United Nations World Water Development Report 2018

Launch Presentation

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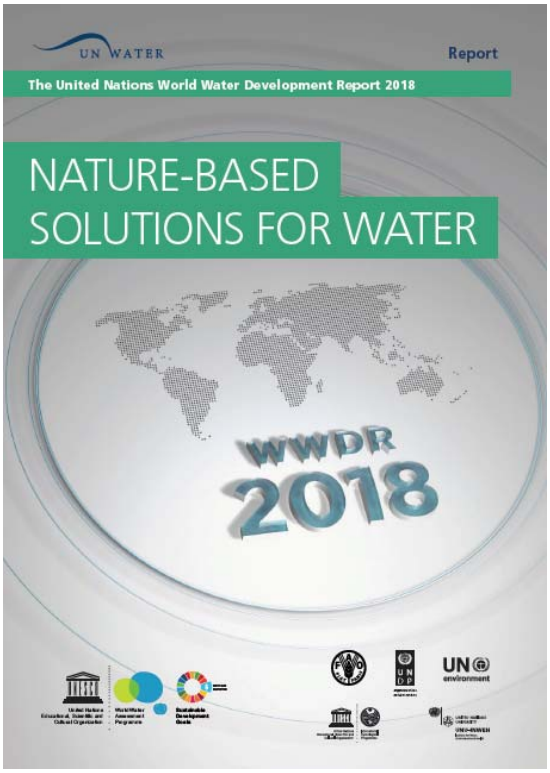

United Nations Educational, Scientific and Cultural Organization

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 annually 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 39 partner organizations that comprise UN-Water. Therefore, WWDR is a functional example of the UN system 'delivering as one' in the field of water.

Sustainable water security will not be achieved through business-as-usual approaches.

The 2018 edition of the United Nations World Water Development Report, titled *Nature-based solutions for water*, demonstrates how nature-based solutions (NBS) offer a vital means of moving beyond business-as-usual to address many of the world's water challenges while simultaneously delivering additional benefits vital to all aspects of sustainable development.

Slide 2 – *What do we mean by nature-based solutions (NBS) for water?*

NBS use or mimic natural processes to enhance water availability (e.g., soil moisture retention, groundwater recharge), improve water quality (e.g., natural and constructed wetlands, riparian buffer strips), and reduce risks associated with water-related disasters and climate change (e.g., floodplain restoration, green roofs).

NBS offer significant potential to address contemporary water management challenges across all sectors, particularly regarding sustainable agriculture and sustainable cities.

Currently, water management remains heavily dominated by traditional, human-built (i.e. 'grey') infrastructure and the enormous potential for NBS remains under-utilized. NBS include green infrastructure that can substitute, augment or work in parallel with grey infrastructure in a cost-effective manner. The goal is to find the most appropriate blend of green and grey investments to maximize benefits and system efficiency while minimizing costs and trade-offs.

Slide 3 – PART ONE – *The world's water: Rising demand, increasing scarcity, degrading quality and increasing risks*

We begin with a brief overview of the current state of the world's water resources, examining trends in rising demand, overall water availability, water quality and risks related to extreme events such as floods and droughts.

Slide 4 – Rising demand for water

The global demand for water has been increasing at a rate of about 1% per year over the past decades as a function of population growth, economic development and changing consumption patterns, among other factors, and it will continue to grow significantly over the foreseeable future. Industrial and domestic demand for water will increase much faster than agricultural demand, although agriculture will remain the largest user overall. The vast majority of the growth in demand for water will occur in countries with developing or emerging economies.

Slide 5 – Increasing water scarcity

The global water cycle is intensifying due to climate change, with wetter regions generally becoming wetter and drier regions becoming even drier in many parts of the world. Other global changes (e.g., urbanisation, de-forestation, intensification of agriculture) add to the challenges affecting water availability.

Many countries are already undergoing pervasive water scarcity conditions and will likely have to cope with lower surface water resources availability in the 2050s.

