



**Securing water resources for Water Scarce  
Ecosystems**



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## ***Executive Summary***

*Desertification, land degradation and drought (DLDD) in addition to the loss of biodiversity in ecosystems, the disappearance of animals and plants from many habitats, the climate change resulting in melting glaciers, rising sea levels, and increase of extreme events have negative impact on the availability, quantity and quality of water resources resulting in changed conditions for humanity's sustainable access to water. The challenges and threats of water scarcity to drylands populations are real and set to increase in magnitude and scope in the coming years, with severe and widespread consequences.*

*As the world's population has swollen to well over 6 billion people, some countries have already reached the limits of their water resources. With the existing climate change scenario, almost half the world's population will be living in areas of high water stress by 2030, including between 75 million and 250 million people in Africa. In addition, water scarcity in some arid and semi-arid places will displace between 24 million and 700 million people (WWDR 2009)*

*As desertification takes its toll, water crises are expected to continue raising ethnic and political tensions, contributing to conflicts in the drylands. In some countries, land degradation has led to massive internal migrations, forcing whole villages to flee their farms for already-overcrowded cities. 50 million people are at risk of displacement in the next 10 years if desertification is not checked (UNU 2007). Implementing sustainable water management policies would help to overcome the challenges of these increasingly extreme situations.*

*A lot of UN institutions, agencies, conventions, programmes, bodies, environmental rules and mechanisms propose initiatives and measures against some aspects of these factors, but there remains with no international agreement in place to date specifically recognizing and combating the issue of water scarcity.*

*This paper considers, illustrates and advocates for an integrated, synergy-building approach amongst all the policies dealing with water shortages with the aim of establishing a policy for addressing water issues in Water Scarce Ecosystems for the UNCCD as well as achieving a long-term multilateral agreement on water scarcity at global scale.*

*The UNCCD is well positioned to take a leadership role in bringing such negotiations to the forefront, above all for two main reasons:*

- *Drylands populations that produce from land fully depend on rain-fed agriculture – When there is drought, less water is available and less is produced.*
- *To mitigate the effects of drought: In order to enhance precipitation, it is imperative to facilitate soils with appropriate humidity levels and cool temperatures that will strengthen the natural water cycle during the stages of evaporation.*

*The UNCCD cannot play the unique decisive role about global water scarcity and global land degradation, but the battle against the increasing water scarcity; the growing land degradation the frequent and increasingly severe droughts and the spreading desertification cannot be successful without the UNCCD.*

# **1. Introduction to Water Scarcity**

## **1.1. Understanding the Meaning of Water Scarcity**

There are several ways of defining water scarcity. Most of the many definitions currently used to characterize water scarcity share the basic idea that it is a relative concept, occurring where human and environmental demands for water exceed the available supply. Thus water scarcity is the long-term imbalance between the available water resources and demands; the point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing arrangements to the extent that the demand by all sectors, including the environment, cannot be satisfied fully. This may happen due to actual shortage of water flows, specified as physical water scarcity, or due to restricted access to water as a result of financial interests or institutional barriers, referred to as economic water scarcity.

Water stress is an absolute measure of available water, and typically uses the thresholds of 1700m<sup>3</sup> of 1000m<sup>3</sup> to define the points below which water conditions are stressed and highly stressed, respectively. Withdrawals exceeding 20% of renewable water supply have also been used as an indicator of water stress. A crop is water stressed if soil-available water, and thus actual evapotranspiration, is less than potential evapotranspiration demands.

These terms should not be confused with drought, a water deficit for particular activities or groups resulting from a deficiency of precipitation, or aridity, which regards the balance between precipitation and evaporation and is a long-term average feature of a dry climate. Three of the world's most arid zones are collectively referred to as the drylands or water scarce ecosystems. These terms are used throughout this report interchangeably. These regions experience an endemic and continuous water deficit and a local absolute scarcity in watercourses and aquifers, making them the climatic zones most vulnerable to the phenomenon of land degradation. The UNCCD's understanding of land degradation is one, which highlights the decline (persistent or irreversible reduction or loss) of soil quality, vegetation cover, and ecosystem services, in particular the services of primary production. It is referred to as desertification when occurring in the drylands.

## **1.2. Causes of Water Scarcity**

Water is an inextricable part of life and the world we live in; it is a part of every living organism, and shapes the Earth in the long term (forming and eroding geographical features such as mountains, valleys, and deltas) and in the short term (regulating processes such as erosion and tides).

However, despite its physical abundance, the amount of water available for use is limited by its distribution and quality. When the demand that both human and environmental users exert on water resources persistently exceeds this supply, the long-term imbalance is referred to as water scarcity.

Water scarcity is a natural phenomenon to the extent that the water on Earth has always varied over time and space following natural processes to which ecosystems have adapted. However,

anthropogenic pressures have reduced the supply of water through pollution and distortion of the water cycle, even as demand from the three principal human uses of water (70% from agriculture, 20% industry and 10% domestic) increases in response to social and demographic trends. During the past century, while the world's human population has tripled, the use of water has increased six-fold. Meanwhile, the supply of available freshwater per inhabitant dropped from 17.000 m<sup>3</sup> in 1950 to 7500 m<sup>3</sup> in 2000. Currently, about 3.830 km<sup>2</sup> of freshwater is withdrawn annually for human use; this works out to about 600 m<sup>3</sup> per person per year, which represents about 8,8% of the world's renewable freshwater resources.

