

# The water-energy-food nexus and poverty eradication in Kenya

*This Policy Brief offers practical recommendations for Kenya in improving WEF nexus planning and implementation as part of the battle to eradicate poverty and to build climate resilience.*



**SMALL BUSINESSES IN NAIROBI, Kenya.**  
Copyright: Editorial credit: Jordi C / Shutterstock, Inc.

## Introduction

**Water, energy and food are crucial resources for human life and well-being, and form critical building blocks for sustainable socio-economic development and poverty eradication. Yet a range of recent studies have demonstrated how the world's food, water and energy (WEF) resources are already**

**experiencing significant stress and shortfalls<sup>1</sup>. Demand for these resources is expected to increase rapidly over the coming decades<sup>2</sup>, creating significant challenges in meeting the WEF needs of a growing population in ways that also enable societies to adapt to climate change.**

**To complicate the picture, the systems that provide the water, energy and food needs of society are closely interlinked, and decisions made regarding one may well have impacts on one or both of the others.**

## The WEF Nexus

*The nexus approach, which grew out of systems analysis, recognises that water, energy and food are closely linked, through global and local water, carbon and energy cycles. All three are also essential resources, but billions of people have limited access to them; and all three are under pressure from supply constraints and rapidly growing demand. (SEI [http://sei-us.org/Publications\\_PDF/SEI-RSB-2014-Water-energy-food-nexus.pdf](http://sei-us.org/Publications_PDF/SEI-RSB-2014-Water-energy-food-nexus.pdf))*

<sup>1</sup>Waughray, 2011; Bazilian, et al., 2011

<sup>2</sup>Hoff, 2011; Bizikova, et al., 2013





**Maasai woman carrying a small child**

*Copyright: Editorial credit: urosr / Shutterstock, Inc.*

Over recent years, therefore, there has been an increasing focus on the interactions in managing water, energy and food – the so-called water-energy-food (WEF) nexus – and the need for an integrated approach to support sustainable development. At the same time, there is increasing concern over how climate change will affect the ability of these sectors to meet increasing demands<sup>3</sup>. A realisation that single-sector, top-down and compartmentalised approaches are insufficient in tackling the challenges surrounding water, energy and food resources in a changing climate has led to efforts to develop and implement more integrated approaches and practices<sup>4</sup>.

Improved water, energy and food security can be achieved through taking a nexus approach - an approach that integrates concerns of water, energy and food security management and governance across sectors and scales<sup>5</sup>. The result of this will be that the optimal use of limited resources will be

<sup>3</sup>Bizikova, et al., 2013

<sup>4</sup>Allouche, et al., 2014; Bizikova, et al., 2013

<sup>5</sup>Hoff, 2011

more effectively planned, managed and accounted for.

Climate change has potential impacts on all three sectors, and improved, integrated management of the three sectors has the potential to significantly improve climate resilience, at the local, national and regional levels.

To understand the challenges in the WEF nexus, there are three key interfaces that we need to consider:

**The interface between water on the one hand, and food and energy on the other.**

Water plays a vital role in both food and energy production, and in sustaining the ecosystems that support agriculture and other economic activities that are critical for achieving food security<sup>6</sup>.

**The interface between energy, and food and water.**

Energy is required for food production (especially irrigation) and for water supply, including the extraction, purification, heating and distribution of water<sup>7</sup>.

**The interface between food production and its role as a “consumer” of land, energy and water.**

The agriculture sector is a major user of water (more than 70% of all water use globally) and energy. Agriculture and food production further affect the water sector through land degradation, changes in runoff, and disruption of groundwater discharge<sup>8</sup>. Sustainable agricultural practices, such as those designed to prevent land degradation, can save water and energy by increasing water storage in the soil and groundwater recharge, and by reducing the use of energy-intensive fertilisers<sup>9</sup>.

However, demands for and availability of these resources vary across the world, and how the possible trade-offs between the sectors play out is highly context-specific.

<sup>6</sup>Hellegers, et al., 2008; Molden, et al., 2007 as cited in Rasul and Sharma, 2015

<sup>7</sup>Bach, et al., 2012; Bazilian, et al., 2011; Mukherji and Shah, 2005

<sup>8</sup>Alauddin and Quiggin, 2008 cited in Rasul and Sharma, 2015

<sup>9</sup>Rasul and Sharma, 2015





#### View of Nairobi business district

Copyright: Editorial credit: IndustryAndTravel / Shutterstock, Inc.

The move from a sectoral to a nexus-based approach to managing water, energy and food in the face of climate change is widely recognised as enabling improved use of limited natural resources to support sustainable development. However, there is little experience and few lessons on how to operationalise integrated WEF approaches. This Policy Brief offers some practical recommendations for Kenya in improving WEF nexus planning and implementation as part of the battle to eradicate poverty and to build climate resilience.

