United Nations World Water Development Report 2017

Launch Presentation

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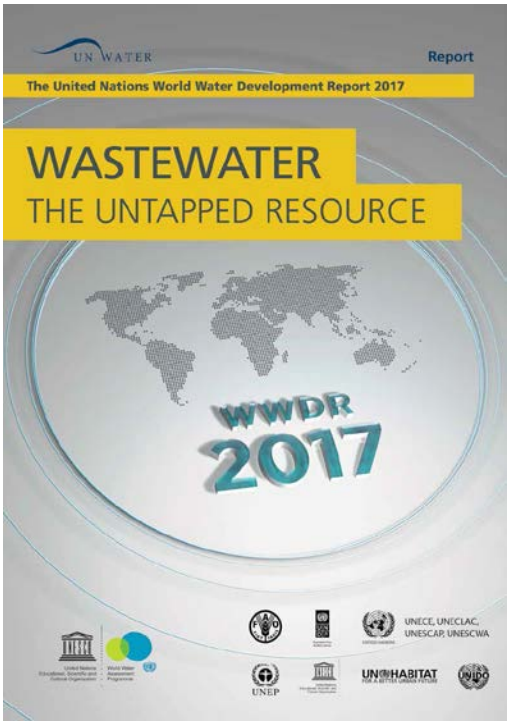

United Nations Educational, Scientific and Cultural Organization

World Water Assessment Programme

Slide 1 – Cover page with main message

As the flagship publication of UN-Water, the United Nations World Water Development Report (or 'WWDR') is designed, prepared and coordinated on an annual basis by the World Water Assessment Programme of UNESCO and financially supported by the Government of Italy. The WWDR benefits from the guidance, support and substantive inputs from the 31 UN Agencies and 38 partner organizations that comprise UN-Water. As such, WWDR is a concrete example of the UN system 'delivering as one' in the field of water.

The 2017 edition of the WWDR, titled *WASTEWATER: THE UNTAPPED RESOURCE*, demonstrates how improved wastewater management generates social, environmental and economic benefits. It also describes how improved wastewater management is essential in transitioning towards a circular economy and to achieving the 2030 Agenda for Sustainable Development.

Slide 2 – Title: **PART ONE – The state of the world's water resources**

We begin with a brief overview of how much water we use, how much is available, how we are affecting its quality, and some observations about how much wastewater we produce.

Slide 3 – Title: **RISING DEMAND for WATER**

Freshwater withdrawals have been annually increasing by about 1% over the past three decades. Agriculture accounts for roughly 70% of total freshwater withdrawals worldwide and for over 90% in Least Developed Countries. Energy production and large industry account for about 15% and 5%, respectively. The remaining 10% is used for domestic purposes, including drinking water, sanitation and hygiene.

The quantity of water that people actually drink – about 2 litres per day – represents only a minute fraction (much less than 1%) of the total amount of water that we actually use.

Slide 4 – Title: **ACCELERATING URBANIZATION**

Water demand is predicted to increase significantly over the coming decades (*see BOX 1 for additional information*). In addition to demand from the agricultural sector, large increases are predicted for industry and for energy production.

Accelerated urbanization and the expansion of municipal water supply and sanitation systems also contribute to increasing demand. The global population is expected to reach 9.1 billion by 2050, of which 6.3 billion will be living in urban areas. Developing countries account for 93% of urbanization worldwide. The additional 2.3 billion people living in cities can be expected to increase the demand for domestic water use by some 30%.

BOX 1: Complimentary background information: Future global water demand estimates*

The OECD's 2012 Global Environmental Outlook projected a 55% increase in global water demand by 2050, due mainly to growing demands from manufacturing (400%), thermal electricity generation (140%) and domestic use (130%).

FAO estimates a 5.5% increase in irrigation water withdrawals between 2008 and 2050.

UN-Habitat predicts that, by 2030, the global demand for energy and water is expected to grow by 40% and 50%, respectively.

IEA projected a 20% increase in freshwater withdrawals for energy production by 2035.

* *Most of these estimates were presented in previous editions of the WWDR. There is no comprehensive assessment of projected increases in water demand. The point is, despite some uncertainty, it is clear that water demand will indeed increase across all major water use sectors, especially in developing countries and emerging economies.*

Slide 5 – Title: **INCREASING WATER SCARCITY**

Two thirds of the world's population currently live in areas that experience water scarcity for at least one month a year and about 500 million people live in areas where water consumption exceeds locally renewable water resources by a factor of two.

