Water Losses in Asia[1]

With accelerating urbanization in Asia, management of the entire water cycle in urban context has become a priority consideration. The rapid rate of urbanization in the region is resulting in many Asian cities facing major challenges of providing their increasing populations with adequate and sustainable water services. Many cities are water stressed and the available water resources for these cities are dwindling rapidly. Not only are these cities now unable to reconcile the water requirements and the water resources, but also current utilization is often both inefficient and ineffective. Water losses are quite high. One of the major challenges facing water utilities in the developing countries of Asia is the high level of water losses (leakage) due to water pipe bursts and leakages, theft of water from the system, or water users not billed properly. In many Asian countries it is an issue that deserves close attention. Table 1 below gives a picture of non-revenue water of Water Utilities in various parts of the Asian region.

Table 1: Non-revenue Water of Water Utilities in countries of the Asian region

S.No.	Country	Name of the Utility	Status	Year of Reference	Overall Non-Revenue Water (per cent)
South Asia					
1.	Bangladesh	Dhaka	Public	2006	37
		Chittagong	Public	2006	28
		Sylhet	Public	2006	70
2.	India	Bangalore Water Supply and Sewerage Board, Bangalore, Karnataka State	Public	2005-2006	45.1
		Municipal Corporation of Jabalpur, Jabalpur, Madhya Pradesh State	Public	2005-2006	14.3
		Kolkata Municipal Corporation, Kolkata, West Bengal State	Public	2005-2006	35.0
		Municipal Corporation of Greater Mumbai, Mumbai, Maharashtra, State	Public	2005-2006	13.6
		Nagpur Municipal Corporation, Nagpur, Maharashtra State	Public	2005-2006	51.9
		Varanasi Jal Sansthan (Water Board), Varanasi, Uttar Pradesh State	Public	2005-2006	30.0
		Greater Visakhapatnam Municipal Corporation, Visakhapatnam, Andhra Pradesh State	Public	2005-2006	14.5
		Municipal Corporation, Amritsar, Punjab State	Public	2005-2006	57.4
3.	Pakistan	Rawalpindi	Public	SEAWUN Bench-marking Database	30
		Karachi	Public		30

[1] Andre Dzikus, Chief WSS-II, Water, Sanitation and Infrastructure Branch, UN-HABITAT, Nairobi

S.No.	Country	Name of the Utility	Status	Year of Reference	Overall Non-Revenue Water (per cent)
		Lahore	Public		42
4.	Sri Lanka	Water Supply	Public	2005	35.92 (Gt. Colombo) 30.86 (Regions)
Southeast Asia					
5.	Indonesia	TPJ	Private	2001	53
		Palyja	Private	2004	47.3
		DKI Jakarta	Public	2006	48
		Banjarmasin	Public	2006	30
		Malang	Public	2006	36
		Yogyakarta	Public	2006	31
6.	Philippines	Maynilad	Private	2004 2006	68.4 66.39
		Manila Water	Private	2004 2006	47.6 31.74
		Dagupan Water District	Public	2005	30
		Orani Water District	Public	2005	19
		Magdalena (LGU managed Utility)	Public	2005	36
East Asia					
7.	PR China	Heze	Public	2005	94
		Liaocheng	Public	2005	3
		Zibo	Public	2005	72
		Weifang	Public	2005	18
8.	Kazakhstan	Almaty	Public	2006	10
		Aqtau	Public	2006	32
		Karaghandy	Public	2006	35
		Shchuchinsk	Public	2006	32
		Taldykorghan	Public	2006	29
Mekong Region					
9.	Cambodia	Phnom Penh	Public	2003 2007	17 6
		Sihanoukville Water Supply Authority	Public	2004	26.3
10.	Vietnam	Hanoi	SOE-One Member	2003	44

S.No.	Country	Name of the Utility	Status	Year of Reference	Overall Non-Revenue Water (per cent)
			Company Ltd.		
		Ho Chi Minh	-do-	2003	39
		Hue	-do-	2003	21
		Haiphong	-do-	2006	22
		National		2002	36.8
Pacific Region					
11.	Fiji	Suva	Public	2007	70
12.	Samoa	Samoa Water Authority	Public	2002/ 2003	44

Strategies and Achievements in NRW reduction

It may be seen that non-revenue water of some of the utilities in South Asia is as high as 70%. In Indonesia, it varies from 30-53%, in Philippines from 19-68%, in China from 3-94% and in Vietnam from 21-44%. However, in Cambodia the water utility in Phnom Penh has been quite successful of reducing its non-revenue water to 6% in 2007. Box 1 explains as to how Phnom Penh water supply authority brought an effective control of non-revenue water.

