



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

Country briefing note Papua New Guinea

Human resource capacity assessment

Briefing Note • Papua New Guinea

KEY POINTS

- ▶ PNG's WASH responsibilities are ill defined, and decentralisation does not signify actions at local government level.
- ▶ PNG is far from achieving the MDG targets¹:
 - Water coverage has stayed approximately the same since 1990; and
 - Sanitation coverage has decreased from 78% to 71% in urban areas.
- ▶ Of the total death rate in PNG, 10.4% are WASH-related and the overwhelming proportion of these deaths is young children².
- ▶ The HR requirements to meet the MDG targets indicate a total personnel shortage of approximately 7,600 people. The specific shortages are: approximately 1,190 WATSAN technical field staff; 4,140 other technical staff; 1,760 management and finance staff; and 520 social development staff.
- ▶ The key blockage appears to be in the engineering field. If the blockages are broken down into rural versus urban service provision, service provision in rural areas seems to be less complicated.
- The public sector in urban areas faces difficulties attracting trained engineers because of lower remuneration packages than other sectors such as private business or international NGOs.
- In rural areas personnel is often trained on the job, and often as environmental health officers that fulfil more than one task. This opens the arena for more vocationally-trained technicians to fill these positions as is the case in villages where community members take care of the O&M.
- Local NGOs source dedicated staff through their church affiliations, both paid and volunteer.
- ▶ Gender inequality prevails and only a few women enter the technical fields, while their participation is higher in the community mobilisation category.
- ▶ Most work involves O&M of existing infrastructure because of the limited investment in new infrastructure in the sector. In PNG the private sector mostly deals with infrastructure construction.

BACKGROUND

This Briefing Note summarises the findings from an IWA-led study in Papua New Guinea (PNG) made possible through the generous support of the Australian Agency for International Development (AusAID) that contributed to assessment of the human resources needs to provide water supply and sanitation services in four countries: Papua New Guinea, Sri Lanka, Philippines, and Lao PDR. These studies

were coordinated by the International WaterCentre, and in PNG executed by WaterAid Australia and ATprojects (PNG).

PNG is part of a group of islands including the eastern half of the island of New Guinea, between the Coral Sea and the South Pacific Ocean, east of Indonesia. The country terrain is mountainous with coastal lowlands and rolling foothills. It is located along a volcanic belt in the Pacific and is always under threat of volcanic destruction, including earthquakes,

mud slides and tsunamis, which have had a severe impact on its population.

PNG has been an independent nation since 1975 and has many development needs, one of which is its people gaining access to improved water and sanitation. The indigenous population of PNG is one of the most heterogeneous in the world. The country has 650 Papuan languages, of which approximately 400 are related and the remainder completely unrelated to one another or any other group. While the PNG population density is generally low, some

1 WHO/UNICEF JMP report 2012
2 Safer Water, Better Health - WHO 2008

urban pockets have grown by between 3% and 8% in recent years, causing unplanned and unstructured urban slums. Under these circumstances, WASH service delivery is extremely difficult.

As in many developing countries, water and sanitation (WATSAN) have received limited investment from both government and donors compared with some other development priorities such as health, education, roads and bridges. As a consequence, the latest statistics show a small reduction in WATSAN coverage³ from 41% in 1990 to 40% in 2010 with respect to access to safe water and from 47% in 1990 to 45% in 2010 for access to improved sanitation. This is not an indication that there has been no investment in WATSAN, but rather that the size of the investment has meant that new constructions have struggled to keep pace with PNG's population growth of approximately 2.7% per annum.

In terms of investments to-date, there has been modest investment in the urban sector from the PNG government and a number of institutional donors such as the European Union (EU), Japanese government (JICA) and the Asian Development Bank (ADB). Most funds are used to operate and maintain current facilities, with modest investment in the development of new systems in currently unserved urban settlements. In the rural sector, a limited amount of PNG government funds have been allocated, and the main investment has been from an EU-funded rural water supply and sanitation program (RWSSP). This programme, completed in 2012, supported 35 local and international non-government agencies (NGOs) implementing mainly village water supply and sanitation programmes.