Slide 6 – Increasing water scarcity – Groundwater

Groundwater use is also increasing globally, and water withdrawals for irrigation have been identified as the primary driver of groundwater depletion worldwide. A large surge in groundwater abstractions has been predicted to occur by the 2050s, corresponding to a 39% increase over current levels.

Slide 7 – Water quality degradation

Water pollution has worsened worldwide since the 1990s, particularly in (the majority of) rivers in Latin America, Africa and Asia. The deterioration of water quality is expected to further escalate over the next decades.

Globally, the most prevalent sources of water quality challenges are nutrient loadings from agriculture and nutrient and pathogen loadings from untreated domestic wastewater. Hundreds of water-born chemicals, mainly from industry, are also impacting on water quality.

Slide 8 – Water-related risks

The trends in water availability and quality are accompanied by projected increases in flood and drought risks.

The number of people at risk from floods is projected to rise from 1.2 billion today to around 1.6 billion in 2050 (nearly 20% of the world's population).

Slide 9 – Water-related risks

Changes in future rainfall patterns will alter drought occurrence, and consequently, soil moisture availability for vegetation in many parts of the world.

The population currently affected by land degradation/desertification and drought is estimated at 1.8 billion people, making this the most significant category of 'natural disaster' based on mortality and socio-economic impact relative to GDP per capita.

Slide 10 – PART TWO – *Ecosystems and the water cycle*

Let's now examine some of the most critical linkages between ecosystems and the water cycle.

Slide 11 – The relationship between ecosystems and the water cycle

Ecological processes in a landscape influence the quality of water and the way it moves through a system, as well as soil formation, erosion, and sediment transport and deposition – all of which can exert major influences on hydrology. Although forests often receive the most attention when it comes to land cover and hydrology, grasslands and croplands also play important roles. Soils are critical in controlling the movement, storage and transformation of water.

Slide 12 – The relationship between ecosystems and the water cycle

Evaporation from the vegetation and soils for terrestrial ecosystems can be a very important source of precipitation for other areas. Therefore, land use decisions in one place may therefore significantly influence water availability in distant locations due the atmospheric circulation and moisture redistribution. Rather than being regarded as water 'consumers', ecosystems are perhaps more appropriately viewed as water 'recyclers'.

This influence on water availability can be substantial: for example, 70% of the rainfall for the Río de la Plata Basin in South America originates as evaporation from the Amazon forest.

Other examples include evaporation in the Congo River Basin, which is a source of rainfall for the Sahel region. Similarly, evaporation from across Central Africa play an important role in generating flows for the Nile via the Ethiopian Highlands.

Slide 13 – The world's ecosystems: Increasing degradation

Ecosystem degradation has major negative impacts on hydrology, from local to regional and global scales, and is therefore a leading cause of increasing water resources management challenges. NBS contribute to reversing trends in ecosystem degradation.

The majority of the world's soil resources, notably on farmland, are in only fair, poor or very poor condition and the current outlook is for this situation to worsen – with serious negative impacts on water cycling through higher evaporation rates, lower soil water storage and groundwater recharge, and increased surface runoff accompanied by increased erosion and flooding.

There is evidence that such ecosystem change has contributed to the demise of several ancient civilizations over the course of history. A pertinent question nowadays is whether we can avoid the same fate. The answer to that question will depend at least partly on our ability to shift from working against nature to working with it – through, for example, better adoption of NBS.

Slide 14 – Nature-based solutions for water: Working with nature

NBS include green infrastructure that can substitute, augment or work in parallel with human-built ('grey') infrastructure in a cost-effective manner, providing alternative options for coping with insufficient or ageing water infrastructure while improving system-wide resilience and performance.

In the 2018 edition of the WWDR, nature-based approaches are articulated as 'solutions' to flag their current, and potential, contribution to solving or overcoming the major contemporary water management problems or challenges – a key focus of the *World Water Development Report* series. However, they can also have utility where no critical local water problem or challenge exists, for example by delivering improved co-benefits of water resources management or simply as an aesthetic choice, even where gains in productivity are marginal.

