Climate Change and the Water Resources: Is Integrated Water Resource Management the answer? – Roland Schulze

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Conflict over the resource of water is an important issue for water stressed environments. Moreover, the sustainable use of water resources is not only essential for both upstream and downstream catchments users, but also important on a regional, national and international level. An integrated approach to water resources management (IWRM) assumes that a successful strategy must meet multiple objectives and will include environmental, economic, social and political outcomes. By linking the management of water across various sectors and users, the possibility to maximise the benefits from water resources can be achieved without adverse impacts on the social and environmental interests.

Strategies and objectives of IWRM

A systems approach assesses the linkages between, for example, humans and nature, water and the land, and the local and national perspective.
An integrated approach provides for a more coordinated and managed approach looking at the catchment and coastal level, and surface and ground water.
A managed approach strives to maximise water resources, minimise negative impacts and balance supply and demand.
The stakeholder approach examines the need for participatory decision making at all levels e.g. from government to individual. This will lead to a partnership approach and an sharing of common objectives.
Finally the sustainable approach will focus on the necessity for equitable access to water resources. There are often compromises to be made between protection and use.

IWRM and climate change

Timescales within IWRM are often on a small scale level due to high intra-seasonal variability and there is a need to capture this variability in daily hydrological models. The process of choosing a suitable model is outlined below:

1. Examine climate scenarios and downscale:
   global climate model -> regional model -> daily hydrological model i.e. catchment.
2. Assign an appropriate hydrological model for climate change including:
   - Landscape component (catchment) – land use, soils, topography, drivers and feedbacks of evapotranspiration.
   - Channel component – the release of water into rivers, changes in the ratio of supply and demand.
   - Wetland and riparian zones – important for streamflow regulation, flood attenuation, water purification, and sediment accumulation. Therefore, providing important ecological goods and services.
3. Use meaningful water management information to provide realistic conditions for relevant stakeholders. In southern Africa the mean (annual mean) is very often

meaningless as there is a huge variability in rainfall from 'big' rain days during the winter months compared with dryer/hotter summer months. Evapotranspiration can be very high in this region especially when compared with European Union countries.

Model: ACRU - an agro-hydrological model designed by *A*gricultural *C*atchments *R*esearch *U*nit, Department of Agricultural Engineering of the University of Natal in Pietermaritzburg - http://www.beeh.unp.ac.za/acru

Additional Dimensions:

1. Water planners cannot make decisions in isolation.
2. Hydrological baselines will shift with climate change
3. There are already existing states of water pressures and climate change is an additional pressure to the current situation.
4. The environment/ecosystems must be considered as a legitimate user.

Adaptive processes and limits:

- awareness of the potential threat
- there must be an intention or willingness to adapt
- active adaption must take place
- better use and quality of water resources could be delivered by a reduction of water system losses, optimal water pricing or marketing policies including privatization or decentralization?
- implement water and soil conservation measures, together with improved water quality monitoring and better enforcement.

limits

- Financial constraints
- There may be no more water available!

Focus for the Future:

Water is considered a limiting resource for development in Sub-Saharan Africa and changes in the water resources of this region could have major implications for the countries' economies. As water resources are often limited, potential decreases caused by climate change may increase vulnerability levels. Focus must be placed on land use change, contingency planning when dealing with extreme events, and the potential problem of an eventual unavailability of water resources in certain regions which will lead to conflict between water users and in some cases sovereign states.

Summary - Is Integrated Water Resource Management the answer?

Integrated Water Resource Management is a process which can support countries in their efforts to deal with water resource problems by maximising, in an equitable manner, economic and social welfare, without compromising the sustainability of vital ecosystems.