

## Chapter 17

# Adaptive Coevolution: Realigning the Water Governance Regime to the Changing Climate

**Dauglas Wafula Juma**  
Tongji University, China

**Makomere Reuben**  
Tongji University, China

**Hongtao Wang**  
Tongji University, China

**Fengting Li**  
Tongji University, China

### ABSTRACT

*Climate change is having a significant impact on water resources globally; more so in developing countries due to lower resilience and weakened coping mechanisms. Water resource and supply management systems need to be adaptive to the uncertainty and unpredictability posed by this challenge. The current water crisis is mainly that of governance within the water sector. On this premise, this chapter seeks to explore the adaptiveness of water management institutions and systems to climate change impacts, with a focus on Kenya's case. Kenya continues to face numerous challenges relating to water supply, which are further exacerbated by climate change. Prior to the development of key legislative and institutional frameworks, through adoption of the Water Act 2002, the water sector grappled with gross mismanagement, manifested via inefficiency in water service provision and resource degradation. Deploying the conceptual model of adaptive (co)-management institutional prescription of polycentric governance, experimentation, public participation, and management of bioregional scale, this chapter stands to contribute novel insights into designing sustainable, adaptive water governance regimes.*

### WATER SECURITY AND CLIMATE CHANGE

Water is a vital component of an ecosystem and is crucial for survival, yet scarce with only 0.1% earth's water being both accessible and in usable form. Despite this critical resource being a prerequisite to society's development, water security has become a global challenge in 21<sup>st</sup> century (Gunawanasa & Bhullar, 2013; Hanjra & Qureshi, 2010) Water scarcity is being experienced across the globe, with the same being exacerbated by the adverse impacts of climate change on water resources. In the recently

DOI: 10.4018/978-1-5225-1046-8.ch017

## ***Adaptive Coevolution***

concluded climate change negotiations (COP21) held in Paris in the year 2015, where parties to the United Nations Framework Convention on Climate Change (UNFCCC) ushered in the Paris Agreement, the issue of especially the most vulnerable countries' resilience and adaptation to the adverse effects of climate change (UNFCCC,2015).

The climactic nature of water security was apparent with a dedicated side event at the Paris talks, organized to specifically discuss the issue, in addition to mitigation and adaptation to climate change. One of the critical outcomes of the conference was the Paris Pact on Water and Climate change Adaptation, which aims towards making the water system a core foundation of sustainable human development, more resilient to climate change. This was essentially a water resilience focus event; vide the Lima to Paris act on climate change, which involved about 290 water basins globally. This underscores the importance of water in the socio-ecological ecosystems since water is the medium through which climate change affects the human and non-human lives (UNFCCC, 2015; Waterblog, 2015). Studies show that climate change is expected to account for about 20% of global increase in water scarcity (UN-Water, 2007)

Globally, the impacts of climate change are being felt disproportionately and with differing magnitudes. Developing countries continue to bear the brunt of climate change impacts as compared to developed countries due to their low resilience and adaptive capabilities. In developing nations, research on vulnerability to climate change shows that the marginalized groups of people are most vulnerable as often they are excluded from the planning and decision making process (Tompkin & Adger, 2004). Poor communities in the developing world thus face serious challenges from climate change impacts on water, as this water insecurity has direct impacts on poverty alleviation. Consequently, their pathways to sustainable development become jeopardized. The developing world thus suffers from increased water insecurity manifested wide unpredictability and high variance in precipitation as a result of climate change (Goswami et al., 2006).

Global South nations continuously face an uphill task with regard to realizing water availability for their populace; a fundamental human right (Gunawansa & Bhullar, 2013). Studies indicate that about two billion people globally currently live in either water scarce or water stress areas (JMP, 2012). Countries that are water-scarce or water-stressed require concerted efforts in managing the few available resources, more so in the wake of climate change impacts. Climatic variability is affecting the ecosystem through water as a medium, with manifestations ranging from prolonged droughts in La Nina to excessive flooding during El Nino periods (Moser & Boykoff, 2013) This consequently translates into water insecurity across the globe, with local effects like prolonged drought in Horn of Africa (Eriksen & Lind, 2009; Huho et al., 2011) and destructive weather events like the typhoon Haiyan in Philippines (Chiu, 2013).

Despite Millennium Development Goals (MDGs) target to halve the number of people without access to clean water, having been met by 2010, approximately 780 million people do not have access to it as at 2012 (JMP, 2012) Notwithstanding this achievement, the same is disproportionate with some regions continuing to lag behind with. Most of the improvement in water access has occurred in China and India, while Sub-Saharan African countries (including Kenya) continue to lag behind with only 60 percent of the population being able to access the same (Gunawansa & Bhullar, 2013). Most of the improvement in supply targets has come from Asian countries coincides with the exponential economic growth seen in China and India. This highlights the importance of water security in the socio-ecological development of society as a whole. Water security is highly regarded in international development to an extent that out of the 17 newly agreed upon Sustainable development Goals (SDGs), three of them are about water; SDGs number 6, 14, and 15 which provide;

10 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/adaptive-coevolution/171263](http://www.igi-global.com/chapter/adaptive-coevolution/171263)

## Related Content

---

### Ecological and Reclamation Monitoring of Drained Lands of Ukrainian Polesie

Viktor Moshynskiy (2023). *Handbook of Research on Improving the Natural and Ecological Conditions of the Polesie Zone* (pp. 97-122).

[www.irma-international.org/chapter/ecological-and-reclamation-monitoring-of-drained-lands-of-ukrainian-polesie/324033](http://www.irma-international.org/chapter/ecological-and-reclamation-monitoring-of-drained-lands-of-ukrainian-polesie/324033)

### The Importance of Changing Natural and Climatic Conditions in Investment Projects

Nadiia Frolenkova (2023). *Handbook of Research on Improving the Natural and Ecological Conditions of the Polesie Zone* (pp. 323-334).

[www.irma-international.org/chapter/the-importance-of-changing-natural-and-climatic-conditions-in-investment-projects/324046](http://www.irma-international.org/chapter/the-importance-of-changing-natural-and-climatic-conditions-in-investment-projects/324046)

### The Triple Dividend: Economic Prosperity, Social Equity, and Climate Resilience in the Age of Energy Transition

Akanksha Singh Fouzdar and Ankit Saxena (2026). *Economic, Social, and Environmental Insights on Energy Transition* (pp. 347-368).

[www.irma-international.org/chapter/the-triple-dividend/393549](http://www.irma-international.org/chapter/the-triple-dividend/393549)

### Human Overpopulation: Impact on Environment

Shivani Uniyal, Rashmi Paliwal, Bhumiya Kaphaliya and R. K. Sharma (2017). *Environmental Issues Surrounding Human Overpopulation* (pp. 1-11).

[www.irma-international.org/chapter/human-overpopulation/173303](http://www.irma-international.org/chapter/human-overpopulation/173303)

### Impact of Synthetic Dyes on Human Health and Environment

Ruchi Srivastava and Irfan Rashid Sofi (2020). *Impact of Textile Dyes on Public Health and the Environment* (pp. 146-161).

[www.irma-international.org/chapter/impact-of-synthetic-dyes-on-human-health-and-environment/240901](http://www.irma-international.org/chapter/impact-of-synthetic-dyes-on-human-health-and-environment/240901)