

# An Avoidable Crisis

## WASH Human Resource Capacity Gaps in 15 Developing Economies

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# Executive summary

## An Avoidable Crisis

### WASH Human Resource Capacity Gaps in 15 Developing Economies

Shortages of human resources in the Water, Sanitation and Hygiene (WASH) sector will undermine the progress of many countries over the last two decades to increase access to water and sanitation. It will impede socio-economic development of those countries that remain off-track to meet the MDG water and sanitation targets, and raises questions about how realistic WASH targets under the Sustainable Development Goals will be.

In this report, the first of its kind, the IWA provides an overarching recommendation for the development of national capacity development strategies that have high-level political buy-in with involvement from multiple actors to ensure sustained, adequate professional and technical capacity. The report also calls for concerted action at regional and global level to collect relevant human resources data, and perform further research to strengthen the evidence base on which action plans and strategies can be built.

The adoption of the Millennium Development Goal (MDG) target 7c, to “halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation”, has prompted significant investment in infrastructure, technological innovation and institutional reform.

This investment has not been accompanied by the necessary focus on the size, competencies and enabling environment for the human resource base needed to design, construct, operate and maintain such services to meet the target and go beyond, towards universal coverage. Many developing economies are lacking significant numbers of water professionals, and the necessary knowledge, experience and specialist skills to meet the rising demand for water and sanitation services.

This is the first time dedicated research has been carried out to establish a baseline of the dimensions of the crisis facing human resources in the WASH sector in 15 developing economies. The initial study was carried out in 5 countries; a second phase was conducted in 10 countries using an adapted methodology. This research informs governments, industry and educational institutions to address human resources gaps.

#### Key data

- In 10 countries reviewed in the second phase of the study there was a cumulative shortfall of 787 200 trained water and sanitation professionals in order to reach universal coverage;
- Mozambique needs to double the number of trained water professionals (shortage is 11 900) to meet targets; whilst the majority is in water sector, most WASH technical field personnel are required in the sanitation sector (62%);
- 98% of the shortfall in human resources in Ghana is in the sanitation sector;
- Papua New Guinea needs to multiply its current WASH workforce by a factor of 9 in order to achieve universal coverage;
- Philippines requires 82 600<sup>i</sup> additional Water and Sanitation technical field personnel and para-technicians<sup>ii</sup>;
- Bangladesh<sup>iii</sup>, reported it required 44 000 additional HR even when the MDG targets had almost been reached; this gap is attributed to the need to maintain progress and focus on operation and maintenance of systems;
- On average 16.7% of the workforce in the 15 countries were reported to be female professionals.

<sup>i</sup> Assuming low productivity rates (low productivity being: 1 staff/186 connections).

<sup>ii</sup> In the Philippines water and sanitation facilities are categorized in 3 levels. Levels I and II water service facilities are operated and maintained by paratechnicians, who are community members that have been provided some short training in their required tasks.

<sup>iii</sup> First phase of the study.

# Key findings

**There are not enough appropriately skilled water professionals to support the attainment of universal access to safe water and sanitation.**

The current availability of data on the human resource demand, capacity, supply and shortages for water and sanitation services, is poor. Without credible evidence to support estimates of the real human resources shortages across all components of water, sanitation and hygiene provision, the WASH sector will not be able to make a business case that will attract sufficient investment.

- Sanitation services are significantly undermined by a poor supply of professionals when compared to water services;
- Low levels of access to and inadequate coverage of courses in tertiary education institutes is a significant bottleneck to meeting human resource demands;
- Female professionals are underrepresented, particularly in technical fields. This trend is mostly observed in the public and private sectors, the non-governmental sector has a greater gender balance; the number of female graduates from technical course at universities was also reported to be low;
- Operation and maintenance of water and sanitation systems are chronically neglected, with human resources inadequately allocated;
- Education and skills development requirements to operate and maintain specific technologies have not been appropriately assessed; such assessments would greatly benefit the WASH sector;
- The dependence on communities, volunteers and semi-skilled workers in rural areas is not sustainable without adequate institutional and operational support from local government and structured, formalised support from the professional sector.

# Key recommendations

**Investment in human resources has the potential to have multiple benefits across sectors. Investing in WASH human resource development is investing in health, education, economic and social development.**

Water and sanitation are crosscutting issues, affecting nearly all other elements of socio-economic development within developing economies. Investment in, and strengthening of, the human resource base for the delivery of water and sanitation services can alleviate the pressure on human as well as financial resources in other sectors.

- Investment in the WASH sector has an easily perceptible knock-on effect through improved access to drinking water and sanitation. It can also be a magnet attracting and retaining high calibre professionals for the WASH sector;
- Data collection needs to be strengthened and the quality of data needs to be improved to provide compelling evidence for investment in recruitment, education and skill development in the WASH sector;
- More research on the current or projected levels of funding required to support capacity development, either in its totality, from governments or from the donor community is critical;
- The Sustainable Development Goals must give consideration to the use of human resource capacity data for WASH as an “enabling environment” indicator;
- Appropriate public policies need to be developed and implemented to support job creation, including investing in skills to support labour supply and enabling private sector engagement to stimulate an increase in labour demand;
- Incentives to attract newly qualified and skilled personnel and retain experienced personnel within the sector and reverse a professional drain to other sectors are required;
- Developing specific programmes and promoting greater investment to engage and encourage female participation at the educational level and at the professional level could provide a ‘quick fix’ to human resources shortages, but will require a mind-set shift;
- Improve coordination and cooperation between WASH sector organisations and the education sector to enhance alignment between human resources demand and supply;
- Make technical and vocational training a pivotal element in human resources development in both urban and rural service provision.

# Next steps

## The recommendations argue for the formulation of a national capacity development strategy

The report also calls for concerted action at regional and global level to collect relevant human resources data, and perform further research to strengthen the evidence base on which action plans and strategies can be built.

### The IWA will:

- Work with national stakeholders, including ministries, education and training institutes, professional associations and industry bodies to develop long-term, national strategic action plans for HR capacity development;
- Work with capacity development, education and research institutes to strengthen the data availability, and gain a better understanding of the factors influencing the planning and development of human resources for the WASH sector;
- Lead global advocacy efforts with capacity development and education organisations and contributing to global development goals and reporting mechanisms for WASH.

## Notes

This report is the result of a project, known as the IWA Human Resources Capacity Gap study (HRCG), in which an International Reference group supported the development of a methodology to measure national HR capacities and to identify gaps in a uniform, systematic way that allows comparison of datasets between countries for specific job categories. This methodology was tested in five countries (Bangladesh, Mali, South Africa, Timor Leste and Zambia) 2009 with the “*Mind the Gap*” study, funded by the Department for International Development (DFID) of the United Kingdom. The first study produced valuable insights and lessons learnt about the challenges to human resources capacity development for the sustainable delivery of water and sanitation services. The outcomes informed a revision of the methodology and continued research in six additional countries in Africa (Burkina Faso, Ghana, Mozambique, Niger, Senegal and Tanzania) with support from the United States Agency for International Development (USAID) and four in the Asia-Pacific region (Lao PDR, Papua New Guinea, the Philippines and Sri Lanka) with support from the Australian Agency for International Development (AusAID).

# Introduction

## ***The HRCG project's origin***

This report presents the outcomes of an initiative designed to generate much-needed information on the status of national human resources and professional competencies (knowledge, skills and experience) to deliver drinking water and sanitation services, and hygiene promotion (WASH). The project, known as the Human Resources Capacity Gap study (HRCG), was carried out as part of the Human Resources and Capacity Development Programme of the International Water Association (IWA).

## ***The preliminaries to the study: the decision to develop an assessment methodology***

Following the publication of the International Development Committee report (2007), the Department for International Development (DFID) of the United Kingdom agreed to support a review of the human resource status and needs in the WASH sector. A reference group led by the International Water Association (IWA) recommended an approach based on country case studies, to collect data on human resource shortages (numbers) and gaps (skills) affecting national WASH sectors. It was recognized that this required the development of HR assessment methods and procedures. The development of a methodology was, therefore, initiated to measure the current numbers and skills of human resources working in water and sanitation, and to assess the HR needs with a view to reaching the MDG targets (by 2015).

## ***As the basis: a guidance document aimed at ensuring consistency***

As a first step, a literature review resulted in the determination of terms and definitions as well as the broad categorization of job functions. Next, a methodological guidance document was prepared for the in-country assessment teams. In 2009, this guidance document was applied and tested in five countries (Phase 1). In Phase 2, an updated version of the methodology was tested in another ten countries

## ***Capacity development in support of efforts towards global goals and targets***

The outcomes contribute to effective, informed decision making on issues pertaining to WASH capacity development, which refers not only to education, training and adult-learning, but also to the creation of an enabling environment: policy, legal and regulatory frameworks, institutional arrangements and the promotion of good practices. Ultimately, this should support the attainment of international goals and targets, including Target 7c of the Millennium Development Goals (MDGs), the anticipated post-2015 SDG targets and the progressive realization of the human right to safe drinking water and sanitation.

## ***Mind the gap, the first study under this initiative***

The two phases of the project were financed by a number of external support agencies. It started in 2009 with the "*Mind the Gap*" study, funded by the Department for International Development (DFID) of the United Kingdom and executed by IWA in five countries (Bangladesh, Mali, South Africa, Timor Leste and Zambia). This study determined the numbers and types of staff needed for water and sanitation service delivery and hygiene promotion. (For the purpose of this report the WASH sector is defined as the collection of professionals and technicians supporting the delivery of water and sanitation services and hygiene



promotion). An assessment methodology was developed and tested to provide a first baseline on national human resources (HR) capacities and to identify gaps in a uniform, systematic way that allows comparison of datasets between countries for specific job categories.

### ***Initial lessons learned applied in the subsequent project phases***

The first study produced valuable insights and lessons learnt about the challenges to HR capacity development for the sustainable delivery of water and sanitation services, although quantitative data was subject to in-country definitions of what was included and excluded. The outcomes informed continued research in six additional countries in Africa (Burkina Faso, Ghana, Mozambique, Niger, Senegal and Tanzania) with support from the United States Agency for International Development (USAID) and four in the Asia-Pacific region (Lao PDR, Papua New Guinea, the Philippines and Sri Lanka) with support from the Australian Agency for International Development (AusAID). Most significantly, the first study provided valuable lessons learned in the application of the assessment, leading to a refined version and procedures being used in the ten additional countries.

### ***The target audience of this synthesis report***

The results of the fifteen national studies are presented in country briefing notes<sup>1</sup>. The present synthesis report provides an overview of these results, and the conclusions and recommendations that emerge from the studies. The report targets decision makers in government departments with responsibilities for WASH, capacity development providers (i.e. universities, training institutes and non-governmental organisations), and other organisations involved in the WASH sector. The recommendations will facilitate contextual learning, a further strengthening of the assessment methods and procedures, and provide the 15 countries with directions to start addressing the challenge of capacity gaps in the WASH sector through the formulation of national HR development action plans.

### ***Global status of access to drinking water and sanitation***

In 2012 the WHO/UNICEF Joint Monitoring Programme (JMP) reported that the global MDG drinking water target had been met in 2010, five years ahead of schedule<sup>2</sup>. Global monitoring is based on measuring access to improved sources of drinking water, a less than perfect proxy indicator for sustainable access to safe drinking water. The JMP progress report highlighted major disparities between and within regions. Countries in Africa south of the Sahara are particularly off-track, while countries in East Asia have made more-than-average progress towards the drinking water target. Progress in access to improved sanitation was reported to lag behind significantly. In fact, sanitation is one of the most off-track targets in the MDG framework. For both the drinking water and sanitation targets, significant disparities continue to exist across the rural-urban divide, and between the various socioeconomic strata, expressed in wealth quintiles.

### ***No sustained progress without effective HR management***

A crucial ingredient in the process of advancing towards the MDG targets and sustaining progress achieved is to employ the right number and calibre of people fit for the functions to be performed in a suitably enabling environment.

This need for HR development to support water and sanitation services was already recognised long before the initiation of the MDGs, at the UN Water Conference in Mar del Plata, Argentina, in 1977 and re-iterated at a 1991 UNDP

<sup>1</sup> <http://www.iwa-network.org/hrcg>

<sup>2</sup> <http://www.wssinfo.org>

**There is a history of efforts to highlight HR needs for WASH ...**

symposium on water sector capacity building in Delft, the Netherlands<sup>3</sup>. Over the past two decades, a number of influential reports focused on water and sanitation have again highlighted the urgent need to develop adequate national human resource bases. The UK International Development Committee (2007) went as far as to argue that the lack of institutional, organisational and individual capacity at national and local level is a more serious impediment to sustaining targets than the lack of financial resources.

**... and there are examples of similar assessments in other sector**

The MDGs prompted research on HR deficiencies in other sectors, notably health (WHO, 2008) and education (UNESCO, 2010). Yet, no comparable or significant data are available pertaining to human resources in the WASH sector that can inform both donor and recipient governments. Fragmentation and the inherent complexities of the water and sanitation systems and services have thwarted the required research initiatives. As was confirmed in the first phase, "*Mind the Gap*", the limited availability of relevant data is another important obstacle to the successful implementation of systematic national HR assessments.

**Monitoring outcomes is now complemented by monitoring the enabling environment**

While the WHO/UNICEF JMP focuses on global outcomes of drinking water and sanitation efforts, there is a growing recognition that the influence of the enabling environment on processes and their inputs and outputs also requires monitoring. Status overviews and updates of policy frameworks, institutional structures, and financial and human resources reveal key bottlenecks to be tackled.

**GLAAS emphasizes the need for more research on HR capacity development**

In response, the World Health Organization has been carrying out the biennial Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS)<sup>4</sup> on behalf of UN-Water. GLAAS has collected data on the status of human resources for WASH in low-and middle-income countries, and has concluded that HR gaps are a real threat to sustaining the achievements of MDG development efforts, but that significantly more research will be required to elucidate the nature and magnitude of the HR gaps.

**GLAAS 2012 findings on HR**

**BOX 1: UN-WATER GLAAS 2012 – CHAPTER 4, HUMAN RESOURCES**

**Countries report insufficient staff to operate and maintain urban and rural drinking-water systems.** From the GLAAS data, of the 67 countries that reported on O & M, only 27 had sufficient staff to operate and maintain their urban drinking water systems and only 11 their rural systems.

**Less than 20% of respondent countries consider the supply of skilled labour and technicians adequately developed to meet the needs in rural sanitation.** While nearly 70% of countries reported that their capacity was under development.

**In most countries, there are opportunities for continuing education and training, but the opportunities are insufficient to meet the needs of the staff.** Only eight countries reported that they had sufficient education/training opportunities for sanitation and only seven for drinking water.

The outcome of such research will provide valuable support to national decision makers in their efforts to set priorities in HR capacity development. The information will be crucial as well to overcome the HR barriers to deliver on donor objectives.

And finally, research outcomes will help promote increased capacity inflows into the sector, reduce the drain of qualified personnel and support capacity and career development for existing staff.

<sup>3</sup> IHE/UNDP, 1991. A strategy for water sector capacity building, proceedings of the UNDP Symposium, Delft 3-5 June 1991. Delft: IHE; New York: UNDP.

<sup>4</sup> [www.who.int/water\\_sanitation\\_health/glaas/en/](http://www.who.int/water_sanitation_health/glaas/en/)

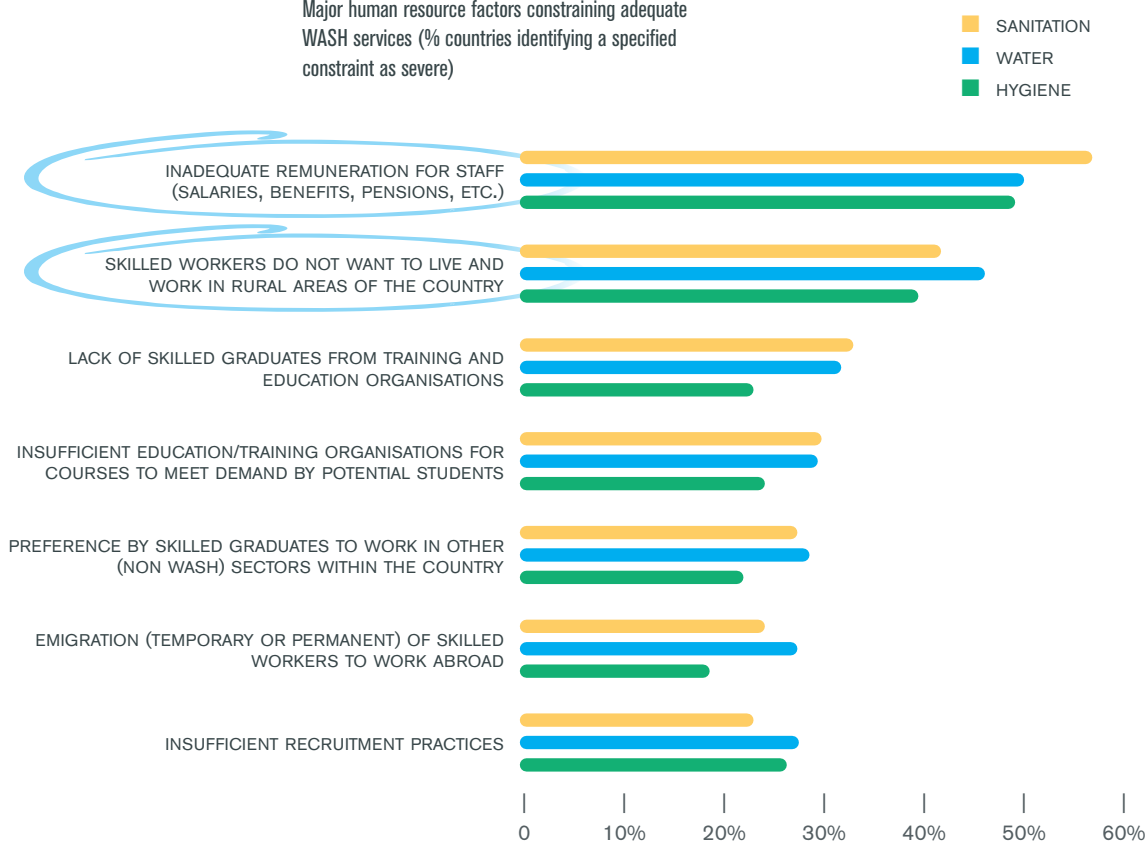
**GLAAS 2014 report (released late 2014) reports HR constraints that are congruent with information presented**

The latest GLAAS report<sup>5</sup>, which will be published in its complete version late 2014 (preliminary GLAAS information was presented at the High-Level Meeting of Sanitation and Water for All in Washington DC in April 2014), presents an in-depth analysis of the HR constraints on WASH as they emerge from the GLAAS country surveys. Two of the outcomes shared by the GLAAS Secretariat are fully congruent with the information presented in this IWA report: the need to provide stronger incentives to attract and retain WASH staff, and the WASH tasks most in need of HR strengthening.

