



# Approaching The 2030 Agenda From A Hydrological Cycle-Based Perspective

LOOKING BEYOND THE GOALS



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## Introduction

This paper focused upon 'Looking Beyond the Goals', highlights the hydrological cycle as a major issue, not explicitly taken into account in 'Transforming our World: the 2030 Agenda for Sustainable Development'. It focuses upon the interconnectedness between the hydrological cycle, climate and the Sustainable Development Goals (SDGs), recognising the possible trade-offs and synergistic relations between them and identifies the global water cycle as a pivotal factor, which links them all:

***“The Global Water Cycle is an integral part of the Earth/ Climate system; water vapor constitutes the Earth’s most abundant and important greenhouse gas, and water is its most active solvent.”*** ([USCRP, Draft White Paper, chapter 7: ‘The Global Water Cycle and its Role in Climate and Global Change, Strategic Plan for the Climate Change Science Program’, November 2002](#))

It is intended to aid in putting the Goals and Targets into perspective and to offer an innovative framework for practical action that could be useful in implementing them. Because it is of major importance in the interaction between all Goals and Targets, it has the potential to have a significant impact upon the achievement of the Agenda. It has been formulated in such a way, as to respect fundamental human rights for all and aims to uphold the original meaning and essential foundations of sustainable development.

***“Sustainable human development is development that not only generates economic growth but distributes its benefits equitably; that regenerates the environment rather than destroying it; that empowers people rather than marginalizing them. It is development that gives priority to the poor, enlarging their choices and opportunities and providing for their participation in decisions that affect their lives. It is development that is pro-people, pro-nature, pro-jobs and pro- women.”*** ([UNDP, ‘Human Development Report’, 1994.](#))

## Key Challenges in Achieving the SDGS

Within 'Transforming our World: the 2030 Agenda for Sustainable Development' it clearly states that climate change is a major challenge, which could potentially undermine all sustainable development:

***“Understanding that climate change is one of the greatest challenges of our time and its adverse impacts undermine the ability of all countries to achieve sustainable development”***

This indicates that addressing the causes of human induced climate change is critical for the realisation of sustainable development and that it is essential to include this, in order to identify the interactions between the SDGS and their Targets.

Understanding the role of the hydrological cycle and its dynamic relationship with climate, could provide the knowledge needed to address this challenge:

***“Earth is a truly unique in its abundance of water. Water is necessary to sustaining life on Earth, and helps tie together the Earth's lands, oceans, and atmosphere into an integrated system. Precipitation, evaporation, freezing and melting and condensation are all part of the hydrological cycle - a never-ending global process of water circulation from clouds to land, to the ocean, and back to the clouds. This cycling of water is intimately linked with energy exchanges among the atmosphere, ocean, and land that determine the Earth's climate and cause much of natural climate variability. The impacts of climate change and variability on the quality of human life occur primarily through changes in the water cycle. [As stated in the National Research Council's report on Research Pathways for the Next Decade \(NRC, 1999\)](#): “Water is at the heart of both the causes and effects of climate change.”***

This emphasises that water and climate are not two separate systems. In fact they are essentially major components of one dynamic global cycle and are utterly dependent upon each other and upon a global network of interlinking ecosystems:

***“In Earth System science, climate is not the long term average of weather statistics, but involves the non linear interactions between the atmosphere, oceans, continental ice, and land surface processes, including vegetation, on all time scales.”*** ([R.A. Pielke Sr, et al. ‘Non Linearities in the Earth System’ 2003](#))

Understanding this intrinsic relationship could provide us with the key to integrating the SDGS and their Targets and achieving the 2030 Agenda, whilst leaving no one behind :

***“Understanding climate variability on seasonal to interannual timescales, especially with regard to the hydrological cycle, offers some of the most direct benefits in all of global change research. In particular, better prediction of precipitation is of special interest because it can change the way people interact with the environment, perhaps in revolutionary ways”*** ([Global Environmental Change: Research Pathways for the Next Decade \(1999\)](#))

