



Mapping human resource capacity gaps in the water supply and sanitation sector

Country briefing note Philippines

Human resource capacity assessment

Briefing Note • Philippines

KEY POINTS

- ▶ Over 30 national government agencies and departments play a role in WASH provision
- ▶ According to the JMP, both the water and sanitation MDG targets are on track to be achieved, despite only 3% of WASH budget directed to sanitation since 1970
 - Government sanitation focus is septage management and reduction of open defecation
 - Government water focus is providing access to the waterless municipalities.
 - Of the total death rate in Philippines, 5.2% are WASH-related and the overwhelming proportion of these deaths is young children¹.
- ▶ The WASH sector relies heavily on community HR capacity for both construction and O&M of water and sanitation facilities, particularly in the rural areas;
 - Approximately 438,000 para-technicians are currently active in the WASH sector. Para-technicians are community people that attended a short training course or formal vocational training.
- ▶ There are over 200,000 volunteer barangays health workers attending to community WASH needs; Total water supply human resource demand to achieve universal coverage:
 - To construct additional level II water supply facilities, 461 construction teams (1 engineer and 2-3 community volunteers) are required to work from 2009-2015.
 - Approximately 488,032 para-technicians and between 13,576 - 80,810 WATSAN technical field personnel (13,576 if the HR is highly productive and 80,810 if the HR has low productivity levels) are required to operate and maintain the level I, II, III water supply facilities
- ▶ Total Sanitation human resource demand to maintain universal coverage is 216 sanitation engineers and ~4,500 sanitation inspectors. Of these numbers 85% of the sanitation engineers and 94% of the sanitation inspectors will be needed in the urban areas. In addition, an estimated 16,838 truck drivers will be required to collect sludge from septic systems.
- ▶ Estimated human resource shortages:
 - Rural WASH provision relies on high number of community-based para-technicians and volunteers, and thus, no HR shortage was identified for rural areas.
 - For water supply in urban areas, if only lower productivity levels of water/sanitation technicians are achieved, there will be a significant shortage of water engineers and technicians and the existing capacity will need to be tripled. This shortage will be even larger if overseas deployment of engineers and plumbers continues at current rates.
 - There will probably be a shortage of para-technicians in urban areas and to achieve the MDG target 7c the existing capacity needs to be increased by approximately 10%.
- ▶ Reasons for shortages
 - Significant overseas deployment of engineers and plumbers
 - Attraction of water/sanitation engineers and technicians to the private sector
 - Poor graduation rates for engineering and social science students and licensure rates for engineers.
- ▶ Recommendations to increase capacity include rapidly increasing the capacity of communities to participate in WASH, and creating stronger linkages between the education/training sectors and public and private sector employers.

1 Safer water, better health WHO 2008

BACKGROUND

This Briefing Note summarises the findings from an IWA-led study in Philippines made possible through the generous support of the Australian Agency for International Development (AusAID) that contributed to assessment of the human resources needed to provide water supply and sanitation services in four countries: Papua New Guinea, Sri Lanka, Philippines, and Lao PDR. The International WaterCentre coordinated the four studies and provided technical support; the Philippines study was executed by Carmen Vallejo Auste (Philippines).

The Philippines, a newly industrialised economy, consists of 7,107 islands, of which only 2,000 are inhabited. Only about 500 of the islands are larger than a square kilometre and 2,500 of them are not named. It is located in south-eastern Asia, between the Philippines and South China Seas, east of Vietnam. The islands are exposed to natural hazards and are located on the typhoon belt which strikes approximately 20 times per year.

ASSESSMENT APPROACH²

The main objective of this study was to assess human resource requirements in the water supply and sanitation sectors to facilitate achieving MDG target 7c in the Philippines. In addition, the methodology adopted in this study also estimated the human resources requirements to achieve universal coverage of water supply and sanitation for the predicted population in 2015. The study focused on the human resource requirements from the public sector and parastatal institutions, and the private sector (private consultancy companies, individual contractors, etc.), as well as

² Full details on the methodological approach can be found in the full report

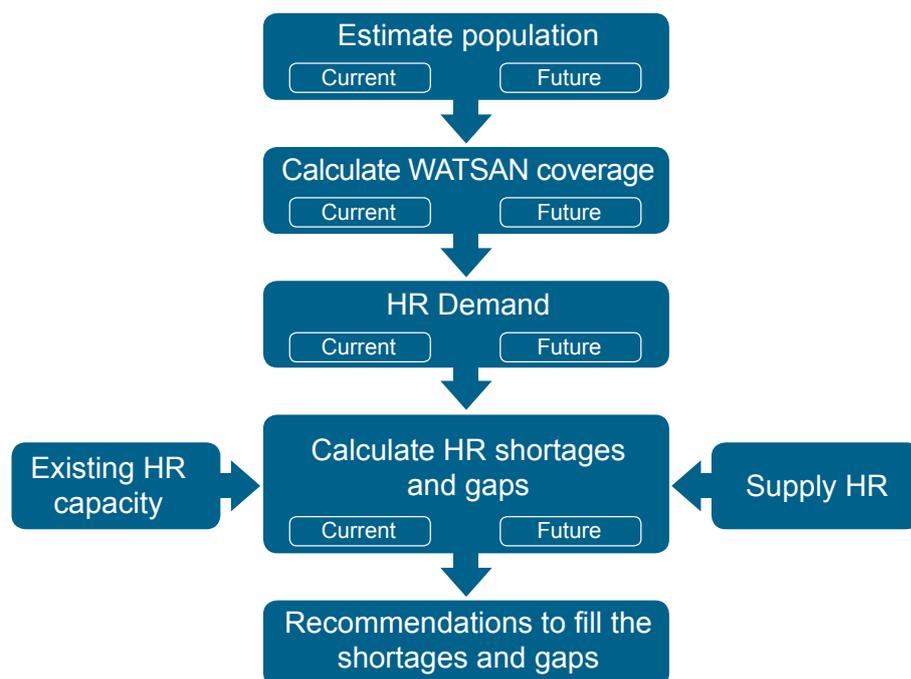


Figure 1: Methodological framework to assess human resource shortages and gaps

NGOs and CBOs active in the WASH sector.