This has resulted in a growing water scarcity in which the frequency and severity of natural shortages increase to the point where they could become permanent, a threat that is especially present and dangerous in the drylands.

Water scarcity is also a direct result of the physical effects of desertification; land degradation, the drying up of freshwater resources, increased frequency and severity of droughts and sand and dust storms. The continued occurrence of these trends bring about a sharp decline in soil nutrients, accelerating the loss of vegetation cover, leading in turn to further land and water degradation, such as pollution of surface and groundwater, siltation, salinization, and alkalization of water resources.

Poor and unsustainable land management techniques also worsen water scarcity. Over cultivation, overgrazing and deforestation put great strain on water resources by reducing fertile topsoil and vegetation cover, leading to greater dependence on irrigated cropping. Observed effects include reduced flow in rivers that feed large lakes such as the Aral Sea and Lake Chad, leading to the alarmingly fast retreat of the shorelines of these natural reservoirs in Central Asia and Northern Africa.

### **1.3 Effects of Water Scarcity**

Different ecosystems experience the changing water availability in different ways. Worldwide effects include dust storms, downstream flooding, impairment of global carbon sequestration capacity, and global climate change. In drylands, there is less rainfall and fewer water supply services. This modifies the intensity and the continuance of dry seasons, the distribution of daily precipitation values in a year, the erosivity of rainfall and annual periods with a less stable availability of water.

Currently, about 1.2 billion people live under conditions of physical water scarcity, and 1.6 billion live under those of economic water scarcity, such that a total of about 2.8 billion people (more than 40% of the world's population) live in river basins affected by water scarcity. Given the projections that world water use will increase by about 50% in the next 30 years, it is predicted that at least 3,5 billion people will face water scarcity by 2025.

Increasing water scarcity constitutes a significant and growing cause of famines and food crises, which can lead to forced human migrations, environmental, social and armed conflicts, epidemics and diseases, energy crises, political instability, and institutional stress. The scope of its impacts is still larger through its exacerbation of land degradation and desertification. Whether natural or human-induced, increasing occurrences of water scarcity serve to trigger and

exacerbate the effects of desertification through direct long-term impacts on land and soil quality, soil structure, organic matter content and ultimately on soil moisture levels.

Though a region's experience of such harm depends in part on differentiating factors such as the economy's reliance on agriculture, the level of technology used in land-based production, and the degree of urbanization. Long-term impacts will be felt not just by directly affected countries, but worldwide through the global nature of the economic, humanitarian and political consequences of water scarcity.

1) Water scarcity is a growing, human-caused issue with environmental and social impacts.
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## 2. Discerning the Relevance of Water Scarcity

Water scarcity is not just a problem of the drylands, but also for regions outside the drylands where communities experience water scarcity as a result of human activities such as deforestation, intensive agriculture, etc. Water quickly becomes scarce when communities, industry, agriculture, and natural ecosystems all depend on the same source. Given the potential of desertification to spread in the drylands that competition is expected to intensify as climate change affects precipitation patterns, potentially depleting natural water reservoirs.

Whether interacting with human or environmental processes, water scarcity is closely linked to other phenomena through feedback loops and mutual effects and causes. Trying to consider them in isolation would be difficult, and, furthermore, counterproductive, as the understanding of current challenges and development of appropriate responses requires a systematic approach. To this extent, a crosscutting response to water scarcity involves a consideration and response to all of the following issues, among others, with some examples of the interrelationships given.

### 2.1. Concepts

To understand how water scarcity is relevant to the aforementioned disciplines described below, it is necessary to provide the relevant introductory concepts:

According to the UNFCCC, climate change is “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”<sup>1</sup>.

According to the CBD, ““biological diversity” means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.”<sup>2</sup>

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All references found at the end of the document

Sustainable land management (SLM) is the term used to capture “land use practices that ensure that the land, water, and vegetation adequately support land-based production systems for the current and future generations.”<sup>3</sup> The term stems from UNCCD’s understanding of land degradation, which as earlier on stated, is one which highlights the decline (persistent or irreversible reduction or loss) of soil quality, vegetation cover, and ecosystem services, in particular the services of primary production. It is referred to as desertification when occurring in the drylands.

The absence of water or the lack of an adequate quality of water has devastating effects in populations already living in poverty. Poverty, according to the definition of UNHCHR is ‘...a human condition characterized by the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights<sup>4</sup>’ UNDP employs quantitative measures of poverty, inter alia , such as those setting a threshold of \$1.00 per day as a standard feature of most definitions of poverty.

## **2.2. Climate Change**

As climate change becomes a major environmental issue around the world, it presents a new framework for evaluating – and gives greater urgency to – a host of other sensitive environmental issues, that include drought and water scarcity, loss of biodiversity, desertification, land degradation, and natural disasters.

The projected climate change effects for the environment and for human life are numerous and varied. The main effect is an increasing global average temperature. Adverse effects associated with climate change that are largely water-related include rising sea levels; increasing frequency and intensity of extreme weather and extreme weather events, changes in patterns of precipitation, flooding, and more severe and frequent droughts. Such consequences all have the effect of changing the distribution of water, which contributes to its scarcity in many regions. Climate change is also associated with a variety of secondary effects, namely altered patterns of agriculture, the expansion of the range of tropical diseases, etc

In turn, water processes affect climate. For example, the amount and distribution of an ecosystem’s water resources determine the proportion of water vapour in the air, retaining solar radiation and thereby regulating the earth's temperature. Another example is that the carbon sequestration capacity of soil is affected by its quality, and typically declines as the soil is degraded through water scarcity.

