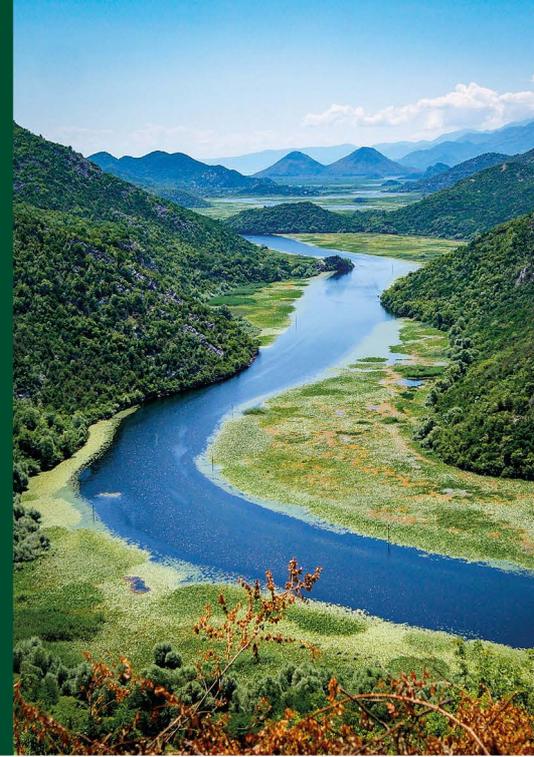


Forest–Water Connections to Achieve the SDGs: A Call to Action

The session ‘Forest-Water Connections to Achieve the SDGs’ under sub-theme six of the World Forestry Congress 2022 illustrates the many and complex forest-water interlinkages that exist. Understanding their synergies and tradeoffs is central to achieving all the Sustainable Development Goals (SDGs).



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It is now well known that forests and trees are crucial for a healthy global water cycle and freshwater ecosystems (including quantity, quality and biodiversity aspects), and that the forest-water nexus goes beyond the role of forests and trees in the hydrological cycle. In fact, the forest-water nexus should be considered within the forest–water–climate–people system (Creed and van Noordwijk, 2018). For example, it is becoming increasingly apparent how climate change will impact different elements of the hydrological cycle, including water quality, which will in turn impact forests, trees, and people. Through the perspective of the forest – water – climate – people system, it is clear that the forest-water nexus is of highest relevance to all the SDGs (Fig. 1).

Research and discussion on the forest-water nexus has increased in recent years, due to the major publications coming from IUFRO, FAO, USDA and SIWI among others, and from the major events organised by the Forest Water Champions, an informal network of partners, which include CIFOR/ICRAF, SIWI Swedish Water House and UNEP – the organisers of this WFC XV session. With this increased attention there has been a shift towards including the human and climate dimensions of the forest-water nexus, in addition to the biophysical aspects. This has led to a more holistic understanding of the role that forests and trees play in addressing some of the world’s major challenges, such as food and water security or climate change, and in achieving the SDGs (Springgay et al., 2019). For instance, sustainable forest management with water-quality objectives is compatible with the provision of other goods and services from forests. This may include trade-offs but also synergies that need to be taken into account in management and policy decisions (FAO, IUFRO and USDA, 2021). Similar topics have also been addressed from a water perspective. Sustainable forest management with water as a main management objective can clearly contribute to achieving the SDGs and to addressing some of the critical issues of our time such as climate change, food and water insecurity.