NBS support a *circular economy* that promotes greater resource productivity aiming to reduce waste and avoid pollution, including through reuse and recycling, and is restorative and regenerative by design, in contrast to a linear economy which is a 'take, make, dispose' model of production. NBS also support the concepts of *green growth* or *green economy*, which promote sustainable natural resource use and harness natural processes to underpin economies.

Slide 15 – PART THREE – *NBS for meeting water management objectives*

NBS can help achieve three basic water management objectives: enhancing water availability, improving water quality, and reducing water-related risks.

Slide 16 – NBS for improving water AVAILABILITY

NBS mainly address water supply through managing precipitation, humidity and storage, including soil infiltration and groundwater recharge. These allow for improvements in the location, timing and quantity of water available for human needs.

The option of building more reservoirs is increasingly limited by silting, decrease of available runoff, social and environmental concerns and restrictions, and the fact that in many developed countries the most cost-effective and viable sites have already been used. In many cases, more ecosystem-friendly forms of water storage, such as natural wetlands, improvements in soil moisture and more efficient recharge of groundwater, could be more sustainable and cost-effective than traditional grey infrastructure such as dams in certain areas.

Slide 17 – NBS for improving water availability for agriculture

Agriculture, which accounts for about 70% of all water use worldwide, will need to meet projected increases in food demand – estimated at 50% by 2050, and water is central to this need. A cornerstone of recognized solutions is the 'sustainable ecological intensification' of food production, which enhances ecosystem services in agricultural landscapes, for example through improved soil and vegetation management.

Although NBS offer significant gains in irrigation, the main opportunities to increase productivity are in rain-fed systems that account for the bulk of current production and family farming, and hence provide the greatest livelihood and poverty reduction benefits.

The environmental co-benefits of NBS approaches to increasing sustainable agricultural production are substantial – food systems (meaning both food consumption patterns and methods of food production) account for 70% of the projected loss of biodiversity by 2050 under business-as-usual.

Slide 18 – NBS for improving water availability in urban settlements

NBS for addressing water availability in urban settlements are also of great importance, especially given that over half of the world's population is now living in cities – a percentage that is still increasing. Examples of measures to regulate water supply for urban settlements include reforestation, the restoration or construction of wetlands, new connections between

rivers and floodplains, water harvesting, permeable pavements and green spaces, which collectively promote bioretention and soil infiltration.

Urban green infrastructure, including green buildings, is an emerging phenomenon that is establishing new benchmarks and technical standards that embrace many NBS. Business and industry are also increasingly promoting NBS to improve water security for their operations, prompted by a compelling business case.

Urban food gardens also help increase the use of urban rainfall and reduce agricultural water demand in rural areas while also shortening food supply chains, translating into further water savings through avoided food waste.

Urban green infrastructure can also significantly improve urban climates through shading and the cooling effects of evaporation – thus enhancing the quality of life for citizens as a co-benefit.

China's 'sponge city' concept and programme [PHOTO] represents a good example of NBS improving urban water supplies at scale, based largely on deploying green infrastructure approaches in urban landscapes, primarily to improve water availability.

Slide 19 – NBS for improving water QUALITY

Forests, wetlands and grasslands, as well as soils and crops (when sustainably managed via conservation agriculture), play important roles in regulating water quality by reducing sediment loadings, capturing and retaining pollutants, and recycling nutrients. Where water becomes polluted, both constructed and natural ecosystems can help improve water quality.

Non-point (diffuse) source pollution from agriculture, notably nutrients, remains a critical problem worldwide, including in developed countries. It is also the one most amenable to NBS, as these can help improve nutrient recycling within soils, and thus lower fertilizer use and reduce nutrient run-off and/or infiltration to groundwater.