## **2.3. Biodiversity**

Water scarcity threatens living organisms that include vegetation and wildlife that depend on the availability of adequate freshwater resources. Biodiversity in rivers, marshes, bogs, etc. that depend on sustainable water supply are also threatened in the face of water scarcity. Forests and other upland ecosystems are equally at risk of significant productivity changes as



water availability is diminished. Basically all organisms experience reduced productivity as freshwater inflow diminish.

For example, drylands ecology has become familiar to strong inter-annual variability in amounts and intensities of rainfall, and in the past plants and animals could respond to it rapidly. However, as the severity and frequency of shortages increase, wildlife is pushed past its limits of resilience, and natural processes must be adapted or diminished in response to the deficit of consumable water. This further undermines the ecosystems' resilience to other phenomena, including new trends such as climate change, or even seasonal variations to which it was able to adapt in the past.

## **2.4. Land Degradation**

Water scarcity can induce land degradation, directly by modifying the composition of the environment, and indirectly by weakening ecosystems' resilience to the impacts of climate change. In turn, the general high temperature and low precipitation in the drylands leads to poor organic matter production and rivers flows, and increases the quantity of soil erosion and salinisation, which feeds back to increase water scarcity as a whole. Due to the phenomena's shared and mutual causes, the increasing water scarcity and the growing land degradation concurrently affect many of the same ecosystems.

Water scarcity leaves a lasting impact on the land. In the face of declining inflows, freshwater sources dry up and ground water tables retreat. When these trends continue unhindered, a sharp decline in soil nutrients would occur, increasing the loss of the vegetative cover and desertification and land degradation sets in as the frequency of sand and dust storms increase.

## **2.5. Poverty and hunger**

Water scarcity does not only reduces access to the water resources needed for drinking, sanitation, and food production, but also threatens the viability of livelihoods that depend on land-based-rain-fed agricultural production, which represent the majority of those available to poor populations. In the face of the ever increasing population and the necessity to feed the poor, water scarcity eliminate a large amount of usable fresh water and exacerbate poverty and food insecurity. The physical adverse effects of water scarcity such as loss of arable land through desertification, widespread erosion that in turn produce the siltation and drying up of freshwater sources, the increasing salinity of soils due to growing water stresses and greater occurrence of flooding resulting from inadequate drainage form major obstacles to increasing agricultural productivity.

Such challenges have already caused significant increases in food prices, and further pressures will only enlarge the food crisis. It is estimated that 80 per cent of the world's food crises are linked to water and especially to drought. The effects of such food crises are economic as well as humanitarian: In North, West, and East African countries, considering the forecasted loss of two-thirds of Africa's arable land by 2025, land degradation will be responsible for an annual average loss of over 3% of their Gross Domestic Product (GDP).

## 2.6. Migration and Conflict

Water crisis is closely related to regional tensions, but acute conflicts over water have been historically resolved through cooperation and such crises have turned out to be cooperative opportunities providing frameworks for consultation. However, in light of its increasing cost and non-decreasing value, humanity use, find, produce and manufacture water in ever-increasing ways: Forced appropriations and conflicts in order to get control of access to water are some of the non-peaceful variants. Emigrations from environments with insufficient water to sustain life for its inhabitants represent other measures of adaptation. The effects power each other; the conflicts with environmental causes at their core are responsible for displacing large numbers of people, and flows of migrants can come into conflict with host populations and governments when seen as competition for resources.

Competition for water exists at all levels (among uses and among users, cities vs. agriculture, hydropower and fisheries, dams/irrigation and delta environments) and will increase with demand in almost all countries. Water scarcity can become the focus of tensions, which may potentially spill over into conflicts. Of the 47 nations regarded as being either water stressed or water scarce in 2007, 25 are regarded as facing a high risk of armed conflict or political instability.

### 2.7. Example:

Improving land and water management could promote a virtuous chain, in which all of the above factors form synergies. For example: Implementing cropping patterns and fertilization techniques as part of a SLM strategy would improve soil conditions so as to facilitate rain infiltration, which increases water storage in the soil. More water available for plants increases biomass, which increases food for alimentation and the stability and quality of the soil. This supports still further biomass, and decreases the risk of floods and erosion, such as those that degrade land and threaten human settlements. Both causes and impacts of climate change are reduced, as the plant cover sequesters carbon from the atmosphere while regulating the amount of water retained and lost in the face of climate change induced weather disturbances.

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| 2) Environmental and social systems have developed to adapt to their water environment such that water scarcity is both a cause and effect of the phenomenon of land degradation, climate change, loss of biodiversity, poverty, migration and conflict. |
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## 3. Current activities related to water scarcity: Identifying possible opportunities

There are a lot of multilateral policies and rules on specific kinds of water (groundwater, trans-boundary watersheds), but there is neither a universal instrument that target and plan for water scarcity mitigation and adaptation nor any international agreement on the use of water resources or focussing on water scarcity. The responsibility for addressing and resolving issues on access to water is still dependant on individual countries, and in some rare cases on respected basin agreements. However, adaptation activities related to water scarcity are being

partially addressed by the mitigation and adaptation measures as described below, throughout each of these phenomena:

### **3.1. Climate Change**

Water scarcity often has its roots in water shortage. In the drylands, where the problems of water scarcity are most acute, it is further exacerbated by droughts and wide climate variability. Policies discussed within the on-going dialogue on climate change will affect and be affected by the increasing water scarcity and the growing desertification, land degradation and drought issues. For example, the International Panel on Climate Change (IPCC)'s fourth Assessment Report explicitly refers to the benefits of taking advantage of improved water use techniques and technologies to alleviate some of the environmental pressures aggravating climate change.<sup>5</sup> Further highlighting this relationship and advocating the use of water management, as a response to climate change would facilitate the systematic response needed to adequately address both issues. This would set off "virtuous cycles" between the natural processes, as well as representing an opportunity for water scarcity and land degradation initiatives to benefit from the support already accorded to the higher-profile topic of climate change.