**GLAAS 2014: There is a need to provide stronger incentives to attract and retain staff (especially in rural areas)**

With respect to providing stronger incentives to staff for delivering WASH services more effectively to the most vulnerable, it was found that the two most severe constraints on delivering adequate WASH services are inadequate staff remuneration and the lack of incentives for skilled workers to live and work in rural areas (figure 1).

**FIGURE 1**  
Major human resource factors constraining adequate WASH services (% countries identifying a specified constraint as severe)



**GLAAS 2014: Tasks that would most benefit from strengthened HR are: Monitoring and Evaluation; Operation and Maintenance and Hygiene promotion**

With respect to task categories that would most benefit from increased human resources for WASH, the ones that scored highest were WASH planning at national and sub-national level; monitoring and evaluation mechanisms; and, operation and maintenance (figure 2). For drinking water, operation and maintenance, and monitoring and evaluation stand out as the two tasks that would benefit most from additional human resources. Health promotion and community mobilisation are the tasks that would benefit most from additional human resources in the area of hygiene.

<sup>5</sup> Two outcomes presented in figure 1 and 2 are preliminary results of GLAAS 2014 report that will be published late 2014.

**FIGURE 2**

Tasks that would most benefit from increased WASH HR (% countries identifying each task in their top three tasks needing additional HR)



## Geographical scope

The study was performed in 15 countries shown on the map below: Bangladesh, Burkina Faso, Ghana, Lao PDR, Mali, Mozambique, Niger, Papua New Guinea, Philippines, Senegal, South Africa, Sri Lanka, Tanzania, Timor Leste and Zambia.

### Selection criteria for country engagement

### Economic status, governance characteristics and MDG priority as secondary criteria

Selection of countries for Phase 1 (*“Mind the Gap”*) was based on the size of the gap between their actual progress towards the MDG water and sanitation targets and the final set target, as well as a number of other considerations:

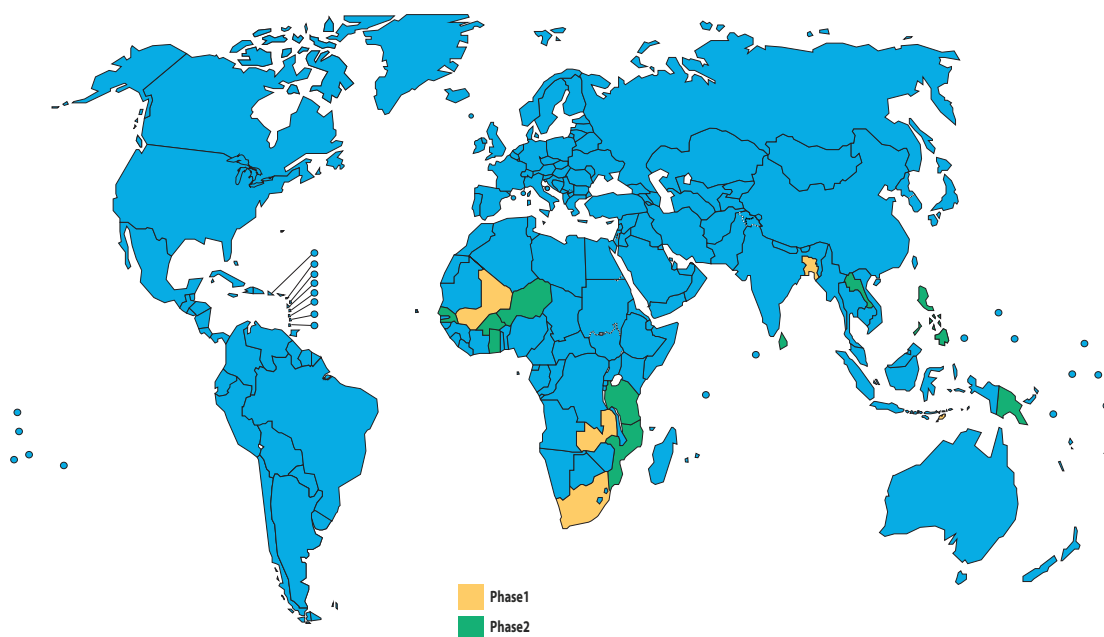
- Income level, as measured by the Gross National Income (GNI) and the World Bank classification of low- and middle-income countries (LMIC)<sup>6</sup>; Governance parameters, usually an assessment based on security and safety, rule of law, transparency and corruption, participation and human rights, sustainable economic opportunity and human development<sup>7</sup>,
- Regional distribution, i.e. the priority regions in the MDG framework – Asia and Africa.

Selection of the ten Phase 2 countries also applied the above criteria, but, in addition, took into account the priority focus of the respective external support agencies.

<sup>6</sup> <http://data.worldbank.org/about/country-classifications>

<sup>7</sup> E.g. as measured by the Mo Ibrahim Index of African Governance, the World Bank’s IDA Country Performance Rating, CPR ratings.

**FIGURE 3**  
Geographical overview of studies countries



**Country status with respect to MDG water and sanitation targets**

Table 1 provides an overview of the population, the indicators for progress towards the MDG water and sanitation targets and related information in the 15 countries where IWA implemented the HRCG study. Seven of them have already met the MDG drinking water target (with two others close to meeting it); only two have met the sanitation target<sup>8</sup>. Of the 15 countries, the five that are farthest from achieving the sanitation target have access rates (2010) below 20% (WHO/ UNICEF JMP, 2012)<sup>9</sup>. One factor contributing to the failure to meet the sanitation target is the JMP definition of improved sanitation, which does not include shared sanitation. There is evidence that shared sanitation does not provide the same public health protection as sanitation used by individual households. Yet, for reasons of expediency, many governments have embarked on projects to provide shared sanitation. By contrast, shared water points such as protected wells and standpipes are considered to be improved sources of drinking water by JMP. This is, in part, the basis of the controversy over the validity of the proxy indicator for progress towards the drinking water target, as it does not guarantee safe water at the point of consumption.

**Relative nature of progress in access to improved sanitation**

In the countries that were part of the study the increase of the population that gained access to improved sanitation is between 5% (Tanzania) and 50% (Lao PDR). The lowest increases are found in Tanzania (5%), Niger (6%), Ghana (8%) and Mozambique (9%). These percentages must be considered in the light of the baseline figures. In the Philippines, for example, the increase was 28%, but the country started off with a rural sanitation baseline coverage of 69%. In Niger, a 6% increase was observed, but that country started off with a sanitation coverage of 4%.

<sup>8</sup> See appendix 1 for more elaborate table – These figures are derived from the WHO/UNICEF JMP figures but were not always the ones used in the HR assessments.

<sup>9</sup> Burkina Faso (17%); Ghana (14%); Mozambique (18%); Niger (9%) and Tanzania (10%).

**TABLE 1**  
Countries' contextual information

COUNTRY	POPULATION (000) <sup>12</sup>	JMP DATA (2012 REPORT)								HEALTH <sup>9</sup>	EDUCATION <sup>10</sup>
		Drinking-water (2010 coverage) <sup>11</sup>				Sanitation (2010 coverage) <sup>11</sup>				Number of diarrhoeal deaths from WASH, 2012; percentage of total diarrhoea deaths 2012	Adult literacy rate 2015 (%)
		Urban	Rural	National	MDG drinking water target (JMP 2012)	Urban	Rural	National	MDG sanitation target (JMP 2012)		
<b>HRCG PHASE 1</b>											
Bangladesh	154 695 368	85*	80*	81*	88	57	55	56	70	8950 (56%)	61
Mali	14 853 572	87	51	64	64	35	14	22	57	8444 (62%)	38
South Africa	51 189 307	99	79	91	91	86	67	79	86	6258 (48%)	93
Timor Leste	1 210 233	91	60	69	73	73	37	47	65	114 (42%)	67
Zambia**	14 075 099	87	46	61	75	57	43	48	73	3308 (58%)	72
<b>HRCG PHASE 2</b>											
Burkina Faso	16 460 141	95	73	79	71	50	6	17	54	6338 (63%)	36
Ghana	25 366 462	91	80	86	76	19	8	14	53	4763 (63%)	71
Lao PDR	6 645 827	77	62	67	66	89	50	63	54	909 (44%)	80
Mozambique	25 203 395	77	29	47	68	38	5	18	55	9499 (64%)	62
Niger	17 157 042	100	39	49	67	34	4	9	52	11 081 (64%)	36
Philippines	96 706 764	93	92	92	92	79	69	74	78	4723 (48%)	96
Papua New Guinea**	7 167 010	87	33	40	71	71	41	45	73	858 (54%)	63
Senegal	13 726 021	93	56	72	81	70	39	52	69	3482 (57%)	56
Sri Lanka	20 328 000	99	90	91	83	88	93	92	85	705 (43%)	93
Tanzania**	47 783 107	9	44	53	77	20	7	10	53	12 913 (61%)	74

\* Adjusted for arsenic contamination levels based on national surveys conducted and approved by the Government of Bangladesh

\*\* Country not included in GLAAS 2012 report

### The rural/urban divide

In eight out of the 15 countries studied general rural development, and specifically the provision of rural sanitation services, lags far behind urban provision. Six out of the 15 countries will probably reach their rural targets for access to improved water sources or have already reached them. In some countries, such as Papua New Guinea, rural water provision lags behind and is on par with rural sanitation provision.

### Countries' own perspective on needs for HR capacity development facilities

Of the 15 countries in the HRCG study, 12 participated in the 2011 UN-Water GLAAS process, reported on in 2012<sup>14</sup>. The three non-participants in GLAAS 2011 are Zambia, Papua New Guinea and Tanzania. All 12 countries reported to either have, or to be formulating, HR targets for drinking water supply and sanitation within their national plans or strategies. Similarly, all 12 countries had in-country training institutions covering water and sanitation, although in nearly every case these are considered to be insufficient for the needs – with the exception of Ghana which considered it has an adequate number of training institutions, and Burkina Faso which only saw the need for more training capacity in rural sanitation.

10 Prüss-Ustün, A., Bartram, J., Clasen, T., Colford, J. M., Cumming, O., Curtis, V., Bonjour, S., Dangour, A. D., De France, J., Fewtrell, L., Freeman, M. C., Gordon, B., Hunter, P. R., Johnston, R. B., Mathers, C., Mäusezahl, D., Medlicott, K., Neira, M., Stocks, M., Wolf, J. and Cairncross, S. (2014). Burden of disease from inadequate water, sanitation and hygiene in low- and middle-income settings: a retrospective analysis of data from 145 countries. *Tropical Medicine & International Health*, 19: 894–905. doi: 10.1111/tmi.12329.

11 Education for All Global Monitoring Report (UNESCO, 2012).

12 Coverage data taken on basis of baseline year for the studies (2010).

13 <http://data.worldbank.org/indicator/SP.POPTOTL>

14 The GLAAS data collection process has a significant component of self-reporting by in-country stakeholders with cross-checks wherever feasible through interaction between members of the national WASH coordination group and the regional GLAAS facilitators. Country processes differ and, at least for some countries, much of the data on human resources presented in the GLAAS 2012 and 2014 report are likely to be based on the views of government representatives; the private sector and NGOs were potentially under-represented.

***A total lack of in-service training  
and continuing education***

None of the 12 countries could confirm that water and sanitation staff undergo sufficient “continuing education” and most countries had over 10% of designated posts un-filled for either sanitation or drinking-water, or both. Seven of the 12 countries did not report to GLAAS on their staff numbers for either drinking-water and/or sanitation, which underscores the importance of the development of a suitable methodology for national assessments, as presented in this report.



Basra school for girls 2008.  
© Essam al-Sudani

# Main findings

***The findings need to be seen in the broader development context***

Numerous factors influence the capacity of the WASH sector. For each country the HRCG study took into consideration its status of development as reflected by the literacy rate; the enabling environment created by national policies, strategies and financial resources; the capability of national institutions to fully use the potential of the available workforce; the capability and capacity of education and training institutions to develop knowledge and skills of their students; and the career path offered to attract staff to the sector. This section presents an in-depth summary of the main findings, with illustrative examples from the individual countries studied.

## 1

**The HR Assessment Methodology is an effective tool to inform where WASH capacity gaps and shortages need to be addressed within a country to meet universal access to water and sanitation.**

***Project's strategic objective: methodology development for HR information***

The strategic objective of the project was to develop, test and revise data collection methods and procedures that will produce baseline information about national human resources status and needs in the water, sanitation and hygiene (WASH) sector. This information is intended to provide decision-makers in national governments and external support agencies with an evidence base for the formulation of strategic WASH HR capacity development plans to address critical gaps.

***The scope of assessment had to move beyond infrastructure to also include O&M***

The initial methodology set out to measure HR needs to achieve the MDG targets, implying a focus on increasing access, and, as a consequence, its scope was limited to HR needs for the construction of new infrastructure. The five Phase 1 studies indicated, however, significant HR needs for the operation and maintenance (O&M) of existing and new infrastructure if the targets were to be achieved sustainably without a fall-back in access. With the MDG deadline fast approaching and the transition to the post-MDG era taking shape, it was considered critically important that HR for O&M as well as community mobilisation be investigated in the second phase. This observation was confirmed in the 2012 GLAAS Report (see introduction) which pointed to a risk of fall-back in achievement if the HR needs for O&M were not addressed.

***A proxy for HR demand needs to be developed to offset against the capacity in sector, and supply from education***

The Phase 1 studies based their estimations of shortages mostly on information about current vacancies in the relevant organisations. The findings illustrated, however, that many other factors influence vacancy numbers, such as government quotas, limited financial investment in HR or limited capacity development adjoining decentralization efforts. It was decided that for future assessments vacancy numbers were not the appropriate indicator. To allow for comparability and estimate the numbers needed at the national level, a proxy of HR demand per 10,000 would need to be estimated distinguishing HR for construction (temporary workers), O&M (full time workers) and community mobilisation (full time workers). This demand should be based on the essential functions in the service delivery that require a certain number of staff with qualification and skills clearly defined.



In the Phase 1 studies, functionally defined job categories were used (see Box 2). While the definitions made sense in theory, under practical conditions it proved challenging to associate existing jobs to the categories defined by their function description.

**BOX 2: FUNCTIONAL DEFINITIONS FOR JOB CATEGORIES ASSESSED IN THE PUBLIC SECTOR, NON-GOVERNMENTAL ORGANISATIONS (NGOS) AND PRIVATE COMPANIES:**

- **Engineer:** a person who is qualified or professionally engaged in any branch of engineering related to the provision of water and sanitation facilities or infrastructure.
- **Associated professional:** an occupation related to water, sanitation or hygiene promotion requiring further education (usually to degree level) in a non-engineering topic (e.g. geology or social sciences).
- **Technician:** someone who has technical training, a practical understanding of general theoretical principles (but not to graduate degree level) and experience in the application of technologies.
- **Skilled worker:** a worker who has acquired technical skills but lacks formal qualifications such as a plumber, mechanic, driller, mason or latrine caster.

**Multiple functions combined in one person obscure the picture**

The guidance document included a list of example jobs under each category, yet the study teams discovered that one person could be responsible for several functions pertaining to different job categories. In the second study, the revised methodological guidance focused on determining people's working hours in specific functions, rather associating each individual with a singular job category. Still determining inclusion or exclusion of jobs in categories is subject to the country's institutional context, types of technologies, HR supply and many other factors.

**Too many distinct functions are combined in one professional category**

It was also found that the category of associated professionals became a 'catch-all' for a wide range of jobs in the sector including geologists, sociologists, accountants and others. Therefore, it was hard to draw robust conclusions from the data collected. This highlighted the need to further specify separate subcategories to distinguish social, management and finance functions.

**Methodology flexibility resulted in diverging outcomes**

The methodology, which was set out to enable comparisons across countries, turned out to be too flexible in its application. This resulted in diverging procedures to assess and estimate HR figures in the different countries, no longer allowing for comparisons as originally foreseen.

**A more structured approach for quantitative data analysis was developed**

The difficulties in obtaining reliable and comparable quantitative data through the national assessments that could be merged into a global analysis surfaced during the Phase 1 study. The methodology had to be strengthened to allow for a more comprehensive and in-depth assessment. The methodology was revised to incorporate a more structured approach to collecting and analysing quantitative data, and a supporting Excel-based tool was developed.

**Lessons learned phase 1: methodology revisions**

In conclusion, the methodology revised for phase 2 (see appendix 2) used an HR proxy to form the baseline of demand against which to measure capacity and supply. It distinguished HR need for construction, O&M and community mobilization, and used universal coverage targets with a view to the post 2015 era. The categories changed slightly and moved from educational distinction to incorporate distinction on the basis of content. The quantitative figures were now based on hours of work (in construction, O&M and community mobilization) in different job categories rather than assigning one person to one category only. The phase 2 methodology was evaluated after it had been applied in the 10 countries, and recommendations are provided in appendix 2.

## 2

**Countries with high human resource demand and low service levels that will not meet their MDG targets are likely to be seriously challenged in their efforts to make progress towards possible SDG targets and will be significantly hindered in the progressive realisation of universal access to water and sanitation services.**

**Countries with high HR needs and low service levels stand out with regards to challenges to meet goals and objectives**

Vast numbers of professionals will be needed for adequate water and sanitation service provision. Table 2 presents estimates of the total projected demand<sup>15</sup> of professionally qualified personnel (WATSAN professionals, professionals in related technical fields; technicians, management and finance staff, and social scientists) per country (for Phase 2 countries) to reach the MDG targets.

