Interview with Stefan Uhlenbrook,
Director of the Hydrology, Water and Cryosphere Branch of the World Meteorological Organization (WMO), Director of the Secretariat of the Water and Climate Coalition.

WATER AT THE HEART OF CLIMATE CHANGE
FOR A SYSTEMIC APPROACH

*In an interview for Confrontations Europe, **Stefan Uhlenbrook**, Director of the Hydrology, Water and Cryosphere Branch of the World Meteorological Organization (WMO), Director of the Secretariat of the Water and Climate Coalition, sheds scientific light on the close relationship between water and climate change.*

♦ **In the frame of this discussion on the relation between climate change and water management, it is important to note that the year 2023 has been the warmest year on record. Each year and each decade have been warmer than the previous ones. Could you delve into what are the current and forthcoming repercussions of climate change on water?**

Stefan Uhlenbrook : In general, it is true that we tend to break every temperature record one after the other. Hence, last year was the warmest year on record for the global annual mean in temperature. Since the 1980s, each decade has been warmer than the previous one. The past nine years have been the warmest on record.

The global annual mean of temperatures depends on the Niño and the Niña signal. Usually, during la Niña, we should have a globally cooler situation. This situation does last until the middle of the year, before turning into El Niño conditions, which further strengthens the temperature increase. Therefore, with this shift from cooling La Niña to warming El Niño, this year could again break our record in temperature and be even warmer. Looking closer at the period between January and February 2025, we notice that it has been especially warm and dry in many parts of the world.

In Europe, the effects of this period of drought were particularly strong, especially in the northeastern part of Spain. At this time of the year, we should be seeing significant rainfall, which would help to fill in the rivers and store water for the next period. However, these reserves are recorded at dramatically low levels.

Focusing on the European continent, we may highlight **the Mediterranean zone,** where in the next ten years, the predictions are expecting very dry periods like in Spain, Italy, the South of France, Greece or the eastern part of the Mediterranean due to the repercussions of the North of Africa. This obviously represents a major challenge for people and cultures. Furthermore, in this area, we have also recorded hard rainfall events, as for example, in Greece and Libya, because of the formation of a cycle with similar characteristics to a tropical cyclon. These kinds of phenomena happen because of the especially warm Mediterranean Sea, where **we notice a meteorological phenomenon that we should not normally observe in that part of the world.** However, again, in the few years, these kinds of events might happen more frequently.

Then, another type of geographical area particularly affected by these changes is **the high mountain regions of Europe**, like the Alps, parts of Scandinavia and parts of the Pyrenees. At first glance, we can see that snow is becoming increasingly sparse. If you have less snow, you have less water stored in the mountains and then available in the coming summer because normally snow and ice are accumulating in the high mountain regions of Europe before their depletion in the spring period. And this is happening less and less because in the recent period, considering the abnormal warm temperature, we may have in wintertime rain even up to two thousand meters... It also means less storage of water, which is terrible for ecosystems but also for energy or long-term water irrigation.

In many European countries, particularly in the South of France, Spain or Italy, an important part of the agriculture production system is relying on irrigation systems, a sector which withdraws around 70% of all withdrawals of water resources. Hence, if one depends on an irrigation system, one also depends on the water taken from rivers and groundwater. Therefore, on one hand, one needs more water because it is increasingly dry in the summer and on the other hand, one has less and less water available for other uses and users. Furthermore, more water scarcity is predicted in many parts of the world. For instance, many regions around the world are facing water stress, with over 50% of global catchment areas and reservoirs displaying deviations from normal conditions in 2022.

♦ **Based on the scientific studies and observations led and gathered by the WMO, to what extent has climate change already impacted both hydrological system and people in Europe?**

S.H : When looking at the direct consequences for people, we have experienced heat waves going above 40-45 degrees, where it is very difficult for human beings to function, especially for elderly people and people with cardiovascular problems. It is a situation where you need a sufficient water to mitigate the negative effects, however, heat waves are often accompanied by water scarcity. In a nutshell, climate changes are related to the changes in the hydrological system, and these elements combined are heavily impacting societies and economies.