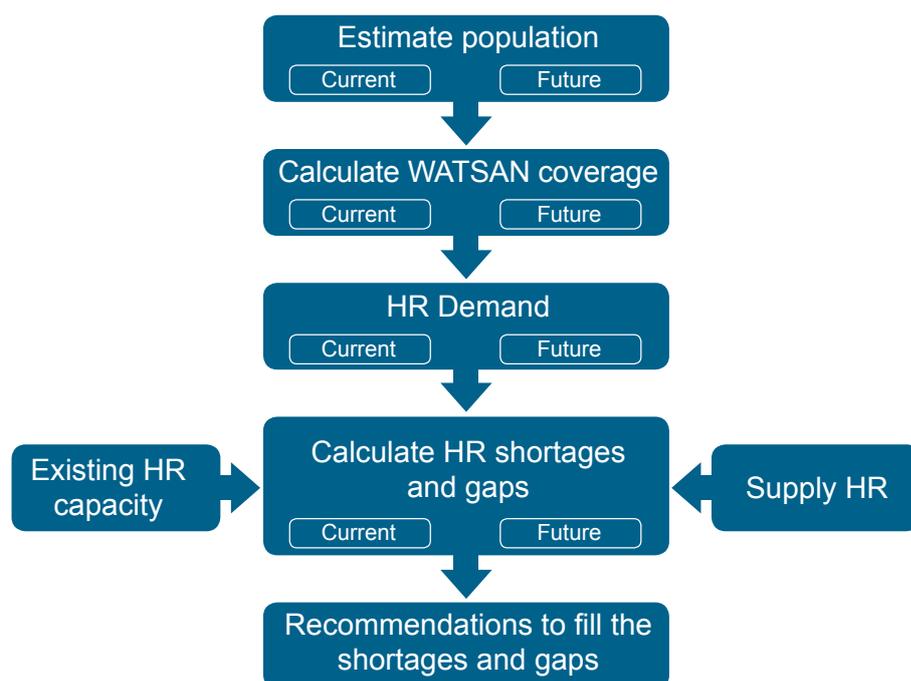


Figure 1: Methodological framework to assess human resource shortages and gaps

ASSESSMENT APPROACH

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 2015⁴. 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 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:

- Estimate the 2015 population to incorporate growth;
- Determine the current water supply and sanitation coverage and calculates the increases needed to achieve a) the MDGs and b) universal coverage (access to water and sanitation for all);
- Estimate a proxy of HR demand per type of service delivery per 10,000 people;
- Determine the existing HR capacity in the country in terms of numbers and skill sets;
- Assess the HR supply in the years up to 2015 in terms of graduates as well as vocational training;
- Calculate the HR shortages and assess the HR gaps; and
- 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.

3 WHO/UNICEF JMP report 2012

4 2015 figures used for comparability (and due to lack of future target year)

DISCIPLINES TO MAP HUMAN RESOURCES CAPACITY

The study used the following disciplines to map human resources capacity in the water supply and sanitation sectors:

- **Technical specialisation specific to water and sanitation services** (water/sanitation technical personnel): a person who is professionally engaged in a technical field, specifically related to the provision of water and sanitation facilities or infrastructure (for instance civil/environmental engineers).
- **Technical specialisation, not specific to the provision of water and sanitation services** (other technical personnel): a person who is professionally engaged in another technical field that is required in the planning, design or operation of water and sanitation facilities or infrastructure (such as hydro-geologists, mechanical/electrical engineers), but is not water and sanitation sector specific.
- **Management and finance:** a person who is professionally engaged in management (for instance finance, human resources or strategic managers and office managers fulfilling administrative functions) as well as persons who procure goods and services or cost planners.
- **Social development:** a person who is professionally engaged in hygiene promotion or other relevant water, sanitation and health professions in the social sciences (for instance health promotion specialist, sociologist, community development worker).

COMPONENTS OF THE WASH SERVICE DELIVERY PATHWAY

This study investigated the capacity of these four disciplines noted above, whilst distinguishing the human resource requirements for three different types of



work noted below:

- Design and construction;
- Operation and maintenance;
- Community mobilisation/ hygiene promotion.

LOCATION

The study was undertaken in PNG, however given the geographic challenges of PNG and financial constraints of the study, a limited number of field visits was possible. Face-to-face interactions were possible with stakeholders in Port Moresby, Goroka and Wewak, with telephone communications to stakeholders in Lae and Madang and Arawa (Bougainville Island).