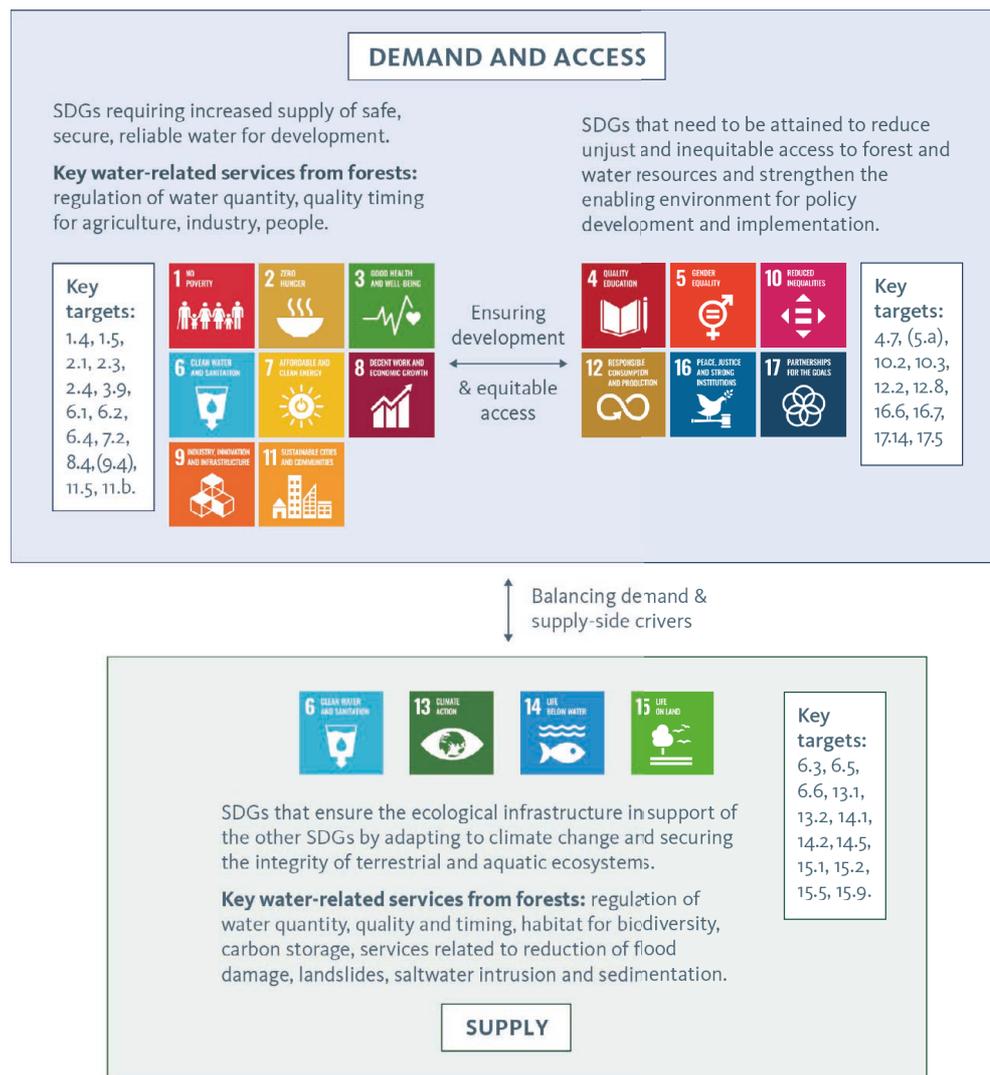


Figure 1. Relevance of the forest-water nexus for the SDGs with key targets and services. SDG 6 appears twice as it includes targets related to water supply (i.e. WASH targets) as well as targets related to ensuring the integrity of aquatic ecosystems (i.e. IWRM, water quality and ecosystem protection and restoration targets). Adapted from Creed and van Noordwijk, 2018.

Through this WFC session, the organisers wish to highlight advances in research, best practice and ultimately stress that the forest and water nexus must be increasingly taken into account if we are to achieve the SDGs, and successfully adapt to and mitigate climate change. Furthermore, through key examples summarised here from different ecosystem types, locations within the landscape, and management scales - the case is made for the need to understand the contextual nature of forest-water interactions; how they translate into services for people and planet, and how they are impacted by climate change. This means that management guidance needs to be flexible, as what is true for one location in the landscape or a particular ecosystem, may not be true for another.

