Session DD 2.2: Freshwater availability under sealevel rise and climate change: Fresh water supply and salinisation in developing countries

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In the Khulna region salt water is coming further inland, stated Asif Mohammed Zaman. Salinity peaks in summer and than flushes out during the monsoon. On yearly average the salinity is 140 days above the threshold for freshwater supply (1 ppt Chloride). The Asian Development Bank started a project to make salinity projections under climate change up to 2050. Integrated socio-economic and climate scenario's were developed, feedbacks were excluded. They used 3 models, a regional climate model (RCM), a salinity model and an urban drainage model. Data collection included physical but also socio-economic variables. The results: fresh water inflow slightly decreases but not significantly. However, the salinity levels increase significantly in the region under business as usual and more rapidly under climate change scenario's. They focused on 15% probability values: the number of days that the threshold (1 ppt chloride) is exceeded. Measures for solutions were evaluated by cost benefit analysis, also social criteria were included. The best option was the construction of a pipeline (based on economic and social criteria) and reallocation of some inlets. A fresh water reservoir was more expensive and a lot of people would have to move. Recently also new research was started at Dhaka for underground (aquifer) storage of rain water. The preliminary idea is to catch rainfall from the roofs.

Zahidul Mamun presents an NGO action programme for water supply in a disaster-prone area, the coastal zone of Bangladesh. Local people have to cope with cyclones, salinity intrusion and flush floods. In a new study it was stated that there are 4.5 million Climate Refugees in Bangladesh. The objective of the NGO is to develop Disaster friendly water and sanitation measures. The project is paid by governments and international NGO's but also by some private entrepreneurs (for example Coca Cola). The action programme wants to provide water and sanitation facilities at schools and promotes 'community based water supply'. Zhidul showed pictures of very simple measures to improve sanitation infrastructure at community/house hold level, such as pumps (without electricity supply) to pump water to reservoirs that are above the flood level. Up to fifty people can make use of such a pump. They developed a calendar with options for disaster proof water sanitation and distributed that among the local people.

Wouter Wolters: Egypt is a gift of the Nile, 95% of the people live on 5.5% of the land, the delta. It is a challenge to maintain the current agricultural land in operation. Agriculture is the main water user (>80%) but drinking water and Industry have higher priority in the water management. Egypt faces the following challenges: population increase, expansion of agriculture and economic development. Fresh water demand exceeds supply. The presented project includes a Dutch-Egypt co-operation, that started in 1976. It started as a technical project. However, currently the project also includes policy advise and training programmes. Water quality is a major issue in Egypt. When the water quality is bad, water scarcity is high.
The water supply in Egypt is 55.5 BCM (Nile) and 1.3 BCM (precipitation). Climate change impacts include floods, droughts, sea level rise and deterioration of water quality. In the Nile basin a 10% rainfall reduction results in 30% lower river discharge (Nile). In the scenarios water for agriculture may remain stable, increase or decrease. However, we should take into account that there are limited options to cultivate more agricultural land. Productivity should increase but also import of food is necessary.

Mohammed El Bastawesy used satellite images to map the water ditches and the land use. The maps make a distinction between irrigation and drainage ditches. Some ditches disappear during time (silted up). Farmers make alternative ditches. Also "paleo"-ditches were traced down by both satellite images and in situ research.

Those “paleo ditches still influence local hydrology and ground water quality. About 6.1 BCM/yr are annually extracted from the aquifer for irrigation, municipal and industrial freshwater supplies.

Aquifers are a natural storage vessel and a natural mixing vessel, explained Pieter Stuyfzand. A ‘cure all’ because: (1) safe for earth quakes, nuclear waste, etc… The water quality can easily be maintained at a (high) constant level (compared to surface water). ASR can be coupled with geothermal heath exploitation. Aquifer storage can be applied in brackish aquifers. Aquifer water passage/infiltration can replace chemical/physical water quality treatment. Several ASR techniques are applied in the Netherlands, but in other areas in the world it is more used. However, there are also problems: clogging of recharge basins and wells, rise of ground water tables (damage to cellars of houses). It may result into anoxic conditions, and formation of iron-clogs. Another issue is the accumulation of pollutants in (coastal dune) systems, for example heavy metals. We should also avoid the leaching of valuable aquifer compounds such as CACO3, a buffer for acidification. Some leaching processes are speeded up by ASR. Message: Aquifer storage is a very nice solution but… you should do it in a VERY proper way.