DATA COLLECTION

Data was collected through a variety of sources: secondary sources included the population census, national demographic databases, JMP data describing existing coverage and MDG targets. Primary data was sourced through a variety of data collection methods including telephone interviews and consultations, workshops, key informant interviews, semi-structured interviews and surveys, and was analysed and distilled in order to derive the final estimates and

to extract the trends discussed in the country assessments on which the report is based.

ASSUMPTIONS

The detailed methodology applied in PNG is based on a number of assumptions following the IWA methodology, as follows:

- The methodology used Joint Monitoring Programme (JMP)⁵ coverage figures and definitions for the use of 'improved' water and sanitation facilities;
- Within a country, different settlement sizes are typically served by the same water and sanitation technologies; and
- The methodology assessed professionals, hence does not include household and community involvement.
- The country specific assumptions related to the IWA disciplines and their interpretation.
- The IWA category of "Other Technical field" incorporates all non-engineer technical employees.
- The other area of difference was the way the IWA category of

⁵ <http://www.wssinfo.org/>

“Social Development “and work type “Hygiene Promotion “were interpreted. There was found to be much crossover between community engagement and hygiene promotion, often being undertaken by the same staff person. To fit local terms, the social development category was renamed to Health and Community development (CD) advisors, to include also only those.

LIMITATIONS

Data describing the PNG WASH sector was difficult to access, for example, the latest accessible national census data dates to 2000 and there is no national database on WATSAN coverage in PNG. During the study, no other studies or data relating to existing HR capacity, demand or supply were uncovered. HR data was therefore generated through interviews with stakeholders.

The mountainous and scattered geography of PNG exacerbated the data collection and stakeholder consultation difficulties. For example, there is no road connecting the capital with the major provinces in PNG and the country includes many islands far from the mainland which makes regional travel costly and time consuming. As a consequence, the study was limited in the number and spread of its face-to-face consultations. Several consultations were conducted over the phone, which, to an extent, limited the quantity and quality of the data collected.

In addition, stakeholders had difficulty estimating the HR demand quantitatively to deliver services adequately, because it is not common practice for them to quantify human resources in this way (per population or connection); they were however willing to estimate this. This fact should be considered and the statistics should be taken with caution.

SECTOR CONTEXT

Despite being resource-rich, PNG is considered the least developed country (LDC) in the Pacific in terms of its human development and health indicators. The majority (around 85%) of its 6.6 million people live in rural areas, where access levels to clean water and sanitation are low. The low WATSAN coverage figures have remained virtually unchanged for a decade. The incidence of water-borne diseases – including typhoid, dysentery and diarrhoea – is high, with diarrhoeal diseases accounting for as much as one-third of all childhood deaths. In 2004 the death rate from diarrhoea in children under five was nearly 11 deaths per 100,000 people. WHO estimate that 10.4% of all deaths in PNG are WASH related with the great majority of these deaths being children⁶.

INSTITUTIONAL ENVIRONMENT FOR SERVICE DELIVERY

At the national level, delegation of responsibility for WASH is ill-defined and confusing. Under the Water Supply and Sewerage Act (1986), responsibility for all WATSAN in the country rests with Water PNG (formally known as the PNG Water Board), with a mandate for provision of services in urban areas, and, in rural areas, to ‘promote’ WATSAN. The Public Health Act (1973) allocates responsibility for drinking water quality and septic tank regulations to the Department of Health, which also has a responsibility for health promotion.

Water PNG is a state-owned enterprise with a cost-recovery and profit mandate, and administers reticulated water supplies with metered usage to ensure cost recovery. Whilst Water PNG is responsible ‘to ensure the provision of safe, reliable and sustainable water and sanitation services in urban areas outside the capital district’, a 2006 review found that it had delegated

responsibility for district towns with a population of less than 1,000 to the Department of Health (presumably due to the difficulty of service cost recovery in smaller centres). The result is that Water PNG only services three of the nation’s 89 district towns. Reticulated water and sanitation provision in the capital, Port Moresby, is managed by parastatal company Eda Ranu, and in Goroka by the Goroka Urban Authority.