**TABLE 2**

HR demand in Phase 2 countries (in this table Phase 1 countries are not included because HR demand was not estimated in a comparable way)

PHASE 2 COUNTRIES	TOTAL HR DEMAND TO MEET THE UNIVERSAL COVERAGE DRINKING WATER TARGET	TOTAL HR DEMAND TO MEET THE UNIVERSAL COVERAGE SANITATION TARGET
Burkina Faso	43 900	37 800
Ghana	31 400	597 600 <sup>16</sup>
Lao	730	290
Mozambique	12 700	6900
Niger	17 100	7400
Papa New Guinea <sup>17</sup>	6000	6000
Philippines <sup>18</sup>	643 407 (low productivity) 576 173 (high productivity)	
Senegal	2700	1100
Sri Lanka	4300	700
Tanzania	19300	4700
<b>TOTAL<sup>19</sup></b>	<b>138 430</b>	<b>662 470</b> (if Ghana excluded: 64 870)

**The overall picture shows huge human resource demands**

**Large discrepancies between countries reflect bias of definition**

**Ghana: high professional needs in rural sanitation result of misguided interpretation of criteria for classification**

The large differences in needs observed between countries reflect the different interpretations in individual countries of what is included or not in the definition of professional capacity.

The substantial HR demand documented to reach the MDG sanitation target (for instance in Ghana), must be considered contextually: while rural sanitation shows the greatest HR needs, in reality rural households and NGOs generally bear the brunt of sanitation implementation. Therefore, engagement of semi-skilled workers will suffice, with oversight responsibilities for local government. Appraising the data on requirements for professionals, one may conclude that the disproportionately large estimates of professionals needed in the countries studied are the result of inadequate categorization of human resources. For jobs that can be done by semi-skilled and/or vocationally-trained workers (such as plumbers), professionally trained human resources were scored.

<sup>15</sup> HR demand is the ideal number of people and education and skills (includes existing and additional human resources required). This type of baseline was only consistently estimated in Phase 2, hence table 2 is only showing Phase 2 countries.

<sup>16</sup> This large number for Ghana may include semi and unskilled workers, which was not included in the definition as defined by the methodology.

<sup>17</sup> Estimate as HR demand was not fully calculated.

<sup>18</sup> Takes into account para-technicians (semi-skilled but not professional workers), and the detailed disaggregation is found in the case study itself.

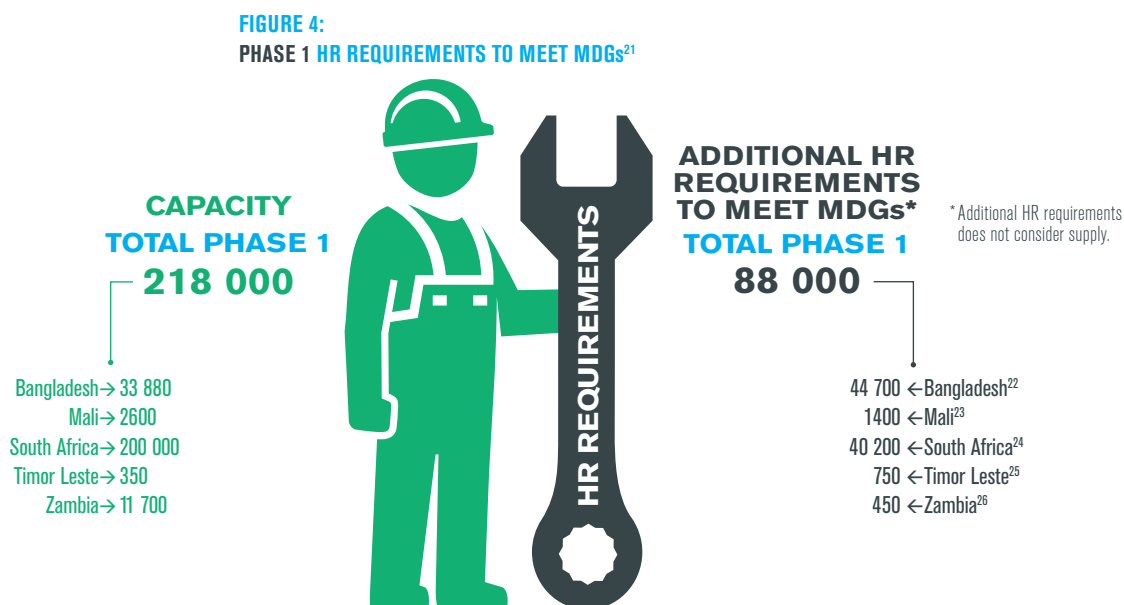
<sup>19</sup> Total figure excludes Philippines demand as it was the only country that included para-technicians, which leads to skewed figures.

The over-estimation of professional staff needed for rural sanitation services may be the result of different interpretations of the concepts of professionally trained and semi-skilled/unskilled staff.

Figure 4 illustrates the HR shortages of the countries in Phase 1 and Table 3 and Figure 5 presents the shortages in the countries studied, in terms of meeting HR demands with their current capacity or through the supply of new personnel from national education and training institutes to meet the 2015 targets.

**Various determining factors explain variations in shortages**

Shortages identified in the case studies vary significantly, due to differences in a number of determining factors, including context, coverage rates, and mechanisms/methods of delivery. Table 3 has summed all categories adding surpluses in some to shortages in others<sup>20</sup>.



20 See appendix 3 for more detailed shortages country tables. Some countries did not provide total sum of capacity; the numbers represent hand count through country assessment reports.

21 Phase 1 studies – were pilot and test phase; figures are rounded. As the quantitative calculation methods diverged across the countries, and certain shortages did not consider HR supply to the sector we should take care reading them.

22 Does not consider supply to the sector till 2015, as the percentage entering the sector is not known. Potentially supply, if absorbed by the sector can cover the additional HR requirements.

23 This country research team used expected growth rates on existing capacity.

24 Average HR shortages of 465 936 (high employment growth scenario) and 40 218 (low employment growth).

25 Averaging best and worst case scenarios used in this Phase 1 study.

26 This figure does not consider technicians, as they did not manage to find reliable quantitative figures for the technicians but indicate that it would be many.

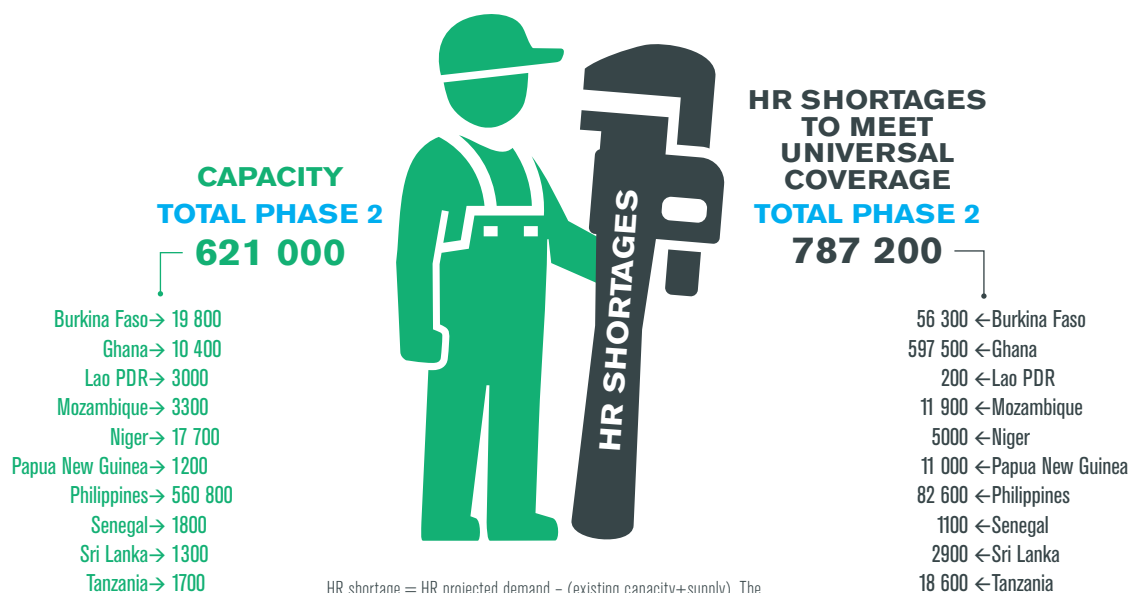
**TABLE 3**

Total HR shortage estimations from IWA HRCG study – 10 countries (excluding the 5 Phase 1 countries)<sup>27</sup>

COUNTRIES	TOTAL <sup>28</sup>		WATER		SANITATION	
	MDG	Universal	MDG	Universal	MDG	Universal
Burkina Faso	29 800	56 300	21 400	30 700	8 400	25 600
Ghana <sup>29</sup>	312 800	597 500	1 600	11 300	311 200	586 200
Lao PDR	-600	200	-300	400	-30	-200
Mozambique	5 300	11 900	5 000	8 800	300	3 100
Niger <sup>30</sup>	-2 100	5 000	-3 000	400	900	4 600
Philippines <sup>31</sup>	63 000 (low productivity) 7 500 (high productivity)	82 600 (low productivity) 15 400 (high productivity)				
Papua New Guinea	7 400	11 000	3 700	5 600	3 700	5 400
Senegal	600	1 100	600	900	0	200
Sri Lanka	2 500	2 900	2 600	2950	-100	-50
Tanzania	13 100	18 600	8 900	14 200	4 200	4 400

Numbers represent the sum of all different job categories (WATSAN technical field; other technical field; management & finance; social development). Minus figures indicate surpluses

**FIGURE 5:**  
PHASE 2 HR SHORTAGES TO MEET UNIVERSAL COVERAGE



HR shortage = HR projected demand - (existing capacity+supply). The shortages are higher because of very high shortages in Ghana. This large number for Ghana may include semi and unskilled workers, whom were not supposed to be included in the research.

<sup>27</sup> See appendix 3 for further details; negative figures indicate surpluses in professionals; these are rounded figures.

<sup>28</sup> Minus figures indicate surpluses, but since segregated categories are summed one category can in fact be a shortage, whilst another is a surplus.

<sup>29</sup> In Ghana the extreme high shortages in the sanitation field are caused by very low coverage rates for sanitation, as well as the fact that the study team have likely included in their estimates also those functions that would perhaps not require professional education, e.g. to construct all the facilities.

<sup>30</sup> The minus indicates a surplus; this is only due a surplus in the management and finance job categories. Separating the categories, there is in fact a relatively small shortage in technical personnel and larger shortage in the community development category.

<sup>31</sup> In the Philippines, the complexity of data collection procedures did not allow use of the exact same method. Therefore this table only presents total figures that are based on Water and Sanitation technical field personnel and para-technicians only. This study did distinguish between low and high productivity (low productivity being: 1 staff/186 connections; high productivity being: 1.4 staff/1000 connections).

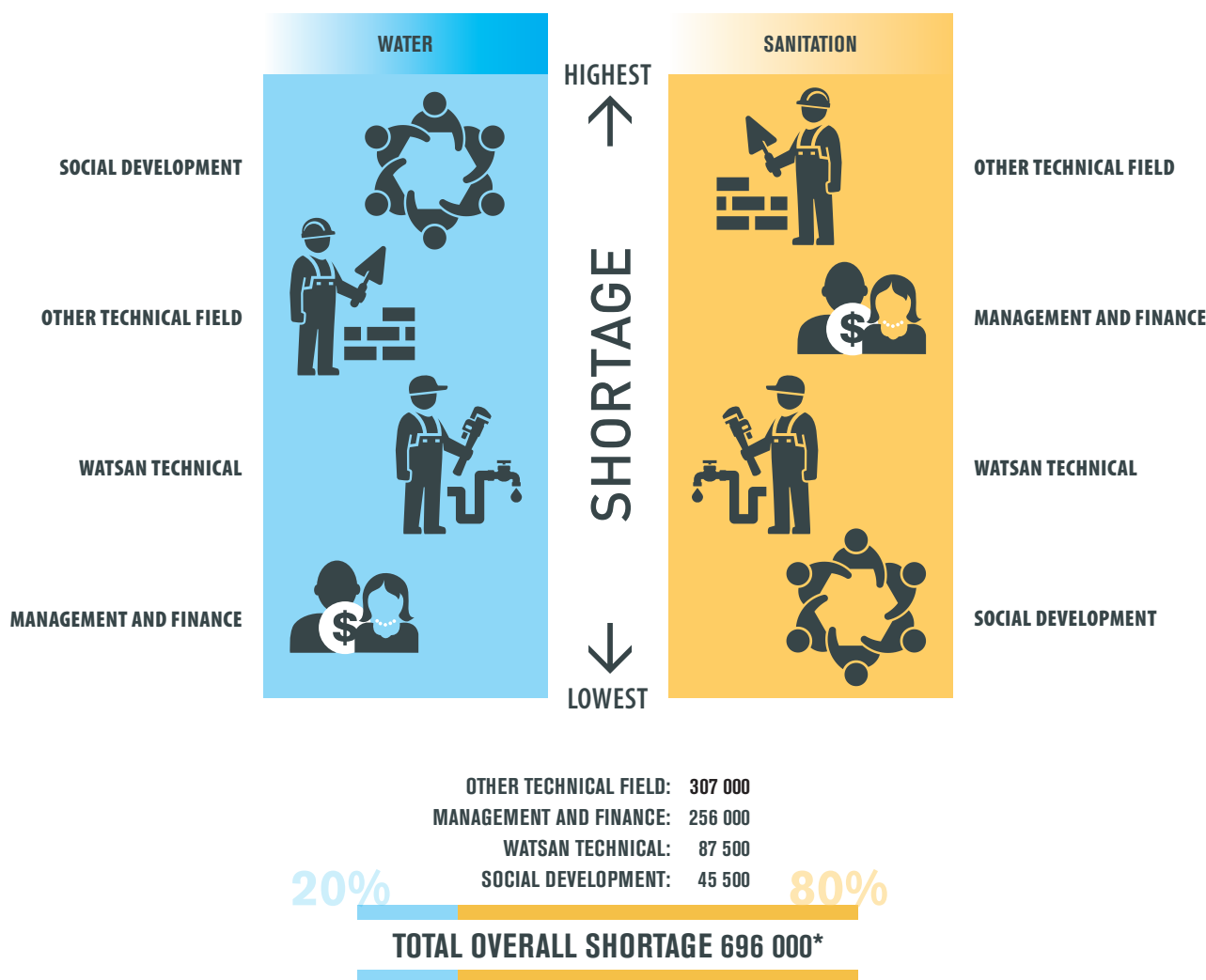
**Total surpluses may obscure imbalances between technical and management staff**

**Mid-level technical staff is particularly in short supply**

For example, in Ghana a surplus of approximately 56 000 in the management and finance category was found, against a shortage of roughly 280 000 technical staff in other technical field category to deliver appropriate sanitation services. In some countries (e.g. Niger and Lao PDR) the outcome actually indicates overall HR surpluses, because management and finance have HR surpluses that surpass the HR shortages in technical fields.

Nevertheless, in most countries the overall shortages remain staggering, especially in the number of technically qualified staff (WATSAN and other technical fields). Most of the country studies indicate that within the technical fields, especially mid-level technicians and engineers are in short supply. Figure 6 shows many of the countries reported a high shortage of community development personnel with a social science background as well, explained by the increased support required for community managed facilities.

**FIGURE 6. HR SHORTAGES ON PROFESSIONAL CATEGORIES TO REACH UNIVERSAL COVERAGE**



\* This overall shortage excludes the Philippines as that country did not segregate into the same categories. The segregation of shortages according to job categories was only done in nine countries in phase 2, and here rounded total figures are presented.

### ***Underqualified staff as a stop-gap measure***

In some countries (e.g. Niger and Burkina Faso) provision of urban water and sanitation services is hampered by a dearth of highly qualified technically personnel, such as engineers, to an extent that underqualified technicians are employed to perform essential functions. Financial issues may also be at stake: some institutions simply are unable to afford higher qualified personnel. Obviously, quality, reliability and safety issues then start to jeopardize the delivery of adequate services.

### ***A strategic approach to address HR needs in an incremental and sustainable way, in line with SDG needs***

In conclusion, the studies clearly show that any future investments to improve and sustain water and sanitation services will fall far short of their intended returns unless immediate and strategic steps are taken to incrementally address WATSAN human resource shortages, for the different HR categories ensuring a proper balance between them. The strategic goal should be to have the posts filled sustainably in the medium term, to perform the functions required by efforts to attain the agreed SDG targets.

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## **3**

### **Where decentralization of responsibilities is not accompanied by devolution of effective decision-making over financial and human resources, the essential functions cannot be optimally performed.**

#### ***Devolution of WASH authority is often not accompanied by transfer of financial and human resources***

In some countries, such as the Philippines, the devolution of responsibilities from national to local authorities has been successful with respect to the delivery of drinking water services, but for sanitation its success remains limited. The greatest challenges of devolution lie in rural areas, for example in Mali, South Africa, Niger, and Zambia where this process is often not accompanied by the necessary transfer of human and financial resources to the local authorities. As a result, local organisations with increased roles and responsibilities at the decentralized level, which require new capacities, new sets of skills and changed working practices, cannot take action to meet their needs.

#### ***Inefficiencies resulting from incomplete devolution negatively affect local capacity building efforts***

The country studies clearly demonstrate a direct link between inefficiencies in decentralised offices responsible for water and sanitation services and the lack of capacity to mobilise enough human and other resources to provide such services. Papua New Guinea offered one example of how incomplete devolution of decision-making powers can result in a lack of focus and spending inefficiencies at lower levels of government. Another example is Ghana where, despite the transfer of responsibilities of sanitation service provision to local government, at the time of the study the Ministry of Health at the central level continued to receive budget allocations to train staff for sanitation-related jobs. These funds were, therefore, not transferred to local government to meet their specific capacity building needs in water and sanitation. In Niger, Burkina Faso and Mali, where literacy rates in the adult population are around 35%<sup>32</sup>, this lack of basic education has a direct link with and impact on the ability to attract professionals into any sector at the municipal level. As a result, this is where less professionals are employed, and in such contexts human resources development remains a challenge.

#### ***Duplications and overlap at different government levels further undermine HR management***

Overall duplication of functions and overlapping roles and responsibilities at various government levels lead to an inefficient use of scarce human and financial resources. Tanzania is a clear example, where research showed that efforts are duplicated as a result of inadequate communications and coordination between various government institutions. Inadequate awareness creation and poor

<sup>32</sup> Education for All Global Monitoring Report (UNESCO, 2012).

communication between public sector institutions, local organisations and water users have led to a lack of active participation of beneficiaries in the execution of water schemes in rural areas, and in turn to a lack of community ownership and poor service delivery.

