United Nations/Austria/European Space Agency Symposium on Space Applications for Sustainable Development to Support the Plan of Implementation of the World Summit on Sustainable Development

"Water for the World: Space Solutions for Water Management"
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REPORT BY THE CHAIRPERSON

"Water, Sanitation and Health"
Chairperson: Dr. R. R. Shrestha (Nepal)
Presented by: Dr. E. Engman (USA)

1. "Satellite Remote Sensing of Water Resources: Applications for Predicting and Monitoring Diseases" by Ted Engman, Goddard Space Flight Center, NASA (USA)

Remote sensing (RS) has been used to derive a number of water resources variables, either directly or indirectly. Remotely sensed data has also been used for monitoring, surveillance and risk mapping of water related diseases. These applications are based on water resources variables such as vegetation, humidity, standing water, soil moisture, etc. In general, the successes of using remote sensing for disease monitoring and prediction depend upon observation of surrogates, not direct observation of conditions. The distribution of vegetation types integrates the combined effect of rainfall, temperature, humidity, topographic effects, soils, water availability and human effects. Past applications have been predicated upon the spatial and temporal distribution of vegetation types and conditions for predicting and monitoring diseases.

There is no one spatial, temporal or spectral resolution that is ideal for understanding the transmission risk for any one disease. However, newer satellite systems that are currently in orbit or about to be launched offer a new capabilities for the prediction and monitoring of diseases. However, an even more promising remote sensing based technology in the form of four-dimensional (4D) data assimilation needs to be considered for this application. Four-dimensional data assimilation incorporates a variety of land based data (in situ, rainfall radar, weather stations, etc.) in addition to the satellite measurements. These various data are merged with various interpolation schemes to produce grid values of land surface variables associated with water resources. These in clued rainfall, soil moisture, temperature, humidity, etc. at grid scale as small as one km and time scales as small as one hour. These new model data products offer a new capability for disease monitoring and predictions.

2. "Water, Sanitation and Health: needs of developing Countries" by Johannes Buckle, Water Cycle Management Strategist, Rand Water, South Africa.

The paper gave background information about the water situation in the economic heartland of South Africa, the Gauteng Province. Rand Water was 100 years old in 2003 and supplies potable water in bulk to 13 municipalities and 3 metropolitan municipalities over an area of 18 000 square kilometres. In all, 10 million people are served with water which is of the world class quality.

The paper pointed to the water wastage that is experienced in the reticulation networks of the municipalities but much more so on private properties. The latter happens because of widespread non payment for services. If one does not pay for services such as water, one would not repair a leaking tap or toilet cistern. This wastage amounts to 27% of what Rand Water supplies daily – about 1,2 million kilolitres per day.

If this wastage can be addressed, further expensive augmentation could be deferred.

The paper gave an insight into Water Cycle management as practiced by Rand Water. Water Cycle Management is a cluster of strategies that can be used for the equitable and sustainable management of water resources. One of the cluster of strategies is Water Demand Management. The latter is again made up of different activities that can be utilised to intervene in water consumption:

- Technical interventions (this is the search and repair of leaks, installation of water meters and sectorising of areas for better management of the network, amongst others);
- Policy and legislation (this is needed to strengthen the institutional backing of efforts in Water Demand Management);
- Financial interventions (typically one would use rising block tariffs for implementation of Water Demand Management and also have good governance in the delivery of services);
- Awareness and education (no Water Demand Management intervention can be successful if this aspect is neglected – a continuous campaign is needed to change habits.)

The paper also pointed to the fact that there must be synergy between the amount of information that is available from space technology and getting same information to the real users of such information. It shows also how Rand Water has for some time utilised the long term weather forecasting from the International Research Institute to assist in 3 to 6 months forward planning as well as to try and track El Nino events which affect the weather in south Africa to a large extent.

3. Recommendations

Workers in the public health community need to be aware and attempt to use data from the newer satellites for disease monitoring and prediction. But even more importantly, they need to be aware of the potential products from 4D data assimilation which have the potential for vastly improved spatial and temporal data related to water resources and the conditions controlling disease outbreaks and transmission.

Data and data products derived from the remote sensing community need to be distributed to all levels of society so that each person can understand the conditions and limitations of water resources. Water managers need to be made aware of the availability of and access the short and medium term climate predictions and introduce these into their overall annual planning.

Scientists and players in the space applications field need to disseminate information not only between scientific institutions, but also to the implementers at the operational level where interventions are needed to, for instance, turn around disasters like the lakes Chad and Aral.