

Nature-based solutions work everywhere, including Africa

By

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The [2018 World Water Development Report \(WWDR2018\)](#) is a UN-Water Report that is coordinated and produced by the UN World Water Assessment Programme of UNESCO. It combines information and knowledge coming from various Members and Partners of UN-Water and represents the view of UN-Water collectively. The UN World Water Assessment Programme welcomes debate stimulated by the March 19 release of the WWDR2018 on "Nature-based solutions" (NBS).

This article has been written in response to an [Op-Ed](#) by Prof. Mike Muller, which was published several days before the WWDR2018 was launched, originally entitled "Why UNESCO's natural solutions to water Won't Work in Africa".

Some interesting and valid points have been raised the article. However, in the spirit of fostering more constructive debate, some of its claims, facts and misconceptions need to be addressed.

Most notably, WWDR2018 stresses that the debate between "green" and "grey" infrastructure is a [false dichotomy](#). There are some water resources management challenges that can only be addressed at any scale through NBS. In the case of Africa, for example, desertification can only feasibly be addressed through improving land (including water) productivity through improved soil and vegetation management (a nature-based approach). Likewise, similar approaches are widely agreed to be the key response to improve water availability for agriculture by improving the performance of rain-fed farming through [restoring the ecological foundation of farming](#).

These two examples alone refute the claim that "nature-based solutions won't work in Africa". As WWDR2018 points out, they already are working there, and address key water-related challenges. It is actually more difficult to give examples of where "only grey" works because ecosystems are the origin of most freshwater so all grey infrastructure already depends on "green". There are also cases where only grey solutions can deal with highly contaminated water or physical barriers

installed for flood protection. It may be the case that a traditional large dam (grey infrastructure) is the best option to store and deliver water for a specific purpose, but it is the rainfall and condition of the catchment/ecosystem above the dam that delivers the water to make the dam feasible in the first place. In fact, many of the examples of NBS cited in WWDR2018 are where they significantly improve the efficiency and life time of grey infrastructure (e.g. reduced erosion and sedimentation). But WWDR2018 notes that in most cases approaches should, or already do, involve a combination of green and grey working in harmony. Local solutions require the best blend of grey and green to optimise the benefits and minimize the trade-offs. WWDR2018 argues for a shift from fragmented and narrow assessments to systems thinking - a point consistently made throughout the [World Water Development Report](#) Series.

Nature-based solutions do not necessarily require more land

WWDR2018 notes that ecosystem services are not delivered only from "the natural environment" and pays much attention to using ecosystem services in artificial or managed landscapes including farming landscapes, urban systems and through constructed wetlands. It can be true that "[NBS] often require lots of land and compete with farming and housing for space". But the examples cited in the Op-Ed are selective. In many cases, NBS involve making intelligent use of existing space. The aforementioned example of ecological approaches to improve farming actually reduce competition for farm land because they make existing land more productive. Where applicable, retrofitting green infrastructure into existing urban settings makes more intelligent use of existing city landscapes.

Making an existing pavement or road permeable, or converting a roof to green, does not require more space. And there are many urban water planners that would take issue with a simplistic objective, cited in the article, of diverting water across city landscapes as quickly as possible in order to "replenish" rivers - because in most cases that translates into increased flood risk, not to mention increased urban pollution run-off and reduced groundwater availability. WWDR2018 points out that the effective deployment of NBS, as indeed for grey, depends on the water management outcome desired. Citing mis-application of NBS in some circumstances does not negate their effectiveness in all.

Nature-based solutions contribute to climate change mitigation

Yes - "nature based solutions may actually be harmful" and "can reduce the amount of water available for human use" and "they may even fail during extreme droughts or floods". WWDR2018 agrees and stresses the need to avoid over-generalised assumptions regarding NBS applications and argues for impartial science based deployment and more rigorous evaluation of NBS to promote their benefits and weed-out inappropriate applications. But many grey infrastructure solutions also have a track record of being harmful, reducing water availability and

failing during extremes - and usually more spectacularly. Unless an approach delivers the required outcome it is not a solution, whether nature-based or not.