***The urban situation is significantly better than the rural situation***

Generally, the relationship between institutional capacity and service provision in urban areas seems relatively intact as urban public service providers that deliver piped water and wastewater systems have better access to qualified human resources. This is due to geographical (urban) advantage where most (semi-) professionals prefer the urban life over hardships of remote areas.

***Greater differentiation in future assessments is desirable***

Urban working conditions, especially remuneration and resource availability, are significantly better than those of most decentralised positions. Future assessments could consider a further geographic differentiation, addressing demand and shortages in capital cities, secondary urban conglomerations, informal settlements in peri-urban areas, and towns and villages in areas with predominantly rural economies.

Dealing with the lack of resources, efficiency and capacity development opportunities at lower levels of government, in decentralised areas, calls for cooperation between local governments and/or consolidation of HR situations across neighbouring districts/municipalities.

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## 4

**There is a clear disparity in the human resource requirements of rural versus urban water and sanitation services.**

***Diverging demands in rural and urban contexts***

The country studies show a divergent HR demand in rural and urban areas. The differences are due to different population/ settlement sizes, diversity in geophysical conditions and contextual technology options for the provision of water supply and sanitation services.

***Rapid urbanization and technical complexities create high demand in cities***

The complexity of systems in the urban WASH sector results in the highest demand for professionally-qualified staff being in urban areas. Moreover, while in all countries studied the bulk of the population lives in the rural areas, the high, sometimes exponential urban growth rates and accompanying rise in demand for urban water and sanitation facilities further boost this demand.

***The rural situation is more nebulous as functions are carried out informally***

Rural systems are less complex to implement, operate and maintain, and, therefore, require less highly qualified labourers. For sanitation implementation in rural areas many countries rely on members of the households and local NGOs. Many of the rural water and sanitation services are provided by semi-skilled or unskilled workers who are either self-employed or employed by local, small private firms. They often have low levels of literacy and acquire practical skills informally as apprentices or from members of their family.

***The Philippines' model: choosing for decentralized, sophisticated sanitation has important HR consequences***

In the Philippines technology options for mid-level provision are sophisticated and septic tanks are the technology of choice for sanitation. This requires a different set of expertise and skills, with employment opportunities for large numbers of pit-emptiers, truck drivers and other skilled labour involved in the management of on-site sanitation. The Philippines' approach to WATSAN and WASH has proved successful; it is significantly different from the rest of the countries studied and therefore provides a model worth considering in the post-MDG period when

countries will re-set their targets to universal coverage. It is also clear from the different approaches that globally, there can be no rural and peri-urban sanitation norms and standards universally applicable to all low- and middle-income countries (or deprived parts of high-income countries for that matter). Linked to this it has to be accepted that there will be different measuring standards for HR needs assessments, as mentioned before.

***Local systems and associated technology choices are determining factors***

The conclusion drawn from this is that the expertise levels of the human resources required to work in the sanitation sector in different geographical areas is contextually determined by the locally optimal service system and by the associated technology choices.

***Separate but connected strategies are needed for urban and rural settings***

The disparity in HR needs in urban and rural areas will require separate strategies, funding mechanisms and supporting initiatives to ensure that the human resource demands can be met. However, such strategies should identify areas of joint action at the interface of urban and rural systems, in peri-urban settlements.

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## **5**

**The mismatch between supply (in terms of shortage of professionals entering the job market from education institutions and their level of skills) and demand (the number and skills required) is one of the key factors undermining the sustainability of the WASH sector.**

***The education system, institutional weakness and lack of financial support are commonly blamed for HR deficiencies***

Countries where both coverage and the probability of attaining the MDG targets are low show a pattern that underlines the role of the HR deficiencies in this connection. First, the cause for the HR deficits is always laid at the doorstep of the education system and its inability to provide professionally trained people. Second, fingers are pointed at the low institutional and organisational capacity to render services, exacerbated by a weak private sector involvement. Third, there is the lack of financial resources to invest in systems, for O&M and to recruit and retain staff. Generally, the countries studied, with the few exceptions already mentioned, do not have the educational capacity to train enough engineers, technicians, sociologists, and management and finance personnel.

***Training does not respond to societal needs***

The study makes it clear that there is little common ground between what human resources are needed in the sector and what the universities, technical and vocational training institutions equip alumni, graduates and job entrants with. The human resources development needs, as determined by the 'market', are not being satisfied by the selection of courses offered. Also, the applicability of knowledge and skills transferred fails to fully meet the identified needs of the countries.

***Several underlying causes for mismatch between supply and demand of HR***

There are many causes for the mismatch between supply and demand, including a lack of understanding of what is truly required (HR demand), restrictions imposed by government recruitment and employment policies, the quantitative and qualitative supply from education institutes, and the ability of the sector to attract the graduates.

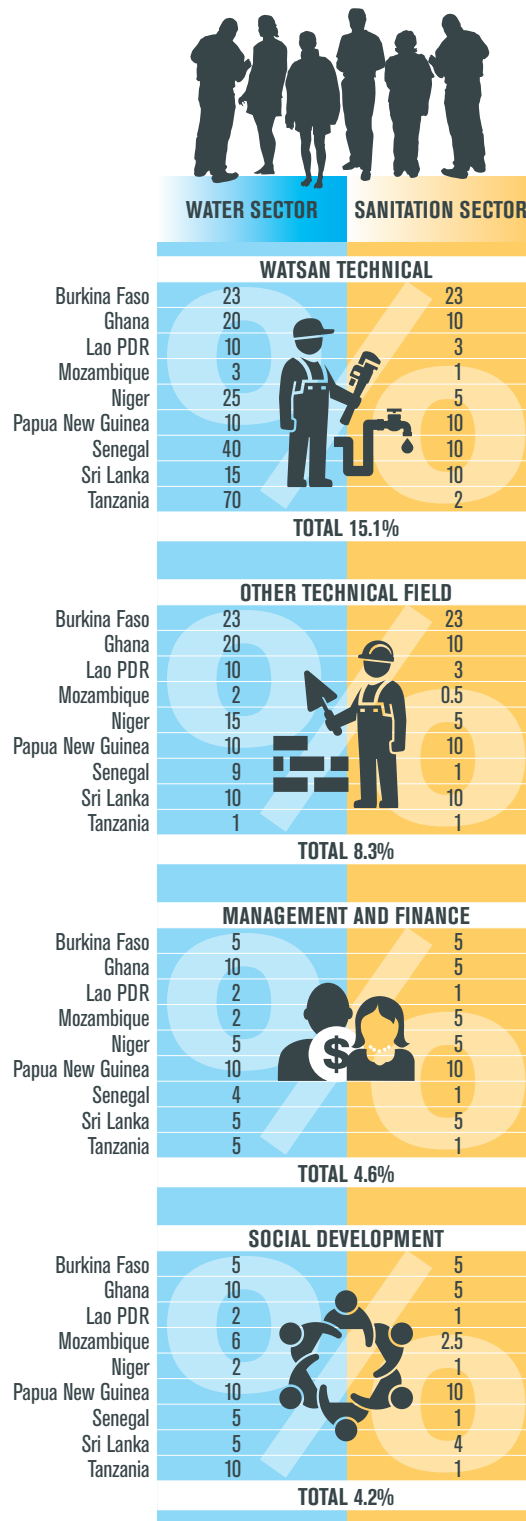
***The PNG and Ghana examples show the nature and magnitude of the mismatch***

Figure 7 indicates that the sector's overall ability to attract graduates into the sector is relatively limited. In Papua New Guinea, for instance, it is reported that of the graduates of the three universities that provide relevant WATSAN education, only about 10% enter the sector. While the HR demands in that country do not run into the hundreds of thousands as they do in Ghana, for the country to train and supply 9 400 professionally trained staff with such a small education capacity



**FIGURE 7**

Percentages of graduates entering the water/sanitation sector for some of the countries studied<sup>32</sup>



The percentage distributed results from the average of nine countries of phase 2. The in-country estimations were based on key informant interviews.

<sup>33</sup> This figure is based on the average of the percentages of in-country estimations based on in-country key informant interviews.

renders their aspirations to reach the MDG targets unrealistic. In Tanzania, 500 engineers qualify annually and the human resources demand is for approximately 18 500 staff in the next two years. Of the 500 engineers, it is not known how many enter the WASH sector. It is obvious that in the above cases the human resources demand cannot be met. Overall the percentages are low, as Figure 7 witnesses, and worst for the sanitation sector. In the majority of countries studied, much of sanitation service provision relies on households themselves, indicating there is no market for sanitation personnel.

***Clear communication to education sector is missing***

The country studies supplied several other reasons for the WASH sector's inability to absorb the graduates, one being the inability to clearly define and articulate to the education sector the nature of the sector's HR requirements.

***Legal restrictions in Tanzania vs a more flexible approach in the Philippines***

It emerged from the research that between the different national WASH sectors there are vastly different expectations of the type of human resources needed to fulfil their essential functions. In Tanzania, it is a legal requirement to have a qualified finance person in each project, be it rural or urban. This legal requirement is responsible for a shortage in the WASH sector of approximately 6 200 management and finance personnel which will have to graduate from relevant education institutions.

Conversely, in the Philippines rural water and sanitation projects are successfully implemented, managed, operated and maintained by volunteers and community members who are not professionally qualified and who may or may not have attended a short training course.

***The issue of over- and under-qualification***

Currently, the qualifications often do not meet the job descriptions in either direction: staff may be over- or under-qualified. In Lao PDR, for instance, 98% of all public sector employees of the Ministry of Health have a health qualification, but work as community mobilisers. In most cases, however, the qualification levels are low. In Mozambique 29% of the staff included in the research survey had only completed primary education, 22% completed secondary education, 30% completed pre-university education, 3% had bachelor degrees, 12% held a licentiate or honours degree and only 3% held a master's degree. In Niger, the WATSAN and WASH sector's education qualification levels are: 14% of senior technicians have a BA, 61% have senior school certificates and 14% have primary school education. Thus, in the public sector the size of the human resources component with low qualifications is considerable.

***The mismatch between supply and demand is not limited to the professional grades***

Universities generally do not supply enough engineering or WATSAN-specific graduates to fill the HR gaps in the sector, while, at the same time, they release graduates into the sector that are not qualified for the requirements for the jobs they are expected to carry out. Not only is there a severe lack of insight into what the WASH sector need from qualified graduates, but this mismatch between supply and demand extends itself over the entire job spectrum. In terms of skilled and semi-skilled staff, Papua New Guinea, for example, has five vocational and technical institutes that train plumbers and construction, finance and administrative workers. Research has shown, however, that the courses offered are not aligned with the demands placed on human resources to effectively perform their functions. This compounds the difficulties to supply staff, professional as well as non-professional.

***The mismatch incurs costly in-service training ...***

***... but even that is insufficient to address the needs***

***Public sector recruitment restrictions limit opportunities for HR strengthening***

***Creating an enabling policy environment is an option***

***Multiple issues need to be tackled at the same time to address the mismatch observed***

In most countries, sector organisations indicated the need for graduates to be provided with more practical training. Without this, the employability of graduates remained low, and the need to invest in further on the job training high. In all countries studied some in-service training takes place, particularly in the NGO sector. This helps to fulfil immediate needs of an organisation or a project. Whilst crucial to the skills development of the workforce, and to continued professional development, it is not sufficient to fill the vast human resources gaps that currently exist and to address the needs to attain the MDG targets by 2015 and the post-2015 SDG targets of universal coverage. These types of discrepancies were found to be prevalent in all the countries studied, which points to the fact that the WASH sector has no or few norms, standards and procedures for HR management.

Another important factor, influencing the mismatch between supply and demand, is government policies/restrictions to recruitment. In the case of Ghana, the Government has recently imposed a public sector recruitment stop, which includes local government with responsibilities to oversee service provision in rural areas.

The result is that the WASH sector in Ghana cannot respond adequately to the dire need to expand access to water and sanitation for inability to recruit the necessary human resources.

Government strategies and policies do not necessarily have to adversely affect HR supply and demand, they can also enable the education sector and stimulate the labour market. The Philippines, with its focus on human resource excellence, its ethos of volunteerism and its institutional water and sanitation implementation priorities has made significant steps in the HR development of the WASH sector. In Sri Lanka, the Government's free education policy, which maintains high standards, as well as its focus on water and sanitation service provision, has made enormous impacts on the sector.

This mismatch can only be effectively addressed if the various relevant aspects are dealt with simultaneously: creating an enabling environment for the national WASH sector to allow for the establishment of a collaborative framework with the education sector, the sector employers and employees in the dialogue; the establishment and financing of partnerships amongst universities, training institutions and sector employers to perform technical and administrative functions in an integrated manner; and, improved communication across the education/ service delivery divide to fine-tune the supply and demand criteria.

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## 6

***Sanitation services are significantly undermined by a poor supply of professionals to the sector.***

***A labour market for sanitation is lacking***

Only two of the studied countries have achieved the MDG sanitation target and five are far removed from achieving it. There are numerous reasons for this, from complex institutional contexts, unclear roles and responsibilities amongst actors, and inability of the public sector to take responsibility for national sanitation implementation, due to lack of financial and qualified human resources. Overall, the lack of a labour market for sanitation can be observed.

***There is insufficient money for recruiting and retaining staff for sanitation***

In Burkina Faso, for instance, where rural sanitation coverage is only 1% and urban sanitation 14 %<sup>34</sup>, the government claims this situation is mainly due to a lack of

<sup>34</sup> Figures according to the Government of Burkina Faso.

financial resources to recruit and retain staff, compounded by poor organisational capacity to support or advise NGOs or households.

Urban sanitation provision is heavily reliant on qualified, skilled technicians which are short in supply in all the countries studied, including those where the MDG targets have already been met.

***Qualified, skilled sanitation technicians are in short supply***

This phenomenon is exacerbated by the fact that few engineering graduates enter the sanitation sector, be it public or private. The countries studied, with the exception of the Philippines and Sri Lanka, have no incentives embedded in their human resources recruitment framework to attract graduates to the sector. And it has to be acknowledged that, to begin with, it is simply not an attractive sector to work in. As a result there is a shortage of skilled staff for the provision of urban sanitation services.

***From a career perspective, the sanitation sector is stigmatized***

This situation will worsen under the prevailing rate of urbanisation rates, including the alarming growth of urban slums. These slums are not connected to wastewater collection grids and at best alternative, on-site technologies are applied to serve their inhabitants.

***Specific sanitation curricula are rare ...***

In some countries, such as Tanzania and Ghana, the sanitation sector remains stigmatised. The socio-cultural environment causes few parties to be interested to work in the sector, and drives out those that get offered job opportunities in the other sectors.

***... and where they exist their quality is not satisfactory***

On top of this, most countries indicated that the availability of sanitation specific curricula is limited, if not completely absent in the country's education system, creating a further obstacle in addressing the poor supply of professionals.

In summary, most developing countries are not able to provide the needed human resources for the provision of adequate sanitation services. There is an urgent need to address the dearth and inadequate quality of curricula covering sanitary engineering in universities, as well as sanitation-related vocational training. Greater efforts are needed to establish courses put in place incentives to attract more students. Additionally, the labour market for sanitation professionals will need to be upgraded.

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## **7**

**Consideration should be given to the incentives and motivations to attract newly qualified and skilled personnel and to retain experienced personnel within the sector so that they are not lost to other sectors.**

***The enabling environment for a career development structure is absent***

This research identified that a major bottleneck to reach adequate professional capacity is the inability of most governments in low- and middle-income countries to create an enabling environment for the training, recruitment, retention and development of a cadre of efficient and effective human resources and to increase the inflow into the WASH sector.

***Government recruitment policies can further impede***

In a number of countries studied, such as Ghana, the public sector has restrictions on recruitment and appointment of staff. As the public sector on its own or in partnership with the private sector is responsible for all urban water supply and wastewater management, this recruitment embargo or curtailment is a serious impediment to general sector development and service provision.

***Incumbents weigh low pay against job security***

In many instances the public sector pays low salaries and there is a general lack of career development. In most instances, the public sector compensates this by offering fringe benefits as incentives, or staff stays because of job security. Qualified people often prefer to work in the private sector as it pays better salaries, although generally it offers fewer fringe benefits.

***Quota recruitment systems do not take specific qualifications into account***

In Lao PDR, a different recruitment scenario prevails: there is no targeted recruitment and the public sector works on a quota recruitment system. There is thus no proactive HR management strategy in place where staff can be recruited into a job for which s/he is qualified.

This means there will be no recruitments to make up for the deficit of professionally qualified human resources needed to increase the current coverage of 67% for water and 63% for sanitation towards the 2015 MDG targets and beyond.

***Creating an enabling environment also requires human resources***

Mozambique has a critically low water and sanitation coverage. While 35.7% of all WATSAN staff is employed by the public sector, NGOs employ 22.3% and the private sector 41.9%. The public sector has little capacity to make up for the HR deficit of nearly 12,000 professionally-qualified people needed to reach their MDG target. In such a situation the role of government is to act as facilitator to enable the private sector and NGOs to implement their programmes. This requires that the public sector can count on staff that is suitably trained and skilled to enable the non-government staff to do their job effectively.

***Complex and cumbersome recruitment processes are an obstacle in their own right***

The provision of urban water supply and sanitation services is driven by more high-tech solutions for which qualified personnel is needed. Traditional public utilities (hence: the State) tend to be responsible for the bulk of all jobs, be it at national, regional or local levels. The public sector is thus in charge of the recruitment, retention and promotion of staff. From the countries studied it is clear that the recruitment processes are complex and cumbersome. In some instances staff recruitment itself is the barrier. In more autonomous agencies (e.g. corporatized utilities) this obstacle of attracting, recruiting and promoting staff less predominant.

***Incentives should address unattractive postings and bonuses for performances that exceed expectations***

Research results show that the sector will have to offer more competitive employment packages and career development opportunities, combined with a system of rewards to incentivize workers. For instance, there is a need for an incentive structure to encourage the deployment of staff to rural and remote areas. Performance-related pay and bonuses for exceeding targets may act as strong incentives to improve performance, motivate and retain staff and to encourage capacity development. These are private sector principles that have been successfully applied by public sector service providers; there is a need for these principles to be adopted more widely.