METHODOLOGICAL FRAMEWORK

To assess the human resources requirements in WATSAN sector, in terms of numbers (shortages), skills and competencies (gaps) the methodological framework, has set the following steps, to:

- 1 Estimate the 2015 population to incorporate growth.
- 2 Determine the current water supply and sanitation coverage and calculate the increases needed to achieve a) the MDGs and b) universal coverage.
- 3 Use a geographical sampling approach to estimate a proxy of human resources demand per type of service delivery per 10,000 people. Service delivery types are identified for different sizes of settlements.
- 4 Determine the existing human resources capacity in the country, using the geographical sampling approach, in terms of numbers and skill sets.

- 5 Assess the human resources supply in the years up to 2015 in terms of vocational education and training.
- 6 Calculate the human resources shortages and assess the human resources gaps.
- 7 Provide recommendations for the way in which training institutions can address the shortages and gaps, as well as provides recommendations for alternative ways to meet the said shortages and gaps.

MODIFICATIONS TO THE PRESCRIBED METHODOLOGICAL FRAMEWORK

In the Philippines study, modifications to the IWA approach were required, being:

- 1 The conceptual approach used to estimate existing and future demand relies on a correlation between the size of a settlement and the type of WATSAN technology delivered. In this study the water supply technology did not correlate strongly with settlement sizes and thus in this study, the water supply technologies

Figure 2: Map of The Philippines



data was used, but as this appears to represent only 91% of the actual total (NSCB), a uniform adjustment was applied to provincial population figures to increase them to 100%.

Data representing access to water and sanitation (coverage)

The demand for human resources was estimated using the number of water or sanitation connections and/or households as a basis, rather than population (using province-specific household size /household occupancy numbers). However it is important to note that a household with access, in this assessment, does not infer access within the household boundary, and may in fact refer to access of householders to a communal tap.

Disciplines to map human resources capacity

- 1 In the Philippines, it is widely acknowledged that there is a surplus of management and finance personnel; this category was therefore not considered.
- 2 Stakeholders consulted considered the existing number of social development personnel as sufficient to meet their WASH needs and to promote sanitation and hygiene practices. The demand for social development personnel is therefore assumed to be the same as the existing capacity.

Although the standard IWA methodology does not assess community or volunteer human resources capacity, the Philippines WASH sector relies heavily on their contribution for both construction and operation and maintenance (O&M), and they are therefore described. The following categories and definitions of HR were assessed in this study.

- **Technical specialisation specific to water and sanitation services (WATSAN technicians):** a person

were identified based upon provision of 3 service delivery classifications for the 81 provinces. From this data, HR demand, capacity and shortages were estimated.

- 2 Provinces were categorised into different population sizes, to allow detection of disparities between rural and urban areas.
- 3 The HR demand for construction was based on estimating the number of additional connections required to achieve future targets (MDG and universal coverage). The HR requirements for one construction project was determined through stakeholder consultations then used as a basis for determining the number of connections that can be constructed in the time remaining

to 2015 (target deadline) and then the number of construction teams required was estimated.

- 4 Shortages are defined as existing capacity subtracted from the future demand and does not consider HR supply.

ASSUMPTIONS AND LIMITATIONS

Population estimates

There were inconsistencies between the provincial-level population data and national population data, between UN Division Population, National Statistical Coordination Board (NSCB) and National Statistics Office (NSO). For this study, provincial-level data was required to estimate HR demand, and consequently the NSO provincial

who is professionally engaged in a technical field specifically related to the provision of water and sanitation facilities or infrastructure (for instance civil/environmental/mechanical/chemical engineers, professionally trained water technicians).

- **Para-technical personnel:** with specific WASH training (non-professional by education but trained through short courses or vocational training) and engaged in specific WASH tasks. These may include community volunteers.
- **Social development/hygiene promotion:** a person who is professionally engaged in community mobilisation and development, hygiene promotion or other relevant water, sanitation and health professions in the social sciences (for instance health promotion specialist, sociologist and community development worker).

WASH Service Delivery components

The IWA methodology was designed to calculate both the current and expected additional professional HR requirements, with a distinction between HR requirements for:

- 1 Construction of new water and sanitation infrastructure.
- 2 Operation and maintenance
- 3 Community mobilisation, sanitation and hygiene promotion.

However this study assessed existing professional construction HR capacity or demand for rural water systems only. Construction of piped-water and sewerage systems is undertaken by the private sector, with occasional participation from the Local Water Utilities Administration, a government-owned corporation. Private sector organisations have no difficulty in attracting skilled professionals to undertake construction work, because of

the attractive benefits offered; likewise once these personnel have entered the construction sector they are very unlikely to move from it into government to undertake operation and maintenance.

Consequently, construction of piped-water and sewerage systems is limited by funding rather than human resources and the existing HR capacity of the WATSAN construction sector is assumed to equal existing demand. With regard to septic systems, in urban areas, developers build septic tank systems in new housing developments, or the homeowners build their own (occasionally with the support of experienced builders, though not usually professionals) and there does not appear to be any limitation to construction. In rural areas, the construction of septic tanks is undertaken by householders and community volunteers; professional personnel are rarely involved. Consequently, HR required to construct sanitation services is not estimated in this study.

Water supply technologies

NEDA Board Resolution No. 12 (s. 1995) categorises existing water infrastructure into three classifications, being levels I, II and III, which is applied in both rural and urban areas.

- **Level I** (point source) systems include a protected well or a developed spring with an outlet but without a distribution system. These systems are generally adaptable for rural areas where the houses are thinly scattered. Level I infrastructure provides for least 20 litres of water per person per day.
- **Level II** (communal faucet system or stand posts) systems is composed of a source, a reservoir, a piped distribution network and two or more communal faucets, with each faucet serving from four to six households.

These systems are generally suitable for rural and urban fringe areas where houses are clustered densely to justify a simple piped system. Level II infrastructure provides for at least 60 litres per person per day.

- **Level III** (waterworks systems or individual household connections) systems are systems with a source, a reservoir, a piped distribution network and household taps. It is generally suited for populated areas. Level III infrastructure provides for at least 100 litres per person per day.

For each province, the proportion of the population that should receive each of level I, II and III can be predicted. This forms the basis of estimating HR demand in this study.