Box 1: Effective Control of Non Revenue Water

In 1993, NRW in the PPWSA was incredibly high at 72%. By 2007. However, NRW had been reduced to 6%, of which 2-3% was estimated to be due to unauthorized consumption and commercial losses, and the rest due to physical losses mainly from leakages caused by road, drainage, and cable-laying construction. In 2004, road construction caused 75% of leaks, rising to 81% in 2005 and to 83% by 2006.

Commercial losses were addressed by metering all consumers and tackling the high incidence of illegal connections which had been widespread due to the high connection charge of $1,000. Illegal consumption was reduced by running a public awareness campaign, giving incentives to anyone providing information on illegal connections, heavily penalizing those connected illegally, and paying special attention to the removal and punishment of any PPWSA staff found associated with illegal connections. Physical losses were reduced by replacing old pipes, creating 41 leakage control zones based on district metering areas, and establishing NRW control teams in 2003. In 2005 0.4% of revenue was spent on repairing leaks and controlling the 41 zones.

There were three key factors in the success achieved: 1. the role of the PPWSA staff who were incentivized to become champions in themselves, 2. active public support, and 3. managing the 41 zones to control leakage.

Ek Sonn Chan, General Director of the Phnom Penh Water Supply Authority

Hai Phong and MWCI have each reduced their NRW levels to 21.5% and 26%, respectively, from levels beyond 60% in the last 10 years. MWSI on the other hand, has just been turned over to new owners and has identified NRW reduction as their main focus given the current levels at 69%. A NRW reduction strategy is currently being put in place with firm financial management commitment to support the program.

Realizing the need for reducing non-revenue water, organizations like WHO have been regularly monitoring volumes of non-revenue water. Table 2 gives estimates of worldwide NRW volumes and Table 3 provides estimated value of non-revenue water and its components.

Table 2: Estimates of Worldwide NRW volumes (billions of cubic metres/ year)

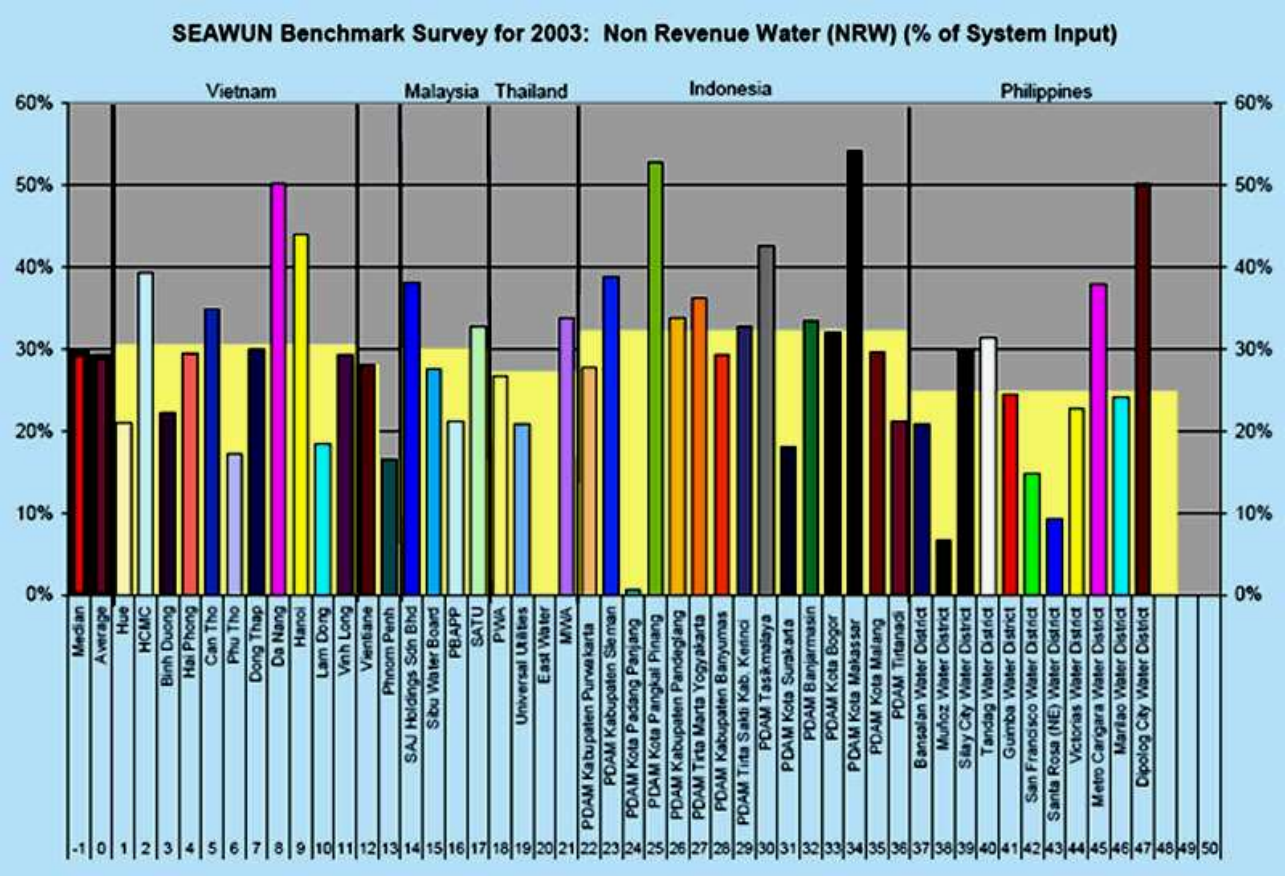
	Supplied population, millions (2002)	System Input l/capita/ day	Estimates of NRW					
			NRW as share of system input (%)	Ratio (%)		Volume, billion m^3/ year		
				Physical losses	Commercial losses	Physical losses	Commercial losses	Total NRW
Developed countries	744.8	300	15	80	20	9.8	2.4	12.2
Eurasia (CIS)	178.0	500	30	70	30	6.8	2.9	9.7
Developing Countries	837.2	250	35	60	40	16.1	10.6	26.7
					Total	**32.7**	**15.9**	**48.6**