The discussions currently taking place to develop new policies and legally binding rules to be used after the expiry of the Kyoto Protocol in 2012 represent a good opportunity to bring up and pursue these issues. Further opportunities exist on a national-level, where climate change policies are taken and/or mandated by a government in order to accelerate mitigation and adaptation measures.

### **3.2. Biodiversity: The 2010-Targets and post-2010:**

There exists a Programme of work on the Biological Diversity of Dry and Sub-humid Lands. This provides guidance on actions to stop desertification and sustain biodiversity in the drylands and realizes the goal of reducing the rate of biodiversity loss by the year 2010. The Programme involves steps amongst others, such as reducing overgrazing in delicate ecosystem, reducing pollutants produced by intensive agriculture, slowing the conversion of grasslands and savannah systems to agriculture and urban settlements, taking steps to control invasive alien species into these ecosystems. Post-2010 aims of the CBD, call especially for ambitious but realistic, measurable short term targets, indicators and milestones with a long term vision, on the basis of robust scientific evidence<sup>6</sup>.

### **3.3. Land Degradation**

Effective and efficient integrated water scarcity adaptation is the heart of any land degradation control strategy. UNCCD plans and programmes can be seen as, in fact, activities for water

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scarcity adaptation, and all NGOs involved in the implementation process of the UNCCD can play a role on water issues. All four strategic objectives and many of the operational objectives composing the Ten Year Strategy that guides the Convention's implementation implicitly refer to the MDGs and to water scarcity policies.

During the UN Commission on Sustainable Development's Review Session in May 2008 (CSD-16, New York), reflections on and purposes of the connected right to food and right to water with agriculture, desertification, and water scarcity emerged already. These will lay the basis for consequent decisions of the UNCCD Ninth Session of the Conference of the Parties (COP 9) when it meets in Buenos Aires in the fall of 2009.

Conferences, forums, and discussions carried out in the framework of the International Year of Deserts and Desertification (IYDD; 2006) often referred to water scarcity and water issues. All the calls and documents elaborated during IYDD quoted the relationship between UNCCD and water, as mentioned in reports and discussions at UNCCD COP 8 (2007).

A growing trend is to address issues of desertification, land degradation and drought through sustainable land management (SLM) practices, which encompass water management policies as well as affecting other environmental processes with which the water cycle has synergies. SLM strategies are continually developing to try to increase the efficient and sustainable use of land in response to the pressures of scarcity as well as economic motives; the viability of land-based production has clear economic consequences, especially in developing countries where primary production forms the largest sector of the economy.

Techniques making up resource management practices vary over time and place, but an SLM plan as a whole addresses the following components of land-use that need managing:

- Intensity and duration of land-based production activities
- Vegetation cover
- Soil quality and stability
- Efficiency of water use
- Integration of cropping techniques such as organic farming and agro-forestry

### **3.4. Poverty and Hunger**

Water scarcity issues will affect the successful achievement of most of the Millennium Development Goals (MDGs), adopted by world leaders to guide a medium-term plan of action to "meet the needs of the world's poorest" by 2015.

In particular, Goal 7c that calls for the number of people without sustainable access to safe water for drinking and sanitation to be halved by 2015. Given the current trend of the spread of both physical and economic water scarcity, the world is not on track to meet this target. Further efforts must be devoted to supporting the MDGs in general, and combating water scarcity in particular as a way to improve access to water, food, health, education and equity.

Thought must also be given to how to keep the core issues relevant after 2015. Human needs, as expressed in the MDGs, have to be integrated with the need to preserve and rehabilitate ecosystems and their functions as part of the Earth System. This could be institutionalized by a formal connection between human rights and environmental/resource law. This is difficult in light of the variety of legal systems in different regions and levels of government, and the lack of consensus on the topic. The United Nations bodies dealing with human rights, as well as laws at national and local level, recognize the right to water as an implicit component of some other human rights, although there is an on-going debate about doing so explicitly. Any further discussions on the topic should consider the potential role and implication that the issue of water scarcity could have from such an action. In the meantime, recognition of the human rights affected by water availability should be given weight when valuing possible responses to water scarcity, including the cost of inaction.

### **3.4.1. On track to meet the MDGs?**

The third target of the 7<sup>th</sup> Millennium Development Goal (7.c.) specifically addresses the battle against water scarcity<sup>7</sup>. The sufficient supply and the sustainable access to sources of drinking water are today denied to a great number of men and women: this denial has to be at least halved by 2015. Reaching the goal seems difficult and perhaps impossible in some areas or regions (particularly in Africa). Since 1990, the number of people in developing regions using improved sanitation facilities has increased by 1.1 billion. Nevertheless, in order to meet the target, this number must increase by about 1.6 billion in the next 7 years (substantially more than the growth achieved since 1990).