Urban green infrastructure is increasingly being used to manage and reduce pollution from urban runoff. Examples include green walls, roof gardens and vegetated infiltration or drainage basins to support wastewater treatment and reduce stormwater runoff. Wetlands are used within urban environments to mitigate the impact of polluted stormwater runoff and wastewater. Both natural and constructed wetlands also biodegrade or immobilize a range of

emerging pollutants, including certain pharmaceuticals, and often perform better than grey solutions. For certain chemicals, they may offer the only solution.

Slide 20 – NBS for improving water QUALITY – Limits

There are limits to what ecosystems can achieve and these need much better identification. For example, 'tipping points', beyond which negative ecosystem change becomes irreversible, are well theorized but rarely quantified.

NBS options for industrial wastewater treatment depend on the pollutant type and its loading. For many polluted water sources, grey infrastructure solutions will continue to be needed. However, industrial applications of NBS, particularly constructed wetlands for industrial wastewater treatment, are growing.

Slide 21 – NBS for reducing risks to water-related extreme events (floods and droughts)

Water-related risks and disasters, such as floods and droughts, associated with increasing variability of water resources due to climate change, result in immense and growing human and economic losses globally. Around 30% of the global population is estimated to reside in areas and regions routinely impacted by either flood or drought events.

NBS for flood management can involve water retention by managing infiltration and overland flow, thus making space for storing excess water through, for example, the restoration of floodplains.

Droughts are not limited to dry areas, as is sometimes portrayed, but can also pose a disaster risk in regions that are normally not water-scarce. The mix of potential NBS for drought mitigation are essentially the same as those for water availability and aim to improve water storage capacity in landscapes, including soils and groundwater, to cushion against periods of extreme scarcity.

Slide 22 – PART FOUR – The untapped potential for NBS

Having establish all the impressive things that can be accomplished using NBS, one has to wonder how come they are not being implemented on a broader scale?

Slide 23 – Current trends in investing in NBS

Water management is heavily dominated by traditional, human-built (i.e. 'grey') infrastructure and the enormous potential for NBS remains under-utilized. Evidence suggests that NBS account for less than 5% of the total expenditure in water resources management – which includes green and grey infrastructure as well as costs related to human resources, regulation, administration, and other non-infrastructure related expenditures.

In the countries of the Latin American and Caribbean region, water utilities are investing less than 5% of their budgets in green infrastructure (with the possible exception of some cities in Peru), although these allocations appear to be on the rise.

Slide 24 – The 'Green' vs. 'Grey' debate

The 'green versus grey' infrastructure debate may appear to suggest that it is necessary to choose one or the other, whereas in reality the choice is usually which blend of each is most appropriate. There are examples where nature-based approaches offer the main or only viable solution (for example, landscape restoration to combat land degradation and desertification) and examples where only a grey solution will work (for example supplying water to a household through pipes and taps). But in most cases green and grey infrastructure can and should be working together.

The goal is to find the most appropriate blend of green and grey infrastructure to maximize benefits and system efficiency while minimizing costs and trade-offs.

Slide 25 – Co-Benefits of NBS

A key feature of NBS is that they usually offer multiple water-related benefits and often help address water quantity, quality and risks simultaneously – even if only one is being targeted by the intervention. Another key advantage of NBS is the way in which they contribute to building overall system resilience.

In addition, NBS often offer co-benefits beyond water-related ecosystem services. For example, constructed wetlands used for wastewater treatment can provide biomass for energy production. Ecosystem creation or restoration can create or improve fisheries, timber and non-

timber forest resources, biodiversity, landscape values and cultural and recreational services. These can in turn lead to added-on socio-economic benefits that include improved livelihoods and poverty reduction, as well as new opportunities for employment and the creation of decent jobs.

The substantial value of these co-benefits can tip investment decisions in favour of NBS.

Slide 26 – Supporting the 2030 Agenda for Sustainable Development

NBS offer high potential to contribute to the achievement of most of the targets of SDG 6 (the *Water* SDG) of the 2030 Agenda for Sustainable Development. Furthermore, NBS have high potential to contribute to the achievement other SDGs and targets of the 2030 Agenda.