Source: World Health Organisation

Table 3: Estimated value of NRW and its components

	Supplied population, millions (2002)	System Input l/capita/day	Estimated value (US$ billions/ year)		
			Cost of physical losses	Lost revenue due to commercial losses	Total cost of NRW
Developed countries	0.30	1.00	2.9	2.4	5.3
Eurasia (CIS)	0.30	0.50	2.0	1.5	3.5
Developing Countries	0.20	0.25	3.2	2.6	5.8
		Total	**8.1**	**6.5**	**14.6**

Organisations like Southeast Asian Water Utilities Network (SEAWUN) have been undertaking benchmarking surveys from time to time. The chart below presents results of SEAWUN benchmarking survey for 2003.



The role of water conservation and demand management measures for reduction of water loss and water utilization in all spheres of the water sector is, therefore, becoming increasingly important. In Malaysia e.g. the entire water supply distribution system comprises more than 91,247 km of water pipes of which 45,746 km or 50% are Asbestos Cement Pipes. These pipes have been extensively laid and have been in service for more than 30 years. The government under the 9th and 10th Malaysia plan is planning to replace about 12,000 km of water pipes – totaling to RM11.7billion to bring down NRW level to a target of 20% by the year 2015.

There is a felt need in Asia for networking among utilities for knowledge sharing experience that caters exclusively to the issue of water loss in Asia. There is also a need to encourage government supervision and private sector initiative to reduce NRW and also generate immediate operational and financial benefits.

Cities in Asia also need to build capacity and undertake the following

(1) Establish a standardized water balance & calculate water loss performance indicators;

(2) Reduce commercial and physical losses;

(3) Produce an NRW Assessment and Management Action Plan; and

(4) Acquaint with the available NRW techniques and equipment.

Hai Phong and MWCI have each reduced their NRW levels to 21.5% and 26%, respectively, from levels beyond 60% in the last 10 years. MWSI on the other hand, has just been turned over to new owners and has identified NRW reduction as their main focus given the current levels at 69%. A NRW reduction strategy is currently being put in place with firm financial management commitment to support the program.

Reducing Water Losses: UN-HABITAT Efforts towards Water Conservation

UN-HABITAT in association with Rand Water of South Africa produced a Manual on Water Demand management, which has the following objectives.

- To introduce a standard terminology for component based leakage management and to encourage water utilities to calculate components of Non-Revenue Water and Water Losses using the standard annual water balance;
- To highlight the importance of adopting standard terminology and a standard approach to the complex issue of leakage in a water distribution system;
- To highlight and explain certain key issues which water utilities should be addressing even in situations where the available financial resources are insufficient to implement normally accepted international practices; and
- To identify and explain various issues and items of equipment that can be of specific use to the local situations in different regions.

Water Demand management is one of the key thrust area under the Water for Asian Cities Programmes. In India UN-HABITAT has been working in the four cities of Madhya Pradesh, India viz. Bhopal, Indore, Gwalior, and Jabalpur where the non-revenue water of the water utilities has varied from 50-65 per cent. For each city a Water Demand Management Strategy has been developed which aims at reducing the non-revenue water to a level of 15 per cent by the year 2010. The strategy includes technical aspects of water demand management and implementation plan together with the financial, institutional and policy reforms. The strategy is specific for each city and provides the basis for formulating effective water demand management policies.

****