ESTs

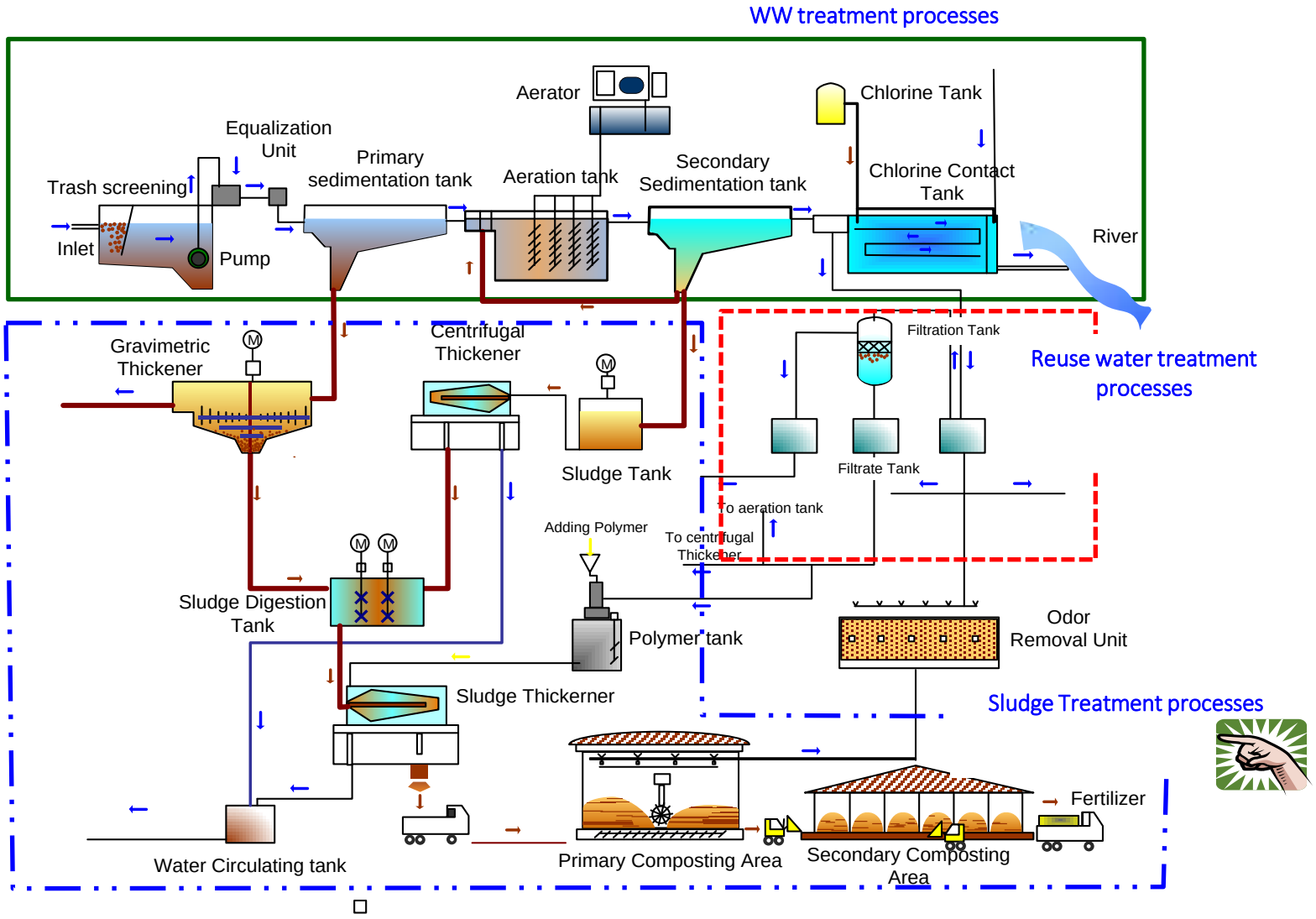
quality and treatment issues

1. Domestic rainwater use
2. On-site treatment of grey water
3. Constructed wetlands
4. On-site and near-site treatment of black water and mixed sewage
5. Separating rainwater from sewer systems
6. Environmentally sound centralized sewage treatment in developing countries

Municipal Wastewater Reuse



Wastewater Treatment



INTERNATIONAL ENVIRONMENTAL TECHNOLOGY CENTRE
国際環境技術センター

- The International Environmental Technology Centre (IETC) is a branch of the Division of Technology, Industry, and Economics (DTIE) and is leading the waste management portfolio within UNEP.

