

## **Mixed Forests and Biodiversity are Crucial for Freshwater**

We cannot think about freshwater and the global water cycle without thinking about mixed forests and biodiversity. These play an absolutely indispensable and pivotal role in water, climate and the evolution of life on Earth. They purify air and water that are the basis of life. They stabilise and moderate the Earth's climate, renew soil fertility, recycle nutrients and seed clouds.

Water and forests are constantly interacting to produce healthy and productive ecosystems. Acting as enormous sponges, forests provide natural filtration and storage systems that supply a high percentage of freshwater globally. Their roots and leaf biomass create conditions that promote the infiltration of rainwater into the soil and then into the groundwater and aquifer systems. They play a crucial role in the renewal and recharge functions of the hydrological cycle by affecting rates of transpiration and evaporation and influencing how water is routed and stored in watersheds.

Deforestation is posing a major threat to water catchments and the quantity and quality of available fresh water globally. According to the FAO the loss of forest cover can adversely affect freshwater supplies, threatening the survival of millions of people. This was affirmed at Rio+20 the UN Sustainable Development Conference.

***“We recognize the severity of the global loss of biodiversity and the degradation of ecosystems and emphasize that these undermine global development, affecting food security and nutrition, the provision of and access to water and the health of the rural poor and of people worldwide, including present and future generations.”*** (The Future We Want RES/A/66/288 para.197)

Mixed indigenous forests and biodiversity provide irreplaceable natural services. They are an absolutely vital part of the global water cycle. This is because of the various ways in which they contribute to and regulate the quantity and quality of freshwater. They are presently under extreme threat from deforestation and humanity cannot afford to lose them.

***“We reaffirm the intrinsic value of biological diversity, as well as the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its critical role in maintaining ecosystems that provide essential services, which are critical foundations for sustainable development and human well-being.”*** (UN, 2012, ‘The Future We Want’, RES/A/66/288 para.197)

Water is unique amongst Earth's natural resources because whilst it is renewable, it is not replaceable and virtually all terrestrial life is dependent upon it. There are various substitutes for presently used energy sources but there is no substitute whatsoever for fresh water. However the renewability of fresh water is dependent upon a healthily functioning water cycle. This is utterly reliant upon biological diversity to function effectively and provide adequate quantities of fresh water.

***“The ecological linkages between water, wetlands and forests represent the intricate interdependence of our ecosystems and our resources. Forests play a pivotal role in the hydrological cycle by affecting rates of transpiration and evaporation, and influencing how water is routed and stored in a watershed.”*** (UNEP, CBD, 2010, ‘Water, Wetlands and Forests’)

Most people in the world are dependent upon groundwater. However ground water availability is related to the recharge aspect of the hydrological cycle and high areas, such as forested mountains and hills are typically where aquifers are recharged. They are naturally recharged by rain and snowmelt and the roots of these forests help to channel the snowmelt into the underground water systems, which feed into aquifers. Recharge is critical to maintaining the abundance, quantity, purity and quality of groundwater. It provides a constant supply of freshwater to wells, springs, and wetlands. Therefore the necessity of forests, particularly mixed indigenous mountain forests, for freshwater and the entire global water cycle becomes starkly evident. This indicates that protecting, conserving and restoring them is absolutely essential for water, food, development and the well being of all worldwide.

***“The availability and especially the quality of water are strongly influenced by forests and thus depend on proper forest management”*** (FAO, 2007, ‘Forests and Water’)

Water is one of the most valuable and essential services that natural environments provide. Biodiversity is what underpins the ability of nature to provide this service by sustaining the continuous recycling of water, through the hydrological cycle. Forests, for example, influence the hydrological cycle by directly affecting rates of transpiration and evaporation and by influencing how water is recycled and stored in watersheds.

***“Mountain forests of all kinds have great value as protective cover on the steep slopes of headwater catchments. Mountains have been called the world’s ‘water towers’, and forests the stabilizers that guard water quality and maintain the natural flow regime of streams and rivers emanating from these mountain headwaters. Soil surface erosion and occurrence of shallow landslips are minimized, by natural healthy forest cover. Cloud forests on tropical mountains not only fulfill this protective role admirably, but they also provide additional hydrological benefits. Because of their frequent exposure to fog, cloud forests enjoy an additional source of water compared to forests situated below the average cloud base. During dry spells in otherwise humid areas, and in places with low rainfall but frequent low cloud, the ‘stripping’ of wind-blown fog by the vegetation becomes particularly important.”***

(UNESCO, 2002, Decision time for Cloud Forests)

It is important to note that it is the mixed native forests with their great variety of biodiversity, which are really so fundamental for maintaining the health of rivers, streams, watersheds, aquifers and springs.

***“Water and ecosystems are fundamentally linked through processes, structure and function. Human society is responsible for the management of these ecosystems and, de facto, the management of water. Ecosystems should not be viewed as consumers of water, but rather they are essential elements of natural infrastructure within water management.”*** (UNEP, 2013, ‘Natural Solutions for Water Security’)

Transpiration, the movement of water through trees, plants, vegetation and soil, accounts for approximately 62% of the Earth’s renewable fresh water. Therefore the presence of forests and plants affects the hydrological cycle and rainfall patterns and its large-scale removal significantly changes

these patterns globally. (UN Water, 2010)

***“When land is cleared of trees and plants (deforestation), soil holds less water, drying up wells and springs. Dry periods may become longer or more frequent, causing all the health problems of not having enough water”*** (Hesperain, 2012)

The mass of research that indicates the crucial function of biodiversity and forests is irrefutable. Thus the protection and restoration of ecosystems is a vital and essential contribution for protecting the global water cycle, which in turn is essential for water and food security. The protection and conservation of ecosystems was also acknowledged by the UN Water Security Task Force as the central factor in achieving water security in an Analytical Brief released on 22/3/13. This Brief was sent to all UN Governments for serious consideration regarding water security as a matter of National and International concern. It states:

***“Ensuring that ecosystems are protected and conserved is central to achieving water security – both for people and for nature. Ecosystems are vital to sustaining the quantity and quality of water available within a watershed, on which both nature and people rely. Maintaining the integrity of ecosystems is essential for supporting the diverse needs of humans, and for the sustainability of ecosystems, including protecting the water- provisioning services they provide.”*** (U.N Analytical Brief, 2013)

It is now clear that safeguarding the ecosystems, which maintain the water cycle, is necessary in order to resolve current and future water challenges, as well as many other social and environmental challenges. Population growth is often considered to be one of the main threats to these. However if the essential ecosystems are not restored and preserved then water and food security is not achievable regardless of population growth.

***“The understanding of linkages between ecosystems, water, and food production is important to the health of all three, and managing for the sustainability of these connections is becoming increasingly necessary. In many places, changes in the global water cycle, caused largely by human***

***pressures, are seriously affecting ecosystem health and human well-being".*** (Millennium Ecosystem Assessment, 2005a. Ecosystems and human well-being: general synthesis.)

Our lives depend upon fresh water and food. Therefore our lives depend upon global biodiversity and ecosystems. Life on Earth is interconnected and we are all interdependent and intrinsically linked. We need to protect and restore nature and ecosystems around the world, for the long-term well being of our own families, regardless of where we live on Earth.

<http://www.activeremedy.org/forests-and-biodiversity-are-crucial-for-fresh-water/>