The National Department of Health (NDoH) is the unofficial lead coordinating agency for rural WASH as no formal MOU or delegation of responsibility exists. Until recently, the NDoH has expressed a lack of desire to focus on rural WASH (RWASH) with little or no evidence of activity in the sector other than in health promotion. As a result, rural WATSAN to date has received little government attention, with efforts by the NDoH primarily concerned with ensuring WATSAN services are provided for public facilities such as schools and Health Centres / Aid Posts. With the NDoH’s responsibility for coordination, policy and standards of rural WASH it does not nor will it have any funding for implementing WASH. The complication comes through decentralisation where it is the responsibility of lower levels of government to undertake WASH. Although this is where all the funding is allocated to, no one is attending to WASH.

In the absence of clear government leadership, most recent activity in RWASH has therefore, been confined to NGOs, community-based organisations (CBOs) and church-based organisations. There are between 35 and 40 organisations that currently play the role of primary service delivery providers in the RWASH sector.

National NGOs and CBOs are vulnerable and generally dependant on a single

6 Safer Water Better Health - WHO 2008



donor, surviving from contract to contract. Technical and organisational capacity in this group has been characterised as low, and attrition rates of skilled or semi-skilled staff is high, particularly when there are periods of inactivity between contracts, when skilled staff are often lost to other employers. The RWSSP responded to this situation by focussing resources and support on training and mentoring, as well as providing a stable funding base, with the aim of building up a pool of technically qualified and competent organisations in the sector (the RWSSP was completed in 2012).

POPULATION, EXISTING WATER AND SANITATION COVERAGE, TARGETS AND COVERAGE DEFICITS

A national census was conducted in 2011 but the results are not formally available yet. The previous census was in 2000 and these population statistics were used.

There is general agreement that the average yearly population growth rate is 2.7%. As the total population in 2000 was 5,190,786 then the 2010 estimate is 6,775,441 and by 2015 would be 7,805,688.

The best currently available statistics indicate that only 40% of people have access to safe water and 45% to basic sanitation (as at 2010). The PNG government's Medium Term Development Strategy sets targets of 70% for both water and sanitation coverage by 2030, while the MDG targets are 71% for water coverage and 74% for sanitation coverage by 2015. This relatively unambitious long-term⁷ target for 2030 but may be considered to be 'modest but realistic', given the very poor progress that PNG has made with the WASH MDG target.

⁷ Department of National Planning and Monitoring 2010

Since 1990, neither urban nor rural access to water has improved. In fact, urban water access decreased by 2% and rural water coverage increased by only 1%. Similarly, in the same period, urban sanitation followed a downward trend from 78% to 71% coverage, while rural sanitation declined marginally from 42% to 41%. The high national population growth⁸ rate of 2.7% effectively negated the gains from recent investments in mostly rural WATSAN infrastructure because the investments in new constructions have not kept up with population growth, and despite a significant drift of people from rural to urban areas, PNG remains an essentially rural society.

Table 1 summarises the additional water and sanitation coverage that is required to achieve MDG targets and universal coverage. The statistics shows the

⁸ WHO/UNICEF JMP report 2012

Table 1: MDG and universal coverage deficit (absolute population numbers)

	Pop 2015	MDG deficit Water	MDG deficit sanitation	Universal coverage water	Universal coverage sanitation
dispersed	6,555,103	2,727,952	2,465,601	4,661,708	4,202,703
rural village	379,191	157,803	142,627	269,664	243,112
small town	0	0	0	0	0
large town	150,283	22	24,012	44,356	63,837
city	721,111	107	115,216	212,835	306,311

Table 2: Future HR Demand to meet MDG Targets

	Rural/urban split	WATSAN Technical field	Other Technical field	Management/ Finance/ Admin	Health/ CD advisors	TOTALS
Water Supply	Rural	617	2,507	1,016	356	4,378
	Urban	32	194	89	0	306
	Sub Total	632	2,630	1,076	347	4,684
Sanitation	Rural	627	2,074	1,099	496	4,295
	Urban	39	225	102	32	398
	Sub Total	665	2,299	1,202	528	4,694
Water & Sanitation	TOTALS	1,297	4,929	2,278	874	9,378

Table 3: Future HR demand to meet universal coverage

	Rural/urban split	WATSAN technical field	Other Technical field	Management/ Finance/ Admin	Health/ CD advisors	TOTALS
Water Supply	Rural	852	3,462	1,403	492	6,210
	Urban	44	268	123	-	435
	Sub Total	897	3,730	1,526	492	6,645
Sanitation	Rural	852	2,821	1,496	674	5,844
	Urban	52	307	139	44	542
	Sub Total	905	3,128	1,635	718	6,386
Water & Sanitation	TOTALS	1,802	6,858	3,161	1,210	13,030

enormity of the task in PNG. In general, the current coverage numbers will need to be doubled to meet the MDG targets and then doubled again if universal coverage is to be achieved. While these figures are daunting, they do provide a basis upon which national WASH planning can be built, and can also be useful to encourage a much higher prioritisation and investment in WASH by both the PNG government and donors.