- UNEP IETC focuses on identifying and showcasing environmentally sound technologies (ESTs) and management practices, primarily in relation to waste.

UNEP IETC is located in Osaka, Japan.

Wastewater Reuse

Water scarcity and water pollution pose a critical challenge in many developing countries. In urban areas, it is becoming difficult for the authorities to manage water supply and wastewater. Strategies for water and wastewater reuse can improve urban water management.
This publication provides introductory guidelines for these strategies.
The important aspects to minimize public health risks are identified.
The possibilities of wastewater reuse in agriculture, industry, urban uses, and environmental water enhancement including groundwater recharge are discussed with the help of practical examples.
The capacity building, policy-making, institutional strengthening, financial mechanisms, and awareness raising and stakeholder participation are vital to implement these strategies for wastewater reuse.

www.unep.org

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UNEP UNEP

WATER AND WASTEWATER REUSE

An Environmentally Sound Approach for Sustainable Urban Water Management

UNITED NATIONS ENVIRONMENT PROGRAMME

GEC

DTI/0625/PA

Wastewater Reuse Publication

- 1. Introduction
- 2. Wastewater Reuse as Environmentally Sound Technologies (ESTs)
- 3. Requirements for Wastewater Reuse
- 3-1. Basic Principles of Wastewater Treatment
- 3-2. Public Health Risk Minimization
- 4. Wastewater Reuse Applications
- 4-1. Wastewater Reuse for Agriculture
- 4-2. Wastewater Reuse for Industry
- 4-3. Urban Applications
- 4-4. Wastewater Reuse for Environmental Water Enhancement
- 4-5. Groundwater Recharge
- 5. Key Factors for Establishing Initiatives
- 6. Building Capacity for Water and Wastewater Reuse
- 6-1. Capacity Building: Human Resource Development
- 6-2. Capacity Building: Policy and Legal Framework Development
- 6-3. Capacity Building: Institutional Development and Organizational Management
- 6-4. Capacity Building: Financing
- 6-5. Capacity Building: Raising Public Awareness and Parti
- 7. Moving Forward