Data collection

A combination of approaches was used to collect both qualitative and quantitative data, being:

- a. Literature reviews of existing documents and information, databases and contacts identified the main stakeholders active in the WASH sector and existing datasets on population, water and sanitation coverage, targets.
- b. Consultations with organisations and groups actively involved in WASH, including national government agencies, non-government organisations (local and international NGOs) and networks, academic and resource institutions, professional associations, private businesses (contractors/consulting firms), small water service providers, water districts, water concessionaires and local government units).
- c. Presentation and discussion of the study and key findings was undertaken at several stakeholder forums, such as the 4th Conference of Small Water Service Providers

organised by the National Water and Sanitation Association of the Philippines (NAWASA).

SECTOR CONTEXT

INSTITUTIONAL FRAMEWORK FOR WASH SERVICE DELIVERY

The Philippines has 42,028 barangays (villages), 1,491 municipalities, 80 provinces and 17 regions. Construction, O&M, supply and delivery of WASH services in different parts of the country is the responsibility of various government agencies and water utilities, and community-based management systems.

More than 30 national government agencies or departments play a role in WASH provision. The most relevant are:

- 1 **National Economic Development Authority (NEDA)** is the central planning and policy coordinating body, coordinating preparation of national development plans and investment programs, formulating sector policies and strategies, monitoring implementation of sector policies, programs, and projects
- 2 **Department of Environment and Natural Resources (DENR)** establishes policies and implements programs for the equitable distribution of natural resources and serves as the lead agency in promulgating the (1) rules and regulations for the control of water, air and land pollution and (2) ambient and effluent standards for water and air quality
- 3 **National Water Resources Board (NWRB)** is the primary regulatory and coordinating body for water resources management and development and regulates operations of water utilities outside the jurisdiction of LWUA and MWSS.
- 4 **The Department of Public Works and Highways (DPWH)** functions as the engineering and construction arm

of the government and is responsible for the planning, design, construction and maintenance of infrastructure;

- 5 **The Department of Interior and Local Government (DILG)** provides technical assistance to LGUs to help them effectively manage their water supply, sewerage and sanitation services;
- 6 **Department of Health (DoH)** sets water quality regulations and standards for testing, treatment and surveillance and oversees the implementation and enforcement of the Sanitation Code. The provincial, city and municipal health offices provide assistance to ensure enforcement and compliance;
- 7 **Metropolitan Waterworks and Sewerage System** has jurisdiction, supervision and control over all waterworks and sewerage systems in Metro Manila as well as the province of Rizal and some municipalities in the neighbouring provinces of Bulacan and Cavite;
- 8 **The Local Government (LG)** mandate includes full responsibility for the provision and management of basic services and infrastructure facilities including WASH supply. Water supply provision is usually implemented through LGU-owned water service providers that function as private sector organisations;
- 9 **The provincial/city/municipal Planning and Development Office (PDO)** serves as the technical arm of the local Chief Executive (i.e. governor or mayor). It provides assistance in the development of project proposals, feasibility studies as well as in sourcing and engaging potential funders or partners;
- 10 **Local Water Utilities Administration (LWUA)** is a government-owned and controlled corporation with a specialised function to promote and support the development of water supply

systems in provincial cities and municipalities outside of Metropolitan Manila;

- 11 **Water Districts** are government owned and controlled corporations that provide water supply services usually to aggregations of local government areas;
- 12 **Community Based Organisations (CBOs)**: the RWASAs, BWASAs and cooperatives are CBOs which establish and operate water systems in barangays and other localities. They act as service providers in the place of LGU-managed water utilities; and
- 13 **Non-Government Organisations (NGOs)**: there is no recent data on quantitative contributions of NGOs in delivering potable drinking water services to households and communities.

POPULATION FIGURES

In 2010, the total population of the Philippines was 92,337,852 based on the 2010 Census of Population and Housing³. National population growth rate is 1.9% (2000-2010), a reduction on the growth rate of the previous decade (2.34%)⁴. According to the UNDP, the proportion that is urban has remained steady since 1990 at ~48.6%, although it is projected to increase steadily over coming decades, to reach 53.9% by 2025.

The current and projected (2015) population of each of the 81 provinces of the Philippines was used to classify each province into one of six population size-based categories as per table 1.

3 National Statistics Office. www.census.gov.ph. Accessed 3-2-13

4 World Population Prospects: The 2010 Revision and World Urbanization Prospects: The 2011 Revision Saturday, February 02, 2013; 5:35:19 PM

Table 1: Population and household distribution across population size based types of provinces

Province (and designation to urban or rural)	population category (and designation to urban or rural)	Population category definition (no. people per province)	Population (2007, adjusted)	Population (2015, projected)	No. Households (2007, adjusted)	No. Households (2015, projected)
Rural Disperse (rural)		<100,000	299,942	115,718	65,904	24,052
Small Rural Province (rural)		100,000-200,000	986,686	1,075,633	199,740	220,134
Mid-Size Province		200,001-600,000	9,877,815	5,714,078	2,077,921	1,226,497
Large Province (urban)		600,001-1,000,000	16,848,978	19,609,315	3,536,210	4,090,448
Very Large Province (urban)		1,000,001-2,000,000	23,755,214	23,027,472	5,001,836	4,834,174
Mega Province (urban)		>2,000,000	36,930,970	56,115,656	7,846,724	11,878,851
Total			88,699,605	105,657,872	18,728,335	22,274,156

Table 2: Comparison of MDG 2015 Targets and PDP Targets

	MDG (%) 2015	National target (PDP) (%) 2016
Access to Safe Drinking Water	92%	92
Access to Improved Sanitation	84%	86% rural, 96% urban

Note: provinces were categorised based upon their actual or projected population for the given year. As the population grows in the rural dispersed provinces, their categorisation shifts upwards. This explains why fewer provinces are categorised as rural dispersed in 2015 than in 2007.

MDG AND COUNTRY TARGETS

MDG target 7c is to 'halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation'. According to the JMP, both the sanitation water targets are on track. In recognition of the vital importance to reach the MDG targets, the Philippine government mainstreamed them in the Medium Term Philippine Development Plan (MTPDP) from 2004-2010, and subsequent 2010—2016 Philippine Development Plan.

WATER SERVICES AND COVERAGE

In 2009, the population in the service areas of Water District Providers was estimated at approximately 42 million and for LGU-operated water systems at 11.87 million people. Three quarters of the water district providers are

considered small with 5,000 or less connections. While Water District Providers cover a significant proportion of the country, their service coverage is below 20%.

