

# Dealing with Droughts

Report of workshop during NCR days 2008

Summary by E. van Beek<sup>1,2</sup>

<sup>1</sup> Deltares, PO Box 177, 2600 MH Delft, the Netherlands, Eelco.vanBeek@Deltares.nl

<sup>2</sup> University of Twente, Faculty of Civil Engineering, PO Box 217, 7500 AE Enschede, the Netherlands

## Introduction and objective

As mentioned in the key-note drought issues are expected to increase in importance as a result of climate change. Droughts are often associated with desert like conditions in Africa but also in Europe droughts occur. Given the socio-economic values involved and the fact that measures to prevent droughts are very costly, droughts may in future even get a higher political weight than flooding, also in Europe. This will certainly be the case in countries where droughts are now already important socio-economic issues such as in Spain and Italy.

Some NCR partners are already involved in drought related research but much less than in flooding research. The question arises if NCR should pay more attention to droughts and if so, how and who should be involved. These questions were discussed in this workshop. The workshop started with two introductory presentations, one about the Netherlands by dr. H. Berger and one about developing countries by prof.dr. H.H.G. Savenije. Based on these presentations a plenary discussion was held. The workshop was attended by 26 participants.

## Droughts in the Netherlands

**Dr. H. Berger**

**(RWS, Centre for Water Management)**

The Netherlands has in general sufficient water. The precipitation deficit in summer is at average about 100 mm and most of this deficit is available for the plants from soil moisture. Moreover, the Rhine River supplies huge quantities of water to the country, also during dry years. However, most of this Rhine discharge is needed to push back the salt intrusion in the Rotterdam Waterway and for flushing of the polder-boezem systems. On top of that not all of the Netherlands can be supplied with this Rhine water; in particular the higher areas in the East and the South of the country lack the necessary infrastructure. This means that during dry years such as 2003 and 1976 droughts do occur also in the Netherlands. Some of the new KNMI climate scenarios predict that these shortages might occur more often in future. In the so-called W+-scenario the dry year 2003 will become the average situation. Both the farming and shipping sectors have expressed that these sectors will have to take major adaptation

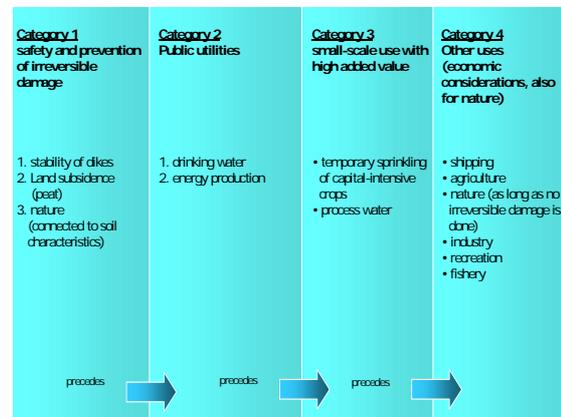


Figure 1. Priority list droughts in the Netherlands

measures, if this scenario would indeed become true.

During periods of drought a National Coordination Committee on Water Distribution (Landelijk Committee Watervedeling - LCW) advises the responsible authorities on operational measures to be taken. These measures follow a priority list of water allocation as presented in Figure 1.

This priority list aims to reduce the overall damage to the country.

The Dutch government is of the opinion that droughts are likely to become more important and for that reason has initiated an applied research project to make the water supply in the Dutch climate change proof. The main purpose of that project is to develop a feasible water policy in which supply and demands are again in balance, also during dry periods. Research questions have been derived that need to be answered. NCR is invited to address these questions.