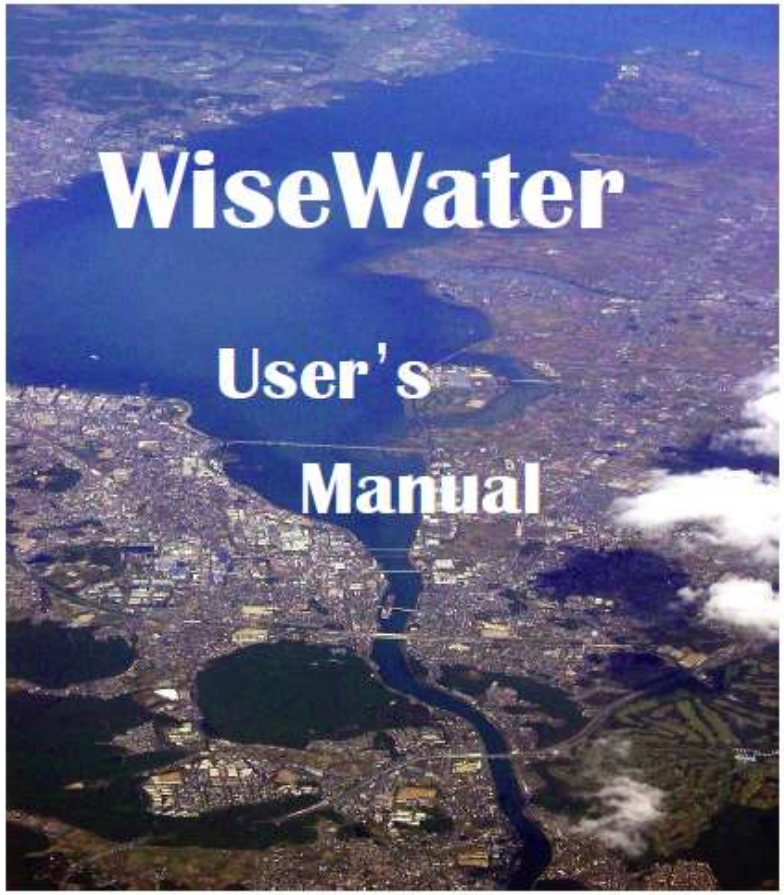
UNEP

WATER AND WASTEWATER REUSE

An Environmentally Sound Approach for Sustainable Urban Water Management

INTERNATIONAL ENVIRONMENTAL TECHNOLOGY CENTRE

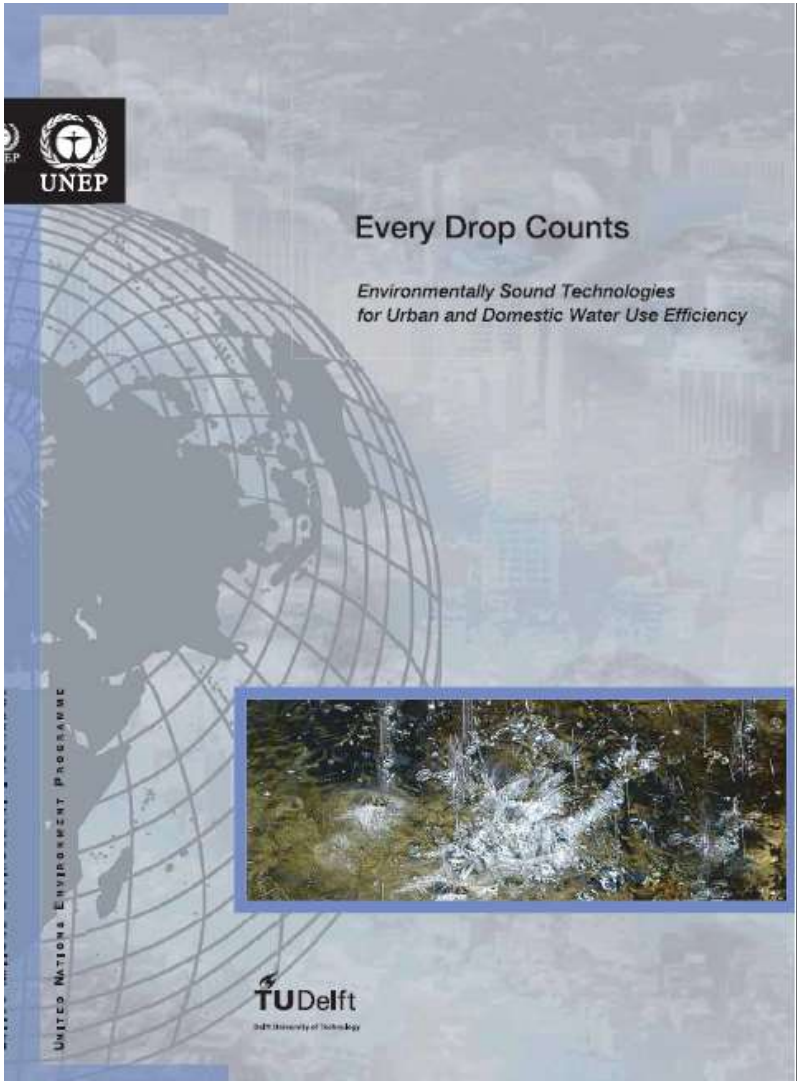
Wise-water & Every Drop Counts



environmental management centre
emc

UNEP

TU Delft
Delft University of Technology



Phyto-technologies

The most widely and accepted approach to control eutrophication or freshwater degradation from industrial discharges, urban and agricultural run–off is by means of conventional treatment plants.
Although very effective they are also expensive to build and maintained; added to the fact that they also require skillful personnel to be operated. In light of these fact decision makers are looking for alternatives which although may not totally replace the use of treatment plants, they could at least be used as complementary methods reducing the size and nature of these facilities as well as reducing treatment costs.