***Comparisons reveal a way forward***

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**8**

***Appropriate public policies need to be in place to support job creation, which involves investing in skills to support labour supply and enabling private sector engagement to stimulate an increase in labour demand.***

***Investment in human resources for education and training is crucial***

Generally, in most of the countries studied where HR shortages are prevalent, these are coupled with weak education institutions, weak local government capacity, limited enabling factors, restrictions in recruitment policies, and lack of financial investment in technical assistance for project implementation.

Comparing, for instance, Burkina Faso with its current rate of access to sanitation amongst the lowest in the world and prominent among the countries that will not reach the sanitation MDG target by 2015 and the Philippines, with a population five times that of Burkina Faso, that has reached the MDG sanitation target<sup>35</sup> and is one percentage point away from reaching the drinking water target of 92%, it is clear that the latter is doing something right. While Burkina Faso has a severe lack of investment in all aspects of water and sanitation (including human resources) and fragmented institutional arrangements, the Philippines boasts a focus on human resource excellence, a strong ethos of volunteerism and institutional WATSAN implementation priorities.

***There is a discernible adverse impact on WASH HR from lack of prioritization***

A lack of investment is one reason for Burkina Faso's low coverage levels. The Philippines has reached its sanitation targets, despite the fact that only 3% of WASH investment (of country's total WASH budget) has been allocated to sanitation since 1970. The Government of the Philippines made an economic decision to focus its efforts on encouraging excellence in all human resources development and training and the country sees its people as an export commodity. In 2009 there were nine million Filipinos (nearly 10% of the country's population) working overseas and remitting money back home<sup>36</sup>. The WASH sector has benefited from this policy, although there may be some concerns that too many people work overseas and not enough human resources may stay behind to render services.

***Fragmentation and lack of prioritization are detrimental to HR development***

Conversely, where water and sanitation provision and hygiene education are fragmented and not the responsibility of a core champion ministry, or where the governing institutions did not prioritise WASH, the concomitant effect on human resources has been negative and water and sanitation coverage remains low. In most of the countries studied the lack of focus on clear WASH human resources development activities, coupled with population increases, has wiped out any increase in coverage achieved. For example, in Papua New Guinea coverage effectively declined from 41% in 1990 to 40% in 2010 for drinking water and from 47% to 45% for sanitation over the same period. With the current levels of finance and the severe lack of human resources to do the work, it is unlikely that either of the MDG targets will be reached.

In Papua New Guinea responsibility for WATSAN supply is delegated to the National Department of Health which has shown scant interest in focusing on water and sanitation, apart from some health promotion and service provision in public places. Admittedly, this Ministry has limited funding, but there is no evidence at all that it considers WASH in its expenditures, particularly in rural areas. In the absence of government leadership, churches, NGOs and CBIs have assumed responsibility.

***A failing water supply network is the reflection of many undermining factors***

In Mozambique the extension of the rural water supply network is negatively affected by factors such as management deficiencies and the lack of local markets catering to the need for water supply parts; faulty installations; a weak sense of ownership; a lack of willingness and/or ability to pay; lack of adequately trained human resources; financial constraints, and a lack of investment in rural development. This picture is generally the same for most of the countries studied.

Another country in South East Asia that has attained both the water and sanitation MDG targets is Sri Lanka, which is remarkable when one takes into account the

<sup>35</sup> According to the study team's figures.

<sup>36</sup> The Economist. People, the Philippines' best export, Feb 9th 2010. [http://www.economist.com/blogs/banyan/2010/02/philippines\\_and\\_its\\_remittance\\_economy](http://www.economist.com/blogs/banyan/2010/02/philippines_and_its_remittance_economy)

## **The Sri Lanka success story**

under-performance on the tea and rubber estates and the fact that the country was embroiled in a civil war for more than two decades and experienced a devastating tsunami in 2004. The Government of Sri Lanka is strongly focused on providing water and sanitation to its citizens. It established a special committee to monitor progress towards reaching the MDG targets and created a separate Ministry with the aim of mobilising more resources to achieve universal coverage. The country started planning for WASH service provision by incentivising students and providing free education, while at the same time ensuring correspondence between what the universities offer and what skills the sector demands. They identified the need for on-going operations and maintenance (O&M) and the appropriateness of the current engineering qualifications set versus what the sector needs and designed their courses for non-professionally qualified engineers. Sri Lanka executed their WASH strategy by addressing human resources as a priority at the onset of their planning to reach the MDG targets. The government's focus has gone beyond plans and ministries: the country is at the forefront of human resources development in the region as its education system is of a high standard and the Government's free education policy (15 universities offer free education) encourages education and training. Similar to the Philippines, with its high quality of professional and vocational training, Sri Lanka also exports skilled workers and it is estimated that the total foreign demand for construction industry occupations will be about 30,000 per year.

The success stories imply that in order to appropriately address the HR shortages in the sector, there is a need for a national WASH strategy that incorporates HR, a focus on job creation in the WASH sector, and the formulation and implementation of enabling policies to strengthen the job market, and allowing for the education sector to respond to the needs.

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## **9**

### **Low levels of access to and inadequate coverage of courses in tertiary education institutes is a significant bottleneck to meeting human resource demands.**

#### **Quality teaching staff requires adequate funding**

As mentioned before, in the countries studied there is little common ground between what human resources are needed in the WASH sector and the formation for WASH professionals universities and training institutes have on offer. A lack of an enabling environment for training institutes to offer specific WASH-related education and training is contributing to the HR shortages. Exacerbating the education and training bottleneck are the funding shortages for institutions to equip themselves with the necessary quality teaching staff or to acquire equipment and materials to teach scientific or technical programmes.

#### **Training equipment and materials play a critical role**

Inadequately-trained staff, a lack of equipment, outdated curricula and a mismatch between the graduate qualifications and market demands seems to be a major obstacle in supplying appropriately-trained human resources to the sector. One negative ramification is an abundance of unemployed graduates who cannot find employment because they are not adequately qualified.

#### **Tuition fees can be a major stumbling block**

Additionally, there is a socio-economic component that impacts demand for courses. Often courses are only available for a limited section of the population, who are able to pay the course fees. This creates an even greater need to align the courses to the sector's needs, so that the students, who have invested in attending the course, have a good chance of actually finding a job.

**Free education can help overcome financial constraints to enrolment**

An example of a positive approach was brought to light in the Sri Lanka's assessment. Free education is offered by 15 universities, overcoming the socio-economic problem of affordability of attending a course. Additionally, out of 1200 engineers that are graduating each year, about 10% specialise in water and sanitation related subjects. The country's existing capacity was developed through scholarships specifically designed in the early stages of its strategic attention to WASH. Where skills shortages were identified, engineers were sent abroad to specialise in water and wastewater treatment. Similar to most other countries there are more engineers in water sector than in the sanitation sector. Postgraduate courses are offered specifically in water and sanitation and an average of fifty students are enrolled annually. More than 100 sociologists qualify at the post graduate level, which is adequate to meet the country's social development demands. Sri Lanka has a unique 'intermediary' engineering qualification: non-professionally qualified engineers who qualify through field experience and then write internal tests and undergo performance evaluations to qualify. They are employed for O&M services, rather than for planning and design. Capacity building in the sanitation sector shifted from conventional approaches to a more practical approach. The Philippines have a similar intermediate qualification called para-technicians who undergo lower level, practical training.

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## 10

**The numbers talk, in terms of percentage of WASH professionals per 100 000 population**

**Strengthening Technical and Vocational Education and Training (TVET) in terms of institution building, curriculum development and internships will contribute importantly to overcoming shortages in many countries.**

To put the numbers of technical and engineering graduates into perspective, one can take a success story such as the Philippines with 92 million people, home to 5,577 higher and vocational education institutions that produced a total of approximately 14,600 engineers between 2004 and 2008 and compare it to Tanzania with 50 million people, 39 higher and vocational education and training institutions that produce 500 engineers annually<sup>37</sup>. It is clear that all countries that find themselves in a similar predicament need to focus their attention on the foundation of their development economy and start by equipping their countries with the capacity for the formation of people who can design, build, maintain, operate and manage both water and sanitation systems in urban areas and render the support services needed for low-tech rural systems.

Looking at countries such as Sri Lanka and the Philippines, where education is at the heart of the countries' development, it is clear that market demands are seriously considered and the right courses are offered in order to provide the WASH sector with appropriately-trained people. In those countries studied where services are lagging, it is clear that the education systems are not adequately developed, with too a weak higher education system, lacking in quality and quantity, and an inadequate number of vocational education and training institutions to respond to the human resources demands of the WASH sector.

<sup>37</sup> <http://eonyango.blogspot.nl/2008/10/erb-marks-sixth-annual-engineers-day.html>



**The importance of TVET is generally underestimated**

#### **BOX 3: TVET GAINS PROMINENCE**

Non-formal TVET is predominant and often highly fragmented. Learning opportunities at the workplace, non-formal learning, private provision, and initiatives under various non-education sector ministries all tend to operate in a non-coherent way. Governments and international institutions are paying increasing attention to TVET (it is one of eight priority areas in the African Union's Second Decade of Education (2006–2015)). But despite an increase in the number of African students in TVET, only a few governments in Africa are able to finance TVET at a level that can support quality training.

TVET (Technical and Vocational Education and Training) takes place from secondary school level, upper secondary level and post-secondary level, non-tertiary as well as through the provision at the first tertiary level. This signifies that the scope is wide, and thus the TVET cannot represent one homogenous group of people. The TVET sector in developing countries occupies a marginal position in the education systems. For instance, the percentage enrolment of TVET in relation to the whole education system in sub-Saharan Africa (between 2001 and 2005) was only 5.2% in 2003 and has been falling since, while in South East Asia it was 9.5% in comparison to Australia 70% and Belgium 68%<sup>38</sup>.

**There is a lack of statistics on informal and vocational training**

In most countries, informal training is commonplace for construction, maintenance of sanitation services and particularly for rural water and sanitation provision. On-the-job-training is often provided through NGOs and the private sector. The research generally found that there were no statistics available for this level of training, but it was indicated in many countries that many positions, especially related to O&M<sup>39</sup>, could be fulfilled by people who had completed lower level technical training courses.

## **11**

**The dependence on communities, volunteers and semi-skilled workers in rural areas is not sustainable without adequate institutional and operational support from local government and structured, formalised support from the professional sector.**

**Community-based systems also offer job opportunities**

Throughout the developing world, rural areas house the bulk of the populations with the lowest levels of access to drinking water and sanitation facilities. The provision of water and sanitation services as well as hygiene education and promotion in rural areas has traditionally fallen on community members, householders or volunteers. The studies confirmed that in most of the 15 countries rural WASH is not addressed by local government, although it sometimes receives assistance from CBOs or NGOs. In some instances these community-based systems also provided job opportunities for operation and maintenance workers, water kiosk owners, pit emptiers, or pit diggers. However, the studies indicate that chances of success are enhanced where community-based management systems are technically and financially supported by local government.

**Community/volunteer inputs reduce HR demand**

The research showed a few trends: in countries where there is a well-organised community and volunteer input (such as in the Philippines) the human resources demand for rural service provision is low or insignificant. This is most prevalent in rural sanitation provision. The countries where hygiene education was prioritised and executed as part of the health authorities' responsibilities at local level, and

<sup>38</sup> <http://www.africaneconomicoutlook.org/en/in-depth/developing-technical-vocational-skills-in-africa/the-rationale-for-technical-and-vocational-skills-development/taking-stock-of-technical-and-vocational-skills-development/access-to-technical-and-vocational-education-in-africa/> quoting a 2006 worldwide survey conducted by the UNESCO Institute of Statistics.

<sup>39</sup> Between 50-75% of most organisation's staff worked on O&M.

where sanitation subsidies are paid, this has an impact on the sanitation coverage in rural areas.

### **The Philippines success story**

The Philippines have a success story in this connection. First, service levels were identified for each type of community, based on the technology level required to provide a certain amount (litres) of water per person per day. There was a close supervisory and advisory link between professional government officials and a large contingent of volunteer village health workers (approximately 200 000); para-technicians (about 438 000 people who have specific short-term training to work on WATSAN systems); village sanitation inspectors on municipal level (about 83 000 high school leavers or a person who completed a vocational training course); and village inspectors who work with rural health officers (approximately 212 000). Residents are engaged in the construction of their own water facilities through the Community Bayanihan System (Helping Each Other). It was noted before that direct financial investment in the sanitation sector is marginal and despite this, the country has achieved its sanitation target of over 90%. The successful mobilisation of such large numbers of volunteers goes hand-in-hand with an educated population, commitment and support from the government and focused, clearly demarcated roles and responsibilities of the volunteers and the availability of short-term and on-the-job training opportunities.

### **Without targeted government support community-based services are likely to fall victim to the poverty cycle**

In contrast, the grand-scale failure of rural WATSAN systems is indicative of the neglect of the WASH sector. Small-scale operators who work within communities often fail because of the perpetuating poverty cycle that manifests itself in a shortage of equipment and money to buy the necessary tools; fluctuating season-driven demand – e.g. pits often overflow and market for water sellers is reduced during the rainy season –; no access to credit. The reliance on communities to operate and manage their water systems without local government support is a significant bottleneck in service provision. The perception persists that trained human resources are not needed in rural areas because of the low technology levels. This is not the case, however, as the appropriate level of trained personnel is crucial for rural service provision and maintenance of existing systems.

If community-managed rural water, sanitation, health and hygiene provision does not yield the necessary level of success to ensure at least basic service provision, the paradigms of self-supply and volunteerism need to be further explored at the national level. For this paradigm to shift it is required that the government serves as the starting block with concomitant support structures on local level.

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## **12**

### **The water supply and sanitation sector will benefit greatly from increased gender equality translated into more women being active in service provision in order to improve communication with women and foster the identification and adoption of best practices.**

#### **Gender inequality as an HR development bottleneck**

Gender inequality is one of the bottlenecks that span the entire spectrum of development, including the WASH sector. While women have traditionally been the primary custodians of water collection in the rural areas of the developing world, they have consistently been excluded from entering the sector formally, except for the aspect of community mobilisation. In the countries studied, women have not been represented in technical fields or management roles in technical environments, which points to a much deeper problem than simply exclusion: gender discrimination is an embedded cultural issue in many societies which is

rooted in education exclusion first and then permeates all other connected issues. Powerful stereotypes and institutional arrangements add to the spirit of exclusion.

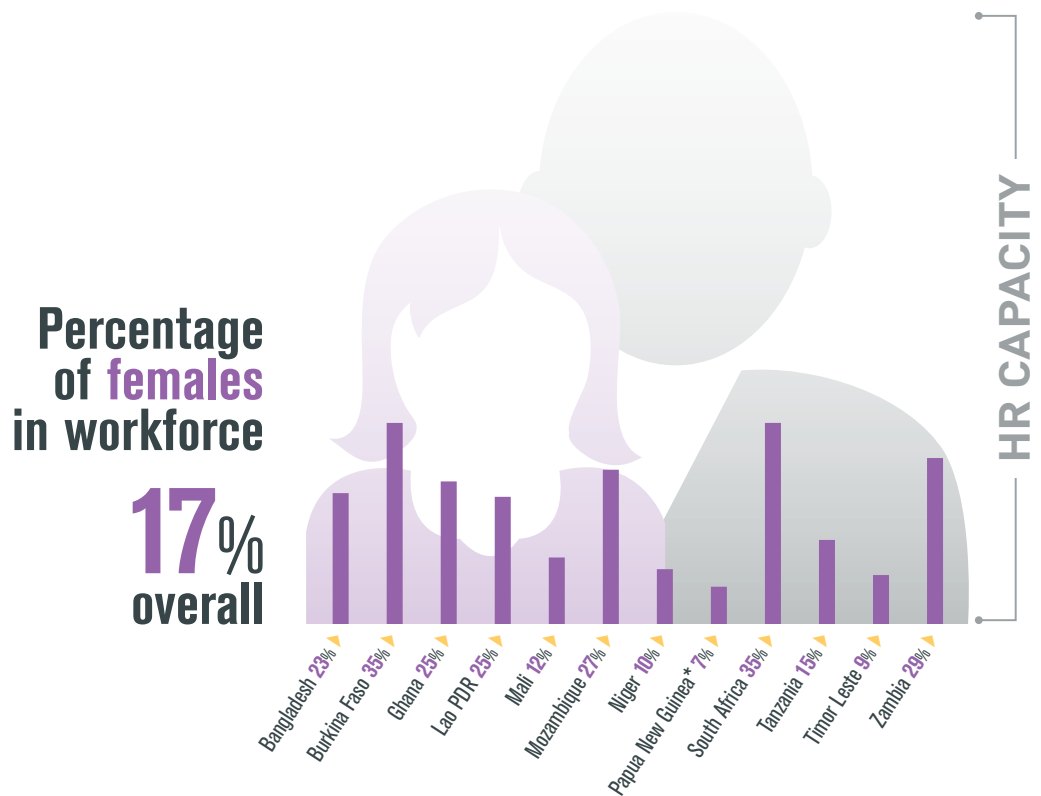
**Mainstreaming women through focused education is the answer**

To exclude women from the WASH job spectrum is to create a bottleneck through the marginalisation of half the population. The answer to this marginalisation is the mainstreaming of women through focused education and training programmes. Gender discrimination has been a subject of discussion for many decades and only through concerted effort and legal recourse from committed governments will this discrimination be curtailed or changed.

**Gender discrimination was generally flagged as a problem in almost all studies**

In practically all countries studied gender inequality in the workforce was flagged as a problem, particularly when investigating the technical fields. The gender inequality is particularly observed in public and private sector, whilst NGOs seem to have more females on board. In general the research indicated that there was also a low level of female graduates in the technical courses from the universities.

**FIGURE 8. GENDER DISTRIBUTION IN EXISTING HR CAPACITY OF COUNTRY STUDIES**



\* Based on specific sample organization.

This figure was estimated through averaging % of women professionals in the workforce in determined in all 15 country assessments. Philippines, Senegal and Sri Lanka did not provide the details, but listed low numbers of women professionals.

### ***Sri Lanka is an exception***

Sri Lanka indicated not to have the problem of gender discrimination. The number of female engineers in the Sri Lankan WASH sector has grown steadily over the past three decades.

### ***The role of women in community mobilization efforts is recognized***

Women are not completely excluded from WATSAN operations and the WASH sector. In all countries studied women are well represented in the social development sector where they mostly work on community mobilisation or as health extension workers. While this seems to be a natural environment for women to work in, it should not be an accepted categorisation that is used to debunk the debate on the exclusion of women from entering the other job categories.