About 2.5 billion people remain without improved sanitation. In 2006, there were 54 countries where less than half the population used an improved sanitation facility;  $\frac{3}{4}$  of those countries were in Sub-Saharan Africa. In 21 countries of this area, just 16% of the poorest quintile of the population has access to improved sanitation, compared to 79% of the population in the richest quintile. Of the 1.2 billion people worldwide who practice open defecation, more than 1 billion live in rural areas. Since 1990, 1.6 billion people have gained access to safe water. Nowadays, 1 billion people are still lacking safe sources of drinking water. Less progress has taken place in Sub-Saharan Africa, which now accounts for more than  $\frac{1}{3}$  of those without improved drinking water supplies and requires a jumpstart to meet the target. About 742 million rural people live without access to improved drinking water, compared to 137 million urban residents. The same disparity applies to piped drinking water.

With the current trends, the world will not be on track to reach the MDG on sanitation and water. As a result, millions of people die each year from water-borne diseases (such as schistosomiasis), most of which are children under the age of five years and there are billions of cases each year of diarrhea and other illnesses related to water. The costs for some nations in health and productivity are enormous.

To ensure meaningful progress on the current work towards the 2015 target, there is a need to establish common grounds and promote mutual cooperation towards more precise definitions of 'sustainable access' and 'safe' drinking water and to develop the appropriate indicators. At

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present, the proxy for “improved water quality” for “safe” quantities is reflected only on the number of pipes, pumps and faucets and this overlooks the actual quality of water. New measures must be made to overcome barriers present in translating project “outputs” (e.g. laying water pipes) into effective “outcomes” (e.g. obtain potably safe water).

### 3.5. Migration

The terms “climate displaced people” or “climate refugees” are used to refer to those forced by environmental conditions to relocate, although they do not have official refugee status under the definition given in the 1951 Geneva Convention and subsequent 1967 Protocol<sup>8</sup>. There is on-going debate on whether environmentally displaced populations should be recognized as refugees, with the UNHCR not currently favouring such an action<sup>9</sup>. While not requiring the declaration of a “side” in this debate, proponents of the water scarcity issue should take part in this debate, as it represents part of a greater effort to deal with the challenges of migration. Also, it represents the costs of water scarcity.

3) Water scarcity, as a recent emerging issue, is only to some extent, at the attention of the international community through the phenomena of climate change, biodiversity, land degradation, poverty and hunger and migration.
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## 4. UNCCD Recommendations – How to Move Forward

The first step in moving forward on addressing the issues of water scarcity is to raise awareness on the issue and bring it to the attention of the international community. This involves identifying an inventory of the relevant existing local/watershed/regional initiatives on integrated water scarcity adaptation. It is then necessary for the UNCCD to define a water scarcity global project plan in the framework of UN-Water coordination in the context of multilateral integrated policies and targets.

There are two subsequent challenges: a) to survey and analyze information on integrated water scarcity adaptation and the possibility of establishing new synergies from different national and international sources and at different scales; For example, as a first step it would be useful to suggest that the principles on which the IWRM bases their water policies should be updated because until now, water management has only dealt with blue-water management while green-water has been considered as residual with less attention paid to it.

Challenge b) would then consist of concentrating funds, policies and initiatives in the most vulnerable drylands (water scarce ecosystems) such as Sub-Saharan Africa.

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#### **4.1. International Support**

Addressing water scarcity requires actions at all levels. It calls for actions at global and international levels, that lead to increased collaboration between nations on shared management of water resources (rivers, lakes and aquifers), it requires an inter-sectoral and multidisciplinary approach to managing water resources in order to maximize, environmental, economic and social well being in an equitable manner if the sustainability of vital ecosystems is not to be compromised.

A multilateral discussion on the principles of action, producing concrete synergies among relevant global conventions and a coalition of willing UN agencies and other parties is an important first step for addressing the issue of water scarcity and garnering support for further actions. Such a dialogue must begin by addressing the need to define water scarcity as an emerging issue in the first place, taking into account development, supply, use and demand and placing emphasis on people, their livelihood and the ecosystems that sustain them and establish a definition of the term to permit common understanding. The goal of subsequent discussion would be the negotiation of an agreement specifically addressing the topic of water scarcity, with a limited number of clear, quantifiable and legally binding targets on addressing water scarcity at the global level.

On an international level, such negotiations could take place during regularly scheduled sessions of the COP sessions of the UNCCD and UNFCCC, the UN General Assembly, G8 and G20 Summits, as well as events arranged and organized specifically for water by UN-Water, such as those taking place during World Water Week, and the World Water Forum. On a national level, actions may be taken to integrate considerations and outcomes of the water scarcity discussions with policies that are already in place, such as the monitoring of the National Action Programs done to implement the UNCCD, and PRSPs.

Strengthening a few key working relationships among international partners will be important in ensuring the discussion of water scarcity is fostered as an emerging global issue, and accountability is assigned for following up on discussion decisions. Due to their common history and mandates, a formalized partnership between the UNCCD, UNFCCC and CBD would be an effective way to promote these actions under a common programme of work directed at land degradation, climate change and biodiversity issues in water scarce environments. Also, the UNCCD should pursue a more formalized relationship with UN-Water.

Some partnerships and initiatives are already in place, some actors are receptive (ex. FAO, IFAD, UNDP), and still more NGOs could be interested in getting involved. What will be key in organizing co-operation is fostering on-going dialogue to prevent duplication of efforts and guarantee the most efficient use of resources. Time should be spent at the beginning of the process to realize an inventory of relevant existing initiatives related to water resources management and specifically, to adaptation to water scarcity.