What is the value of this Manual?....

The Manual provides information for designers, builders and operators about a wide range of applications and objectives such as:

- Developing, implementing and operating Artificially Constructed Wetlands (ACW) and Waste Stabilization Ponds (WSP);
- Standard systems approach which can be adopted universally and which can accommodate a development technology with changes in information concepts and ideas with time;
- Theoretical background on the biological, chemical and physical processes of each method, the current state of the technology and technical knowledge on how to design, operate and maintain them; and
- Theoretical knowledge on how best the models may be used to describe the systems.

Waste Stabilization Ponds are already familiar treatment facilities in many parts of the world due to their effectiveness and low cost, robustness and stability added to the fact that they are good at removing pathogenic organisms from wastewater. The only handicap they have is the fact they require large surface area.

WASTE STABILIZATION PONDS

AND

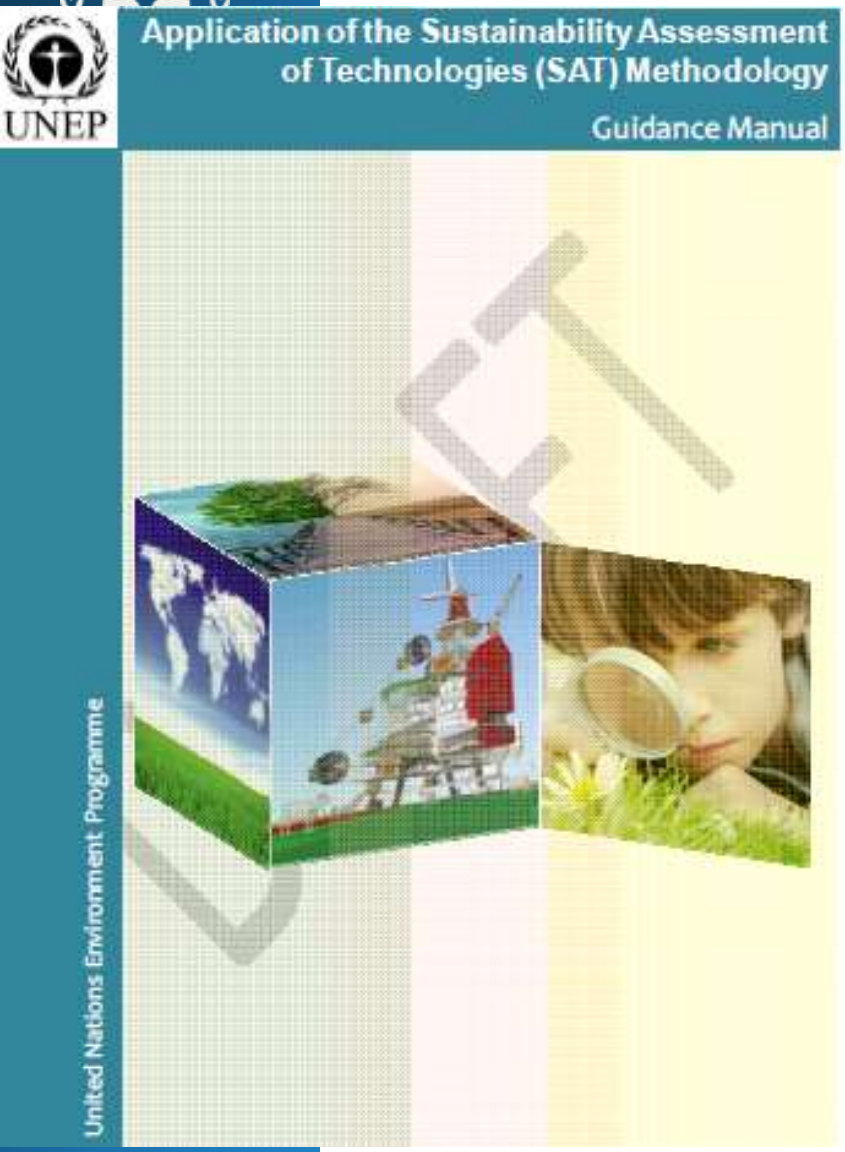
CONSTRUCTED WETLANDS

DESIGN MANUAL

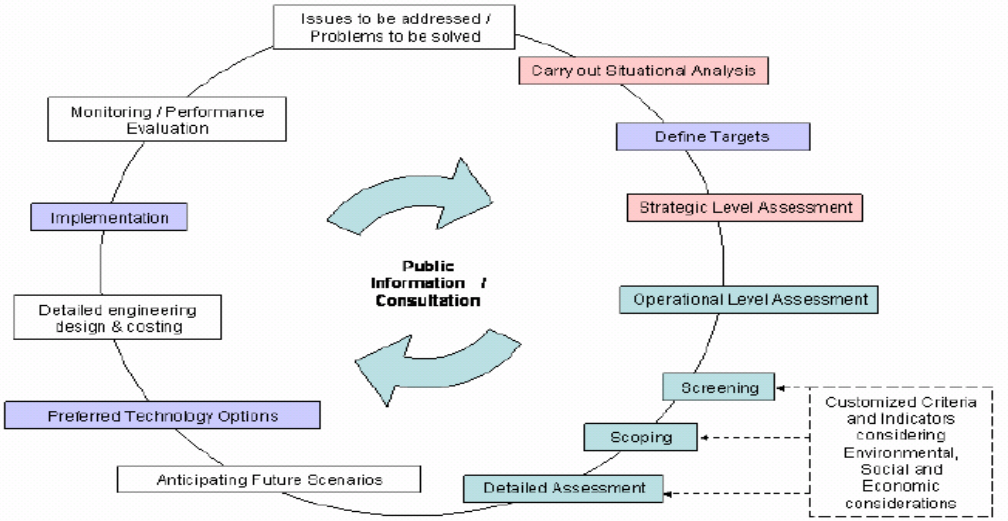
The application of Phytotechnologies is becoming more popular to augment water quality in freshwater bodies and waste effluents. There are already some cases where the floodplains and natural wetlands are used to reduce nitrogen and phosphorous from urban by using natural and artificially constructed wetlands as they are also capable of doing the same job besides being environmentally friendly.