Slide 6 – Title: **INCREASING WATER SCARCITY**

Climate change scenarios project an exacerbation of the spatial and temporal variations of water cycle dynamics, and discrepancies between water supply and demand are becoming increasingly aggravated. The frequency and severity of floods and droughts is likely to increase in many river basins worldwide. Droughts can have very significant socio-economic and environmental consequences. The crisis in Syria was, among other factors, triggered by a historic drought (2007–2010).

In 2016, the World Economic Forum identified the water crisis as the global risk of highest concern for people and economies over the next ten years.

Slide 7 – Title: **DEGREDATION of WATER QUALITY**

The availability of water resources is intrinsically linked to water quality, as the pollution of water sources may prohibit different type of uses. Increasing discharges of untreated sewage, combined with agricultural runoff and inadequately treated wastewater from industry, have resulted in the degradation of water quality around the world.

Slide 8 – Title: **MORE WASTEWATER than EVER**

Human activities that use water produce wastewater. As the overall demand for water grows, the quantity of wastewater produced and its overall pollution load are increasing worldwide.

In all but the most highly developed economies, the vast majority of wastewater is neither collected nor treated, but released directly to the environment with highly detrimental impacts on human health, economic productivity and ecosystems.

Slide 9 – Title: **MORE WASTEWATER than EVER**

Of the nearly 4,000 km^3 of freshwater withdrawn for human activities each year, 56% is released as municipal and industrial wastewater and agricultural drainage water.

On average, high-income countries treat about 70% of the municipal and industrial wastewater they generate. That ratio drops to 38% and 28% in upper- and lower-

middle-income countries. In low-income countries, only 8% undergoes treatment of any kind.

Slide 10 – Title: **MORE WASTEWATER than EVER**

These estimates support the often-cited approximation that, globally, over 80% of all wastewater is discharged without treatment.

Wastewater generation is one of the biggest challenges associated with the growth of informal settlements (slums) in the developing world. There were more slum dwellers in 2012 than in 2000, a trend that will likely continue in the future.

Slide 11 – Title: **PART 2 – HUMAN HEALTH, SANITATION and the SUSTAINABLE DEVELOPMENT AGENDA**

Let's now briefly talk about the links between wastewater, human health, sanitation and the 2030 Agenda for sustainable development.

Slide 12 – Title: **HUMAN HEALTH and IMPROVED SANITATION**

While 2.1 billion people gained access to improved sanitation facilities since 1990, 2.4 billion still do not have access to improved sanitation and nearly 1 billion people worldwide still practice open defecation.

Access to improved sources of water and to sanitation is remarkably lower among poorer communities in low-income countries.

In 2012, an estimated 842,000 deaths in middle- and low-income countries were caused by contaminated drinking water and inappropriate or inadequate sanitation services. Children under 5 accounted for 42% of theses deaths.

Access to improved sanitation facilities can contribute significantly to the reduction of health risks, and further health gains may be realized through the provision of safely managed sanitation services and safely treated wastewater.

Slide 13 – Title: **The 2030 AGENDA for SUSTAINABLE DEVELOPMENT**

Building on the experience of the MDGs, the *2030 Agenda for Sustainable Development* has a more comprehensive goal for water, going beyond the issues of water supply and sanitation.

Slide 14 – Title: **The 2030 AGENDA for SUSTAINABLE DEVELOPMENT**

The extremely low level of wastewater treatment in developing countries indicates an urgent need for technological upgrades and safe water reuse schemes. This in turn will require investing in appropriate and affordable wastewater treatment systems.

Efforts required to achieve Target 6.3 (*halving the proportion of untreated wastewater*) will place a higher financial burden on lower-income countries, because so little wastewater is treated in the first place, putting them at an economic disadvantage compared to higher-income countries.

According to the WHO, over 80% of countries have reported insufficient levels of financing to meet national targets for water, sanitation and hygiene, let alone the higher levels of service that are the focus of the SDGs.

Slide 15 – Title: **PART 3 – MEETING the CHALLENGE of IMPROVING WASTEWATER MANAGEMENT**

The challenges related to wastewater are indeed immense. But a number of solutions are already available.

Slide 16 – Title: **Not a BURDEN but a VALUABLE RESOUCE**

Wastewater remains an undervalued resource, all too often seen as a burden to be disposed of or a nuisance to be ignored.

This perception needs to change to correctly reflect its true value. Wastewater can be a potentially safe, affordable and sustainable source of water, energy, nutrients, organic matter and other useful by-products (e.g. metals). This is especially important in the context of a circular economy (*see BOX 2 for additional information*), whereby economic

development is balanced with environmental protection, and where a cleaner and more sustainable economy has a positive effect on water quality.