Discussion between two of the key figures of the Droughts workshop

## Dealing with droughts in developing countries

**Prof. H.H.G. Savenije (TUD)**

Droughts in Africa are the classical examples of what can go wrong during dry periods if insufficient measures are (can be) taken. Many African climate zones show clear meteorological and river discharge variabilities, both within years and over years as illustrated in Figure 2 for the Zambezi. These changes in time are significant and subject to a lot of research. What gets much less attention is that as a result of land pressure people are migrating into other climatic zones and other landscapes. This means that we have to deal with change of quantity in time and space expressed as follows:

$$dQ = \frac{\partial Q}{\partial t} dt + \frac{\partial Q}{\partial x} dx$$

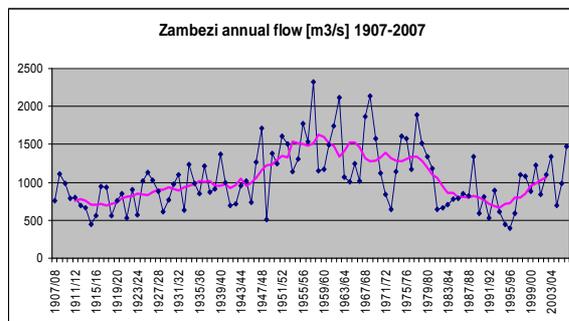


Figure 2. Zambezi long-year flow patterns

The main message of the presentation was that as a result of increasing land pressure land use will change, the discharge regimes will change (sharper flood peaks, less low flow), upstream withdrawals will change and there will be changes in partitioning, storage and function. It is argued that all these changes are more important than climate change.

Some coping strategies were presented that are applied in such systems. These typically rely on so-called "Smallholder System Innovations" which include rainwater harvesting techniques, minimum tillage and an irrigation technique that is locally known as "Fanya Yuu's". The approach in Africa is clearly different from what is applied in Europe but lessons can be learned and research need to be carried out to develop these systems further.

## Workshop discussion

**Chaired by E.C.L. Marteiijn (RWS)**

The main questions to be answered in the workshop were:

1. Do we consider drought an important research topic for NCR? and if so What actions should NCR take to stimulate this?

The discussion started with an inventory with all kind of aspects that should be addressed in drought research. Participants indicated a strong need to know more about the economic aspects involved and about the vulnerability of the system. So far damages included are only the direct costs, e.g. for the shipping sector. It was recognized that the indirect costs might be much bigger, e.g. for the industry if insufficient supplies can be delivered because of the transportation problems.

With respect to agriculture in the Netherlands it was concluded that compared to Europe the Netherlands is less vulnerable to drought because of the high groundwater table and the abundant water supply. Increased prices at the European market will outweigh the less production and as such drought could be good for the Dutch economy as a whole. This means that besides looking for solutions to avoid damages, we should also look for opportunities, i.e. develop tailor made solutions. It means also that a clear distinction should be made between a financial (cash-flow) and an economic analysis. Opportunities could include the use of Remote Sensing techniques for operational uses. WaterWatch has already carried out pioneering research in this subject.

In general it was concluded that compared to flooding we know very little about the physics and economics of droughts. Lessons could be learned from the recent 2003 drought and the somewhat older but even more severe 1976 drought. At the other hand we should not only look at individual years but look at longer time series. This ultimately could lead to the development of a 'drought risk approach' comparable to the flood risk approach that received a lot of attention in NCR. Several links with other subjects were mentioned, in particular energy and water quality. Water quality is in particular addressed in the Water Framework Directive (WFD) and the basin approach of the WFD is also needed to deal with droughts.

## Conclusions and recommendations for NCR

The general conclusion of the workshop was that drought is indeed a promising research topic for NCR and that NCR should develop activities to stimulate such research among their members. That research includes physical topics (understanding the issue), the economics involved and possible adaptation measures. To include climate change it will be needed to increase the cooperation with KNMI.

For the economic aspects it will be needed to invite more economic oriented research institutes such as IVM of the Free University (VU) to join in the research. Cooperation with PBL (Planbureau voor de Leefomgeving) is needed to derive consistent economic and spatial planning scenarios. NCR is challenged to pick this up, using their extensive experience with similar research on flood risks.



*Impression of the lively discussion during the various breaks*