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## **13**

**Operation and maintenance of water and sanitation systems are chronically and universally neglected, with inadequately allocated financial and human resources. The appropriate education and skills development requirements to operate and maintain specific technologies have not been appropriately assessed; such an assessment would greatly benefit the WASH sector.**

### ***O&M HR needs were more prominent in the Phase 1 studies***

The Phase 1 studies focused on the HR needed to construct new infrastructure to increase access in line with internationally agreed development targets (MDGs and SDGs). Regardless, all Phase 1 countries indicated the importance of O&M personnel, and of enhancing their skills to develop and implement preventative maintenance, as well as asset management, in order to reduce the risk of system failures on the long term.

### ***O&M also scored high in the more disaggregated Phase 2 studies***

In the Phase 2 studies, where a distinction was made between construction, O&M, and community mobilisation, the human resource shortages for operation and maintenance of water supply often scored highest, whereas staff required to mobilise communities scored lowest. This can likely be attributed to the need for more infrastructure maintenance to sustain services. For sanitation operation and maintenance the need for professionals was not so high, which can imply that there are a higher number of unskilled workers involved (not included in the investigation) in O&M of sanitation facilities. The findings did show a high need for staff to mobilise communities in the sanitation sub-sector, which may be explained by the high dependence on community managed sanitation systems, and the required staff to train those communities.

# Observations

The main findings, a broad literature review and key informant interviews led to the following general observations which may serve as guidance in the formulation of national WASH HR development plans.

## 1

**From a national public sector perspective it may be assumed that strengthening the human resource base for the delivery of water and sanitation services will alleviate the pressure on human as well as financial resources in the public health sector – investing in WASH human resource development is investing in health.**

***Dealing with WASH HR shortages will stop the flow of hidden costs to the health sector***

As a given, improvements in community health status are a function of increased access to safe drinking water and basic sanitation, and improved hygiene practice. The outcomes of Phase 1 and 2 studies point to significant deficiencies in the human resource base of the WASH sector, seriously impeding the delivery of even the most basic services to large segments of the population. From this we can infer that a shortage of WASH HR has a negative impact on health and transfers hidden costs to the health sector. If this relation holds, WASH HR development has the potential to substantially alleviate pressure on the health sector resources (both financial and HR). The fact that the health sector has to deal with its own HR deficiencies is an important further consideration in its own right. Taking a holistic view of the public sector economy will reveal the considerable real gains to be made from investing in WASH HR development.

## 2

**The availability of data on the human resource shortages for water and sanitation services and on the capacity of education and training institute to address these shortages is poor. Without credible evidence to support estimates of the real human resources shortages across all components of water, sanitation and hygiene provision, the WASH sector will not be able to make a business case that will attract the investments needed.**

***Addressing the dearth of data is complicated by sector fragmentation and undefined sector boundaries***

Data on human resources in the WASH sector are to a large extent unavailable. This greatly limits making a reliable estimate of the human resources available in the different parts of the WASH sector, and an assessment of what are the deficiencies and across which ranges of skills they are prevalent. Without credible data to estimate the real human resources shortages across all components and segments of water, sanitation and hygiene provision, it will be impossible for the sector to attract the attention needed. The fragmentation of the WASH sector and its nebulous boundaries further complicate the process of making reliable estimates. Yet, for efficient HR development it is crucial to know exactly where the bottlenecks are, and what their nature and magnitude is: are there not

enough human resources to draw from? Do the available human resources lack the necessary skills to carry out essential functions in a satisfactory manner? Are recruitment procedures and the practices to deploy human resources inadequate? To answer these and other questions, compared to the health and education sectors the WASH sector does not have sufficient relevant information its disposal, making it practically impossible to formulate a national HR strategy that responds to real needs and demand.

***The bottom-line: the lack of information remains a major hurdle***

The IWA studies focused on developing and testing a methodology that would ensure comparability of data across the countries studied. Yet, more basic and to the point, each country reported the sheer lack of information as the real stumbling block. In most of the countries studied complex computations were required to extract the data that met the criteria of universality and comparability. None of the countries studied had sufficient data for the researchers to use.

***WASH HR status and expectations vary wildly***

To compound the problem, vastly different expectations prevail within the WASH sector of the type of human resources needed to fulfil the different tasks. A country like Lao PDR where approximately 33% of the workforce is qualified as a WATSAN engineer or technician cannot be compared with Burkina Faso where 37% of public servants and 35% of private sector WATSAN workers have only a secondary school education.

***HRCG study in a first step towards studying the GLAAS findings in-depth***

The UN-Water GLAAS reports of 2010, 2012 and 2014 highlight the lack of data on national financing and on the human resource base to deliver WASH services (see Introduction). This lack was considered to be a major constraint on the ability of countries to strengthen their systems to deliver sustainable and effective WASH services. The HRCG study can therefore be considered a first step in filling a key knowledge gap in the WASH sector. It is hoped that the methodology tested in the 15 countries will be further strengthened for routine use by countries when carrying out their national WASH reviews and when participating in future GLAAS reporting cycles.

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### 3

***Adapting the methodology to the country's context, including the stakeholders and having the right composition for the study team will allow the assessment results to contribute to effective informed decision making on issues pertaining to WASH capacity development.***

The WASH sector institutional set-ups are complex and diverse in different countries. This has an immediate impact on the composition of its workforce. Human resources in the sector often work across variety of sectors, making HR assessments for WASH very difficult.

***Adaptation of methodology and involvement of stakeholders will be pertinent to actions derived from assessment***

This methodology is flexible to suit the diverse countries' needs, and whilst this implies that cross comparison becomes harder (or even impossible), the results of the assessments will become more relevant for in-country national capacity development plans.

To ensure applicability and relevance of the results, key principles to make the assessment a success are:

### **Research team should have ...**

- The team should consist of representatives of the education sector, government level WASH sector and organisations in the WASH. Together the team should have the following important characteristics:
  - have a good professional network
  - social and communication skills
  - analytical skills
  - attend relevant sector review, planning or capacity development meetings
  - have a statistician
  - activator skills (turning results into action plans)
- Focus on the preparation phase: This is the most critical part of the entire assessment
- Gain approval at ministerial level, and linking it where appropriate to government plans

### **Key success factors**

- Engage sector organisations: Through kick-off, data collection, analysis and validation ensure ownership of results. Involve the organisations particularly at definition stage:
  - Define job categories (and qualification levels); The methodology can be adapted to add categories to overcome summing of shortage on qualification levels and or add additional parts of the supply chain, such as HR for policy, in the investigation
  - Determine targets and target years
  - Determine how to estimate HR proxy

### **Successful research methods**

- Flexibility in sampling and sensitivity in data collection is required to collect right amount of data
- Surveys are great for quantitative data collection; semi-structured interviews provide more complete data (with qualitative explanation.)



Cooperation through workshops.  
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## 4

**There is no information available on the current or projected levels of funding required to support capacity development, either in its totality, from governments or from the donor community.**

***Cost estimates were not part of the study remits***

Global estimates of the costs incurred by achieving the MDG water and sanitation targets or by the attainment of universal coverage exist<sup>40</sup>. It was not within the scope of the Phase 1 and 2 studies to address the issue of costs associated with filling the shortages at the national level. No investigation was done on what investment is required to develop institutional capacity of education and training institutes, or sector organisations, nor the costs of education and training per functional job profile.

***Cooperation with GLAAS proposed in establishing funding needs/gaps***

Research should be conducted to ascertain the current level of funding dedicated to capacity development and the existing funding gap for efforts to adequately address the HR needs. This had best be carried out within the UN-Water GLAAS reporting framework and be linked to work carried out on policy adoption and the tracking of financial flows.

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## 5

**Effective policies for improving human resource capacity at a national level are not well documented.**

***Studies did not focus on existing policies***

To address shortages through country level action, it will be necessary to understand whether national HR policies and strategies are in place. The studies only touched lightly on this aspect, because the terms of reference did not include an evaluation of existing policies/ strategies.

***There are unused opportunities to apply lessons learned from countries with strong policies***

With respect to HR policy formulation, an opportunity remains to learn from experiences in other countries that made significant advances in addressing human resource capacity gaps, by distilling and synthesising their lessons learned.

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## 6

**In formulating the SDGs, consideration should be given to the use of a human resource capacity data for WASH as an “enabling environment” indicator.**

***SDG WASH targets should contain an HR indicator***

Whilst the discussions informing the creation of SDG targets and indicators have included discussions on capacity development in the WASH sector, it remains to be seen whether, under a dedicated water goal, HR status and trends will be included as an indicator. The IWA studies bear witness to the HR needs in the WASH sector, and the outcomes aim to further inform the discussion on this matter. The results of the assessments strongly suggest that consideration should be given to the WASH HR capacity data as an “enabling environment” indicator.

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<sup>40</sup> [http://www.who.int/water\\_sanitation\\_health/publications/2012/globalcosts.pdf](http://www.who.int/water_sanitation_health/publications/2012/globalcosts.pdf)



# Recommendations

The previous section already touched upon some of the options and opportunities for action to address identified HR shortages and gaps. This section summarises some of the specific recommendations that came out of the application of the proposed methodology for country assessments. These recommendations primarily target national decision makers.

## 1

**Investment in the WASH sector has an easily perceptible knock-on effect of improved access to drinking water and sanitation. Yet, it can also be a magnet attracting and retaining high calibre professionals for the WASH sector.**

***More WASH investment translates into better job attraction***

To increase investment in water and sanitation requires government commitment to increase budget allocations for WASH, putting into place sound and equitable cost recovery mechanisms, and collaboration with development partners through a Multi-Donor Budget Support (MDBS) system<sup>41</sup>. The MDBS will ensure that annual allocations by donors and the private sector are increased incrementally, not only to expand services with a view to achieving the MDG water and sanitation targets but also to sustain those achievements through effective O&M, and in the post-2015 period to expand improvements further to a target of universal coverage. Tackling O&M neglect provides a good entry point for addressing HR shortages through the definition of an education and training response, for acquiring a better understanding of qualification and skills needs, and establishing or strengthening job performance criteria.

***Investment and HR development to be led by the public sector***

Financial support is needed to expand the WASH services, partly through the recruitment of more adequately trained staff, particularly by the public sector as a way of leading by example and encouraging the private sector and NGOs to do the same. This can be expected to have a direct impact on the attractiveness of the WASH sector. As a consequence, it will also have an impact on attraction and retention of qualified personnel. Government investments should also address the alignment of Technical and Vocational Training and other education trajectories with the capability and capacity needs of the WASH sector.

## 2

**Increasing the institutional capacity and developing an enabling environment for the WASH sector will provide it with a solid base to manage and develop its human resources.**

***Strengthened institutional capacity is an important cornerstone for HR development***

To eliminate the HR shortages and gaps requires countries to address their institutional capacity as the basis for the development of WASH HR. There is a clear need to evaluate the institutional framework, investigate roles and

<sup>41</sup> <http://www.aideffectiveness.org/Tools-Aid-modalities-Budget-support.html>

responsibilities of various actors and clarify these if needed. Synergies must be promoted and overlaps reduced to a minimum. The division of roles and responsibilities should be accompanied with the resources (financial and HR) that are required to perform the essential functions.

### ***WASH HR policies to fit broad national HR framework***

This will allow countries to evaluate existing WASH sector policies and strategies from an HR perspective: in particular whether there is a strategy for HR development, fitted or not in a broad, national framework for human resources development for the public sector at large. These efforts should focus in particular on how to align the HR issues into WASH sector policies and strategies, and to introduce the formation of water professionals into country-wide HR development plans.

### ***Assessments should aim to identify stakeholders, processes and impediments for planning action***

It is recommended that the assessments inform the preparation of a national HR capacity development plan, a process with the following crucial components:

- To identify key stakeholders to be involved in the formulation and implementation of the plan (including staff from other relevant sectors);
- To identify key processes that are needed to formulate, implement, monitor and evaluate a capacity development plan; and;
- To identify key impediments for the implementation of the plan and ways to overcome these.

The national HR capacity development plan for the water and sanitation sector should:

- Address the greatest needs in the provision of drinking water and sanitation services, and hygiene promotion;
- Stratify the different HR needs, on the basis of appropriate technologies for peri-urban, urban and rural settings;
- Estimate costs and benefits of the various options for professionals, technicians, and skilled and unskilled labour to optimally play their role.

### ***A multisectoral buy-in into any national HR plan is essential***

In the drafting process, the national HR capacity development plan should be discussed at multi-stakeholder meetings and sector-wide reviews. It is critically important to ensure that the education and public health sectors are involved, with representation from national, regional and local government levels. Only then will effective coordination, efficient use of resources and targeted planning for HR development be achieved.

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## **3**

### ***There are special opportunities for HR development at the local level***

#### **Improve HR capacity at the level of local government.**

Human and institutional capacities at the local level (districts, municipalities, village councils) should be strengthened to ensure that they are in a position to competently undertake their roles of maintaining regular contacts with the communities, of supervising the various operations and of using lessons learned to continuously improve the performance of the sector. This should go hand in hand with the creation of the necessary conditions to attract adequately qualified personnel to the local levels. The district level should be given increased attention in this connection.

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## 4

**To be able to present compelling arguments for the need to invest in WASH sector capacity development, including HR planning and the formation of adequate numbers of professionals with the appropriate technical background, data collection needs to be strengthened and the quality of data needs to be improved.**

***Compelling arguments require back up by solid datasets***

The Phase 1 and Phase 2 studies give rise to several recommendations to improve national HR data collection, interpretation, analysis and presentation:

***Register WASH organizations ...***

- Establish, at the ministerial level, a national directory and human resources monitoring system for the WASH sector, including registration of all organisations working in WASH sector and a database containing all education and training institutions with water supply and sanitation curricula;

***document employment records ...***

- Establish a database to keep track of employment of graduates, monitoring where alumni end up working – this database can be managed by the Ministry of Education or by the relevant professional associations;

***and create a framework for HR demand***

- Build a national framework for HR demand in the sector with the following objectives:
  - Define essential functions for drinking water and sanitation services linked to components of the project cycle (planning, design, construction, operation, maintenance) for a limited number of settings;
  - Categorise essential functions for the public (central, provincial, decentralized) and for the private sector.

***Incentives, professional associations and legal arrangements need attention within such plans***

- Create incentives or regulatory obligations for organisations to maintain an HR database;
- Support the development of professional associations, with registration offices for water-related functions;
- Re-organise the private WASH sector into legally-recognised corporations, which will allow for better.

Organisations can improve their HR databases by:

- Formulating generic post descriptions for the execution of essential functions with a clear indication of education, skills and experience requirements;
- Organization-wide mapping of HR;

***Concrete steps to improve HR databases***

- Expanding their HR datasets with reliable data detailing:
  - qualifications
  - years of experience
  - specific skills aligned with their function
  - gender
  - age
  - performance appraisal
  - staff turnover and attrition.

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## 5

### *Incentive schemes and campaigns to attract new personnel*

#### **Attract new personnel to the WASH sector.**

At country level, incentive schemes and or promotional campaigns for working in the WASH sector should be initiated. This could include:

- Rolling out an educational awareness-raising programme, where school students are informed about the nature and importance of working for water, sanitation and hygiene practice as well as the career opportunities in the WASH sector;
- Organizing a sector attractiveness campaign, with the aim to attract personnel from other sectors; such a campaign should function as an eye opener for work in the WASH sector.

### *Invest in young professionals*

Incentive schemes and promotional campaigns only make sense if the country is actually investing in the water and sanitation labour market, and real jobs can be offered to those that are interested.

It is also recommended to recognise the importance of young water professionals from across a variety of disciplines and organisations. They are the future of the WASH sector, and they can fill the existing shortages and gaps. Encouraging them to engage and connect across a variety of fields now, and empowering them in their position will be a motivation for them to stay in the sector. These young professionals can drive new students and professionals into the sector through the organisation of young water professional activities.

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## 6

### *Change should start at the level of education*

#### **Improve alignment between HR demand and supply.**

For a successful inflow of appropriately trained young professionals into the WASH sector, it is imperative that tertiary education institutions include employers and HR managers from the sector when planning for new and updating existing university courses/ academic years in order to ensure that curricula respond to functional needs and are targeted to meet sector demand. The recommendations proposed to institutes of tertiary learning are<sup>42</sup>:

### *Curriculum development in tertiary institutes needs re-direction*

- Curriculum planners at tertiary institutions should be aware of the specific needs of the water, sanitation and hygiene sector, reflect these in the objectives, scope and focus of the curricula and ensure that qualifications match the needs;

### *Curricula must reflect diversity of needs*

- Curriculum planning should consider the diversity of needs linked to environmental and social aspects in different geographical regions, and to emerging issues;

### *Teaching capacities need strengthening*

- A pre-condition for institutes of tertiary learning could be to match the curricula they offer with WATSAN market demands they will must have the capacity to perform their teaching functions effectively with quality teaching staff, facilities and equipment;

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<sup>42</sup> Successful implementation of the recommendations critically require substantial political will backed up by adequate financial investment. This financial investment should be focused and earmarked to support specific technical areas. One option is to operationalize them through a dedicated fund. External support agencies can make their WASH investments contingent on including a sustainability clause that creates obligations to enhance HR development and management.

- Education and training institutions should be encouraged to provide follow-up support to their graduates for the identification of employment opportunities, to communicate the trends in demand and to alert them to barriers to employment and career development. This could feasibly happen through alumni organisations;

***R&D: from science to policy***

- Universities should include water and sanitation as priority areas for research and extension work. Twinning between utilities, water districts and small water service providers, and universities and other research institutions with a strong WASH focus should be promoted;
- The industry placement and practicum programmes of universities (internships) should be strengthened to ensure 'best fit' between curriculum focus and actual labour market requirements;

***Adult learning should not be overlooked***

- Institutes of tertiary education should be invited to develop and design courses for adult learning, which should aim at problem in-service training for practising professionals to update them on new developments (such as water safety planning), and to develop their skills in increasingly multi-sectoral and multi-disciplinary approaches.

***Ministerial convening powers should facilitate discussions on HR strategies***

At national level, the ministries responsible for water and sanitation have the convening power for meetings with various actors, including the institutes of tertiary education to address HR capacity development needs, to highlight specific requirements (in terms of skills and competencies) for the sector, and to inform them about expected shortages on the short, medium and long term. In preparation for such meetings, it is crucial to have detailed and reliable WASH HR data available. The outcome of these meetings should facilitate synergies between the education and WASH sectors, for example by:

- The formulation of research agenda, linked to targeted training courses and alignment of education and training with the HR demands.
- The creation of permanent consultation mechanisms for WATSAN training institutions to guide the development and evolution relevant curricula aligned with the national WATSAN implementation plan.