HUMAN RESOURCES IN THE WASH SECTOR

HUMAN RESOURCES DEMAND

In this instance 'demand' refers to the

number of human resources that are considered 'ideal' to serve the population effectively, using future coverage figures (to achieve MDG targets and universal coverage).

The basis of this approach estimating future HR demand is to use an estimate of HR employed to serve 10,000 people (HR demand ratio)

The HR demand to meet the MDGs and universal coverage respectively is presented in tables 2 and 3. The most significant observation is the large demand in rural areas, and relatively small demand for urban areas. This is due to the higher ratios of HR required

to deliver WATSAN services in rural dispersed settlements, because 85% of the population of PNG live in rural areas, and because of the low existing coverage of WATSAN in rural areas compared to urban areas.

Assessing what total number of staff is needed in each occupational category, for serving existing as well as for construction of new facilities and for operation and maintenance (O&M) proved difficult as almost all current HR employed in the urban areas is engaged in O&M of existing facilities rather than construction.

In the dispersed rural areas almost all HR were employed in the construction of new facilities and very few were involved in O&M. As in most developing countries, once constructed, village systems are typically handed over to local water committees within the community for O&M. The handover usually involves a short training course given to a group of community members during the construction process. It is recognised that rural households and communities require some form of on-going external support in order for them to sustainably operate and maintain their WATSAN facilities.

In terms of rural sanitation, household pit latrines are the norm and the on-going O&M of these are assumed to be the responsibility of the individual householders.

There is limited community mobilisation for WASH in urban areas. However, in rural areas, community mobilisation and hygiene promotion efforts are more significant (in part due to the greater responsibilities of individuals and communities in O&M). Rural hygiene activities overlap with the other social development activities and most rural WASH programmes involved one

Table 4: Estimates of the current HR employed in the water and sanitation sector in PNG

Institution	WATSAN Technical field	Other Technical field	Management/ Finance/ Admin	Health/ CD advisors	TOTALS
Eda Ranu	15	101	84	0	200
Water PNG	11	235	132	0	378
Goroka Urban	0	12	6	0	18
Dept. Health	0	0	0	100	100
Private sector	30	150	30	0	210
NGOs	15	134	60	60	269
Totals	71	632	312	160	1,175
WATER	36	316	166	60	
SANITATION	36	316	166	100	

person performing a range of social development activities, including community facilitation, mobilisation, and health and hygiene promotion.

EXISTING HUMAN RESOURCES CAPACITY, QUANTITY AND QUALITY

The current personnel in the WASH sector is estimated to be 1,175. Table 4 provides estimates of the total current HR employed in the WATSAN sector in PNG. There are more or less equal numbers of people currently working in water and sanitation.

WATSAN provision in terms of three main settlement types, namely Port Moresby, other urban cities and towns, and rural/village areas follow:

Port Moresby: Eda Ranu, servicing Port Moresby, currently employs approximately 200 staff across three main areas: engineers (15), technicians (101) and staff involved in management, finance and administration (84). Most staff (75%) works in water supply compared with 25% on sanitation. Ninety percent of current staff is involved in O&M of current facilities. There has been limited funding from the government and donors for capital works to extend the current system. The norm is that when work is required, private consulting and contracting companies tender to do it under supervision of Eda Ranu. It is estimated that collectively, the private sector employs approximately

30 engineers, 150 technicians, and 30 management, finance, and administration personnel.

Other urban settlements: Apart from Port Moresby there are currently 18 other urban water systems operating in PNG. Seventeen of these are operated by Water PNG while the Goroka Urban Council operates the service in the provincial town of Goroka. Water PNG employs a total of 378 staff made up of 11 engineers, 235 technicians, and 132 management, finance, and administration personnel. Goroka Urban Council has 18 staff, 12 technicians and six management, finance, and administration personnel.