Mountains

The Hindu Kush Himalaya (HKH) is a 3,500 km long mountainous terrain of extremely fragile landscape and one of the most vulnerable to the adverse impacts of climate change. But this region is endowed with trees-forest-water in the form of natural capital. This natural capital not only addresses ecosystem-based adaptation but also contributes to significant biological mitigation action. Drying of springs is an emerging issue in the region as a result of which communities are facing unprecedented water stress. The drying up of spring sources has adversely affected rural water security. Despite the high dependency on freshwater from the springs, there is a lack of scientific knowledge on springs in the Himalayan region and the exact extent of this problem is not well known. The Water-Agriculture-Forest-Energy (WAFE) nexus presents a shared vision for the future of the HKH region in which its societies and people — children, women, and men — are prosperous, healthy, peaceful, and resilient in a healthy environment. To realise this vision, this HKH Call to Action elaborates six urgent actions and taking a WAFE approach may be one way to achieve this.

Plains

In the Central Rift Valley, Ethiopia, recent research by Wolde Mekuria at International Water Management Institute (IWMI), has shown that losses in ecosystem service values reach over 62 billion US dollars due to changes in land use and land cover over a 47-year period. To reverse the loss of ecosystem services and achieve the SDGs at the national level, the degradation of land and water resources needs to be addressed. The researchers found that the degradation of forest resources and water bodies needs particular attention as the increase in human and livestock populations has resulted in trade-offs of ecosystem services where food, water and raw materials have been prioritised over regulating services such as water flows and cultural services. Furthermore, the authors emphasised the importance of studying the flow of ecosystem services from upstream to downstream areas and looking at the basin as a whole to better understand the impacts of changes in land use and land cover on the provision of ecosystem services and human wellbeing. In other words, the forest-water nexus needs to be addressed at the watershed/ landscape level through management approaches that take into account socioeconomic and environmental aspects. This should also include policies that incentivize, for example, through payment for ecosystem services approaches so there is a balance between provisioning, regulating and cultural services.

Watershed scale

Understanding the different water-related ecosystem services at the watershed scale and how they change with land use, in the face of climate change, is imperative to develop restoration initiatives that can benefit people and the planet. The Smithsonian Tropical Research Institute in Panama is working on the Panama Canal watershed to better understand the ecosystem services provided by forests and the best restoration approaches to maintain and restore those services. As an example, they are studying how land use management affects water supplies by comparing water flows in forest areas and cattle pastures. They have confirmed that forest soils act as sponges, reducing floods during major storms and providing water during dry periods.

Urban areas

Forests and trees are increasingly being used as nature-based solutions for disaster risk reduction (DRR), as is the case of San Salvador where UNEP is working with the city and adjacent coffee farms through the CityAdapt project, to restore 1,150 Ha of forest and coffee plantations. San Salvador will be a 'sponge city' where forests and trees are used to increase the city's resilience in the face of more frequent extreme storms due to climate change. Forests and trees can play a significant role in reducing the impact of floods and landslides while preventing erosion and contributing to groundwater recharge. This makes them a cost-effective nature-based solution for DRR.

Coastal areas

In The Gambia, the population of 2.3 million is extremely vulnerable to climate change from sea level rise, storm surges and floods. To increase the resilience of rural villages to these hazards UNEP and the government of Gambia have partnered to implement the project 'Large-scale Ecosystem-based Adaptation in The Gambia: developing a climate resilient, natural resource-based economy.' Large-scale (over 15,000 Ha) restoration of degraded forests, savanna, mangroves and farmland is a major component of the project and part of the ecosystem-based adaptation approach, which also has a socioeconomic component aiming to establish natural resource-based businesses, increasing the participatory management of resources in the country. Overall, the restoration initiatives strengthen the water-related services from forests by reducing soil erosion and contributing to groundwater recharge. Furthermore, mangrove restoration can increase the ability of these coastal ecosystems to act as buffer zones for storm surges and floods.