The most significant improvement in access to water supplies has been the expansion of piped (level III) water systems in both urban and rural areas. Access to piped water systems reached 43% in 2010. This increase in 'piped water to premises' can be expected to bring about significant health gains.

In each province there is a mixture of different water supply technologies (levels I, II, III). Aggregating the provincial data according to the population categories generates the summary of existing (2009) water supply coverage (see table 3).

Combining the MDG target (92%), and the objective of universal coverage with the expected coverage proportions of levels I, II and III water supply and the projected population numbers for 2015, generates an estimate of future coverage for each water supply service level if the national target is achieved, and if universal coverage is achieved.

Note: an artefact of this type of data analyses is that there are projected to be fewer level II connections if universal coverage is achieved than if only the PDP target of 91% coverage is achieved; this is related to the much increased coverage of level III services that are projected to exist if universal coverage is achieved.

SANITATION SERVICES AND COVERAGE

The MDG target for sanitation is considered to be "on-track", despite the fact that since 1970, 97% of all public investments in water supply and sanitation infrastructure have been for water supply. While local governments and water districts have the provision

Table 3: Existing (2009) access (number of households - HH) to improved water supply, disaggregated by population category and water supply service level

Water Supply service level	Rural Disperse	Small Rural	Mid-Size Province	Large Province	Very Large Province	Mega Province	total
HH with Access to Level I	8,170	74,776	416,624	1,389,468	1,642,101	4,035,080	7,566,220
HH with Access to Level II	2,215	20,274	112,957	376,718	445,213	1,094,007	2,051,383
HH with Access to Level III	7,688	70,360	392,017	1,307,403	1,545,115	3,796,759	7,119,341
Total No of HH with Access	18,073	165,410	921,598	3,073,589	3,632,429	8,925,845	16,736,944

Table 4: Number of households to be serviced to achieve (a) universal coverage; (b) national target of 92% coverage

Universal coverage	Rural Disperse	Small Rural	Mid-Size Province	Large Province	Very Large Province	Mega Province	Total
Water Supply Service Level							
HH with access to level I	8,170	74,776	416,624	1,389,468	1,642,101	4,035,080	7,566,220
HH with access to level II	8,194	74,997	417,856	1,368,348	1,490,775	1,180,512	4,540,682
HH with access to level III	7,688	70,360	392,017	1,332,632	1,701,297	6,663,259	10,167,253
Total number HH with water supply (2009)	24,052	220,134	1,226,497	4,090,448	4,834,174	11,878,851	22,274,156
Deficit (Total number HH without access)	5,979	54,724	304,899	1,016,859	1,201,744	2,953,006	5,537,212

MDGtarget (92% coverage)	Rural Disperse	Small Rural	Mid-Size Province	Large Province	Very Large Province	Mega Province	Total
Water Supply Service Level							
HH with access to level I	8,170	74,776	416,624	1,389,468	1,642,101	4,035,080	7,566,220
HH with access to level II	6,270	57,387	319,736	1,066,341	627,531*	2,338,784**	4,456,049
HH with access to level III	7,688	70,360	392,017	1,307,403	2,177,808	4,456,049	8,469,954
Total number HH with water supply (2009)	21,887	200,322	1,116,112	3,722,308	4,399,098	10,809,754	20,269,482
Deficit additional HH to receive access to achieve MDGtarget)	4,055	37,113	206,780	689,623	815,011	2,002,698	3,755,279

Assuming 92% in each population category is achieved) *level I and III = existing coverage; level II = required total (92% HH) - level I - level III; ** level I = existing coverage (no deficit); levels II and III were solved algebraically, assuming that the existing proportion of level II: level II will remain into the future (in urban provinces)

of sanitation services included in their mandates, in practice, most households are left to deal with sanitation on their own and sanitation facilities are mostly VIP toilets and septic tanks on one end of the spectrum and a few centralised sewerage systems on the other. Ten of the country's approximately 1,650 towns and cities have sewerage systems, while the majority of the population relies on on-site treatment through septic tanks that are ill-constructed or poorly maintained.

The human resources requirements for O&M and community mobilisation were assessed to fulfil the following tasks, being sludge collection; the functions of sanitation inspectors (SIs) and engineers; and community mobilisers and health workers.

Table 5: Projected Household (HH) coverage of septic systems in 2015 if MDG target is met and if universal coverage is achieved.

Categories of Settlement according to population	Projected HH 2015 (universal coverage)	Projected HH with septic 2015 (MDG)
25,000 or less (Rural)	71,881	61,818
25,001 to 50,000 (Urban)	213,454	204,916
51,000 to 100,000 (Urban)	525,615	504,590
100,001 to 200,000 (Urban)	4,540,583	4,358,959
200,001 & up (Urban)	16,447,794	15,789,882
Total	21,799,326	20,920,165

In order to estimate HR demand for sanitation management, it is necessary to do so considering the number of septic tanks that will be required. Table 5 summarises the projected number of septic tanks by 2015.

HUMAN RESOURCES IN THE WASH SECTOR

FUTURE HUMAN RESOURCES DEMANDS

The complex nature of WASH governance, service delivery and aspirations in the Philippines required a range of approaches be applied to estimate HR demand. The basis of the

Table 6: Basis of the HR demand calculation

Subsector for which HR demand is estimated	Construction	Operation and maintenance	Social development/hygiene promotion
Water – rural	Number of additional water connections required to achieve targets	Number of HR required to maintain future coverage of water services	Demand = existing capacity, within government and communities
Water - urban	Not estimated (refer to methodology and assumptions discussions)	HR for Septage collection (demand only, existing capacity not known)	
Sanitation & hygiene – rural		HR for Sanitary inspections	
Sanitation & hygiene – urban			

Table 7: Number of additional Households requiring each level of water supply services for universal coverage and meeting national targets**Universal coverage**

Number of additional HH requiring access	Rural Disperse	Small Rural	Mid-Size Province	Large Province	Very Large Province	Mega Province	Total
Level I	no deficit	no deficit	no deficit	no deficit	no deficit	no deficit	0
Level II	5,979	54,724	304,899	991,630	1,045,562	86,506	2,489,299
Level III	additional level III not provided	no deficit	additional level III not provided	25,229	156,183	2,866,500	3,047,912
Total number of additional households (HH) to receive services	5,979	54,724	304,899	1,016,859	1,201,744	2,953,006	5,537,212

MDG target (92% water supply coverage)

Number of additional HH requiring access	Rural Disperse	Small Rural	Mid-Size Province	Large Province	Very Large Province	Mega Province	Total
Level I	no deficit	no deficit	no deficit	no deficit	no deficit	no deficit	0
Level II	4,055	37,7113	206,780	689,623	794,932	no deficit	1,732,503
Level III	additional level III not provided	no deficit	no deficit	no deficit	20,079	2,002,698	2,022,776
Total additional households (HH) to receive services	4,055	37,7113	206,780	689,623	815,011	2,002,698	3,755,279

calculations of HR demand for each sub-sector is summarised in the table 6.