Actions to improve wastewater management fall under one of the 'four R's': ***reducing*** pollution at the source; ***removing*** contaminants from wastewater flows; ***reusing*** treated wastewater; and ***recovering*** useful by-products.

BOX 2: Complimentary background information: Wastewater in the circular economy

A *circular economy* balances economic development with environmental sustainability through the most efficient use resources. It seeks to minimize pollution, waste production and energy consumption, while maximizing the reuse and recycling of materials and improving the life-cycle of products. It involves applying cleaner production processes and integrated resource-based planning across industries, agriculture and urban areas. A circular economy also promotes sustainable social development by embracing principles of equity, justice and accountability.

Materials such as plastics and metals are recyclable but have a *cradle-to-grave* aspect – from their initial extraction/synthesis, through their (re)use and recycling, to their ultimate disposal. Water, on the other hand, is a naturally *renewable* resource. Although water too is *extracted* before use, and can be reused several times, it will inevitably find its way back to the *natural* water cycle (*cradle-to-cradle*) which is itself *circular* by definition.

Just as materials like tin, paper or plastic can be recycled through various chemical and physical processes (e.g. plastic can be melted and moulded into a new object), wastewater can be treated through chemical, physical and biological processes to be safely used over and over again (e.g. in the International Space Station).

Sustainable water management embraces all the features of a circular economy mentioned above – low consumption, minimizing waste and pollution, and high use efficiency. However, because of its very nature as *the universal solvent*, water is *contaminated* with *additional substances* every time it is used. For example, water used for agriculture may contain sediments, fertilizers and pesticides; water used for domestic purposes may contain human waste (rich in nutrients like phosphorus and nitrogen), microbial pathogens and a myriad household product from soaps to pharmaceuticals; water used by industry may contain a wide range of material from metals to persistent organic pollutants (POPs); and water used for power generation may contain excess heat.

In the context of a circular economy, it is the various *contaminants* of wastewater – or, more appropriately, its *useful and recoverable by-products* like nutrients, energy, metals, etc. – that make it unique compared to other substances.

Economically, the recovery of resources can provide additional revenue, thus helping to cover the overall costs of wastewater management and sanitation. Socially, lower costs improve the potential for expanding sanitation services, with significant implications for human health and wellbeing. And environmentally, improved levels of wastewater treatment enhance ambient water quality and water resource availability, which is of particular importance in areas facing recurring or chronic water scarcity.

In summary, the circular economy offers an additional and an affordable impetus for improved wastewater management through resource recovery.

Slide 17 – Title: ***REDUCING* or PREVENTING POLLUTION at the SOURCE**

First and foremost, approaches that focus on pollution prevention and the minimization of wastewater flows should be given priority over traditional 'after-use' treatment whenever possible. Remedial actions to clean up polluted sites are generally much more expensive than measures to prevent pollution from occurring in the first place.

Such actions include prohibiting or controlling the use of certain contaminants through regulatory, technical and/or other means. This approach also includes demand management and increased water use efficiency measures that reduce wastewater volumes.

Monitoring and reporting of pollutant discharges and ambient water quality are also necessary for achieving progress. If something is not measured, the problem cannot be defined and the effectiveness of policies cannot be assessed.

Slide 18 – Title: ***REMOVING* CONTAMINANTS from WASTEWATER: COLLECTION and TREATMENT**

Centralized waterborne waste disposal remains the prevalent method for sanitation and for evacuating municipal and industrial wastewater.

However, expensive large-scale centralized wastewater treatment systems may not be the most viable option for cities in many countries. Low-cost decentralized systems, serving individual or small groups of properties, have shown an increasing trend worldwide. Particularly well-suited to countries with warm climates, they can produce effluent of adequate quality for several potential uses, including agriculture, and allow for the recovery of nutrients and energy.

It has been estimated that the investment requirements for low-cost treatment systems, which, represent only 20–50% of that of conventional treatment plants, with even lower operation and maintenance costs.

Slide 19 – Title: ***REMOVING*** **CONTAMINANTS from WASTEWATER: COLLECTION and TREATMENT**

When tailored to meet specific local needs, such alternative, decentralized low-cost approaches to wastewater management can provide a safe, affordable and effective alternative to more costly centralized systems to meet the needs of unnerved populations. From an economic point of view, the widespread adoption low-cost systems appear essential to achieving SGD Target 6.3.

Healthy ecosystems can also complement engineered solutions to wastewater treatment in a cost-effective manner.

Slide 20 – Title: ***REUSING*** **WATER**

Treated wastewater is a safe and reliable source of water that can be used to enhance water availability and offset water scarcity.

Safe water reuse is more economically feasible and attractive when there is a potential for cost recovery by treating wastewater to a quality standard acceptable to a particular user.