***“A characteristic of the Earth’s climate that distinguishes it from all other known planets is the coexistence of water in three physical states (solid, liquid, and gas). The***

***cycling of water among the three phases is important not only for driving the atmospheric general circulation but for the very existence of life as we know it.***  
(USGCRP, 'A Plan for a new science initiative on the global water cycle', executive summary, 2001)

In Rio de Janeiro in 2012, it was recognised by world governments that water was central and absolutely essential for sustainable development:

***“We recognize that water is at the core of sustainable development as it is closely linked to a number of key global challenges. We therefore reiterate the importance of integrating water in sustainable development”*** ([UN, 'The Future We Want' 2012](#))

### **The Nexus Between Water and the Sustainable Development Goals**

Looking at the major objectives outlined within the SDGS in relation to water, it becomes apparent that the hydrological cycle, which provides adequate quantity and quality of freshwater, is the nexus between them all. Approaching each of the SDGS, in relation to how it is influenced by water, could provide a sturdy framework and clear strategy for implementing them in a cohesive and synergistic manner.

#### **Goal 1. End Poverty**

Lack of freshwater and its repercussions is one of the greatest causes of poverty worldwide. The numbers of people presently suffering from water scarcity are over one billion. These figures are still increasing and it is predicted that half of humanity will be directly experiencing water scarcity and its inherent problems related to health and poverty within the next thirteen years:

***“By 2030 nearly half the global population could be facing water scarcity, with demand outstripping supply by 40 per cent.”*** ([UN Secretary General 22/3/13](#))

With the intensification of the global water cycle, climate systems are disturbed and fresh water is not distributed efficiently. This effects quantity of available freshwater and access to it and has a negative feedback upon health, due to food shortages and malnutrition. Overall this puts greater stress upon all vital resources and increases poverty worldwide.

***“Indigenous peoples are recognized as being among the world’s most vulnerable, disadvantaged and marginalized peoples.” “While they constitute approximately five per cent of the world’s population, indigenous peoples make up 15 per cent of the***

*world's poor and one-third of the world's extremely poor.”* ([UN, 'Declaration on Rights of Indigenous Peoples', 2007](#))

Traditionally, indigenous communities have had very effective strategies for water conservation. Integrating indigenous knowledge with water conservation techniques could be instrumental in safeguarding the hydrological cycle. Re-stabilising this cycle would inherently reduce escalation of world poverty and the negative impacts that it would have upon achieving the SDGS.

## **Goal 2. End Hunger**

Food production and agricultural yield is without question, utterly dependant upon water quantity and quality. Therefore addressing the global water cycle is key to tackling the escalating hunger crisis:

*“The degradation of mountain ecosystems - home to 600 million people and the source of water for more than half the world's population threatens to seriously worsen global environmental problems including floods, landslides and famine,”* ([UNU, Contribution to the Agenda 21, Chapter 13: 'Managing Fragile Ecosystems: Sustainable Mountain Development', 1992](#))

An ecosystem based approach to this not only safeguards sources of fresh water and the circulation of water but also positively impacts upon other ecological factors, which further increases yield and food productivity.

*“Sustainable management of ecosystems, and an ecosystem's approach to water management from local to continental levels is key to ensuring quantity and quality of water for food security and nutrition in the future.”* ([FAO/HLPE, 'Water for Food Security and Nutrition', 2015](#))

## **Goal 3. Ensure Healthy Lives**

Adequate quantities of freshwater are necessary for health. Water scarcity leads to declining water quality and pollution, which has an especially adverse impact upon the poor and is responsible for creating greater poverty. Lack of clean water means that proper hygiene and sanitation is not possible, which in turn increases sickness, disease and mortality. The poor more often find themselves unable to get an adequate supply of clean fresh water or have to drink water that is unfit for human consumption. This leads to a wide range of health problems and mortality. Water scarcity also leads to a wide range of social and environmental problems that have negative and often disastrous

effects upon health. Examples of this range from water related conflicts and migration to crop failure, the loss of essential ecosystems and habitats and the extinction of species.