Water construction

The HR demand for construction of water systems is based on the number of additional connections required to meet future targets by 2015.

In order to achieve the national target of 92% coverage of water supply services in line with the water service levels and provincial categorisations, construction of level II and III water supply services only are required.

There are 455 waterless municipalities (where less than 50% of people have access to improved water supply), which may receive either level I or II services. However to achieve the coverage of levels I, II and III services predicted for each province, approximately 2.5 million additional level II water supply services, and three million level III water supply services will be required for universal coverage, across both urban and rural provinces.

Level III services already exist in some rural provinces (rural dispersed, small

rural, mid-size provinces) because of their proximity to larger water service providers and they may indeed expand Level III services in rural areas, however in the absence of detailed plans, this assessment has focussed on rural provinces (rural dispersed, small rural, mid-size provinces) meeting future targets through the construction of additional level II water supply services..

Table 7 summarises the number of additional households requiring each level of water services for universal coverage and meeting MDG targets (note, households may gain access to shared water supply connections beyond their property boundaries, such as through level I and II water supply facilities). A total of an additional five and half million households (approximately 26 million people) need to gain access for universal coverage to be achieved, and three and three-quarter million households (approximately 18 million people) need to gain water access for the MDG water target to be achieved.

Table 8 summarises the HR demand for construction of additional level II water

services for achievement of universal coverage and MDG targets. Each construction team requires one water engineer and two or three community volunteers.

O&M of water supply facilities

The future HR demand was determined by estimating the HR requirement to operate and maintain the three different water supply service levels per 10,000 people. Demand was determined by combining existing standards and regulations with stakeholder consultation about the adequacy of the existing service delivery. Productivity levels for O&M services on level III were identified by stakeholders, acknowledging the different capacities of utilities in rural and urban areas, and between the large private concessionaires operating in Manila, and the smaller water district utilities in other urban areas. The high productivity rates have been achieved by the large private concessionaires and so very large Water District Operators; the present attention to capacity building such as through twinning with foreign water concessionaires, these high productivity rates are achievable in

Table 8: HR demand for construction of additional level II water services. Note each construction team requires one water engineer.**Universal Coverage**

Province type	No. of Provinces	Shortfall in coverage (No. HH)	No. new connections required (6 HH per connection)	No. construction teams required (25 connections /year/team)	No. construction teams required (active 2009 to 2015)	No. construction teams per province
Rural Disperse	2	5,979	997	7	1	0.6
Small Rural	7	54,724	9,121	61	10	1.4
Mid-Size Province	15	304,899	50,817	339	56	3.8
Large Province	26	991,630	165,272	1,102	184	7.1
Very Large Province	16	1,045,562	174,260	1,162	194	12.1
Mega Province	15	86,506	14,418	96	16	1.1
Total	81	2,489,299	414,883	2,766	461	41.5

To achieve MDG target

Province type	No. of Provinces	Shortfall in coverage (No. HH)	No. new connections required (6 HH per connection)	No. construction teams required (25 connections /year/team)	No. construction teams required (active 2009 to 2015)	No. construction teams per province
Rural Disperse	2	4055	676	5	1	0.4
Small Rural	7	37113	6186	41	7	1.0
Mid-Size Province	15	206780	34463	230	38	2.6
Large Province	26	689623	114937	766	128	4.9
Very Large Province	16	794932	132489	883	147	9.2
Mega Province	15	No deficit	No deficit	No deficit	No deficit	No deficit
Total	81	1,732,503	288,750	1,925	321	18.1

the short-term for larger Water District Operators, and in the longer term for the smaller Water District Operators.

Applying HR demand to future (target) populations provides an estimate of the total HR future demand (table 10). If universal coverage of water supply services to 2015 population is to be maintained, an estimated 536,000 para-technicians will be required, with

approximately 92% of these (488,032) providing level I and II services in urban provinces. The requirement is similar for the MDG target: 523,997 para-technicians, 484,302 in urban provinces. Assuming water district utilities were operating at high productivity, approximately 17,500 engineers will be required to maintain universal water coverage. If the high level of productivity is not achieved by water service

providers, then approximately 85,000 engineers will be required to maintain universal coverage. If the MDG target coverage of 92% is to be maintained, approximately 15,000 (high productivity) and 70,000 (low productivity) engineers will be required.

Operation and maintenance of sanitation systems

The core O&M requirement of the sanitation systems is 1. enforcing the regulations and 2. sludge management from the septic tank systems. The HR requirements for these two tasks were determined separately, as follows:

- 1 The HR requirement for sanitation engineers was based on the existing standard of one engineer per province and one in each city of the province. Stakeholders consulted considered the existing service to be inadequate and no estimate of 'ideal' HR requirements could be obtained.
- 2 The existing standard of one LGU sanitation inspector per 10,000

Table 9: Estimates of HR demand per household and per 10,000 people, for the three different water supply service levels.