Not all wastewater needs to be treated to the level of drinking water quality[1]. As more advanced levels of treatment imply greater costs, treating wastewater to the level most appropriate for its intended 'safe' use – known as 'fit-for-purpose' treatment – is essential in maintaining the system's affordability. Non-potable quality water can be safely used in agriculture, industries and municipalities for a variety of different purposes – irrigation, cleaning, cooling, etc.

When adequately treated and safely applied, domestic wastewater is a valuable source of both water and nutrients. Safe water reuse for irrigated agriculture enhances food security and provides opportunities for improved nutrition. The practice has been most

[1] The quantity water that people actually drink – about 2 liters per day – represents only a minute fraction (much less than 1%) of the total amount of water that we actually use.

successful in urban and peri-urban areas, where wastewater is easily available and where there is a nearby market for agricultural products.

The planned safe use of municipal wastewater for irrigation is a common pattern in countries of the Middle East and North Africa, and the Mediterranean, as well as in Australia, China, Mexico and the USA.

The benefits from investments in water reuse compare well with the cost of dams, desalination, inter-basin transfers, and other options for increasing water availability.

Slide 21 – Title: ***RECOVERING* USEFUL BY-PRODUCTS**

Wastewater can also be a cost-effective and sustainable source of energy, nutrients and other recoverable by-products, with direct benefits to food and energy security. As such, wastewater is poised to play a pivotal role in the transition towards a circular economy. However, wastewater's vast potential as a source of recoverable by-products remains largely underexploited.

Energy can be recovered from wastewater in the form of biofuel, biogas, heat, and electricity generation (e.g. turbines). Energy recovery has significant business potential for wastewater management in terms of reducing its energy use, its operational costs and its carbon footprint. With the optimization of energy use in wastewater treatment processes and the recovery of energy from wastewater and biosolids, there are opportunities for wastewater treatment facilities to transition from major energy consumers to energy neutrality, or even to net energy producers.

The development of technologies for recovering **nutrients like nitrogen, and especially phosphorus**, from sewage sludge is advancing. It is now both technically and financially feasible to transform these nutrients into fertilizer. Phosphorus recovery from wastewater is becoming an increasingly viable alternative to scarce and depleting mineral phosphorus reserves. Recycling human waste worldwide could satisfy an estimated 22% of the global demand for phosphorus.

Urine is a particularly rich source of phosphorus. It is likely that urine collection and use will become an increasingly important component of ecological wastewater management, as it contains 88% of the nitrogen and 66% of the phosphorus found in human waste.

The recovery of nutrients and energy can add significant revenue streams to help cover the investment and operational costs of wastewater treatment and sanitation.

Slide 22 – **PART 4: CREATING AN ENABLING ENVIRONMENT FOR CHANGE**

Improved wastewater treatment, and the increase in water reuse and the recovery of useful by-products in particular, support the transition to a circular economy by helping to reduce water withdrawals and the loss of resources in production systems and economic activities.

The barriers to the use of reclaimed water and recovered by-products are often economic and regulatory, rather than technical. Achieving progress will require a flexible and incremental approach, and this needs to begin now.

Slide 23 – Title: **1. SUITABLE LEGAL and REGULATORY FRAMEWORKS**

An effective regulatory framework requires that the implementing authority has the necessary technical and managerial capacity and performs in an independent fashion, with sufficient powers to enforce rules and guidelines. The capacity and political will to fairly enforce regulations and penalties is equally critical.

New regulations regarding water reuse and the recovery of wastewater by-products may be required. There is often little or no legislation on quality standards for these products, creating market uncertainties that can discourage investment. Markets for these products could be stimulated by financial or legal incentives (e.g. compulsory blending of recovered phosphates in artificial fertilizer).

At least 11 out of 22 Arab States have adopted legislation permitting the use of treated wastewater.

Slide 24 – Title: **2. COST RECOVERY and APPROPRIATE FINANCING MECHANISMS**

Wastewater management and sanitation are generally considered to be expensive and capital-intensive. This is especially the case of large centralized systems, which require a large degree of up-front capital expenditure and relatively high operation and maintenance costs over the medium and long term to avoid rapid deterioration. The

problem is further exacerbated by chronically lacking investment in developing appropriate institutional and human capacity.

Smaller, low-cost decentralized wastewater treatment systems can be used to offset some financial problems generated by centralized systems. When properly designed and implemented, such low-cost technologies can provide satisfactory results in terms of effluent quality for different non-potable uses. They also allow for the extraction of nutrients and energy.