In Lae, PNG's second largest city, Water PNG currently employs 62 staff, almost all involved in O&M as there is currently little funding available for capital works to extend the system. In Madang, Water PNG employs a total of 30 staff, with almost all being employed in O&M of the existing facilities.

Five percent (340,000) of the population lives in 15 rural villages. For the purposes of this study Wewak and Goroka were used as samples and data collected on each town. In Goroka, 18 O&M staff is employed and in Wewak, Water PNG employs 28 O&M staff.

Rural dispersed settlements: The majority of the population live in

relatively small rural villages where the Department of Health employs approximately 300 environmental health officers (EHOs). These EHOs have a wide range of responsibilities related to environmental health, one of which is water and sanitation. It is estimated that one third of their time is potentially devoted to water and sanitation but this depends on government investment in programmes, which at present, is low.

The EU-funded Rural Water Supply and Sanitation Programme (RWSSP) supported 35 NGOs in the construction of new village water systems and household latrines. This investment enabled the NGO WASH sector to scale up their activities and an estimated 270 people work in WASH, consisting of 15 engineers, 134 technicians, 60 management, finance, and administration, and 60 social development personnel (community development, health promoters).

Human resources quality

At current levels of activity most employers are reasonably content with the skill sets of employees. However, employers in urban areas find it hard to attract and retain trained engineers, as salaries are higher in the private sector. There is a need for more specific training in the areas of water and sewerage treatment plant operators. In urban areas, the focus is currently on technical jobs, such as the O&M of plant and equipment on a fee-for-service basis, especially in relation to water supply. Consequently, the perceived staff needs are greater for higher-level engineering and technical skills. This may change in the future as urban WASH providers shift their focus to areas of customer relations and satisfaction in order to improve their social and financial sustainability.

In rural areas, NGOs train staff on-the-job in the particular methodologies

and technologies used in village WATSAN projects. Staff retention is high, as personnel generally find the work satisfying and is less motivated by financial reward alone. Many local NGOs source dedicated staff through their church affiliations, both as paid employees and as volunteers.

In the rural areas, the focus is greater on the social development components of WASH and this is reflected in the expressed need for higher level skills in community facilitation and hygiene promotion in particular. In rural areas O&M of WASH facilities is usually the responsibility of the villagers themselves.

As there is often little initial demand for rural sanitation, hygiene promoters need to be highly skilled in order to bring out latent demand for latrines and convince people of the importance of latrine use and hand washing. While some of these skills are available locally, there is often a need to bring in trainers from other countries to share some of the latest successful methodologies such as Community-led Total Sanitation (CLTS).

As rural areas have been concentrating most of its activities on the construction of new WATSAN facilities, it is likely that in the future more attention will need to be given to the long-term sustainability of these facilities. This is likely to require more community mobilisers and technical support staff to provide on-going support to the local community WATSAN committees.

Gender

Regarding gender, the water and sanitation sector has traditionally had more males working in the engineering and technical positions. At Eda Ranu of the total staff of 200 only 30 are female. This seems to be typical in urban areas. In rural areas, as community development and hygiene promoters



tend to have more females, the overall gender split is more even.

Water versus Sanitation

In terms of the division of HR resources between water and sanitation, 75% of staff in water supply sector and 25% in sanitation are employed in urban areas. In rural areas it is estimated that 65% of people employed in the sector works in water and 35% in sanitation.

SUPPLY OF HUMAN RESOURCES FROM THE EDUCATION AND TRAINING SECTORS

Universities

Three universities were considered relevant to this study, being Unitech in Lae, the University of Papua New Guinea in Port Moresby and the Divine Word University has its main campus in Madang.

Unitech in Lae, conducts degree courses

Table 5: Estimates current supply of trained personnel provided each year by relevant training institutions and organisations

Training Institutions	Water/Sanitation technical personnel	Other Technical personnel	Management/ Finance / Administration	Health/CD Advisers	TOTALS
Unitech	69	0	0	0	69
Divine Word	0	0	10	24	34
Tech Colleges	0	100	100	0	200
ATprojects	0	100	0	0	100
NGOs	0	100	20	50	170
UPNG	0	0	20	50	70
TOTALS	69	300	150	124	643

in a range of engineering disciplines, a number of which would have applicability in the water and sanitation sector. In 2011, 69 civil and mechanical engineering graduated. Approximately 10% of engineering graduates secure employment in the WATSAN sectors.

