The results can be applied in the following fields:

- agriculture (irrigation and drainage, desalination of soil)
- housing water management (water supply and sanitation)
- erosion control
- flood protection
- water balance
- nature conservation (establishment of borders for marshlands, nature reserves, national parks)
- energy industry
- rural and urban measures (road construction and construction of unclassified roads, sewerage system)

We are planning to make these data and analysis available for planning projects to following parties:

- Relief organizations
- Organizations of development cooperation and their partners
- Involved countries

Sustainability

If precise knowledge about water resources is available, negative consequences for the environment through ignorance and mismanagement can be avoided in future project plans. Sustainability of the project is given because, e. g.

- it has no negative effects on nature or ecology
- it enables a lasting management of water resources
- the operation of the measuring net will continue even in times of crises, since data is transferred via satellite
- it will enable a higher planning security and lasting project success
- reliable hydro-meteorological data enables active planning
- an active agricultural economy helps avoid malnutrition and incorrect feeding as well as resulting illnesses

Conclusions

- The project requires constant work over years. Collection of data of at least five, or preferably ten years have to be analyzed to give convincing results which can be made available. The statistical confidence increases year by year.
- In a world of fast success it is the more urgent that this work can begin immediately. For every day without measured data is a lost day.

Institute Water for Africa

Responsibility for the Life Source Water

Data Shortage in Africa

Africa isn't only suffering from water shortage but also from data shortage.

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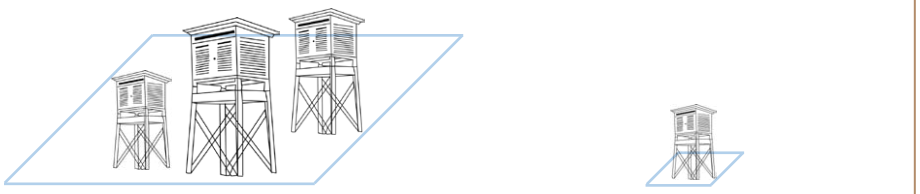
Actual state

Compared with the western world, African countries cannot fall back on a cross-country hydro-meteorological measuring net, covering all needs and supplying them with data for a lasting management of water resources, water supply, agriculture, generation of energy and protection against erosion. Where data is entered, it is often not centrally stored, made accessible or analysed.
Usable water deposits are often not recorded in quantity, quality or in spatial and temporal distribution. The negative effects of insufficient data can only be avoided on a long-term basis. Inadequate data often has many of negative effects:

- Wells are drying up when too much water is withdrawn.
- Ground water levels are reducing due to unknown ground water recharge, evaporation, precipitation, run-off and geology, resulting from too greater water withdrawal.
- Dying vegetation is resulting in harvest losses and increasing desertification, since the depth of groundwater is rising due to sinking ground water levels.
- Slums and streets are flooding due to bad planning caused by lacking precipitation data.
- Reliable precipitation data for the planning of dams, e.g. in irrigation projects, is missing.

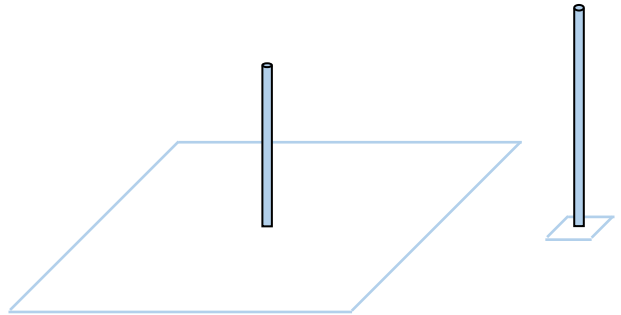
Comparision of covered area per WMO weather station in Africa and Germany



Area per WMO weather stations in Arfrica: 27,347 km²
Number of WMO weather stations in Africa: 1,108

Area per WMO weather stations in Germany: 1,244 km²
Number of WMO weather stations in Germany: 287

Comparision of covered area per gauging station in Africa (without Sahara) and Germany



Area Arfrica without Sahara: 21,300,000 km²
Gauging stations: 888

Area Germany: 357,114 km²
Gauging stations: 1,150

Aim

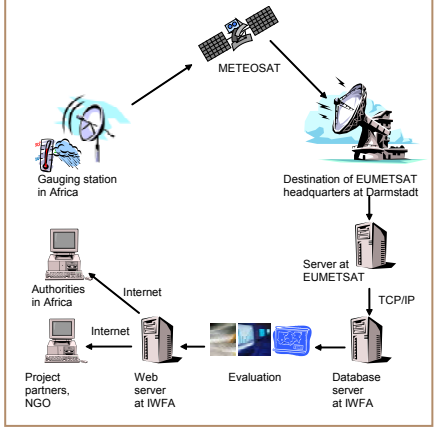
The aim of the project is to set up a cross-national hydro-meteorological measuring net of sufficient density, that is raising data continuously. It will consist of meteorological, hydrological and water level gauging stations.
Cross-national measured data is stored in a central database and analysed statistically, so that every area can be supplied with applicable data for water resources management calculation. The project will provide the preconditions for sustainable water resources management, in making available quantities and figures for water resources management planning.

Meteorological gauging station

Meteorological gauging stations will have to consist of the following sensors at least, to measure parameters necessary for calculating water resources management quantities such as precipitation and evaporation:

- rain gauge (measuring of precipitation)
- pyranometer (measuring of global radiation)
- sunshine duration sensor (measuring of sunshine duration)
- wind speed sensor (measuring of wind speed)
- hygrometer (measuring of relative humidity)
- thermometer (measuring of air temperature)
- albedometer (measuring of reflexion radiation)

The way of data from the collection to the usage for projects



Hydrological gauging station

As ground water levels are dependent on time and place they will be analysed for problems which demand examination with regard to time and space.
A ground water gauging station consists of a ground water data-logger with capacitive measuring cell.

Water level gauging station

Water level at rivers is measured with a water level gauge. The outflow in rivers can influence ground water levels or be influenced by it. For this reason discharge is an additional quantity in hydrological balance.

By employing solar panels and satellite transmitters, gauging stations can also be used in remote areas. Each station transmits the measured data to the satellite hourly, which transmits it to the destination station. From there the data can be transferred via the internet into the database in the office of the Institute Water for Africa.