Artificially Constructed Wetlands are proving to have enormous value in terms of efficiency, low cost, simple operation and maintenance when compared to waste treatment plants.

Sustainability Assessment of Technologies (SAT)



Policy and Government level	• For strategic planning and policy making
Financing Institution Level	• For assessing projects for funding
Operational Level	• For assessment of alternative technologies
Community and Cluster Level	• For assessment and comparison of collective alternative technologies
Village / Enterprise Level	• For comparing technology options



http://www.unep.org/ietc/InformationResources/Publications/tabid/56265/Default.aspx

Resource Augmentation Demonstration Project in Vietnam

Community

Industry

Water & Energy Demand

Rainwater Harvesting

Waste

Agriculture

Biomass

Compost

Wastewater Reuse

Project Activities

- Background Studies & Selection of the Industry
  September ~ October 2005
- Awareness Raising / Information Dissemination
  November 2005 ~ January 2006
- Data collection
  January 2006 – March 2006
- Identification of ESTs for rainwater harvesting, wastewater reuse, and composting
  January 2006 – April 2006
- Designing ESTs for local conditions
  January 2006 – June 2006
- Implementing project components based on ESTs
  April 2006 – February 2007
- Collection and disseminations of lessons learned

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Partnership, Partnership and Partnership

Thank You…