The University of Papua New Guinea in Port Moresby, runs courses in social work, communication sociology and health promotion and approximately 50 people graduate each year that could be potentially employed in the sector. It also has courses in accounting management and approximately 20 of these graduates could be employed in the water and sanitation sectors.

The Divine Word University offers relevant courses in environmental health (EHOs) and management and finance, with an estimated yearly contribution to the sector of 20 EHOs and ten finance and management graduates.

Technical/Vocational Training

There are a number of institutions offering courses in the technical areas sought by the WATSAN sector, including construction, plumbing, carpentry, and finance and management. The major institutions are Lae Technical College, ATprojects, Port Moresby Technical College, the Don Bosco Technological Institute and the Australia-Pacific Technical College. The estimated output of the institutions relevant to the sector is

estimated to be 200 technicians and 100 finance and administration personnel.

The 40 NGOs operating in the sector also conduct a significant amount of on-the-job training, often starting with relatively unskilled employees. RWSSP has also devoted a considerable amount of time to conducting water, sanitation and hygiene training to staff from the NGO's they have been supporting. This training is estimated to be capable of training 170 people each year made up of 100 technicians, 20 finance and management, and 50 community development/hygiene promoters.

The area of technical or technician training seems to be relatively static, with demand far outstripping supply. Notably, at least one resource company has set up its own technical training institution (in Port Moresby) in order to supply for its own needs. There is a clear need for increased technical training opportunities, but the Department of Education would need to develop

appropriate plans and get significantly increased funding from the national government.

Supply of professional HR

Table 5 provides best estimates of the current supply of trained personnel being provided each year by relevant training institutions and organisations. There is no existing data describing the number of graduates entering the WASH sector; stakeholders estimated that at best approximately 10% of suitably-qualified engineers are employed in the WASH sector. More attractive salaries and conditions being offered by natural resource companies are attracting the majority of qualified engineers.

HUMAN RESOURCE SHORTAGES: COMPARING HR DEMAND WITH CAPACITY AND SUPPLY

Table 6 represents the current personnel and the shortages if the MDGs and universal coverage are to be met. The numbers are disaggregated by water and sanitation respectively.

From table 6 it is clear that an enormous increase in trained personnel would be required in all HR categories to reach both the MDG targets and total coverage. The requirements in social development (community development and health and hygiene promoters) and in finance and management are achievable, but the increased demand

Table 6: Existing HR capacity and HR shortages to achieve water and sanitation MDGs and universal coverage

Personnel		Water/Sanitation technical personnel	Other Technical personnel	Management/ Finance/ Admin	Health/ CD advisers
Current capacity	Water	36	316	166	60
	Sanitation	36	316	166	100
Shortage to meet MDGs	Water	562	2,169	790	167
	Sanitation	595	1,838	916	328
Shortage to meet universal coverage	Water	827	3,269	1,240	312
	Sanitation	835	2,667	1,349	518



RECOMMENDATIONS TO MEET THE HR NEEDS

It is clear that in order for PNG to meet its MDG 7c targets a considerable amount of additional investment will be needed to build new systems and operate and maintain them. In order to achieve this increase in water and sanitation systems infrastructure, more personnel will need to be trained and employed in the sector. The HR requirements to meet the MDG targets indicate shortages of approximately 7,600 people. When these shortages are compared with the current staffing of around 1,750 in the sector, the HR shortage would seem to be difficult to comprehend, let alone address in the few short years left to the 2015 MDG deadline.

It is recommended that the targets be viewed as aspirational that is more indicative of the need to link increases in new constructions with the development of increased human resource capacity. Considering this, training institutions should be consulted and included in future expansion plans, so they can tailor-make their courses and align them with government plans. It will seem more realistic at this stage to focus on the HR resources required to meet the national target of 70% coverage by 2030⁹ but setting key milestones along the way perhaps at 2020 to ensure that the challenges are addressed without delay.

