

Water Learning Webinar - Questions and Answers

Q1 What are the processes involved in purifying ground water and making it fresh? Prof. Re, is it advisable to use sea water for maybe other domestic activities other than drinking in a region where ground water is not readily available or something needs to be done before the water can be used?

Sea water can be used for some domestic activities, if the salinity do not create any issue, otherwise desalination may be required. As Prof. Olago mentioned, this can be a quite costly and energy demanding process, so it may not be efficient in all countries/regions. An alternative option can be rainwater harvesting, but also in this case some treatment may be required if it is planned to use for drinking purposes.

Q2 How can clean water get mixed with oil, for example as happened last year in Mexico?

Perhaps this was resulting from an oil spill from the oil industry.

Q3 Climate change is manifesting itself in terms of increasing rainfalls. Why is the situation in the deserts not getting better?

This question was answered live.

Q4 How sustainable is to desalinate the over 90% sea water and having it piped to water scarce areas?

The main challenge for having desalination be sustainable is energy supply. It takes a lot of energy to desalinate water and also to transport it in pipes (because water is heavy, a lot of energy is needed to pump it through pipes). Energy can be expensive and also there are concerns about greenhouse gas emissions depending on what type of energy source is used. There must also be a plan for what to do with the salty brine that is produced as a by-product of desalination. So, desalination can be a good solution in some places but it depends a lot on the type and cost of energy being used, and also the options for disposing of the brine.

Q5 Does the water cycle take place differently in different countries? (Prof. Ellen and Prof. Wilfried, does deforestation not influence rainfall?)

Yes, absolutely! Wilfried talked about topography and moisture sources in Cameroon. In East Africa, the Indian Ocean is very important but there is less of an influence. There are also fewer forests there which have a local impact on the rainfall - however there are some deep groundwater aquifers!

Q6 Water is neither created nor destroyed. Then, why do water shortages occur in the environment? Boreholes are considered a good source of drinking water. What will be the long term effect of constructing so many boreholes in an area? Why is it that during the rainy season in Cameroon, we still experience a month or some weeks of dryness, as though it was the dry season?

This question was answered live.

Q7 Can the volume of ground water reduce or will its temperature get warmer or colder with climate change? After using large quantities of ground water, is it possible that it will get finished?

This question was answered live.

Q8 Global warming is a really big problem both locally and globally. Is there any way that it can be stopped permanently and, if yes, how can it be done rapidly?

Global warming can't be stopped, it is a natural process. The current issue with global warming is its speed driven by human activities. The main action to reduce global warming is to reduce greenhouse gas emission. Even if they were no emissions from today onward, the climate system would continue to warm because dissipation of some gas already in the atmosphere will take several centuries.

Q9 Some countries in East Africa have been experiencing flooding for long. An example is South Sudan – there were plans of dredging the Nile River but some experts said it would damage ecosystems. What could be the solutions since many people have been losing their lives and properties too?

There are a number of ways to control flooding, including damming of rivers. However, there are also passive ways by which we can avoid disasters related to flooding, including not building settlements in river floodplains.

Q10 How are we sure of the purity of glacier water?

Researchers may have analysed these waters, so the information may come from chemical/biological analyses.

Q11 How can rainwater be made available for consumption?

Direct rainwater collection is possible - but it is important to make sure that this is a clean source of water. As Prof. Olago said, groundwater is also a source of filtered rainwater.

Q12 How does human activity impact the water cycle?

This question was answered live and complemented by one of the participants: Development of urban areas have also reduced the amount of water that can infiltrate into the aquifers as recharge.

Q13 What climate information is useful in managing the water cycle?

Many different types! To know when the rainy season might start for farming or water collection you might be interested in a forecast or forecast model. To understand how forests influence the cycle you could use a model to calculate a recycling ratio (Wilfried's work) to know how much rainfall comes from forests. You might also want to know when extreme rainfall might change from a climate model - this can help you understand how groundwater is recharged and help you manage that recharge and make sure it isn't polluted. You would ideally have some information about all parts of the cycle so you can understand how they interact - and if you have a model, experiment with management decisions.

Q14 Why do water shortage occurs?

This can happen for a number of reasons. A climate reason could be a drought - for example, there has been a long La Nina which caused massive water shortage in East Africa. Sometimes groundwater can be over extracted so that water source is no longer useable. Sometimes water shortages happen because water is too polluted to use safely. Infrastructure problems or damage can be another reason for a water shortage. Some are physical reasons and some are socio-economic.

Q15 In your research on sociohydrology, what is the cultural value placed on water? How come some communities living in water scarce areas don't adopt sustainable practices like rainwater harvesting, recycling of water at the household or community level?

In each country/region we may have different cultural values. For example, in some places water is sacred, in others there may have special traditions related to it. So, if we can take into account these aspects, that sometimes we tend to forget, we may resort to [be able to develop] traditional practices (which can also be sustainable, such as rainwater harvesting) to protect groundwater. By re-connecting with the water cycle, we can also make sure not to waste water and ensure access to all.

Q16 After seeing the issue of climate change, some countries started to mitigate and adapt to this problem. It is difficult to know if the groundwater is polluted. What is your suggestion on this?

Chemical analyses of major elements may allow us to know if waters are polluted. These analyses are often done in many laboratories all over the world (many also in universities). The same for microbial analyses. This may be the first step needed to know more about the quality of groundwater.

Q17 Can groundwater be found in the desert? How do we determine the area and depth to dig in order to obtain water?

Yes. The largest aquifer in Africa is the Nubian aquifer that has an estimated groundwater storage of about 0.5 million cubic kilometers! It was last recharged between 5000 to 10000 years ago and is therefore considered to be fossil water. To determine where to drill for groundwater, we carry out a geological survey to determine what types of rocks occur in an area and their trend and orientation, and we also use geophysical methods (e.g. electrical resistivity surveys) to determine at what specific depths we are likely to encounter groundwater. Following that, we then do the drilling to that level.

Q18 How is understanding the water cycle important in our lives?

Understanding the water cycle is very important for planning for the future at short and long timescales. If you are a farmer you might want to know when to plant crops, and which kinds of crops to plant. Sometimes knowing about extreme variability in the water cycle is important for warning about dangerous events or planning for disaster management support after dangerous events like a flood or a big storm. Perhaps you are a city planner or you are building a house and you want to avoid flooding. At a large scale countries want to be able to plan investments that won't be damaged by variability and change in the water cycle in future.

Q19 What are the field of jobs (careers) of socio hydrogeology?

People who are trained in sociohydrology often work in research. They might also have careers as consultants, water policy-makers, or they might work with non-governmental organisations or development funding agencies who are involved with water projects.

Q20 Does the water cycle takes place in the desert?

It is taking place everywhere all the time. In a very dry place there will be a much smaller amount of water transported through the processes.

Q21 What are the different methods by which groundwater can be obtained?

A borehole can be drilled into the earth and a handpump or electric pump used to raise the water to the surface. People can also dig wells by hand.

Q22 Why is it that a particular area will experience high rainfall while others will experience severe sunshine?

This can be because of the amount of water available for rainfall. If there is no evaporation locally, or there is no moisture being transported into the area it is unlikely to rain even if it is sunny. If you are interested in storms and why it might be raining on one side of the city and not the other - these climate features can be very local and they can move due to wind as well. That is one reason why storms are so hard to model in a realistic way.