For example: The United Nations Commission on Sustainable Development (CSD) serves as the high-level forum for sustainable development within the UN system. Water was accorded special focus during the Commission's thirteenth session in 2005 (CSD-13), producing a

decisions document<sup>10</sup> detailing criteria for an adequate water policy and encouraging countries to take action to apply them. Progress on implementation and identification of obstacles was reviewed at the CSD-16 in 2008. The result was a call for assistance to address a lack of funding, infrastructure and capacity in poor countries, as well as better coordination at the country level.<sup>11</sup>

Further follow-up on applying the water management criteria of the CSD-13 is scheduled for CSD-20 in 2012, when Parties will decide on measures to speed up implementation and mobilize action to overcome these obstacles and constraints. Policy actions until that time will benefit from the clarity and standardification of the CSD-13 list, but progress is constrained by the voluntary nature of compliance.

Promotion of the water management criteria would make compliance a higher priority, as would the push to incorporate them into other resource management plans already being used. This is largely an issue of making parties aware of the need and methods to do so, as the economic nature of land-based production means that most countries already do have such resource management plans in place.

Coordinating responses to water scarcity issues, as well as agreeing on the nature of the issue in the first place, will be challenging on a national level, because some of the rules regarding legal action for water uses are ancient, settled in peoples and communities, in the written and unwritten law of states and governments, and are not defined and implemented alike in every country. The initial phase of discussion and negotiation must therefore have an appropriate focus on engaging all perspectives and establishing common values to set the set for later reconciling of positions. It may be useful to start from a synthetic framework of definitions, indicators, management models, research models, and participation models. A point of departure could be the new insights into the situation gained by the updates to the above data.

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| <ul style="list-style-type: none"><li>4) The first reasonable step would be to act on opportunities to increase the prominence of water scarcity as an emerging issue and garner international support for integrated initiatives in response. Breaking down this step in further stages, would imply to:<ul style="list-style-type: none"><li>a. Bring the issues to the attention of the international community in the context of the issues already recognized (as explored in section 3)</li><li>b. Recognition of water scarcity</li><li>c. Recognition of water scarcity within land degradation mandate</li><li>d. Recognition of UNCCD as appropriate global leading institution on water scarcity issues</li><li>e. Establish formal partnerships with UN-Water, UNFCCC and CBD</li><li>f. Inclusion of issue in further discussions</li></ul></li><li>Facilitate cooperative work efforts</li><li>g. Develop synthetic framework</li><li>Timeline</li><li>Partner list</li></ul> |
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All references found at the end of the document



## 4.2. Water Scarcity Global Project Plan

The policies for addressing the increasing water scarcity and the growing land degradation need new principles, data, indicators, patterns, models, and pilot projects. There also must be measures to evaluate and promote compliance. Within the policy framework set out in its 10 year strategy, the UNCCD can contribute to these steps by a) monitoring them, b) promoting them at national, regional, multilateral level as needed, suggesting both quality- and quantity-specific targets for drylands, c) promoting information exchange, research partnerships and joint publications on relevant topics between governments at all levels, private institutions, and universities, d) fostering partnerships and collaborative agreements or policies on water scarcity adaptation at the national and regional level, e) attending, co-organizing and hosting workshops, forums and meetings on topics identified as relevant, and f) identifying social and economic costs of investment and inaction.

- 5) Development of a “Water Scarcity Global Project Plan” which should start as soon as possible by the UNCCD in close partnership with UN-Water, the UNFCCC and CBD. This plan, would ultimately provide the framework for ongoing generation of international attention and responses to water scarcity explicitly, as well as coordinating measures in the related topic
- 6) Definition of the Plan: Such Global Plan, would be defined *not only* in terms of the tools already available to the UNCCD within the policy framework set out in UNCCD strategy *but also* in terms of the subsequent identification of further needs/policy gaps to combat water scarcity.

## 4.3. Identification of Requirements

As centuries-old patterns of precipitation will be modified, drought will be relevant in some areas even as others will receive more rain. This has direct consequences on environmental factors such as those that also affect climate change, biodiversity, land degradation, and sustainable land management. These then present legal and political consequences as existing cross-border or domestic agreements for water sharing will lose validity and will have to be renegotiated, often between actors with different standards and conventions. The target areas include some of the most politically volatile areas in the world and water stresses have the potential to generate large political and economic crises.

To prioritize actions, policy makers need to understand the areas of need and sensitivity, both in regards to environmental and social characteristics and risk. This requires the collection, analysis and communication of environmental data. This must involve integration of world water assessments with assessment of land (soil and vegetation) degradation, especially on a global scale, that involves three stages: generating numerical data based on ground observations and measurements; transforming the numerical data to map units; and extracting statistics by subjecting map units to various analyses. Many data collection and analysis tools to do so already exist, and coordination of them would make policy makers better informed, as well as shed light on areas needing further data collection or analysis. To minimize duplication

of effort, an initiative to improve data sharing should begin by identifying current data systems, and promote long-term integration of their use, perhaps within the UN system.

