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Low Carbon Development
Summary Sheets

Water and low carbon development

Key message: Water is vital for economic and social progress in developing nations, and the core natural resource for sustaining an ecological balance in human ecosystems. The low carbon economy could overcome some barriers to achieving water security goals, but it could also challenge water security, for example if widespread agro-fuel production is fostered. Strategic planning of mitigation measures must ensure that interventions are climate smart and do not increase the current vulnerability of developing countries to water scarcity.

Introduction

Climate change impacts have significant implications for the availability (quantity and quality) of water and are likely to make development goals even more difficult to achieve[1]. Both will, in turn, affect structure and dynamics of the low carbon society. The Stockholm International Water Institute (SIWI) estimates that 'the economic benefits of improved water supply and – in particular – sanitation far outweigh the investment costs'[2]. Economic benefits of between USD3 to USD34 per USD1 invested would be gained in the health, agricultural and manufacturing sectors as well as at the individual and household level if the water and sanitation Millennium Development Goal objectives are achieved[2].

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1. **By 2025, 3 billion people will live in water stressed countries.** Many of those countries already have significant basic development goals to meet[3]. Asia has the highest number of people that are vulnerable to floods. Between 80 and 100 million people are affected directly or indirectly by floods there every year[4]. In Africa, more than 40% of the population live in arid, semi-arid and dry, sub-humid areas. About 60% live in rural areas and depend on rain-fed farming for their livelihoods[1]. Water scarcity challenges in North Africa and the Middle East, which are often transboundary, are outlined in the case study on the next page.

2. **Water issues in Africa have a two-sided nature: surplus and scarcity, underdeveloped and overexploited[5].** Nations often have water sources available, but poor infrastructure, poverty and inequity prevent water access. Converting potential to reliably accessible water requires significant investments in infrastructure – something that many underdeveloped and developing countries currently cannot afford[5].

3. **The status of global water resources is driven by socio-economic trends including rapid population growth, urbanisation and food insecurity.** Over half of the world's population now lives in urban areas. By the middle of this century, the global population is projected to rise to 9.1 billion, 34% higher than today, which could overwhelm the capacity of water supply infrastructure. Agriculture consumes 70% of available fresh water globally[3]. To achieve food and nutrition security (FNS) for the growing population, annual agricultural output must grow by 3.3%, representing a significant increase in demand for water[6]. Importantly, achieving FNS is not a case of increasing agricultural production, but overcoming storage, access, and utilisation challenges[7].

4. **Some measures to achieve a low carbon economy, if not climate smart, could exacerbate water scarcity challenges[8].** Rising demand for land and, specifically, water for irrigation to produce agro-fuels and develop infrastructure for low-carbon power generation could drive forward land clearance. In forested water basins, deforestation can disturb river flow, increase siltation and erosion, and negatively impact the quality and quantity of the water supply for humans. Furthermore, growing the current generation of energy crops encourages fertiliser use, which implicates water quality and contributes further to climate change through increasing emissions of nitrous oxide, a powerful greenhouse gas[9].

5. **Water availability will affect the sustainability of low carbon energy technologies, such as hydro-electric power, nuclear and thermal power generation, such as concentrated solar power (CSP) and geothermal power.** These are, like some traditional methods of energy generation, hugely dependent on water availability. In Southeast Asia, 75 GW - over half of existing and planned capacity for major power companies - is located in water scarce or water stressed areas[10].

6. **While water is required in the production of energy, energy is vital to produce and distribute clean water.** Energy use in water treatment and distribution can be reduced by improving water use efficiency[6]. Worldwide, water management must be prioritised throughout the life of the fuel cycle, and managed through integrated water resource management (IWRM) and adaptive management (AM) approaches that fit in wider strategies to achieve low carbon, climate-resilient development.

7. **It is extremely difficult to predict future availability of adequate and safe water.** Climate change accelerated faster than predicted in the northern hemisphere between 2000 and 2005. The frequency and scale of floods and droughts could increase in the Himalayan region, which supplies almost 25% of the world's cereal production and provides water resources for over 1.3 billion people[7]. Subsequently, there is high uncertainty attached to climate change adaptation planning, which seeks to reduce vulnerability to climate change impacts in regions such as the Himalayas.

8. **While there are many water-security 'hotspots', further research could be channelled around several water-security 'hopespots'.** For example, in many dry areas, there is great potential to expand long-practiced and new water harvesting strategies[5]. Investing in IWRM and sustainable socio-ecological systems delivers immediate and long-term benefits – economically, socially and environmentally[11]. However, multi-stakeholder involvement, knowledge and capacity building are essential supporting factors.

Case study

Transboundary water resources are those that cross one or more international borders. Water challenges in the Middle East and North Africa are particularly transboundary and have led to violent and non-violent conflict over water resources[12]. A number of problems arise from the Nile River Basin as countries such as Egypt exploit technological, land and economic power inequalities to stake their claims to water resources. Climate change mitigation and adaptation requirements could incentivise upstream water users to capture water resources by acquiring land and constructing large-scale infrastructure.

Egypt's Aswan High Dam, which was completed in 1970, has brought socio-economic benefits to many in the Nile River Basin. However, by removing the rich silt that once made land very productive in the Nile Valley, downstream farmers have suffered[13].

9. **Designing and strengthening adaptation strategies that focus on specific local water challenges must be a national and international priority[4].** Recommended measures include integrating climate change adaptation and development through 'mainstreaming climate change adaptation' into policies and programmes[14]. Improved climate change scenarios are required for climate variation and impacts, future water demand and availability. This includes expanding knowledge of the impacts on biodiversity, ecosystem services, agro-ecology, food systems and human security[7]. It also requires a better understanding of the impact of the economic growth agendas of developing countries on water resource requirements - an understanding that is further complicated by the local nature of the water challenge.

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Definitions

Low carbon climate resilient development combines key elements of mitigation, adaptation and development strategies. A 'triple win' is where low carbon development brings benefits in mitigation, adaptation and poverty reduction/economic development. A 'double win' is where benefits are seen in only two of these areas.

Climate resilience is used in this document to mean: The capacity of households and communities to manage change and maintain or transform their living standards in the face of climate induced stresses and shocks without compromising long term prospects.

USD is the US dollar

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For more information about the issues covered in this document, please contact Gill Wilkins at AEA.
T 0870 190 6309 or 0870 190 1900 **E** gill.wilkins@aeat.co.uk or enquiry@aeat.co.uk **W** www.aeat.com