Some areas where the co-benefits from NBS for water deliver particularly high rewards in terms of achieving the SDGs are:

NOTE TO PRESENTER: This is alternative text, which can be used instead of using slides 26-33, which could therefore be skipped. If this is the case, please proceed directly to slide 34.

Other aspects of promoting sustainable agriculture (SDG 2, notably target 2.4); healthy lives (SDG 3); sustainable energy (SDG 7); promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (SDG 8); building resilient (water-related) infrastructure (SDG 9); other aspects of making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11); ensuring sustainable consumption and production patterns (SDG 12); taking urgent action to combat climate change and its impacts (SDG 13); and in particular through promoting improved overall environmental outcomes and halting and reversing land degradation and biodiversity loss (SDGs 14 and 15). NBS also offer significant opportunities to strengthen the means of implementation and revitalizing the global partnership for sustainable development (SDG 17).

Slide 27 – SDG 2 – Promoting sustainable agriculture

The non-water-related co-benefits of NBS for water supply in agriculture (e.g. through conservation agriculture and landscape restoration) are significant and include pest and disease regulation, nutrient cycling, soil regulation, pollination etc. All improve overall system resilience, sustainability and productivity.

Slide 28 – SDG 3 – Healthy lives

Healthy ecosystems, promoted through NBS, help regulate water-borne human diseases and parasites.

Slide 29 – SDG 7 – Sustainable energy

NBS for improving water quality reduce energy requirements for subsequent water treatment. Natural and constructed wetlands are also among the world's most productive ecosystems, capable of producing relatively large quantities of biomass. This biomass can be harvested at regular intervals to be used as biofuel.

Slide 30 – SDG 8 – inclusive and sustainable economic growth, full and productive employment and decent work for all

NBS applied at scale reinstate positive feedbacks between economic growth and environment. Ecosystem creation or restoration can lead to added socio-economic benefits that include improved livelihoods and poverty reduction as well as new opportunities for employment and the creation of decent jobs.

Slide 31 – SDG 9 – Building resilient infrastructure

NBS promote green infrastructure, which increases resource use efficiency and clean and environmentally sound technologies. An approach particularly suited to countries with low capacity and limited financial resources.

Slide 32 – SDG 11 – Making cities and human settlements inclusive, safe, resilient and sustainable

Deploying green infrastructure in urban catchments can link urban and peri-urban (and catchment-scale) planning for safe, resilient and sustainable settlements. This is particularly appropriate for developing countries.

Slide 33 – SDG12 – Ensure sustainable consumption and production patterns

NBS are a key means to implement the 10-Year Framework. They are particularly effective in promoting sustainable consumption of resources (e.g. of chemicals, fertilizers and land) in farming.

Slide 34 – SDG13 – Addressing climate change

In addition to significant contributions to strengthening resilience to water-related hazards NBS help improve overall system resilience and adaptive capacity. NBS also help mitigate climate change through improved sequestration of carbon through, for example, reforestation and the rehabilitation of soil organic carbon. They also help integrate climate change policies, strategies and planning across sectors.

Slide 35 – SDG 14 & 15

One of the most important co-benefits of NBS is the way in which they support Goals 14 and 15 by promoting the conservation, restoration and sustainable use of ecosystems

Slide 36 – PART FIVE – Making it happen: Accelerating the uptake of NBS

The required responses essentially involve creating conditions for NBS to be considered equitably alongside other options for water resources management.

Slide 37 – Leveraging financing

NBS do not necessarily require additional financial resources but usually involve redirecting and making more effective use of existing financing. Investments in green infrastructure are being mobilized thanks to the increasing recognition of the potential of ecosystem services to provide system-wide solutions that make investments more sustainable and cost-effective over time.