#### **4.3.1. Assessment of Status Quo**

The existing status quo will not deliver the solutions required to address water scarcity problems. Increasing water scarcity in the coming years are likely to threaten national and regional security, economic growth, global trade, energy and food production. By 2030, almost half the world's population will live in areas of high water stress and around 2050 when the world's population is expected to peak at about 9 billion the demand for water will continue to grow because of a combination of climate change, population growth as well as rising demand for food and energy. It is therefore imperative to collect data and undertake an assessment of current and future water use requirements.

The data collected should enable users to:

- indicate synthetic assessments on uses of water
- evaluate virtual water balances and the water footprint
- define the minimum quantities of water essential to life (for primary uses such as food and health)
- evaluate the functional traditional knowledge heritage of humanity

This may be used, for example, to develop policies that:

- introduce specific programs for small islands, coastal zones, risk areas (for extreme events)
- establish an efficient drought monitoring and early warning system
- increase and concentrate resources for development aid without encroaching on historical and geographical specificity
- consider policies to address trends in population growth

#### **4.3.2. Compile a suite of SLM practices**

There exist a number of SLM practices that can help mitigate the problems of water scarcity. There is need to compile a variety of these good sustainable land management practices to address the growing water crisis, because the world simply cannot carry on using water in the same way as it has in the past. When a suite of SLM practices is required to fix water scarcity issues, it is the perfect time to simultaneously start a dialogue on water reform. The information collected should also be used to update widely observed standards, which would improve the quality of policy recommendations. For example, it would enable a user to:

- identify the priorities of sustainable water use
- fix legal provisions on groundwater considering the aridity index
- suggest targets for IWRM within river basin management plans
- indicate targets for sustainable uses (and tourism) in water scarce environment

The principles of *Integrated Water Resources Management* (IWRM) formulated in 1992 have to be updated, mended, and specified with the outcome of the Global Scientific Assessment.

The *Zaragoza Charter* (2008) and a lot of scientific studies or social forums contain new principles and conclusions to be incorporated. For example, water management has been until now synonymous with blue water<sup>12</sup> management, where green water is simply considered as the residual in the water balance, even though these days, all waters are diminishing in availability and quality, particularly in degraded lands in the drylands.

The definition of areas threatened by desertification proper to the UNCCD (the ratio rain-evapotranspiration) should be updated both in theory (evapotranspiration theoretical and real data infiltration and runoff, given temperature, cover, altimetry and permeability) and practice (climate change and water change are expanding the drylands).

For the purposes of collaborating and disseminating good practices, a data sharing mechanism is also important. Information must be drawn from the many sector- or region-specific good practice databanks on water that currently exist in isolation from each other.

#### **4.3.3. Observatory on Risk – Risk Based Management Approach**

The importance of developing international water scarcity observatories to enhance knowledge, and efficient alert systems essential to improve water scarcity preparedness through integrating relevant data and research results, drought and water scarcity monitoring, detection and forecasting cannot be over emphasized. It should be envisaged to further develop prototypes at national levels, with implementing procedures. The observatories will provide regular and concrete threats of water conflicts, to guide focus and priorities of policy attention. The scope of such an observatories would need to distinguish rural or urban areas, trans-boundary or internally watershed zones, disputes concerning two or more concurrent uses, presence of corruption in the water sector, etc. The different interests and the relative conflicts may or may not have legal bases, international rights bases, or peaceful resolutions; they may verify a legal way of prevention and a judicial way of adaptation.

#### **4.3.4. A possible Charter of Water Rights**

The threats of water scarcity are real. Countries should seriously consider developing an international system that provide a framework for action in identifying threats to water supplies from both long and short term impacts, as well as requiring countries to address the problems within their borders. This may require of the UN GA to establish and recognize an intergovernmental process with a mandate to enact a “Charter of water rights”, a series of principles and rules to ensure the right to water in international law, and to negotiate a specific “Protocol Against Thirst”. This would have implications on both legal/political developments regarding how the rights and responsibilities on water may be divided between governments, and humanitarian/development activities, enshrining water as a resource to which access must be made and protected for all.

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All references found at the end of the document

#### 4.3.5. Existing Tools

Although the following examples are not exhaustive, they still represent well-developed initiatives already within UN System and/or with credible and resourceful sponsors:

An interesting scientific Global Water System Project (GWSP)<sup>13</sup> has been developed, which defines the global water system as the global suite of water-related human (organizations, works, sectors), physical (the cycle, including runoff, geomorphology, and sediment processes), and biogeochemical (organisms) components.

The UNHCR's Environmental Monitoring System<sup>14</sup> to provide environmental data to support responses to refugee crises and permit monitoring of effects. It is regularly monitored (annually or semi-annually), and the UNHCR or its partners' follow-up on obstacles revealed through analysis.

The WMO's Hydrology and Water Resources Programme (HWRP)<sup>15</sup> assesses and standardizes hydrological data to support national hydrological services and river basin authorities and provide advice to countries on water management, including efforts to adopt and apply IWRM.

The fundamental goal of the initiative to collect and analyze data is to benefit from a standardized understanding of the situation while recognizing and respecting regional diversity by incorporating the contributions of organizations and governments representing various worldwide perspectives.