***A research agenda and permanent consultation processes are fundamental***

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## **7**

**Make technical and vocational training a pivotal element in human resources development in both urban and rural service provision.**

***Considerable opportunities exist through TVE***

TVET for WASH HR capacity development should be purposefully expanded. It is recommended that the WASH sector take the lead in this initiative and does not wait for the education sector to promote this part of their own sector. Similar to tertiary learning, TVET should take into account the market demands and course programmes should be developed around the specific needs for a well-trained human resources the sector. Focused and targeted short courses can turn unskilled workers into members of a much-needed, semi-skilled workforce.

The promotion of TVET is thus important to fill critical HR gaps of the WASH sector with an appropriately qualified workforce. Some specific recommendations include:

***Make a WASH career more attractive***

- A tailor-made WATSAN TVET trajectory should be developed into an attractive job industry, backed up by support of donors, policy makers and local communities to make it an attractive employment and career option;

***Ensure sustainability through budget allocations***

- An enabling environment should be created by incorporating TVET into WASH sector budget and finance, based on the argument that it contributes importantly to maintaining adequate levels of service delivery and to the sustainability of achievements;

***Build capacity of local training providers***

- As long as a situation prevails with a limited number of local specialist WATSAN education and training providers, national WASH sectors may benefit from support by international training providers who, in partnership with local training institutions, should supply technical expertise for courses;

***Establish TVET institutes***

- Dedicated institutions for TVET for the formation of technicians and artisans should be established in close consultation with WASH sector organizations, utilities and NGOs and the education sector;
- Where feasible, formalization of TVET/WATSAN qualifications within the existing national qualifications frameworks will provide an additional boost towards recognition of the jobs in the sector;

***Ensure job security***

- In response to the reported shortages of trained craftsmen in the construction sector, enhancing outputs from vocational training institutions should be accompanied by effective policies and salary structures to ensure job security and career development.

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## **8**

### **Water and sanitation organisations should take a role in professional development of their staff.**

As study results indicate that much of the practical training happens on the job, organisations should work on the formulation of proper human resource management strategies, investing in the professional and technical development of their staff and using a variety of capacity development mechanisms.

***Twinning, mentoring and community-based initiatives***

- Organisations that provide technical in-house training should be encouraged to collaborate with other organisations (private, public or NGO) that have a similar focus or offer similar training, and with training institutions. This will generate potential economies-of-scale and allow participation by smaller organisations who cannot afford in-house training of their own;
- Funding should be made available for strategic twinning between local water districts and external water service providers, eventually leading to sustainable scaling up;
- Senior professionals and retired staff could assume a role of mentor to guide newcomers in the organisation;

- Government agencies in charge of 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.

## 9

### Recruiting and retaining the right staff in the right positions.

#### *Increase sector attraction*

It is clear that the WASH sector suffers from not having the right staff in the right positions; in addition, the sector's recruitment and retention strategies are not sufficiently attractive to stock the sector with adequate numbers of appropriately trained human resources. Recommendations emerging from the country studies in this connection include:

#### *Mapping career paths*

- Career paths for different job functions and for the various organisation types in the WASH sector should be clearly mapped out to encourage entry into the sector;

#### *Performance appraisal*

- Independent performance agreement and appraisal procedures should be introduced, possibly linked to promotions, rewards and bonuses;

#### *Non-financial incentives*

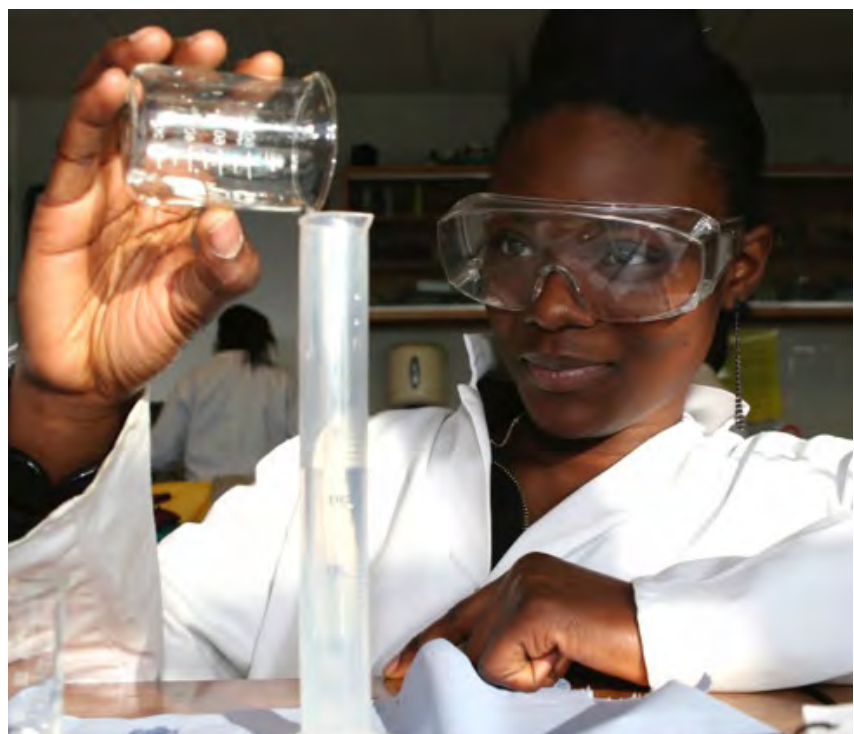
- Consideration should be given to non-financial incentives to retain skilled and experienced personnel within the WASH sector, especially engineers, who are attracted to the higher-paying mineral extraction industry;

#### *In-service training*

- Professional development and in-service training opportunities should be introduced to allow staff to move from other sectors into the WASH sectors and also to enhance people's career opportunities within the sector;

#### *Re-direct recruitment practices*

- Government remains an important employer in the WATSAN sector and is, in some cases, preferred by graduates due to perceptions of job security. This benefit should be taken full advantage off by encouraging a shift from the



Female laboratory professional.  
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current HR recruitment practices to a needs-based and capacity-development approach, based on strategic assessment of required human resources to suit water and sanitation service delivery;

- A specific focus on capacity development in small towns and rural areas should be coupled to incentives to attract qualified individuals from urban centres to more remote areas, in the form of hardship allowances, compensations, improvement of local facilities or prospects of accelerated promotion;
- Deployment of staff to address the needs of remote communities that are underprivileged marginalized is essential in efforts to reduce inequalities and discrimination, as governments are obliged within the human rights framework;
- By expediting the decentralisation process, the transfer of additional functions and financial resources to local authorities can add sustainability to progress made in extending coverage in the rural areas;
- Promote proximity development services (artisans for repairing, plumbing, diving, building etc.) in isolated areas where access to drinking water is a major difficulty.

### **Overcoming inequality in service delivery**

### **Decentralization to drive local HR capacity development**

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## **10**

### **Strengthening the role of Women in the WASH sector.**

#### **The reality: gender imbalance**

Gender inequality is one of the bottlenecks that span the entire spectrum of development, including the WASH sector. Globally women are heavily under-represented in technical fields or in management roles in technical environments. Suggestions to improve this situation include:

- Capture women's involvement in service provision in professional HR data, and seek for better quantification of their input at community level;
- Promote the technical careers to young women, and encourage gender mainstreaming in policies for water and sanitation services. This requires an improved understanding on what would motivate and incentivise females in these professions, and what are the key impediments to entering the sector;
- Design recruitment procedures aimed at increasing number of women employed in the technical fields, without compromising on quality, and make better use of women's skills and knowledge to improve communication and foster the identification and adoption of best practices;
- Encourage women to enter the WASH sector through promoting technical careers to young women through scholarships at education and training institutions (doing this requires an improved understanding on what would motivate and incentivize females in the sector);
- Recognize the traditional role of women in household and community water management by putting them at the centre of community-based TVET efforts;
- Let the WASH sector adopt a trailblazer role in facilitating women's position in its organizations by installing woman-specific entitlements such as maternity leave and child-care facilities.

#### **Key to promoting women's employment opportunities: recruitment procedures and scholarships**



# Way forward

Overall, to respond to the shortages in the WASH sector at national and global level, IWA recommends the following ways forward:

## National action

Working with national stakeholders, including ministries, education and training institutes, professional associations and industry bodies to develop long-term, national strategic action plans for HR capacity development, considering the recommendations in the previous section as well as the following key elements:

- Identify key stakeholders, processes, steps and obstacles that will support the development of a national strategic action plan;
- Appoint and empower an appropriate national institution to lead efforts in assessing, monitoring and reporting on national human resource capacity for water and sanitation services, applying the methods and procedures developed in the project reported in this document;
- Develop, in consultation with all key stakeholder groups, strategies and allocate adequate financial resources for HR capacity development in urban and rural settings;
- Strengthen the administrative and technical capacity of local authorities to provide greater oversight and more structured support for human resources responsible for managing and operating decentralised water and sanitation systems;
- Establish partnerships between universities, training institutes, the private sector and other employers to better match HR supply with demand;
- Establish partnerships between universities to develop appropriate curricula for sanitary engineering and incentives to enrol a greater number of students;
- Support the establishment and strengthen professional associations to facilitate peer-to-peer support within service providers and provide expertise and knowledge to semi-skilled workers, community workers and volunteers.

## Further research

To support global advocacy efforts and national action, IWA will work with capacity development, education and research institutes to strengthen the evidence base for and our understanding of the following:

- The motivation and incentives for attracting and retaining staff in the sector, with an emphasis on young professionals and females;
- The institutional enablers and bottlenecks to increasing the number of female workers in the sector;

- The need, role and market for Professional Vocational Training (PVT) institutes to support capacity development;
- The education and skill requirements for operating and maintaining specific technologies for water and sanitation systems.

## Global policy and advocacy

IWA will lead global advocacy efforts with capacity development and education organisations and contributing to global development goals and reporting mechanisms for water and sanitation, including:

- Advocate for the importance of investing in human resource capacity development to support sustainable water and sanitation service delivery and improving public health, and as a key indicator for attaining WASH targets under the SDGs;
- Contribute further assessments of human resource capacity gaps and support efforts to collect data on existing and required financial flows for human resource capacity development within the framework of the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS).

# Appendix 1

## Countries' contextual information

COUNTRY	DRINKING-WATER (2010 COVERAGE)					SANITATION (2010 COVERAGE)					HEALTH <sup>a</sup>	ADULT LITERACY RATE PROJECT 2015 (%)	GNI/ CAPITA \$	POSITION IN HUMAN DEVELOPMENT INDEX (HDI)
	Urban	Rural	National	MDG drinking water target (JMP 2012)	2010 population gaining access since 1995 (%)	Urban	Rural	National	MDG sanitation target (JMP 2012)	2010 population gaining access since 1995 (%)	Diarrhoeal deaths from WASH (Number of deaths 2012; percentage of total diarrhoeal deaths 2012)			
<b>HRCG PHASE 1</b>														
Bangladesh	85*	80*	81*	88	20	57	55	56	23	70	8950 (56%)	61	780	146
Mali	87	51	64	64	40	35	14	22	11	57	8444 (62%)	38	610	182
South Africa	99	79	91	91	22	86	67	79	19	86	6258 (48%)	93	6 960	121
Timor Leste	91	60	69	73	29	73	37	47	19	65	114 (42%)	67	2 730	134
Zambia	87	46	61	75	26	57	43	48	16	73	3308 (58%)	72	1 160	163
<b>HRCG PHASE 2</b>														
Burkina Faso	95	73	79	71	46	50	6	17	11	54	6338 (63%)	36	570	183
Ghana	91	80	86	76	42	19	8	14	8	53	4763 (63%)	71	1 410	135
Lao PDR	77	62	67	66	36	89	50	63	50	54	909 (44%)	80	1 130	138
Mozambique	77	29	47	68	21	38	5	18	9	55	9499 (64%)	62	470	185
Niger	100	39	49	67	27	34	4	9	6	52	11 081 (64%)	36	360	186
Philippines	93	92	92	92	28	79	69	74	28	78	4723 (48%)	96	2 210	114
Papua New Guinea**	87	33	40	71	12	71	41	45	12	73	858 (54%)	63	1 480	156
Senegal	93	56	72	81	29	70	39	52	25	69	3482 (57%)	56	1 070	154
Sri Lanka	99	90	91	83	27	88	93	92	26	85	705 (43%)	93	2 580	92
Tanzania**	79	44	53	77	16	20	7	10	5	53	12 913 (61%)	74	540	152

<sup>a</sup> Adjusted for arsenic contamination levels based on national surveys conducted and approved by the Government of Bangladesh

\*\* Country not included in GLAAS 2012 report

# Appendix 2

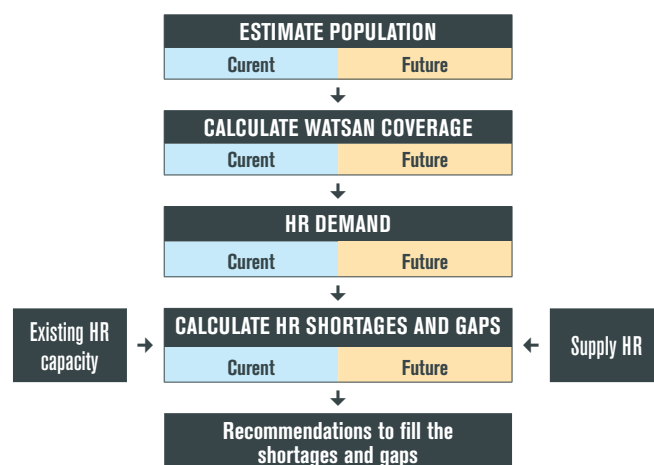
## The methodological framework – Phase 2

### Stepwise approach

The methodological framework to assess the HR requirements in terms of numbers (shortages), skills and competencies (gaps) foresees the following steps:

- 1 Estimate projected population in the target year to take into account population growth.
- 2 Determine the current level of access to drinking water and sanitation and calculate the increases needed to achieve (a) the MDG targets and (b) universal coverage.
- 3 Estimate a proxy of HR demand (quantitative) per type of service delivery per 10,000 people, and their needed qualifications.
- 4 Determine the existing HR capacity in the country in terms of numbers and skill sets.
- 5 Assess the HR supply over the period until the target year in terms of graduates as well as vocational training.
- 6 Calculate the HR shortages and assess the HR gaps.
- 7 Formulate recommendations for training institutions to address shortages and gaps, and for alternative ways to meet the identified needs.