***“Health is a prerequisite for sustainable human development, with direct implications for poverty reduction, social welfare, political stability and economic growth. As the Secretary General has noted the links between the environment and human health are powerful.”*** ([UN, OHCHR, ‘Human Rights, Poverty Reduction and Sustainable Development: Health, Food and Water’, 2002](#))

Ecosystem degradation can also have negative effects upon local and global climate systems and thus increase the spread of health hazards such as vector-borne diseases. Initially these impacts are most severely felt by the poor but eventually affect everyone:

***“The concept of “Water for Food Security and Nutrition” designates water's direct and indirect contributions to food security and nutrition in its four dimensions. It covers safe drinking water and sanitation, water used to produce, transform, and prepare food, as well as the contribution of water uses in all sectors to livelihoods and income and as such to food accessibility. It covers also the objective of sustainable management and conservation of water resources and of the ecosystems that sustain them, and that are necessary to ensure FSN for present and future generations.”*** ([UN,FAO/HLPE, ‘Water for Food Security and Nutrition’, 2015](#))

#### **Goal 4. Ensure Quality Education For All**

Many children and young people are not able to receive adequate education because a large proportion of their time is taken up ensuring that the basic needs for survival, for themselves and their families, are met. Because of water shortages they often have to travel great distances to collect water. Being able to gain an education and benefit from it is also dependent upon the pupil being healthy enough to attend the place of education on a regular basis and being able to concentrate. This relies upon them having sufficient nutritious food and sufficient fresh water.

***“The declaration by the United Nations General Assembly in July 2010 of the access to drinking water and sanitation as a basic human right is an explicit manifestation of this latter approach. It recognizes that a lack of access to drinking water and sanitation services is a global human development challenge, and the numbers to support this are staggering: 780 million of those without access to improved sources of drinking water and 2.5 billion without adequate sanitation (UNICEF and WHO, 2012). The worldwide death toll associated with this problem is around 3.5 million each year, about half of whom are children under the age of five. Women and children are the primary victims;***



*in particular, the lives and educations of girls are impacted the most.”* ([UN Water, 'The Global Water Crisis: Addressing an Urgent Security Issue' 2012](#))

To bring about a healthier, more conscientious society, future education will need to incorporate far greater understanding of the basic principles of sustainable development and humanity's reliance upon natural Earth systems and ecology. Learning about these important matters in exciting and practical ways is important, so that future generations will be able to apply the knowledge learned into their every day lives. They will be able to understand the practical and health supporting benefits gained from living in harmony with nature and have greater understanding of the interdependence that exists between themselves, all living organisms and Earth's ecosystems.

### **Goal 5. Ensure Gender Equality and the Empowerment of Women and Girls**

Because of the traditional role of women and girls, in many societies, involving water collection and sanitation management, water shortages have a particularly negative impact upon them. It has been recognised that inadequate quantities of fresh clean water and sanitation disproportionately affects them and reduces their chances of education and equality.

*“Women are the most affected by threats to water security, and this will be especially true as water security becomes increasingly contested”* ([UN Water, 'The Global Water Crisis: Addressing an Urgent Security Issue' 2012](#))

Women's rights to food, water and sanitation are intrinsically linked to the right to life and health and the attainment of an adequate standard of living. 'The Convention on the Elimination of All Forms of Discrimination Against Women' stipulates in (art. 14.2) that State parties should ensure women's adequate living conditions, in relation to an adequate water supply:

### **Goal 6. Ensure Availability of Freshwater and Sanitation For All**

This is a particularly important SDG, as availability of freshwater is essential for the success of all the other Goals. Ensuring this availability for all, depends upon a functioning hydrological cycle:

*“The water-related problems facing society today are too complex for any handful of individual scientists or agencies to manage alone. An unsystematic approach to these problems, carried out with the vague hope that somebody somewhere will fit all the*

*puzzle pieces together, will not be effective.”* (USGCRP, ‘A plan for a new science initiative on the global water cycle’, chapter 2, 2001)

Within the hydrological cycle, the cycling of water among the three phases is essential. However it is dependent upon healthy ecosystems to function effectively and replenish adequate quantities of freshwater globally.