Assessments of the returns on investments in NBS often do not factor in the many positive externalities, just as those for grey infrastructure often do not take all negative environmental and social externalities into account. Therefore, more comprehensive economic assessment models need to be developed to support sound decision making.

Slide 38 – Leveraging financing – Payment for Environmental services

Payment for environmental services schemes provide monetary and non-monetary incentives to upstream communities, farmers and private land owners to protect, restore and conserve natural ecosystems and adopt sustainable agricultural and other land use practices. These actions generate benefits to downstream water users in the form of water regulation, flood control, and erosion and sediment control, among others, thus ensuring a constant, high-quality water supply, and helping reduce water treatment and equipment maintenance costs.

For example, three protected watersheds provide New York City with the largest unfiltered water supply in the USA. Investments in watershed protection have ended up saving the city more than US$300 million per year on water treatment operation and maintenance costs alone. The programme also serves as an alternative to building a water treatment plant, which would have cost between an estimated US$8 and 10 billion.

The Latin American and Caribbean (LAC) region has a wealth of experience in implementing watershed PES schemes – also known as ‘investment in watershed services schemes’. Successful examples of PES schemes have also been documented in other regions of the world, including the Asia-Pacific and Africa. In the Mekong River Basin alone, PES schemes with watershed protection components have been documented in Cambodia, Laos, Thailand and Vietnam, although Vietnam is the only country in South-East Asia to have a formal national PES plan.

Green bonds, which provide an additional opportunity to mobilize capital for green, or environmentally sustainable, investments, have emerged as key financing instruments for the application of nature-based solutions NBS

Slide 39 – *Enabling the regulatory and legal environment*

The vast majority of current regulatory and legal environments for water management were developed largely with grey-infrastructure approaches in mind. However, much can be achieved by promoting NBS more effectively through existing frameworks by identifying where and how NBS can support existing planning approaches at different levels. National legislation to facilitate the implementation of NBS at the local level is particularly crucial – as illustrated by the example of Peru's recent legislation.

Slide 40 – *Improving cross-sectoral collaboration and public participation*

NBS can require much greater levels of cross-sectoral and institutional collaboration than grey-infrastructure approaches, particularly when applied at landscape or transboundary scale. However, this can also open opportunities to bring groups of stakeholders together under a common approach or agenda.

In many countries, the policy landscape remains highly fragmented. Better harmonization of policies across economic, environment and social agendas is a general requirement in its own right. NBS are not only a beneficiary of such harmonization but also a means to achieve it, because of their ability to deliver multiple, and often significant, co-benefits beyond just hydrological outcomes. Clear mandates from the highest policy level can significantly accelerate NBS uptake and foster improved inter-sectoral cooperation.

Slide 41 – *Improving the knowledge base*

Established evidence helps convince decision makers of the viability of NBS. For example, a frequently raised concern is that NBS take a long time to achieve their impact, implying that grey infrastructure is quicker. However, the evidence shows that this is not necessarily for all NBS the case and timescales to deliver benefits can compare favourably to those of grey infrastructure solutions.

A priority response is the development and implementation of common criteria against which both NBS and other options for water resources management can be assessed (e.g. green versus grey solutions). The full inclusion of all hydrological benefits and other co-benefits and the full range of the costs and benefits of ecosystem services (for any option) is essential. This

will require the development of common guidelines for conducting holistic cost-benefit analyses that include non-water-related co-benefits.

Slide 42 – *Closing statement*

Sustainable water security will not be achieved through business-as-usual. Increased deployment of NBS is central to meeting the key contemporary water resources management challenges of sustaining and improving water availability and its quality while reducing water-related risks. Without a more rapid uptake of NBS, water security will continue to decline, and probably rapidly so. NBS offer a vital means to move beyond business-as-usual.

Slide 43 – Thank you

The World Water Development Report 2018 can be downloaded free of charge from 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 for download in English, French, Italian, Portuguese and Spanish.

For any further information, the WWAP Secretariat remains available to reply to any query. Contact details are also provided in the slide.