TECHNICAL BRIEF

ON

POLICIES AND REGULATIONS

ON

IWRM AND WASH, CLIMATE CHANGE ADAPTATION AND RURAL DEVELOPMENT

Draft Technical brief on Policies And Regulations on IWRM and WASH, Climate Change Adaptation and Rural Development

How District Level Plans Links IWRM and WASH Service Delivery and Climate Change Adaptation

Climate change and WASH Water is the primary medium through which climate change influences the Earth's ecosystem and thus the livelihood and well-being of societies.1 Climate change directly impacts water resources and water services for all economic, social and environmental functions that water supports. Therefore, the impacts reach into many sectoral interests such as health, tourism, agriculture and industry. Water-related climate risks arise from too much water, too little water or polluted water. For example, the occurrence of floods and droughts is expected to increase with a changing climate, with the Intergovernmental Panel on Climate Change (IPCC) predicting water-related disasters to increase in both frequency and severity, as the whole global water cycle is affected by climate change. In fact, in many places these changes are already taking place and the world is ill-prepared to respond to these risks. In turn, this will cause loss and damage, which affect the supply and delivery of water, sanitation and hygiene.

A changing climate brings with it uncertainties that compound those that are already inherent in the WASH sector, especially in developing countries that are the most vulnerable to these negative impacts. Despite increasing challenges with higher levels of warming, there are however opportunities to respond to the risks posed. Developing solutions to manage these escalating risks calls for new strategies and a stronger capacity to absorb expected changes. WASH climate resilient development The WASH sector is already affected in many different ways by weather and climate events (such as variability, seasonality and extreme events). This translates into negative impacts on drinking water availability and quality, and also in negative performance of sanitation and hygiene services. Future climate change will put an additional stress on delivering and sustaining health and well-being related outcomes.

These impacts are intrinsically connected with public health impacts. For example, if there is a decline in the availability of water supplies (e.g. dry boreholes), people may be forced to drink contaminated water (e.g. untreated surface water) leading to an increase in waterborne disease.

The pollution of wells and flooding of latrines also increase the risk of a higher incidence of infectious diseases. In addition, a reduction in water availability makes hygiene practices more challenging and behavioral change campaigns might not be effective in areas where access to water is increasingly constrained by the changing climate. A higher incidence of extreme events poses additional stress to the sustainability of both sanitation and hygiene practices. All of these impacts will result in higher costs for delivering and maintaining climate resilient services. Resilience can be defined as the ability of people and systems to anticipate, adapt to and recover from the negative effects of shocks and stresses (including natural disasters and climate change) in a manner that reduces vulnerability, protects livelihoods, accelerates and sustains recovery, and supports economic and social development, while preserving cultural integrity.8 Climate resilient development involves measures and activities that will deliver benefits under all potential future climate scenarios and can cope with uncertainties over future conditions.

It differs from business-as-usual development in actively considering and addressing potential existing and future climate risks. Various adaptation measures that respond to climate variability, and build upon existing land and water management practices, have the potential to strengthen the resilience of vulnerable communities to climate change and to improve water security, and thus directly contribute to sustainable development. With respect to the WASH sector, climate resilience requires a focus on: a reduction in the likelihood that individuals feel the effects of climate change and related shocks. This can be achieved through programming that seeks to both understand the determinants of climate risk exposure to WASH services and act on them to minimize the exposure of individuals. Strengthening the reliability of WASH services. A starting point for the integration of climate resilience into WASH service delivery is the prioritization and implementation of no/low regrets measures. These measures have a high chance of success against the full range of uncertainty in climate change and other future drivers.

A number of no/low regrets measures will be those dealing with the existing level of climatic fluctuations, which many WASH systems are still not well protected against. Strengthening capacities of governments and communities to increase climate resilience over time. This can be achieved by helping governments design, deliver and sustain investments in WASH services that consider the additional risks posed by climate change. Also by strengthening multi-level WASH governance, strategies/plans and systems as well as building the adaptive capacity of communities to deal with climate-related shocks and stress. The need for responses that are robust to climate uncertainties alongside other pressures on resources, systems and services (e.g. demographic change, economic transition or increasing competition over limited resources) is undeniable. Acting now to identify, manage and minimize climate risks will offer benefits to long-term WASH programme performance by decreasing the sensitivity of the WASH sector to uncertain climate futures.

Integrated Water Resources Management (IWRM) for Climate Change Adaptation

Climate change is one of the significant threats for the society. Water is the primary medium through which climate change influences the Earth's ecosystems and therefore people's livelihoods and well-being. Changes in hydrological cycle due to climate change can lead to diverse impacts and risks (Bates et al. 2008; Jiménez Cisneros et al. 2014). Jiménez Cisneros et al. (2014) synthesized water-related impacts on humans and Earth biomes. Renewable surface water and groundwater resources in most dry subtropical regions are projected to reduce due to climate change. The fraction of global population that will be affected by water scarcity and riverine floods is projected to increase with the level of warming in current century. Agriculture is directly related to water and therefore, food security will be potentially affected by climate change, including food production, transportation, process, access, use and price stability. Climate change and the associated impacts on water are expected to lead to increases in water-related diseases in many regions and especially in the low-income developing countries. In urban areas, climate change is projected to increase risks for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges. Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world. Beside climatic drivers, other non-climatic drivers such as current demographic trends, economic development and related land-use changes have direct impact on social and ecological systems and their processes. These drivers of change are closely linked to each other and pose complex management problems for land and water resources. In order to deal with these complex problems, water management issues should generally consider multiple decisional criteria and large numbers of possible alternatives, usually characterized by high uncertainty, complex interactions and conflicting interests of multiple stakeholders, but also of a multiplicity of compartments, such as river, land or coastal ecosystems or different economic sectors. Therefore, the traditional fragmented approach of management has to be replaced by more holistic system view approaches. Integrated water resources management (IWRM) is such an approach that has been widely accepted internationally as the way forward for efficient and equitable management of water and related resources. Climate change adaptation (CCA) is emerging in the policy agenda of policy-makers worldwide. In the field of water resources, one of the challenges for adaptation is to integrate and mainstream it into the paradigmatic IWRM concept. Integrating and mainstreaming adaptation with IWRM increases additional implementation burden on IWRM. However, this also fosters innovative governance arrangements and practices to build adaptive capacity to climate change impacts. Despite the main focus of IWRM is on current and historic issues compared to the long-term focus of adaptation (Ludwig et al. 2014), they both (IWRM and adaptation) share the same goal of promoting sustainable development and both of them require some identical key elements (e.g. public participation, information sharing and disclosure, and concern for social justice) for their successful implementation.