*“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.”* (UN, ‘Analytical Brief’, 2013)

It is also fundamental for sanitation that adequate supplies of fresh water are available. Recognising the vital importance of the ecosystems, which maintain the hydrological cycle has been included within Goal 6, Target 6.6 as a necessity for achieving water availability.

*“By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes”* (UN, ‘Transforming our World: the 2030 Agenda for Sustainable Development’, Target 6.6, New York, September 2015)

This is a particularly pivotal target, which needs immediate implementation and which will determine the effectiveness of all other efforts towards achieving the 2030 Agenda:

*“The current pace and scale of human development is altering the hydrological cycle in ways that has eroded the capacity of ecosystems to provide life-sustaining functions and services. Rivers that for centuries ran from source to sea now run dry in many years due to damming, diversion and depletion of glaciers and water resources.”* (UN Water, ‘The Global Water Crisis: Addressing an Urgent Security Issue’ 2012)

## **Goal 10. Reduce Inequality**

Within the 2030 Agenda governments have committed to ending poverty and hunger and ensuring that all human beings regardless of gender, race or religion can fulfil their potential in dignity and equality in a healthy environment. This was agreed upon at the UN Conference of the Human Environment, in Stockholm 1972. Within Principle two it states that:

***“Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations.”*** ([UN, Conference on the Human Environment, 1972](#))

Since 1972 death and disease brought about by freshwater scarcity, water related disease and imbalances in the hydrological/climate systems have risen enormously. Rather than protecting and safeguarding the natural resources and other species, hundreds of millions of hectares of forest worldwide have been decimated, species have become extinct and water resourcing ecosystems, including oceans, rivers and aquifers have been polluted and depleted.

***“Forests are essential to our future. More than 1.6 billion people depend on them for food, water, fuel, medicines, traditional cultures and livelihoods. Forests also support up to 80% of terrestrial biodiversity and play a vital role in safeguarding the climate by naturally sequestering carbon. Yet, each year an average of 13 million hectares of forest disappear.”*** ([UN, ‘Declaration on Forests’, Climate Summit, New York, 2014](#))

This behaviour flagrantly disregards and contravenes many previous UN and governmental agreements:

***“The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations”*** ([Report of the UN Conference on the Human Environment, 1972](#))

## **Goal 11. Make Sustainable Human Settlements**

Historically humans settled and prospered in areas that had an accessible supply of clean freshwater and if this supply dried up, the settlements were forced to re-locate. Regardless of how much infrastructure and development had gone into creating these settlements, they were useless without an adequate supply of clean fresh water. This demonstrates that a constant source of clean fresh water is central to achieving sustainable human settlements. The freshwater present in the water tables, of any given area, are replenished as part of a constantly moving global hydrological cycle. They are therefore dependent upon the natural ecological components of this cycle.

These components may be a few miles up stream or they may be thousands of miles away but they are critical in ensuring that freshwater continues to replenish the local water

tables. Therefore in order to make human settlements sustainable, greater emphasis needs to be given to preserving the water resourcing ecosystems, which ensure that freshwater continues to reach these settlements. It is also important that we do not consider settlements in isolation from the natural ecological systems, which support them and which make them habitable and sustainable.