HR requirements	Level I	Level II	Level III		
	1 staff servicing 2 community connections points, each connection serving 15 HH	3 staff servicing 48 community connections, each connection serves 6 HH	URBAN		RURAL
			High productivity 1.4 staff per 1000 connections	Low productivity 1 staff for 186 connections	Low productivity 1 staff for 120 connections
# HR needed per household	0.03	0.06	0.0014	0.005	0.008
# HR per 10,000 people	67	125	2.8	10.8	16.7

Table 10: Estimated total future HR demand to operate and maintain water supply services to future populations (for universal coverage and MDGtarget coverage)**Universal Coverage**

Target and Province type	Water Supply Service Level					No. Para-technicians	No. Water engineers/technicians	
	Level I	Level II	Level III				High prod.	Low prod.
	Para-tech.	Para-tech.	Urban-High prod.	Urban-Low prod.	Rural	water engineers/ technicians		
Rural Disperse	272	512			64	784	64	64
Small Rural	2,493	4,687			586	7,180	586	586
Mid-Size Province	13,887	26,116			3,267	40,003	3,267	3,267
Large Province	46,316	85,522	1,866	11,105		131,837	1,866	11,105
Very Large Province	54,737	93,173	2,382	14,177		147,910	2,382	14,177
Mega Province	134,503	73,782	9,329	55,527		208,285	9,329	55,527
Rural provinces subtotal	16,652	31,315	-	-	3,917	47,968	3,917	3,917
Urban provinces subtotal	235,555	252,477	13,576	80,810	-	488,032	13,576	80,810
Total	252,207	283,793	13,576	80,810	3,917	536,000	17,493	84,727

MDG target 7c

Target and Province type	Water Supply Service Level					No. Para-technicians	No. Water engineers/technicians	
	Level I	Level II	Level III				High prod.	Low prod.
	Para-tech.	Para-tech.	Urban-High prod.	Urban-Low prod.	Rural	water engineers/ technicians		
Rural Disperse	272	392			64	664	64	64
Small Rural	2,493	3,587			586	6,079	586	586
Mid-Size Province	13,887	19,984			3,267	33,871	3,267	3,267
Large Province	46,316	66,646	1,830	10,895		112,962	1,830	10,895
Very Large Province	54,737	39,221	3,049	18,148		93,957	3,049	18,148
Mega Province	134,503	148,674	6,321	37,622		283,177	6,321	37,622
Rural provinces subtotal	16,652	23,962			3,917	40,614	3,917	3,917
Urban provinces subtotal	235,555	254,541	11,200	66,666		490,096	11,200	66,666
Total	252,207	278,503	11,200	66,666	3,917	530,710	15,117	70,583

Table 11: Demand for sanitary engineers and inspectors, to serve projected 2015 population

	No. Provinces (2015)	No. Cities (2015)	No. Households	No. Sanitary engineers	No. Sanitary inspectors
Rural Disperse Provinces	2	0	24,052	2	5
Small Rural Provinces	7	0	220,134	7	44
Mid-Size Provinces	15	8	1,226,497	23	245
Large Provinces	26	26	4,090,448	52	818
Very Large Provinces	16	34	4,834,174	50	967
Mega Provinces	15	67	11,878,851	82	2376
Total Across Provinces	81	135	22,274,156	216	4,455

households was also considered too low by stakeholders, and early discussions indicated a revision of one inspector per 5,000 as more 'ideal'.

By 2015, the need for sanitation engineers will be approximately 216 and for sanitation inspectors approximately 4,500 (see table 11). Approximately 85% of the sanitation engineers and 94% of the sanitation inspectors will be required in the urban areas.

The requirement for septage collection was based on the volume of sewerage to be collected, and the HR demand to collect it. If the MDG is achieved, more than 62 million cubic metres of sludge will need to be collected each year, requiring an estimated 16,838sludge

truck operators (almost all in urban areas, 72 in rural areas). If universal coverage is achieved, more than 65 million cubic metres of sludge annually will need to be collected, requiring an estimated 17,548 sludge truck operators. These estimates are based on use of the most efficient truck types (except in rural areas where a smaller truck is required to reach remote communities), production of three cubic metres of sludge per household per year and collection of 80% of this volume.

EXISTING HUMAN RESOURCE CAPACITY: QUANTITY AND QUALITY

The largest WASH HR capacity lies within communities, primarily in the form of paid and volunteer SIs, and unpaid barangay health workers (BHW), CBOs that manage and operate water service facilities and community volunteers.

The main human resources active in the WASH sector were identified, and their existing capacities assessed (see table 12); they are spread between government, private sector and

community. The exclusions from this list are the HR involved in construction of level III water services and sewerage, and finance and administration personnel as per described in the method

Construction, operations and maintenance of water supply systems

There are more than 9,000 government engineers involved in construction and the O&M of water supply systems. In rural areas (of both urban and rural provinces), residents are engaged in the construction of levels I and II water facilities, through the Community Bayanihan System (Helping Each Other). A representative from the engineers' office serves as foreman and supervises the construction process. Each construction team comprises one engineer, plus three to five community members.

O&M for service levels I and II

The O&M of levels I and II water service facilities is undertaken by community members, typically through WATSAN

councils and BAWASAs, which operate in both rural and urban settings. There are approximately 438,892 Filipinos active in these community organisations. These individuals are considered para-technicians, after receiving some short course and/or vocational training in their required duties. Assuming all municipalities have at least two SIs per barangay, there will be approximately 83,000 inspectors, who have high school level or have completed vocational courses.

O&M for service level III

The primary water service providers (private concessionaires, water district utilities and LGU water utilities) also maintain staff involved in construction and O&M, primarily for delivering level III water services. Across the utilities, an estimated 15,023 WATSAN engineers and technicians operate in urban areas, and 11,161 operate in rural areas. High productivity levels have been achieved by the two large private concessionaires (average ratio of 1.4 staff/1,000 connection⁵). However, based on stakeholder consultations, it is unlikely the Water District Operators or LGU water utilities will be able to achieve the same high rates of productivity.

Gender balance

The gender profile of water/sanitation technical personnel: engineers and plumbers (WSTs) in provincial, municipal and city engineers' offices are predominantly male with the head of the office usually being a licensed civil engineer.

The DoH maintains a large network of volunteer barangay health workers of which the overwhelming majority are female (83%) for rural areas and 85% operating in urban provinces.