- 7) Steps Needed to be taken to achieve the Plan:
    - a. Survey and analyze information on integrated water scarcity adaptation and the possibility of establishing new synergies from different national and international sources and at different scales.
    - b. Promote use and integration of current data systems
      - i. List of existing inventories
        - 1. What inventories currently exist; what is out there already?
        - 2. What data do they contain?
        - 3. What do we still need?
        - 4. What can we do to fill the gap?
      - c. Do gap analysis to ensure following are supported:
        - i. Assessment of status quo
        - ii. SLM practices repository
        - iii. Observatory on Risk – Risk Based Management Approach
- A possible Charter of Water Rights

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<sup>13</sup> All references found at the end of the document

<sup>14</sup> All references found at the end of the document

<sup>15</sup> All references found at the end of the document

#### 4.4. Implementation/Resources

Viability of these measures and development/implementation of the plan rely on resources being adequate and reliable. It is therefore vital to integrate measures as much as possible with actions already undertaken, and co-ordinate them to ensure efficient use.

One channel for this is through its routine review of the NAPs. The UNCCD could verify the content of the *National Action Plans* (NAPs) in relation to water, and the consensus on the proposed integrated water scarcity policies and could promote specific new initiatives on water.

There is already international support for Agenda 21<sup>16</sup>. This should be channelled on development initiatives that increasingly incorporate their actions to meet the various outcomes of this agenda with a streamlined plan.

Better understanding of the issue that results from ongoing negotiation will help to improve resource use. For example, progress on MDGs must be re-evaluated, using measures that capture actual progress towards the intended goals. Consideration of the objectives of the proposed Global Plan will assist in avoiding getting “lost” in proxy variables.

The UNCCD (after long hard work and missions of a panel of eminent personalities) saw land degradation adopted as a Global Environmental Facility GEF focal area in 2002. Although water scarcity is already positioned to benefit in part from the support of this fund under the issue “balancing competing uses of water resources” as a component of the “International Waters” focal area, recognition of land degradation as a focal area represents a significant opportunity: The GEF’s stated interest in financing land degradation activities comes from “the nature and extent of its link to global environmental change” so that “projects cut across the [focal areas biodiversity, climate change, international waters, and ozone depletion] to address land degradation.”<sup>17</sup> To this extent, initiatives to prevent and control land degradation already use an integrated approach such as that which is needed to include and further the issue of water scarcity.

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| <p>8) Concentrate funds, policies and initiatives in the most vulnerable drylands (water scarce ecosystems) such as those in Sub-Saharan Africa. The UNCCD may do so in the following way:</p> <ol style="list-style-type: none"><li>a. Provide advice, information and capacity building</li><li>b. Alignment of 2<sup>nd</sup> generation NAPs</li><li>c. Mobilize and channel resources through Global Mechanism</li></ol> |
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All references found at the end of the document

<sup>17</sup> GEF [http://www.gefweb.org/projects/Focal\\_Areas/focal\\_areas.html#land](http://www.gefweb.org/projects/Focal_Areas/focal_areas.html#land)

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## FOOTNOTES : WEB-BASED INFORMATION SOURCES

<sup>1</sup> UNFCCC [http://unfccc.int/essential\\_background/convention/background/items/2853.php](http://unfccc.int/essential_background/convention/background/items/2853.php)

<sup>2</sup> CBD: <http://www.cbd.int/convention/articles.shtml?a=cbd-02>

<sup>3</sup> IFPRI [www.ifpri.org/pubs/abstract/133/rr133.pdf](http://www.ifpri.org/pubs/abstract/133/rr133.pdf)

<sup>4</sup> UNHCHR: <http://www.unhchr.ch/development/poverty-02.html>

<sup>5</sup> IPCC: <http://www.ipcc.ch/ipccreports/ar4-syr.htm>

<sup>6</sup> APFED: [http://www.apfed.net/dialogue/pdf/200901\\_biodiv/0glowka.pdf](http://www.apfed.net/dialogue/pdf/200901_biodiv/0glowka.pdf)

<sup>7</sup> “Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation” <http://www.un.org/millenniumgoals/enviro.html>

<sup>8</sup> UNHCR <http://www.unhcr.org/protect/3c0762ea4.html>

<sup>9</sup> UNCHR: <http://www.unhcr.org/protect/4901ebf12.html>

<sup>10</sup> UN : [http://www.un.org/esa/dsd/dsd\\_aofw\\_wat/wat\\_index.shtml](http://www.un.org/esa/dsd/dsd_aofw_wat/wat_index.shtml)

<sup>11</sup> UN: <http://www.un.org/apps/news/story.asp?NewsID=26662&Cr=sustainable&Cr1=development>

<sup>12</sup> *Greenwater is soil water originating from rainfall, and represents the fraction of rainfall that it stored in the soil and available for the growth of the plants. Bluewater is water found in surface water bodies and renewable groundwater in aquifers, and comprises one third of the world’s basic water resources. On average, greenwater fluxes are twice as large as those of bluewater.*

<sup>13</sup> Partnership of DIVERSITAS, IGBP, IHDP and WCRP

<sup>14</sup> UNHCR: <http://www.unhcr.org/protect/PROTECTION/3b03d9a94.html>

<sup>15</sup> WMO: [http://www.wmo.int/pages/prog/hwrp/index\\_en.html](http://www.wmo.int/pages/prog/hwrp/index_en.html)

<sup>16</sup> UN: <http://www.un.org/esa/sustdev/documents/agenda21/index.htm>

#### **ENDNOTE**

By the Author

A draft mid-term report was prepared and discussed at an informal meeting held during the UNCCD CRIC 7 in Istanbul, Turkey, in November 2008. After CRIC 7 the comments received on the report were integrated into the draft document that was later posted on the UNCCD website and circulated to the UNCCD national focal points. A lot of comments were received. All comments were carefully evaluated and integrated into this final version.