Accepted Manuscript

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Zahra Kalantari, Carla Sofia Santos Ferreira, Saskia Keesstra, Georgia Destouni

PII: S2468-5844(18)30022-9

DOI: 10.1016/j.coesh.2018.06.003

Reference: COESH 49

To appear in: *Current Opinion in Environmental Science & Health*

Received Date: 5 March 2018

Revised Date: 18 June 2018

Accepted Date: 20 June 2018

Please cite this article as: Kalantari Z, Ferreira CSS, Keesstra S, Destouni G, Ecosystem-Based Solutions for Flood-Drought Risk Mitigation in Vulnerable Urbanizing Parts of East-Africa, *Current Opinion in Environmental Science & Health* (2018), doi: 10.1016/j.coesh.2018.06.003.

Ecosystem-Based Solutions for Flood-Drought Risk Mitigation in Vulnerable Urbanizing Parts of East-Africa

1. Zahra Kalantari, Stockholm University, Department of Physical Geography and Bolin Centre for Climate Research, SE-106 91 Stockholm, Sweden
2. Carla Sofia Santos Ferreira, CERNAS, Agrarian School of Coimbra, Polytechnic Institute of Coimbra, Coimbra, Portugal
3. Saskia Keesstra, Soil, Water and Land Use Team, Wageningen Environmental Research, Wageningen UR, 6708PB Wageningen, The Netherlands
4. Georgia Destouni, Stockholm University, Department of Physical Geography and Bolin Centre for Climate Research, SE-106 91 Stockholm, Sweden

Abstract

Urbanization and climate changes have direct impacts on ecosystems and the services they provide to society, thus influencing human well-being and health. Urban sprawl may conflict with ecosystem services, e.g. enhancing water-related stresses and risks of, e.g., droughts and floods, with significant economic, environmental and societal impacts. Such hydro-climatic extremes and their societal impacts are evident around the world. East Africa is a region with highly vulnerable populations to frequent floods and droughts. To achieve long-term sustainable solutions to such water-related risks and problems, we need to understand and plan for the feedback mechanisms between population expansion and associated land-use changes and their impacts on ecosystem services. The potential of ecosystem-based solutions to mitigate these risk and problems in urban development under climate change needs to be considered and accounted for in spatial planning and management strategies.

Keywords: nature-based solution, natural hazards; sustainable solutions; climate change; land use change; hydro-climatic extremes

Introduction

Ecosystem services and goods (ES) represent the direct and indirect benefits humanity derives from ecosystems [1]. The ES concept is considered a useful approach to highlight the dependence of human well-being on ecosystems, bridging the gaps between ecology, economics and society in order to achieve sustainable resource management [2]. A particular strength of this concept is its ability to spatially integrate multiple biophysical conditions, thereby facilitating collaboration between science and policy in finding solutions for global challenges, recognition of human-nature interactions, and more informed exploration of feedback loops [3, 4]. This is not least useful for our ability to handle water-related disasters, such as floods and droughts, as these are governed by the feedbacks that potentially also hold a key to efficient flood-drought risk reduction.

Water-related disasters are largely created by people living in conflict with their environment [5]. As such, changes in environmental conditions can have enormous consequences on *people* and *places* experiencing such changes [6]. Climate change effects may further accelerate and exacerbate such environmental impacts on society [7]. For water-based disasters in particular, climate change implies altered average temperatures and precipitation patterns that may lead to more intense and frequent floods and droughts [6]. It is essential to develop more effective strategies, methods and tools for incorporating water-based analysis into spatial planning aiming