Table 12: HR roles and capacities assessed in this study

Types of HR positions	Organisation	Existing capacity (no. personnel nationwide) : Rural / Urban
Water Engineer	Provincial/City Engineering office	256 / 1472
Water Engineer	Municipal Engineering office	1295 / 6160
Water and Sanitation Engineers	Private concessionaires	nil / 2241
	Water District water utilities	nil / 12782
Water and Sanitation Health Officers	Provincial/City Health offices	96 / 552
	Municipal Health offices	518 / 2464
Sanitary Inspectors	LGU (Local Government Units)	335 / 2616
Sanitary Engineers	LGU (Local Government Units)	18 / 39
BVSI (Barangay Volunteers Sanitary Inspectors)	Rural Health Unit	9924 / 73628
BHW (Barangay Health workers)		29687 / 182339
Community volunteers: Water and Sanitation Councils	Provincial & City WATSAN Councils	480 / 73628
	Municipal WATSAN Councils	3108 / 14784
	BAWASA: Barangay WATSAN Association	49620 / 368140
Sludge collectors/truck drivers	Private entrepreneurs	Unknown
Plumbers	Private entrepreneurs	3000

5 2010 Annual report of Manila Water and Maynilad

Community mobilisation in water, sanitation and hygiene

The LGUs have extensive personnel engaged in advocacy, information, communication and promotion campaigns on positive practices for water stewardship, water conservation, household and community hygiene, environmental sanitation and community mobilisation. The DoH's provincial, city and municipal offices have approximately 600 health officers active in rural provinces and more than 3,000 in urban provinces. The heads of these offices are required to be either doctors or a social science graduate with advanced studies in public health. A large network of volunteers works under the auspices of the DoH. This includes the volunteer network of barangay health workers (approximately 212,026) and SIs.

SUPPLY OF HUMAN RESOURCES TO THE WASH SECTOR

Education and training environment and capacity

The education and training sectors are dominated by the Commission for Higher Education (CHED) and the Technical Education and Skills Development Authority (TESDA). CHED provides policy guidance and system governance and TESDA provides direction; sets standards; spearheads programmes; curriculum development for partner learning and training institutions; and manages a variety of skills development centres for technical vocational education and training.

In August 2010, the country had 2,180 higher education institutions (HEIs) of which 88% (1,573) were private institutions. Between 2009-2010, 2.7 million (one in four) of the 9.6 million Filipinos aged 15-19 were enrolled in tertiary institutions; the average total enrolment in private HEIs was 1.7 million,

Table 13: Annual average production of water and sanitation engineers/technicians from the education/training sector.

Average Annual No.	Civil Engineer	Sanitation Engineer	Chemical Engineer	Master Plumber
Graduates (av. 2004/5-2008/9)	5,154	91	981	
Examinees (av 2004/5 – 2008/09)	5,225	66	645	677
Board Certified (av 2004/5 – 2008/09)	2,077	27	322	244
Trend (of rates of certification)	Increasing	stable	stable	increasing (but only returning to 2005 levels)

almost double that of public institutions at 942,459. Tertiary education has a strong vocational education training (TVET) system with 3,397 TVET institutions in 2003. In 2011, the TESDA launched the techno-preneurship programme with the aim of developing a pool of specialists to respond to the demand for household and community services, including water and sanitation related activities such as plumbing and masonry.

There is a high number of graduates for the total aggregate of engineering courses, with marked variations across engineering courses: civil engineering is the best subscribed (average 5,154 graduates annually), with sanitation engineering (average 91 graduates annually) and chemical engineering (average 981 graduates annually) also being popular. However, the graduation rates across the three disciplines were low, with an average of 17% of enrollees completing the social development courses, 16% completing business administration, and 15% completing engineering.

Plumbing is traditionally considered as a trade rather than a profession, however in the Philippines many plumbers also hold professional degrees. Currently, 97% of PRC-licensed engineers and architects are also registered master plumbers⁶. Industry experts claim that civil engineers, licensed or unlicensed,

and with or without board certification, are hired in lieu of master plumbers, because of the high demand. This would further deplete the supply of civil engineers in the country. The supply of Board Certified master plumbers from 2006 to 2010 was 1,174.

Exporting skills

A major driver of the Philippine economy is the remittances sent in by its more than ten million overseas Filipino workers (OFW). Despite the global financial crunch, the Philippine economy grew by 7.3% in 2010, the fastest pace in about three decades. This growth is attributed to the significant increase in OFW remittances for 2010, which reached US\$21.3 billion, accounting for about 10% of Gross Domestic Product.

Between 2006 and 2010, 30,900 plumbers were deployed overseas, a staggering number considering that the supply of Board Certified master plumbers during the same period was only 1,174 and the supposed stock in the country 3,000. In addition, in 2007 and 2008, TESDA certified approximately 3,000 NC I and II plumbers. Regardless of the reasons for the discrepancy, with such a high rate of deployment, it is unlikely there will be an additional supply of plumbers to the WASH sector and it is likely that engineers may be attracted towards plumbing jobs.

From 2006 to 2010, 9,746 civil engineers were deployed abroad (Philippine

⁶ The Philippines Society of Plumbing Engineers (PSPE), Inc. Pers. Comm. 2011

Overseas Employment Agency). During the same period, 12,477 civil engineers became board certified. Assuming all of the deployed civil engineers were certified, it equates to 80% of certified civil engineers over a five-year period, leaving approximately 2,731 available engineers.

Estimated supply

No existing data is available to indicate the proportion of graduates of WATSAN engineers/technicians that enter the sector. For this assessment, supply is estimated as the number of graduates passing board exams, less expected deployment abroad (where this is known). If overseas deployment of certified engineers and technicians (particularly plumbers) continues at previous rates, there will be no additional engineers or technicians available to enter the WASH sectors (nor any other sector requiring similarly qualified personnel).

HUMAN RESOURCE SHORTAGES: COMPARING HR EXISTING CAPACITY, DEMAND AND SUPPLY

The HR shortages in the WASH sector is summarised in table 14. The deficit is defined as the existing capacity subtracted from the future demand.

Under the current arrangements, which have minimal involvement of professional personnel, there are no HR shortages in rural areas, primarily due to the very high reliance on community-based para-technicians and volunteers. In urban provinces, if water engineers/technicians achieve high productivity levels, there should be sufficient water engineers/technicians to achieve both the MDG target and universal coverage. However, if only lower productivity levels are achieved, there will be a significant shortage with existing capacity needing to be tripled. These high and low productivity estimates represent each end of the range within which actual productivity achieved will likely fall, and it is foreseeable there will be a shortfall in professional water/sanitation technical professionals. This shortage will be even larger if overseas deployment of engineers and plumbers continues at current rates. There will probably be a shortage of para-technicians in urban areas and to achieve the MDG target or universal coverage, the existing capacity needs to be increased by approximately 10% (caused by the data analyses artefact described above in coverage, where the number of level II connections is fewer if universal coverage is achieved than if the PDP target of 91% is achieved).