However, the argument that NBS can contribute to climate change appears to be unfounded. The only example provided by Prof. Muller's article is that "Wetlands ...accelerate global warming...are the largest single emitters of methane, a potent greenhouse gas...more methane is generated by wetlands than from all human sources". In fact, although wetlands are indeed the main source of *natural* methane emissions, about two-thirds of total emissions actually arise from anthropogenic sources - mainly from fossil fuel burning and livestockⁱ. Natural methane emissions are balanced by natural processes, and, therefore, do not contribute to anthropogenic climate change. If this were not the case the atmosphere, by now, would be mainly methane and we would not be having this discussion. It is true that some, but not all, artificial wetlands emit excessive methane - most notably rice paddies - and this qualifies as anthropogenic emissions. But WWDR2018 points out that NBS to improve productivity in existing rice paddies, in addition to significant water savings of up to 50%, have the co-benefit of [reducing methane emissions](#) by converting the soil ecosystem from anaerobic to aerobic. In addition, WWDR2018 notes the considerable co-benefit of increased carbon storage associated with some NBS, such as reforestation or improving soil health, and therefore their positive contribution to climate change mitigation.

Land-use change affects water resources

The article claims that wetlands can "lose" large quantities of water through evaporation, citing a 94% loss from the Okavango Delta. Odd, since WWDR2018 does not claim the Okavango Delta is a NBS. Nevertheless, no mention is made of evaporative losses from reservoirs, particularly in hot dryland areas, whereas WWDR2018 simply promotes the logical concept of storing water in the safest and most efficient place, including underground and in soils or wetlands, where appropriate. The Okavango example does however raise the important question of water "lost" to whom and for what? The evaporation of water from the Okavango comes down again as rainfall somewhere else and, before simplistic hydrological assumptions are made to trigger draining it, it would be useful to know where that was and if the people living there would miss it when it has gone.

WWDR2018 draws more detailed attention to how land-use change affects water resources and the need to manage "[precipitation sheds](#)"; although acknowledging this is a challenging area, ignoring it does not help. Space does not permit a debate on whether the Okavango should be drained. Case histories such as the [Aral Sea](#), among others, are relevant. But this discussion, whenever held, should go well beyond the narrow interests of the water sector upstream. The ecosystem

delivers enormously valuable and multiple ecosystem services that need to be factored into this discussion - not to mention the fact it is a World Heritage Site.

Beyond North America and Europe

The claim that "The real problem is that the nature based approaches originated in the context of Europe and North America" is unfounded. It did not evolve there, the approach is in fact not new and can be traced back for centuries if not millennia, and neither is there evidence that uptake there is higher. WWDR2018 provides examples of accelerating uptake of the approach in South America, Asia, the Middle-East and, notably, throughout many areas of Africa. There is indeed more extensive built/grey infrastructure in N. America and Europe but that is not why they can now afford to pay more attention to NBS. They now have to retrofit it, often at considerable expense, in recognition of the failings of over engineered solutions and the benefits of a more nuanced approach, and in many cases just a straight forward better outcome through using ecosystem services. Most NBS are driven by the desire to meet direct water-related human needs and not to "improve the environment" as such. But the environmental and social co-benefits of NBS can indeed be substantial, as discussed in the Report, and can tip decisions in favour of their adoption, and what is wrong with that? Hence, WWDR2018 argues that water resources management interventions and investments should be accompanied by comprehensive economic analysis of all costs and benefits and not limited by narrow pre-selected criteria.

No doubt, Africa indeed has a significant "infrastructure deficit" but that gives it the option of incorporating NBS earlier, to achieve overall system improvements, and in many cases save investment and maintenance costs. Does Africa wish to copy N. America and Europe or learn from it and leapfrog? And in this debate, what WWDR2018 promotes is that ecosystems should be considered as water infrastructure alongside built/grey infrastructure and options assessed impartially. The evidence shows this is worth doing.

More than a fringe water resources management activity

The claim that "nature-based approaches will do little to meet the African continent's needs" flies in the face of the reality that they already are contributing substantially. WWDR2018 was written not to promote a fringe water resources management activity, but to acknowledge the great work already undertaken in the field, recognise the accelerating interest in it and, most of all, to highlight what NBS can offer in terms of meeting water resources management as well as broader sustainable development challenges. The evidence compiled in WWDR2018 shows that they indeed are not a panacea or "green bullet" but their potential is seriously underestimated. A key conclusion of WWDR2018 is that the biggest constraint to achieving the potential of NBS is the inherent personal and institutional bias towards built/grey infrastructure approaches and by default a

bias against NBS. The article by Prof. Muller has indeed shown that this conclusion of WWDR2018 is highly pertinent.

ⁱ Dlugokencky, E.J., Nisbet, E.G., Fisher, R. and Lowry, D., 2011. Global atmospheric methane: budget, changes and dangers. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 369(1943), pp.2058-2072.