In order to meet the WATSAN challenges, the following recommendations are put forward:

1. In order to meet the WATSAN MDG targets for 2015, the PNG government must develop a PNG Water and Sanitation Implementation Plan to identify how a rapid and large-scale-up of activities and

for engineers and technicians is beyond what is currently feasible. However, it is probably much easier to train technicians as many could be trained on-the-job or trained in short courses.

The key blockage appears to be in engineering. If this blockage is broken down into rural versus urban infrastructure, infrastructure provision may be more achievable in the dispersed rural settlement category where the WATSAN infrastructure requires less complex technologies than in urban systems. The blockage is exacerbated by the duration of the degree course of three to four years, which over-qualifies engineers for rural area work. Thus, some mid-level courses of shorter duration could help meet this requirement.

Both the current investment and the existing human resources in the WATSAN sector are unlikely to enable PNG to reach its MDG targets. In the urban areas most current expenditure is on O&M of existing systems. Although the JMP data does not indicate progress, the EU-funded RWSSP programme can demonstrate that its investment has led to 4% of the rural population gaining access to WATSAN in the past six years.

This expansion of services should to be viewed against a population growth of around 2.7%.

Most organisations indicated that, apart from engineers, they were able to source the trained staff they required to operate at current levels of investment. However, the current threat is that less capacity will be required in rural areas if the RWSSP funding is not replaced by other funds.

The clear needs in the WATSAN sector are a large scale-up of new constructions in both the urban and rural areas as well as significant investment in O&M in order to protect the investments previously made. In rural areas, community mobilisation can meet a significant part of this need, as technologies are simpler and latrine building in particular can often be carried out by villagers themselves. New construction in urban areas is more technically sophisticated and will require a significant scale-up of trained personnel both within service providers, private consulting and contracting companies.

⁹ Department of National Planning and Monitoring 2010

investment can be achieved over the next two-year period and a target should be set for post 2015.

2. Significant funding needs to be secured for the implementation of such a plan, almost certainly involving a mixture of government and donor funds.
3. A key opportunity to raise money for HR development in the country can be royalties gained from the current minerals resource boom in the country. This will present the government with an opportunity to prioritise the importance of WATSAN within its development agenda.
4. To explore other opportunities for funding, the government should join the Sanitation and Water for All global partnership and attend the annual high-level meeting, held in April each year in Washington. At this meeting developing countries present their national WATSAN plans and international donors are encouraged to help fund each credible plan. In order for the PNG government to put forward the country's needs at such a high-level meeting, credible resource data should be available.
5. A WATSAN HR plan needs to be a core component of the implementation plan so that sufficient staff is available to implement the scale-up of services and to ensure long-term.
6. Rather than compete with the human resource needs of the minerals resource sector, it is recommended that the government considers the

total HR needs across all industry sectors and increase the output of the training institutions to meet both the needs of the WATSAN and the minerals resource sector

7. WATSAN training institutions should be consulted in the development of a WATSAN implementation plan to ensure that they align their curricula with the sector demands and the tenets of the implementation plan.
8. WASH and WATSAN education and training are required across all categories of employees and all aspects of service delivery. It is recommended that the immediate focus be on:
 - a. Human resources to increase community-based O&M of rural water and sanitation services to ensure sustainability.
 - b. Human resource development to support an increased engineering capacity in the WASH sector to design and construct both water supply and sanitation services in rural and urban areas..
9. To ensure training courses meet the needs of employers in the WATSAN sector, it is recommended that stakeholder workshops be conducted, where employers discuss their particular needs with training providers who can then revise their curricula to better suit market demands.
10. In response to the existing requirement for on-the-job training, it is recommended that employers and training providers maximise

opportunities to create an enabling environment where graduates can gain practical experience.

11. With regard to retaining and attracting personnel:
 - a. Consideration should be given to non-financial incentives to retain skilled and experienced personnel within the sector, especially engineers, who are attracted to the higher paying minerals resources industry.
 - b. Re-training requirements to allow staff to move from other sectors into the WASH sector.

If the proposed increase in human resources is to be achieved, considerable investment will need to be made available to training institutions. As it takes time to train personnel, it is important that any future investment in infrastructure, (especially construction of new WASH facilities), be developed in concert with investment in training new personnel. This would seem best achieved through a staged increase in investment in both areas, such that increased investments in new construction is matched with an appropriate level of investment in training additional people.

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