Predicted Impacts of Climate Change

The impact of climate change on surface and ground waters will depend critically on how increased intensities of rainfall, and higher evaporative demands, translate to soil moisture and the volume, variability and seasonality of runoff. Rainfall is predicted to become more seasonal, with prolonged dry periods between rainfall events. Individual rainfall events are also likely to be more intense (Kundewicz et al. 2007). More water is likely to be ‘lost’ as runoff, and there will be greater need to store water to mitigate these effects. Rainwater harvesting schemes may become less effective, as they are vulnerable to extended dry periods under existing climatic regimes. Overall, more reliance may need to be placed on water supply technologies which utilize a water store (e.g. groundwater or dams). Increased intensity of rainfall will also pose a problem for drainage and sewerage disposal in urban and peri-urban areas. It is likely that low-capacity systems, or those that are in poor repair, will be overcome, leading to increased contamination (Hunter 2003).

In rural areas, where on-site sanitation (or no sanitation) co-exist alongside groundwater wells, increased flooding may overwhelm currently used sanitary protection measures, leading to damage or destruction of infrastructure and gross contamination. Surface water resources with increased intensity and irregularity of rainfall, the inter-annular variability of river flows is likely to increase, such that rivers will become increasingly 'flashy' and seasonal. As a result, flood events will be more common, and an increased proportion of the available surface water will lose in peak discharges, reducing the quantity of accessible water for WASH (Boko et al. 2007). Long-term changes in surface water availability are more uncertain. By the end of the century, rivers in South Asia are likely to exhibit decreased summer flows (after an initial increase) and increased winter flows resulting from recession of the Himalayan ice mass in a warmer global climate (Cruz et al. 2007; Kundewicz et al. 2007). Glacial melt water presently contributes up to 70% of the dry season base flow of the Indus, so glacial recession will have significant impacts on water availability for WASH in South Asia (Cruz et al. 2007). In addition, more winter precipitation is likely to fall as rain rather than snow, with the result that rivers in South Asia are likely to become more unreliable and more prone to flooding (Cruz et al. 2007). Shallow boreholes located on the floodplains of rivers in South Asia are therefore more likely to be contaminated from flood events more often (Cruz et al. 2007).

In Africa, long-term change to surface water availability is entirely dependent on how changes in rainfall patterns and increased evaporative demand translate to shifts in soil moisture deficits and surface water runoff (Boko et al. 2007; Kundewicz et al. 2007). At present, this is very difficult to predict. Groundwater The potential impact of climate change on the availability of groundwater is poorly understood. This is partly because recharge processes are complex and poorly constrained – even without the complications of climate change (Döll and Fiedler 2008; Healy 2010). Many water supply services rely on groundwater, particularly in rural settings, so developing a better understanding of climate groundwater links is vital (Calow and MacDonald 2009; Calow et al 2010).

Climate change is likely to modify groundwater recharge patterns, as changes in precipitation and evaporation translate directly to shifts in soil moisture deficits and surface water runoff (Foster et al. 2008). Increases in rainfall intensity and evaporative demand will, more likely than not, result in increased irregularity of groundwater recharge (Kundewicz et al. 2007). However, groundwater recharge will also be affected by soil degradation and vegetation changes, both of which may be affected by climate and human drivers (Solomon et al. 2007). The resilience of groundwater to long-term (decadal) shifts in climate is governed by the available groundwater storage. Larger groundwater bodies contain groundwater storage several orders of magnitude greater than average annual recharge and will, therefore, respond very slowly to long-term changes (decadal) in recharge or short-term (inter-annual) shocks – for example the thick sandstone aquifers in northern Africa (MacDonald et al. 2011). Smaller groundwater bodies with lower storage will not be as resilient to long-term (decadal) changes in climate, but may recover quickly from drought if recharged regularly (MacDonald et al. 2009, 2011). For many people the more important issue is the resilience of the water supplies dependent on groundwater, rather than the actual groundwater resource itself. Research from the behaviour of water sources during droughts has shown that: 1) improved sources are much more reliable than unimproved sources (Bonsor et al. 2010); and 2) boreholes in higher yielding (more permeable) aquifers are generally much more reliable than in lower yielding aquifers (MacDonald et al. 2009). These observations indicate that the permeability of aquifers should be considered alongside storage and long-term recharge to the aquifer when investigating the resilience of water sources to changes in climate. Work by MacDonald et al. 2011 in Africa has indicated that for much of Africa, carefully sited and well-constructed boreholes will be able to sustain rural domestic water demand even with predicted climate change. In some semi-arid and arid areas groundwater-levels may be below the depth at which the groundwater can be easily exploited, but these areas are generally less densely populated than wetter areas (MacDonald et al. 2011).