### METHODOLOGICAL FRAMEWORK TO ASSESS HUMAN RESOURCE SHORTAGES AND GAPS



STUDY STEPS	ACTIVITIES	METHODOLOGICAL APPROACH*	ASSUMPTIONS	SUGGESTED FUTURE ADAPTATIONS TO METHODOLOGY (REFERENCE GROUP MEETING FEB 2013)
2.1 Calculate existing and future populations	<ol style="list-style-type: none"> <li>1) Obtain 2010 population data and growth rates.</li> <li>2) Identify centres of human population (i.e. towns and cities) to be able to estimate the number of settlements).</li> <li>3) Estimate population and its distribution in settlements in 2015 and 2025.</li> </ol>	<ul style="list-style-type: none"> <li>• Secondary sources (population census, national demographic databases)</li> <li>• Excel sheet 2.1</li> <li>• Case study narrative</li> </ul>	<ul style="list-style-type: none"> <li>• Similar growth rates in various settlement sizes</li> <li>• Proposed sizes of settlements are in accordance with the country division</li> <li>• Universal coverage target year is 2025</li> </ul>	<ul style="list-style-type: none"> <li>• Moving beyond MDG target 7c to universal coverage will require a change in target year</li> </ul>
2.2. Calculate WATSAN coverage	<ol style="list-style-type: none"> <li>1) Obtain data about existing WATSAN coverage (JMP).</li> <li>2) Identify standard types of water and sanitation service provision for different types of settlements.</li> <li>3) For each service type, estimate future WATSAN service needed to achieve a) MDGs and b) full coverage.</li> </ol>	<ul style="list-style-type: none"> <li>• JMP data (existing coverage and MDG targets)</li> <li>• Telephone consultation/ interview</li> <li>• Excel sheets 2.2.1 and 2.2.2</li> <li>• Case study narrative</li> </ul>	<ul style="list-style-type: none"> <li>• The current mechanisms of service will be expanded to increase coverage.</li> <li>• JMP coverage figures (2010) are used, that provide estimates of the use of improved drinking water sources and improved sanitation facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Once SDG targets and indicators have been defined, changes to this section will be required</li> </ul>
2.3. Estimating existing and future HR demand	<ol style="list-style-type: none"> <li>1) Estimate HR requirements per WATSAN type for planning, design and construction for a typical scheme to serve 10 000 people, and define the duration of this phase.</li> <li>2) Estimate HR requirements per WATSAN type to operate and maintain system for 10 000 people.</li> <li>3) Estimate the HR required per WATSAN type to mobilise communities.</li> <li>4) Use these estimations and future WATSAN coverage (2.2.2) needed to calculate proxy (2.3.2) for future HR demand in order to achieve MDGs/ full coverage.</li> </ol>	<ul style="list-style-type: none"> <li>• Key informant telephone interviews</li> <li>• Kick off workshop – consultation</li> <li>• Refer to table 1</li> <li>• Excel sheet 2.3.1</li> <li>• Excel sheet 2.3.2</li> <li>• Case study narrative</li> </ul>	<ul style="list-style-type: none"> <li>• Different settlement sizes in a country are typically served by the same water and sanitation service delivery mechanism;</li> <li>• Construction is performed within certain time frame – this results in one staff member doing more in a year/ up till the target year;</li> <li>• Operation and maintenance and community mobilisation are continuous so requires permanent staff</li> </ul>	<ul style="list-style-type: none"> <li>• Estimating the HR demand should have alternative methods so it can adapt to country context: <ul style="list-style-type: none"> <li>– HR per main technology per size of settlement through investigating cases (current);</li> <li>– Based on existing capacity estimate a multiplier factor (adjusted when no relation between technology and size of settlement)</li> </ul> </li> <li>• Nature, structure and conditions of countries' community mobilisation staffing differ. In certain countries staff is deployed full-time in administrative areas, in other countries staff deployment is linked to projects, which implies staff mobility and lack of continuity.</li> </ul>
2.4. Existing human resource capacity in the WASH sector	<ol style="list-style-type: none"> <li>1) Identify, quantify and classify organizations in sector (public, private, NGO) - to be determined in inception phase.</li> <li>2) Select representative sample -to be determined in inception phase.</li> <li>3) Determine the number of employees within sample organizations according to the classification established above.</li> <li>4) Multiply the average by number of organizations in country.</li> <li>5) Identify skill set and composition of staff (level of education (PhD, MSc, B.Eng. or on-the-job training), age and gender).</li> <li>6) Identify and quantify salaries and other benefits.</li> </ol>	<ul style="list-style-type: none"> <li>• Secondary sources</li> <li>• Sampling method – annex B of methodology</li> <li>• Key informant interviews</li> <li>• Semi-structured interviews/ surveys</li> <li>• Focus group discussions</li> <li>• Analyse quantitative data</li> <li>• Excel sheet 2.4 and narrative of case study</li> <li>• Case study narrative</li> </ul>	<ul style="list-style-type: none"> <li>• Sample is representative of size of organisations (public/private/NGOs)</li> <li>• Number of each type of organization is known (private sector (consultancy/construction/ operator) public sector, and NGOs). This will allow for estimating the country HR.</li> <li>• Qualitative and quantitative data is available in organisations</li> </ul>	<ul style="list-style-type: none"> <li>• No further changes were recommended</li> </ul>
2.5. Assessing the supply of HR	<ol style="list-style-type: none"> <li>1) Identify institutions that provide WASH training and assess the quality.</li> <li>2) For each discipline, quantify the number of trainees per annum for the last five years.</li> <li>3) Determine percentage going into the WASH sector and calculate average values.</li> <li>4) Quantify the on-the-job training offered by training institutions within the WASH sector.</li> </ol>	<ul style="list-style-type: none"> <li>• Key informant (number of institutions and percentage of graduates going into WASH sector)</li> <li>• Excel sheet 2.5</li> <li>• Case study narrative – quality of training/ education</li> </ul>	<ul style="list-style-type: none"> <li>• Supply of HR from training institutes is new supply to the sector. This has the consequence that people who are working in the sector, and take training are double accounted for.</li> <li>• Does not consider potentials from other sector, other than estimating the percentage of graduates going into the WASH sector (which then implies that the potential from other sectors</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in the target year will impact the HR supply potential. The quantitative data collection tool should make an option to insert the year so that it can be adapted by country.</li> </ul>
2.6. Quantifying the shortages and assessing the gaps	<ol style="list-style-type: none"> <li>1) Per HR function list the difference between the existing HR demand determined in (2.3.1) and the existing HR (2.4).</li> <li>2) Per HR function list the future HR demand (2.3.2).</li> <li>3) Per HR category add the existing HR and the supply of HR (2.5).</li> <li>4) Future HR demand – (existing HR and supply HR).</li> <li>5) Per category use the skill set determined in 2.4.2 (existing HR) and compare it to on-the-job training (2.5.2) to show the HR gaps.</li> </ol>	<ul style="list-style-type: none"> <li>• Excel sheet 2.6.</li> <li>• Analyse the data.</li> <li>• Case study narrative- write the analysis in a narrative.</li> </ul>	<ul style="list-style-type: none"> <li>• Assumes enough qualitative information is available to explain the shortages and gap.</li> </ul>	<ul style="list-style-type: none"> <li>• There needs to be a focus on both quantitative and qualitative data collection in order to arrive at robust conclusions.</li> </ul>
2.7. Recommendations for meeting the shortages and gaps	<ol style="list-style-type: none"> <li>1) Determine options and opportunities to fill the shortages and gaps in the short, medium and long term, using the qualitative and quantitative information generated.</li> </ol>	<ul style="list-style-type: none"> <li>• Data from key informant interviews, focus groups with diverse organisations in all previous steps.</li> <li>• Case study narrative.</li> </ul>	<ul style="list-style-type: none"> <li>• Clear link back to the sector context, and the findings of shortages.</li> </ul>	<ul style="list-style-type: none"> <li>• The recommendations should be written to address the various decision makers that influence WATSAN HR capacity across the sectors.</li> </ul>

\* As presented in IWA methodology document.

## Functional job categories to map human resources capacity

The WASH sector is fragmented and its boundaries are nebulous. One of the inherent challenges in assessing WASH sector HR needs is to agree on clear criteria to decide whom to count as working inside the sector and whom not. The methodology used includes personnel with an engineering background, but it also crosses the divide into the education sector, to include workers in hygiene programmes within schools and in the health sectors such as community and environmental health workers. The study distinguished four categories, as presented in box (on right), to map HR capacity in water and sanitation.

### FUNCTIONAL JOB CATEGORIES TO MAP HR CAPACITY

- **Technical specialisation specific to water and sanitation services (WATSAN technical personnel):** professional engagement 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):** professional engagement 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-specific.
- **Management and finance:** professional engagement in management (for instance finance, human resources (HR) or strategic managers and office managers fulfilling administrative functions) as well as persons who procure goods and services or cost planners.
- **Social development:** professional engagement in hygiene promotion or other relevant water, sanitation and health professions with a social science emphasis (for instance, health promotion specialist, sociologist, community development worker).

## Components of the WASH service delivery pathway

The studies investigated the capacity for these four categories and the methodology further distinguished between the HR requirements for three different types of work:

1. Design and construction of new infrastructure.
2. Operation and maintenance.
3. Community mobilisation and hygiene promotion.

## Sampling approach

In order to provide accurate data on national HR shortages and gaps for the four categories to construct, operate and maintain and mobilise communities for water and sanitation service delivery, there is a need to carefully select the sample to ensure inclusion of certain factors, such as type of organisation (private, public and NGO) and size (numbers of staff).

The stipulated method was to be performed according to lists of the types of organisations (NGO, public, private) according to three sizes (small, medium, and large). The relative numbers of organisations determined the percentage. Whilst the lists were predetermined, a random sample was opted for from each of the lists.

## Data collection methods

The IWA guidance document for the assessment describes the methods, procedures and tools, including those required for the preparatory work, and the stepwise approach to collect data, indicating what potential sources to gather the quantitative and qualitative data from, what data collection methods to use and how to proceed in storing the data in the excel based tool and use this to analyse the data.

The data collection methods are semi-structured interviews, surveys, telephone interviews, kick-off and validation workshops, and literature reviews, whereas the data sources are secondary data, key informants, key private/ public and non-governmental organisations, key education institutes and government agents.

## Key recommendations for methodology

Key success factors to be addressed for successful methodology application, ensuring comprehensiveness, scientific rigour and avoid bias, include the following:

- **Research team:**
  - Ensure a multi-disciplinary team at global project management level
  - Multi-disciplinary team at country level from education and WASH sector (NGOs, public and private) with at least WASH sector knowledge, capacity development knowledge, large professional network, one person strong in quantitative analysis of data
- **Duration:**
  - Approximately one year from beginning to end
- **Stakeholder engagement:**
  - To gain approval for the research, ensure collaboration, and avoid duplication of efforts
  - To enhance data collection
  - To ensure assessment's relevance to country context
  - To initiate action to address the shortages
- **Setting and clarifying definitions on jobs, categories/types of jobs:**
  - Evaluating country's jobs according to the four categories, reflecting the different levels of qualification
  - Clarifying the scope of the assessment to point end service delivery only (or upon the wishes of the sector include investigation of HR in all stages of service delivery supply chain)
  - Evaluate types of jobs (construction, O&M and community mobilisation) and determine whether this is full time, or part time positions
- **Sampling:**
  - Independent sampling of organizations in each of the categories with a level of flexibility allowing adjustments to individual country situations. Sampling as per indicated in the methodology did not mean cooperation from the organisations, meaning sampling should be flexible to alternative ways.
- **Data collection:**
  - Formally request cooperation of the organisation through higher level management, and clarify importance of collaborating
  - Private sector data is hardest to obtain
  - Quantitative data collection has proven most successful through surveys, whilst qualitative data collection
- **Analysis:**
  - Time consuming
  - Need for a statistician and a person in the team who is good with numbers
- **Report and recommendations:**
  - Details should be available in local language to ensure an impact
  - Recommendations should address decision makers specifically, in the education, health and WASH sectors, at national, regional and local levels of administration

# Appendix 3

## HR shortage in Phase 1 (first 5) and Phase 2 (10) of IWA HRCG studies

### PHASE 1: HR SHORTAGES PER COUNTRY – IWA HRCG STUDY\*

HR SHORTAGES	EXISTING HR IN WATSAN SECTOR 2009	PROJECTED HR DEMAND (2010-2015)	NEED FOR ADDITIONAL HR (2010-2015)	PROJECTED SUPPLY IN 5 YEARS (2010-2015)	HR NEED TO BE ABSORBED IN WATSAN (%)	REMARKS
<b>BURKINA FASO</b>						
Engineers	2160	5023	2863	11 500	25%	Only the supply from BSc. and Diploma Civil Engineering was considered
Associated professionals	6404	16 438	10 034	N/A		Estimate could not be made
Technicians	7661	18 359	10 698	105 900	10%	Supply from relevant vocational disciplines are considered
Skilled workers	17 659	30 123	12 464	N/A		Estimate could not be made

\* In phase 1 of the study, most countries did not evaluate supply to offset the HR requirements.

TYPE OF ORGANIZATION	TOTAL SKILLED WORKERS	GROWTH RATE NEEDED FOR MDGS	HR ESTIMATED FOR MDGS PER YEAR	HR ESTIMATED FOR MDGS IN TOTAL
<b>MALI</b>				
Small NGOs	133	7.8%	10	76
Large NGOs	93	7.8%	7	53
Donor agencies	22	7.8%	2	12
Drilling companies	187	8.1%	15	111
Consultancy companies	260	6.4%	17	118
Large hand pump suppliers	20	8.1%	2	12
Small hand pump suppliers	16	8.1%	1	9
EDM	240	4.8%	11	77
Private Water Operators	533	8.1%	43	316
Hand pump mechanics	387	8.1%	31	229
Government organisations	565	7.8%	44	321
GIEs	140	10.2%	14	111
Grand total	2595		198	1448

OCCUPATIONS IN THE WATER, SANITATION AND HYGIENE SECTOR

ESTIMATED NUMBER OF WORKERS REQUIRED TO DELIVER SUSTAINABLE SERVICES (BASED ON HIGH EMPLOYMENT GROWTH SCENARIO) IN 2015

ESTIMATED NUMBER OF WORKERS REQUIRED TO DELIVER SUSTAINABLE SERVICES (BASED ON LOW EMPLOYMENT GROWTH SCENARIO) IN 2015

SOUTH AFRICA – Estimated on the basis of expected number of households in 2015: 15 274 881		
Leadership and Governance	20 874	2211
Senior Officials and Managers	13 336	2731
Professionals	19 958	6142
Technician and Associate professional	23 680	5828
Skilled Agriculture & Fisheries	3164	652
Clerks	47 547	3199
Service Workers	30 200	2024
Craft and Related	13 661	4421
Plant and Machine Operators	15 771	8035
Elementary Occupations	89 875	4975
Grand total	465 936	40 218



ADDITIONAL HR REQUIREMENTS	CURRENTLY AVAILABLE HR		ADDITIONAL HR FOR RURAL WATER TARGET	ADDITIONAL HR FOR URBAN WATER TARGET	ADDITIONAL HR FOR RURAL SANITATION TARGET	ADDITIONAL HR FOR URBAN SANITATION TARGET	TOTAL ADDITIONAL HR	INCREASE ON CURRENTLY AVAILABLE
<b>TIMOR LESTE</b>								
Engineers	82	Best case:	20	0	5	0	25	28%
		Worse case:	40	14	12	4	70	79%
Professionals	121	Best case:	70	1	5	0	76	58%
		Worse case:	140	3	12	4	159	121%
Technicians	152	Best case:	70	4	50	0	124	72%
		Worse case:	140	13	120	40	313	182%
Skilled	98	Best case:	80	20	N.A. data	N.A. data	100	93%
		Worse case:	150	60	N.A. data	N.A. data	210	196%

HR SHORTAGES	ENGINEERS	OTHER PROFESSIONALS	TECHNICIANS	SKILLED
<b>ZAMBIA</b>				
Rural water supply and sanitation	59	77	3625	60 <sup>a</sup>
Urban water supply and sanitation	171	146	90 <sup>b</sup>	23 <sup>c</sup>

<sup>a</sup> Expected to be much higher, but there is a lot of unavailable data on skilled worker jobs (APMs Well-diggers Latrine builders CHWs V-WASHes).

<sup>b</sup> Expected to be much higher but there is a lot of unavailable data.

<sup>c</sup> Expected to be much higher but there is a lot of unavailable data.

QUANTIFYING THE HR SHORTAGES

	WATSAN TECHNICAL FIELD	OTHER TECHNICAL FIELD	MANAGEMENT AND FINANCE	SOCIAL DEVELOPMENT	
<b>BURKINA FASO</b>					
HR shortage for achieving MDG	4 778	3 899	3 346	9 391	
HR shortage for achieving full service coverage	6 448	5 231	6 503	12 529	
HR shortage for achieving MDGs	2 061	1 680	365	4 295	
HR shortage for achieving full service coverage	4 590	4 209	7 395	9 352	
<b>GHANA</b>					
HR shortage for achieving MDG	930	3 644	-4 265	4 893	
HR shortage for achieving full service coverage	2 302	5 603	-3 335	6 706	
HR shortage for achieving MDGs	31 592	151 072	128 835	-276	
HR shortage for achieving full service coverage	59 897	280 696	242 506	3 086	
<b>LAO PDR</b>					
HR shortage for achieving MDG	-95	-52	-31	-150	
HR shortage for achieving full service coverage	181	55	107	32	
HR shortage for achieving MDGs	-91	-54	-31	-156	
HR shortage for achieving full service coverage	-74	-38	-23	-42	
<b>MOZAMBIQUE</b>					
HR shortage for achieving MDG	1 589	235	715	2 486	
HR shortage for achieving full service coverage	2 392	376	1 755	4 322	
HR shortage for achieving MDGs	2 283	146	-2 604	449	
HR shortage for achieving full service coverage	3 983	187	-2 367	1 253	
<b>NIGER</b>					
HR shortage for achieving MDG	46	-135	-3 694	783	
HR shortage for achieving full service coverage	1 437	1 149	-3 233	1 058	
HR shortage for achieving MDGs	180	271	-94	572	
HR shortage for achieving full service coverage	1 250	1 503	418	1 438	
<b>PAPUA NEW GUINEA</b>					
HR shortage for achieving MDG	562	2 169	790	167	
HR shortage for achieving full service coverage	827	3 269	1 240	312	
HR shortage for achieving MDGs	595	1 838	916	328	
HR shortage for achieving full service coverage	835	2 667	1 349	518	
<b>PHILIPPINES<sup>a</sup></b>					
	Rural provinces		Urban provinces		
	WST	Para-technicians	WST (low production)	WST (high production)	Para-technicians
Target Universal coverage	-8 713	-15 121	58 693	-8 541	47 729
Target MDG	-8 735	-22 474	44 431	-11 035	49 793
<b>SENEGAL</b>					
HR shortage for achieving MDG	292	42	397	-93	
HR shortage for achieving full service coverage	347	77	484	-3	
HR shortage for achieving MDGs	81	-14	11	-77	
HR shortage for achieving full service coverage	141	21	114	-14	
<b>SRI LANKA</b>					
HR shortage for achieving MDG	776	1 350	240	283	
HR shortage for achieving full service coverage	862	1 492	271	318	
HR shortage for achieving MDGs	-72	-133	120	4	
HR shortage for achieving full service coverage	-59	-120	132	12	
<b>TANZANIA</b>					
HR shortage for achieving MDG	3 864	596	3 799	669	
HR shortage for achieving full service coverage	6 701	879	5 500	1 094	
HR shortage for achieving MDGs	637	444	419	2 670	
HR shortage for achieving full service coverage	676	470	445	2 813	

\* The figures here are computed by the Excel support tool (and therefore not rounded off); Negative numbers indicate oversupply of available trained workers, considering that the entry rates of graduates to the sector holds; These figures does not consider attrition, or other environmental factors for losing workforce.

<sup>a</sup> The Philippines study team measured for country relevance the level of Paratechnicians. In the Philippines water and sanitation facilities are categorized in 3 levels. Levels I and II water service facilities are operated and maintained by paratechnicians, who are community members that have been provided some short training in their required tasks; low productivity being=1 staff/186 connections; High productivity = 1.4 staff / 1000 connections).

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# In 2014, one year before the MDG timeframe ends, our understanding of the HR dimensions for water and sanitation services is rudimentary at best.

The findings presented in this report are stark: without due attention given to the number and specific skills of professionals to design, build, operate and maintain water and sanitation systems, we not only risk undoing much of the progress of the recent period, but place the aspiration of universal access for all at an even further distance in the future and put into jeopardy the progressive realization of the human rights to safe drinking water and sanitation. This report provides a first step towards the mobilisation of significant political will, finances and practical actions in the direction of ensuring the world will have enough skilled staff to sustainably deliver and maintain water and sanitation services.

## Key conclusions of this research include:

Investment in the WASH sector, apart from its easily perceptible knock-on effect of improved access to water and sanitation, can also provide a magnet to attract and retain high calibre professionals in the sector.

The mismatch between supply (in terms of the shortage in numbers and deficiencies in skills of professionals and vocational staff entering the job market) and demand (the numbers and skills of human resources required) is one of the key factors significantly undermining the sustainability of achievements in the WASH sector.

Appropriate public policies need to be in place to support job creation, which involves investing in skills to support labour supply and enabling private sector engagement to stimulate an increase in labour demand.

There is a need for incentives and motivations to attract newly qualified and skilled personnel, and to retain experienced personnel within the sector and reverse a professional drain to other sectors.

Low levels of access to and inadequate coverage of courses in tertiary education institutes make up significant bottlenecks to meeting human resource demands; professional vocational training institutes may help in meeting these demands.

Operation and maintenance of water and sanitation systems are chronically and universally under-resourced, in financial and human terms. Appropriate training, education and skills requirements to operate and maintain specific technologies need appropriate assessment to significantly benefit the sector.

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