### **Goal 13. Combat Climate Change and its Impacts**

In Rio De Janeiro in 2012, world governments renewed their commitments to sustainable development and reaffirmed that they would continue to be guided by international law and its principles. In this they affirmed their commitments to Article 6. 1 of the International Covenant on Civil and Political Rights 1966, which it states:

*“Every human being has the inherent right to life. This right shall be protected by law.”*

It was also recognised that human induced climate change threatens all life and requires urgent and immediate practical action:

*“we underscore that combating climate change requires urgent and ambitious action, in accordance with the principles and provisions of the United Nations Framework Convention on Climate Change.”* ([UN, ‘The Future We Want’, 2012](#))

Considering climate change in isolation to the hydrological cycle and the ecosystems, which regulate it, would be a great oversight and would significantly reduce the effectiveness of efforts to address human induced climate change and mitigate related disasters.

*“Climate change would be a less immediate threat, if we had kept pace with commitments to sustainable development enunciated again and again over the years.”* ([UN, Millennium Development Goals Report, New York, 2008](#))

### **Goal 14. Conserve the Oceans**

As a vital component of the global water cycle, the world’s oceans need to be restored to health, protected and conserved. This is indispensable for sustainable development and the continuum of all life on Earth. However oceans also depend upon the global hydrological cycle as it circulates the water, redistributes essential minerals and regulates climate changes, which in turn regulates currents. Oceans and all oceanic ecosystems rely on being replenished by a regular flow of freshwater:

***“The ocean plays a key role in this vital cycle of water. The ocean holds 97% of the total water on the planet; 78% of global precipitation occurs over the ocean, and it is the source of 86% of global evaporation. Besides affecting the amount of atmospheric water vapor and hence rainfall, evaporation from the sea surface is important in the movement of heat in the climate system.”(NASA Science)***

## **Goal 15. Protect and Restore Terrestrial Ecosystems**

Considering the vital roles that forests and all terrestrial ecosystems play in supporting our lives, along with regulating the hydrological cycle and our climate; it is essential that we protect that which is left and do all we can to restore them:

***“There is abundant evidence that changes in land cover and land use can have significant, even drastic, impacts on the water cycle at local and regional scales.”*** (USGCRP, ‘A Plan for a new science initiative on the global water cycle’, Executive summary, The Water Cycle Study Group 2001)

Like us, forests and all biodiversity is dependent upon freshwater but unlike us they play a vital role in its recycling mechanism. In this respect the health of forests and the well-being of humanity is undeniably interrelated and it is important that we understand our dependency upon them and take appropriate action to conserve them.

***Forests perform vital ecosystem services, including the regulation of the water and carbon cycles and protection of biodiversity, that are essential to sustainable food production and FSN in the long term.”*** [\(FAO/HLPE ‘Forests for Food and Nutritional Security, 2017\)](#)

Our survival and that of our families and future generations are dependent upon nature and upon us changing our attitudes towards the other species, which we share Earth with. Both Target 15.1 and the ‘New York Declaration on Forests’ commits governments to dealing with this imminently, as a matter of extreme urgency.

***Forests are essential to our future. More than 1.6 billion people depend on them for food, water, fuel, medicines, traditional cultures and livelihoods. Forests also support up to 80% of terrestrial biodiversity and play a vital role in safeguarding the climate by naturally sequestering carbon. Yet, each year an average of 13 million hectares of forest disappear*** [\(UN, ‘New York Declaration on Forests, Climate Summit’, 2014\)](#)

## **Goal 16. Promote Peaceful and Inclusive Societies**

There is already a great deal of tension and conflict fought over water scarcity. If water shortages increase these conflicts will also increase. Therefore safeguarding the global water cycle is a means of enabling peaceful relations between nations and peaceful and inclusive societies:

***“the wide combinations of causes of water scarcity are all considered to be related to human interference with the water cycle.”*** (FAO, [Coping with Water Scarcity, 2008](#))

It is also important to include and recognise the important role of indigenous people. They have generally been the ones who have respected nature and upheld traditional knowledge as a way of preserving it. Therefore they have a lot to contribute to achieving the sustainable development goals:

***“We recognize that the traditional knowledge, innovations and practices of indigenous peoples and local communities make an important contribution to the conservation and sustainable use of biodiversity, and their wider application can support social well-being and sustainable livelihoods.”*** (UN, [‘The Future We Want’, 2012](#))

A mutual dependence upon the global water cycle unites all of humanity regardless of class, creed, race, age or gender. Therefore working towards safeguarding water is non-exclusive, supports an agenda that stimulates greater cooperation and collaboration and can aid in creating more inclusive societies.