The selling of reclaimed water and recovered by-products can provide additional revenue streams and improve the overall cost-efficiency of the treatment system.

Furthermore, the costs of improved wastewater management are usually outweighed by benefits in terms of human health, socioeconomic development and environmental sustainability.

In practice, the goal is to go beyond mere pollution abatement and wastewater treatment and to seek to gain value from the recovery of water and useful by-products, if for no other reason, as an additional means of paying for wastewater management and sanitation, and for enhancing the economic sustainability of the system.

Slide 25 – Title: **3. MINIMIZING RISKS to PEOPLE and the ENVIRONMENT**

The discharge of untreated wastewater can have severe impacts on human and environmental health, including outbreaks of food-, water- and vector-borne diseases, as well as pollution and the loss of biological diversity and ecosystem services. Exposure of vulnerable groups, especially women and children, to partially treated or untreated wastewater requires specific attention.

The use of low-cost labour is a common practice among farmers using untreated wastewater, and much of this work is carried out by women. As a result, they face higher health risks, including pathogen exposure, and potential transmission to family members.

In wastewater-irrigated agriculture, appropriate levels wastewater treatment, in combination with the application of water quality standards, should be sufficient to protect public health. However, in the majority of low-income countries, where most of

the wastewater produced undergoes little or no treatment, alternative approaches are necessary to prevent pathogens from entering food production chains.

Slide 26 – Title: **4. BUILDING CAPACITY and KNOWLEDGE**

There is a pervasive lack of data and information on wastewater particularly in developing countries. Data and information on wastewater generation, its contents, treatment and use is essential for developing national and local action plans aimed at environmental protection, wastewater treatment systems and the safe and productive use of wastewater.

Innovation and technological development in wastewater management systems are evolving rapidly. The most pressing needs in terms of research and development include increasing the affordability and effectiveness of these processes, the up-scaling of prototypes, and the dynamics and impacts of emerging pollutants.

It is essential to ensure that the appropriate levels of human capacity are in place. Capacity building, research and development aimed at improving wastewater management also generate employment opportunities and promote green growth.

Slide 27 – Title: **5. RAISING PUBLIC ACCEPTANCE and SOCIAL AWARENESS**

Even if wastewater use projects are technically well designed, appear financially realizable, and have incorporated appropriate safety measures, water reuse schemes can fail if planners do not adequately account for the dynamics of social acceptance. Awareness raising and education, tailored to consumers with different cultural and religious backgrounds, are the main tools to overcome social, cultural and consumer barriers.

The social dimension should not be underestimated. Safe water reuse, for example, requires active stakeholder participation, based on an understanding of benefits and actual risks.

Slide 28 – Title: **5. RAISING PUBLIC ACCEPTANCE and SOCIAL AWARENESS**

Public education campaigns can raise awareness among the general public about the ways in which water can and is being safely reused, even for drinking purposes, with provocative examples – like water reuse by astronauts on the International Space Station. This is water that has been recycled and reused everyday for 17 years: in the morning it might have been tea, by lunch time it was pee, the next morning it's used to brush teeth, and so on...

Slide 29 – Title: **TAKE HOME MESSAGES from the WWDR 2017**

1. The quantity of wastewater is increasing worldwide
2. The vast majority of the world's wastewater is released to the environment without treatment, with adverse effects water availability, on human health and the environment
3. 'Low-cost' wastewater treatment options offer an affordable alternative to large centralized systems
4. Treated wastewater is a reliable and sustainable source of water that can be used to offset growing water scarcity
5. Wastewater can be a cost-effective and sustainable source of energy, nutrients and other recoverable by-products, with direct benefits to food and energy security
6. As an essential component of a circular economy, wastewater use and by-product recovery can generate new business opportunities while helping finance improved sanitation services
7. The costs of improved wastewater management are usually outweighed by benefits in terms of human health, socioeconomic development and environmental sustainability
8. Improved wastewater management is essential for achieving the 2030 Agenda for Sustainable Development

Slide 33 – Title: **Thank you**

"In a world where demands for freshwater are ever growing, and where limited water resources are increasingly stressed by over-abstraction, pollution and climate change,

neglecting the opportunities arising from improved wastewater management is nothing less than unthinkable."

The World Water Development Report 2017 can be downloaded free of charge from the WWAP website at the link in the slide. The Report is available in English, French and Spanish.

The Executive Summary is available for download in the six UN languages (Arabic, Chinese English, French, Russian and Spanish) as well as in German, Italian, Hindi and Portuguese.

The Facts and Figures document is available in English, French, Italian, Portuguese and Spanish.

For any further information, the WWAP Secretariat remains available to reply to any query. The contact details are provided in this final slide.