We may also look at groundwater issues. In many parts of the world, the groundwater tables are declining because of overuse. We are seeing that in a dramatic way in India or in Pakistan but also in Europe, including in France, Spain or Northeastern Germany.
In the EU, groundwater supplies are critical for drinking water and water for agriculture and industries. However, when too much water is pumped out of the groundwater, the process is unsustainable. As you are taking more water out of the system than naturally flows back every year, the water balance is out of balance, and the storage goes unavoidably down. We are seeing this ratio being exceeded in many parts of the world. We may also consider its consequences on the subsidence of the ground and its impacts on stability of houses and infrastructures.

♦ **As Director for Water at the WMO, you are also head of the Climate Coalition, a community of multi-sectoral actors founded in 2020 to ask for an integrated water and climate Agenda. In your opinion, to what extent were water-related issues taken into consideration during COP28?**

S.H : First, we can observe that the world is increasingly understanding the issue of water as highly interlinked with climate change. We have already observed this raising awareness during the COP 27 in Egypt in 2022 where the problem of water resources and management was a prominent theme both in climate adaptation and mitigation. We have seen this approach again in December 2023 during COP 28 where the question of water was even more visible. Water is really a transversal topic. For instance, for climate mitigation, we need to think about energy transition. However, you cannot do it without considering the need for water.

We clearly need to change our sources of energy. However, when thinking of alternatives to fossil fuels, we should consider the use of water in them and how to manage water in this crucial transition. Thus, we need to think about an integrated approach asking how we are producing energy considering the water resources we have.

♦ WWC supports the development of global water information services. In what way are the data of the hydrological services vital for better water management?

S.H : We need to highlight two fundamentals. Every water management system needs information data in support, and water resources are peculiar for not respecting boundaries. As a global organization, one of our objectives is to create connections between regions, and a real exchange of information between them [1]. For some regions, the challenge is even to help mitigate conflicts. For instance, if two regions share the same groundwater or surface water bodies, the scarcity of resources can create or intensify tensions and rivalries. Having the same knowledge and data is one of the first steps to discussion and agreements.

Within the European Union, most countries have the means to collect and analyze data. Our role is therefore more to offer expertise, particularly in establishing common definitions and standards to facilitate comparisons (the ways of collecting the data, to store them, to make it accessible for decision making and ideally all stakeholders …). Once again, the idea is here to facilitate data analysis and encourage cooperation on a subject that knows no borders. In regard to that, European agencies and research programs are really a cornerstone in this path, with crucial cooperations such as Copernicus.

♦ The European Economic and Social Committee launched a call for a EU Blue Deal and the Commission will soon present its Water Resilience Act for the new term. What do you think about these initiatives?

S.H : These initiatives are absolutely crucial, and it is excellent news that the European Union is grasping the importance of water resource management as a key part of the fight against climate change. As we have said before, irrigation, water ability and energetic transition are some examples where water management is a cornerstone to further development. We have seen a certain focus on technology and innovation to achieve this, and of course this is necessary. **However, another fundamental pillar that I would like to highlight is the constant need for greater social innovation. People have to be stakeholders in transitions and in the management of resources.**

[1] Today, 60 % of WMO Member States report declining capabilities in hydrological monitoring and thus in the provision of decision support in the water, food, and energy nexus. More than 50 % of countries worldwide have no quality management system for their water-related data in place. Only about 40% of countries worldwide have good flood and drought early warning systems operational.

The European Union can really facilitate this process, particularly where the management of water resources requires substantial investment and in order to facilitate changes in practices, such as changes in crops, as we said earlier.

We may have this transition only if society is fully involved in it. This will be done in particular by means of alert systems that include people because they have the information and the awareness to act.

I will give you an example: two years and a half ago, we had major flood in Germany, where at least 200 people died. This seems astonishing in a country like Germany, which has one of the best data systems and prediction models... However, this disaster allows us to identify a vacuum; the technical part was indeed well-developed, but the social and governance pillar was not efficient enough. Information was not properly conveyed, and preventing action was therefore not efficient. In general, it is always cheaper to invest and act now than after the destruction.