### **Conclusion**

Having established the interaction and indivisibility between water and all the SDGS, it is conceivable that Target 6.6 could be a way to proceed in effectively implementing them, in an interconnected and interdependent way:

***“By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes”***

To have adequate quantities of fresh water for all humanity and life on Earth, along with addressing extreme climate issues, it is vital that safeguarding the entire hydrological cycle is made a central factor:

In 2013 after extensive research UNESCO released a report concerning mountains in which they focused upon the extensive retreat of glaciers worldwide and the related changes in river and stream flows. They acknowledged that the restoration of mountain forests would be an essential element in regulating fresh water supplies for the world:

***“Given their important role in water supply and regulation, the protection, sustainable management and restoration of mountain ecosystems will be essential.”*** ([UNESCO, ‘Climate Change Impacts on Mountainous Regions of the World’, 2013](#))

***“Mountain ecosystems such as mountain forests, cloud forests, wetlands and grasslands play vital roles in water storage and supply”*** ([UNESCO, ‘Climate Change impacts on Mountain Regions of the World’ 2013](#))

With all of this in mind, the restoration of the world’s mountain forests could conceivably be considered as a vital step and an interconnected horticultural program for worldwide implementation could be initiated:

***Forests with their multiple functions as well as with their downstream implications and benefits need to be considered in all efforts related to sustainable mountain development. Accordingly, the management of mountain forests needs to follow integrated and multi-sectoral approaches. The involvement of local communities is essential.”*** ([FAO, Hofer T and Zingaro Oierre Carlos, ‘The Multiple Functions of forest in sustainable mountain development and the challenges of their management’, 2002](#))

However the enormity of denuded and degraded landscapes, along with retreating glaciers in mountain regions globally poses a great challenge and calls upon great determination and immense effort on the part of humanity:

***“The magnitude of the global freshwater crisis and the risks associated with it, have been greatly underestimated. One billion people on earth are without reliable supplies of water and more than 2 billion people lack basic sanitation.”*** ([UN Water, ‘The Global Water Crisis: Addressing an Urgent Security Issue’ 2012](#))

Working together collectively around the world and remembering all the important and critical reasons for doing this, will be a key factor in supporting resolve.

***“We see that it is possible to build a meaningful and durable bridge between science and public policy that will help to successfully address the global water crisis. However, in order to do so in a timely manner to assure water security for all, we need to move quickly in order to keep up with both humankind’s growing and changing needs and demands, and the changes in the way water is moving through the global hydrological cycle.”*** ([UN Water, ‘The Global Water Crisis: Addressing an Urgent Security Issue’ 2012](#))

We at Active Remedy Ltd. have spent more than ten years researching and looking into plausible ways of dealing with the task of safeguarding the hydrological cycle for global security.

*“Humanity is at a watershed moment. Ultimately, the challenge of water security cannot be approached only as a problem-solving exercise – it is about fundamentally redefining and reshaping humanity’s relationship with water as it flows through communities, economies, and the ecosystems that sustain them. Addressing this challenge demands that human society envision and enable new ways to live in harmony with the natural water cycle.”* ([UN Water, ‘The Global Water Crisis: Addressing an Urgent Security Issue’ 2012](#))

In 2016, at the request of the UNFCCC/Nairobi Work Program Secretariat, Active Remedy Ltd produced a strategic model for climate adaptation, using traditional and local knowledge practices along with modern techniques. Focused on the implementation of [Target 6.6, this model offers concrete solutions for integrating and implementing the SDGS, offering a way of looking beyond the goals, whilst appreciating that they are indivisible, integrated and universal in nature.](#)

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## **Active Remedy Report**

[Earth's Water Story](#)