Gambia's mangrove forests. Image from Shutterstock.

Peatlands

Peatlands are the world's most carbon-dense terrestrial ecosystems; peatland soils are estimated to store twice as much carbon as the entire world's biomass, even though they only cover three percent of the world's surface. Peatlands, in their naturally wet state, provide drinking and irrigation water to communities at the catchment level. They mitigate floods and droughts. On the other hand, degraded and drained peatlands are extremely prone to fires, land subsidence and erosion. All of which are

exacerbated by climate change. Drained, degrading and burning peatlands are releasing an estimated four to five percent of yearly, anthropogenic greenhouse gas emissions.

Indonesia is home to one of the largest areas of tropical peatlands. With an important part of its peatlands in a state of degradation, mainly due to conversion to plantations, Indonesia is an example of a country leading with its ambition for peatland restoration. The government, through the Ministry of Environment and Forestry, has committed to restore two million ha by 2030. One of the lessons learnt during the last five years of implementation is that closer integration of companies and communities in peatland restoration activities, and implementing them at the level of hydrological peatland units, can gain full-scale benefits for reduced greenhouse gas emissions, subsidence, and fires.



Extensive peatland in West Papua, Indonesia. Image from Shutterstock.

Flying rivers

As seen in the previous examples forest-water interactions happen, and they should be considered at different management scales considering where they happen in the landscape. These interactions get more complex at the continental level where evapotranspiration from a particular forested watershed can have significant impacts on the precipitation that falls in adjacent watersheds or even further away impacting, for example, rain-fed agriculture. These ‘flying rivers’ pose additional challenges for management and policy as a transboundary dimension needs to be added.

Research in this area is rapidly evolving. There is currently extensive evidence that tree cover shapes the magnitude and reliability of much of the rainfall across the planet.

Thus, forest losses can have catastrophic effects on the rainfall patterns of a continent. This knowledge also presents us with big opportunities. By protecting and expanding natural forests and other tree cover, the flying rivers may help transform dry, arid, degraded areas into humid and productive landscapes.

Call for action and Conclusions

The water-related services that forest and trees provide as part of the forest – water – climate – people system are complex and site-specific. We need to develop management approaches and policies that maximise benefits for people and the planet while taking into account any trade-offs. This is no easy undertaking and major knowledge gaps exist. However, increased research and lessons from the field as well as advancements in Earth observation, monitoring tools and citizen science approaches, are paving the way for increased action when it comes to improving management of our forest and water resources and including them in policy. Furthermore, initiatives and policy frameworks such as the UN Decade on Ecosystem Restoration, the Bonn Challenge, the post-2020 Biodiversity Framework, the Paris Agreements on Climate Change and the SDGs, provide platforms for advocating for the forest – water – climate – people system and ensuring the forest-water nexus is included in policies and management strategies.

To achieve this, the organisers call for action to:

- **Ensure ecosystem restoration approaches that consider forest-water-climate-people relationships** and the multiple water-related services that forests and trees provide to achieve the SDGs.
- **Integrate forest-water management in broader landscape approaches** that acknowledge the human and climate dimensions, their multifunctionality, trade-offs and plural values and objectives.
- **Strengthen and develop policies that take into account the forest-water nexus** and the water-related services that forests and trees provide to humans, especially in the context of climate change.
- **Foster collaboration and integration between sectors** for climate resilient economies and communities that acknowledge the forest-water– climate – people system
- **Increase and promote communications, conversations, research, lessons from actions on the ground, and monitoring approaches that include citizen science** to fill in knowledge gaps and to support better decisions in management and policy making.
- **Develop or adapt restoration targets and initiatives so they go beyond biophysical aspects** to include socioeconomic aspects to better contextualize forest-water relationships.
- **Promote spring shed management to implement programs on freshwater ecosystems** including cryosphere, watersheds and springsheds adopting river- basin management in transboundary scale.

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