As the study indicates, the rural service provision is primarily reliant on community-based para-technicians. It is expected that there will be strengthening in volunteer networks as some foreign funders pay for their training and they will be in a position to fill some of the shortages.

In urban areas, two main concessionaries have been known to reach very high productivity levels, and extending this rate would certainly impact the shortages as well. However, smaller Water District Operators or LGU water utilities are facing a gap when it comes to their staff productivity. Relative to other parts of the sector, salaries are also lower (averaging US\$280 per month). In public sector agencies, staff qualifications are relatively high as standards/requirements are set for hiring staff. No immediate gap was identified.

RECOMMENDATIONS

IMPROVING THE IMMEDIATE QUANTITATIVE OUTPUT OF HUMAN RESOURCES THROUGH ENHANCED COMMUNITY CAPACITY

- 1 The HR potential at the community level should be optimised to ensure sustainability of water and sanitation

Table 14: Summary of HR demand, existing capacity and shortages (negative figures indicate surplus)

Service Delivery component	Target	Rural provinces			Urban provinces	
		WST	Para-technicians	WST	Para-technicians	
Construction - water (level II)	Universal coverage	68		393		
	MDG	46		262		
O&M – water				WST (Low prod.)	WST (high prod.)	Para-tech
	Universal coverage	3,917	47,968	80,810	13,576	488,032
	MDG	3,917	40,614	66,666	11,200	490,096
O&M – Sanitation	Universal coverage	32	378		184	21,625
Subtotal demand	Universal coverage	4,017	48,346	81,387	14,153	509,657
	MDG	3,995	40,993	67,125	11,659	511,721
Existing capacity		12,730	63,467		22,694	461,928
Shortages	Universal coverage	-8,713	-15,121	58,693	-8,541	47,729
	MDG	-8,735	-22,474	44,431	-11,035	49,793



- facilities and protection of water resources. In waterless communities, the NAPC, in collaboration with partner government agencies, TESDA, LGU and other relevant stakeholders (NGOs, WSPs, CBOs, local universities and civil society organisations) should design and roll out a community engagement and capacity development process for the targeted communities.
- 2 Since the barangay health workers (BHWs) and volunteer sanitation inspectors (SIs) comprise a large network across the whole country, it is recommended that the DOH collaborate with LGUs, NGOs and civil society organisations to fast track the training of BHWs and SIs which have proven to be highly effective in septic management, household sanitation, health and hygiene
 - 3 To assess and enhance the current HR-related voluntary assistance practices among WSPs, this study endorses the recommendations of an earlier study to:
 - Institutionalise, strengthen, and expand the voluntary assistance practices to encourage replication. Incorporate the concept in national and local policies and capacity building tools relating to pro-poor water supply service delivery programmes;
 - Incorporate funds for coaching and mentoring in the annual budget of both the mentor/coach and the mentee/coachee WSPs.
 - Provide resources to develop activities to further enhance the coaching and mentoring assistance to WSPs
 - 4 Investments in employment initiatives and relevant academic studies, across the board should be made.
 - 5 Government agencies with community-based water and sanitation initiatives should, as part of their convergence activities, collaborate in formulating a WASH competency framework, learning packages, field manuals and toolkits for community volunteers.
 - 6 In the context of sustainable livelihoods, models of community managed and operated water and sanitation services as social enterprises should be piloted, documented and best practices, effective innovations and remarkable experiences showcased and widely disseminated.

ALIGNING EDUCATION WITH MARKET DEMAND

- 1 The industry placement and practicum programmes of universities

should be strengthened to ensure 'best fit' between curriculum focus and actual labour market requirements.

- 2 Knowledge and experience sharing should be undertaken in collaboration with the Maynilad Water Academy (MWA) since it envisions being the knowledge leader for the WASH sector.
- 3 The recognised regional resource centres (for instance University of San Carlos, Cebu; Xavier University, Cagayan de Oro; Silliman University, Dumaguete etc.) should serve as knowledge hubs and portals and assist other universities/institutions to become knowledge resource centres.
- 4 Universities should include water and sanitation as priority areas for research and extension work.
- 5 Twinning between and amongst water districts and small WSPs as well as between universities with a strong WASH focus should be encouraged and promoted.
- 6 The existing ADB funding made available for twinning between local, very large, strategic water districts and foreign water service providers should be scaled up.
- 7 The LWUAs existing six (6) regional training centres should be transformed into WASH knowledge centres/knowledge hubs providing trainings to water districts and their stakeholders as well as to CBOs.
- 8 NWRB and/or DOST should embed web-based learning sessions on innovative and cost effective WASH

technologies that are appropriate for rural, poor and displaced communities.

- 9 The number of higher educational institutions offering practical short-term WASH courses should be increased.
- 10 Low-cost refresher classes should be offered to the large number of graduates that are non-certified engineers (of various categories). An inter-agency, multi-stakeholder body should be created to assess the current certification processes for engineers.

INSTITUTIONAL

- 1 Public sector institutions should be encouraged to embed WASH capacity building and capacity development initiatives in multilateral and bilateral development aid packages.
- 2 Cost effective in-house learning sessions run by water and sanitation specialists and seasoned practitioners should be undertaken in public sector institutions.
- 3 The Local Government Academy, which orientates and trains newly-elected government executives and legislators and current local executives and legislators, should be encouraged to integrate WASH-related messages and courses on effective water governance and sustainable sanitation.
- 4 The pool of consultants and the model created through the MDG1919 project should be scaled up and the members of various professional

and trade associations should be encouraged to go through this technical accreditation process in order to broaden the pool.

- 5 The various professional associations and societies should be engaged and assisted to reactivate their previous regional and provincial capacity development initiatives.
- 6 An expanded directory /white pages of available local resources across regions/provinces could also be prepared and shared with LGUs and NGOs.
- 7 The NAWASA (National Association of Small Water and Sanitation Service Providers) and PAWD (Philippine Association of Water Districts) should receive financial and capacity assistance for organisational development and institutional strengthening.
- 8 There is a need to clearly map out the career paths for different aspects and organisation types in the WASH sector to encourage entry into the sector.
- 9 Assistance should be provided to public sector employees to map out and rationalise the career progression and pay grade levels for water and sanitation specialist positions.

Full references are noted in the full country assessment reports available at www.iwahq.org/hrcapacity