### Vision 2030

The Kenya Vision 2030, which envisages Kenya becoming a “middle-income country providing a high quality of life to all of its citizens by the year 2030”, is underpinned by the principle of equity, and the need to invest in the ASAL districts and in communities with high levels of poverty, unemployment and vulnerable groups. The Vision

2030 sets out the vision for the WEF sectors as well:

**Energy:** Kenya aims to generate more energy at a lower cost and to increase efficiency in energy consumption. The government is committed to institutional reforms, including more private power generators, and the exploitation of new sources of power including geothermal, coal, and renewable energy sources.

**Agriculture:** The aim is to raise incomes in agriculture, livestock and fisheries through processing products before they reach the market, in order to add value. This includes the utilisation of 1 million hectares of currently uncultivated land and 1.2 million ha of newly opened lands.

**Water:** Vision 2030 recognises that Kenya is a water scarce country and proposes the development of 2 large dams, 22 medium-sized dams, as well as the rehabilitation of a number of major irrigation schemes. The need to rehabilitate the five water towers is also dealt with in Vision 2030.





### Young Maasai warriors herd and protect their cattle

Copyright: Ryan M. Bolton/ Shutterstock, Inc.

Vision 2030 also sets out the goal for equity and poverty eradication as being to “reduce the number of people living in absolute poverty to the tiniest proportion of the total population.”

The goal for gender, youth and vulnerable groups is for “equity in power and resource distribution between sexes, improved livelihoods for all vulnerable groups, and responsible, globally competitive and prosperous youth.”

## WEF, climate change and poverty eradication in Kenya

Kenya has seen sustained economic growth, particularly over the past decade. The World Bank’s Kenya Economic Update of March 2016 projected a 5.9% growth rate in 2016, with this rising to 6% in 2017, largely as a result of low oil prices, good agricultural performance, an enabling monetary policy, and ongoing infrastructure investment<sup>10</sup>.

<sup>10</sup>Available at: <http://www.worldbank.org/en/country/kenya/publication/kenya-economic-update-economy-strong-challenging-global-environment>.

Nonetheless, significant development challenges such as poverty, inequality, and vulnerability of the economy to internal and external shocks remain<sup>11</sup>.

Kenya’s population has grown from 9.5 million people in 1965 to nearly 48 million in 2016, an increase of more than a million each year<sup>12</sup>. The population is estimated to hit 95 million by 2050<sup>13</sup> even though the number of children per woman dropped from 8.1 in 1978 to 4.6 in 2008 and is still decreasing. This is because the absolute number of women giving birth continues to grow, leading to the expected doubling of the population by 2050<sup>14</sup>.

This rapid population and economic growth has significantly increased demands on water, agriculture, energy and environmental services such as forests, with increasing competition between sectors and groups over land and water. In addition, climate change is projected to lead to a range of impacts including increases in temperature and rainfall variability, and a greater prevalence of extreme events (droughts and floods). In

<sup>11</sup><http://www.worldbank.org/en/country/kenya/overview>.

<sup>12</sup><http://www.worldometers.info/world-population/kenya-population/>.

<sup>13</sup>Ibid

<sup>14</sup>Ibid.



combination, these factors put the livelihoods of the poor under increasing pressure, and threaten the potential for sustainable national economic growth.



**A young girl cooks with wood fuel**

*Copyright: Editorial credit: CECIL BO DZWOWA / Shutterstock, Inc.*

The Kenyan government has recognised the vulnerability of the country to climate change, noting that climate change has already impacted on Kenya. The annual average temperature increased by more than 1 degree Celsius between 1960 and 2015, and is expected to continue to increase. Rainfall is expected to increase, which will bring benefits, but will also bring increased flood risks, with negative impacts on food, security, human health, the economy and biodiversity. The government has recognised that climate change might not only affect future development, but, without appropriate adaptation measures, could also reverse existing development<sup>15</sup>.

<sup>15</sup>Kenya's 2nd National Communication to the UNFCCC, 2016

In 2000, Kenya was reported to use 15.1 million tonnes of fuel wood and 16.5 million tonnes of wood for charcoal (processed in kilns with only 10% efficiency), making up most of the biomass energy that provides 68% of Kenya's national energy requirements<sup>16</sup>. Biomass is expected to remain the main source of energy for the foreseeable future. The impact of this demand on forests was confirmed in field interviews and stakeholder workshops in 2015 and 2016 where in the three counties surveyed, demand for charcoal and wood fuel was cited as the biggest obstacle to forest conservation and catchment protection.

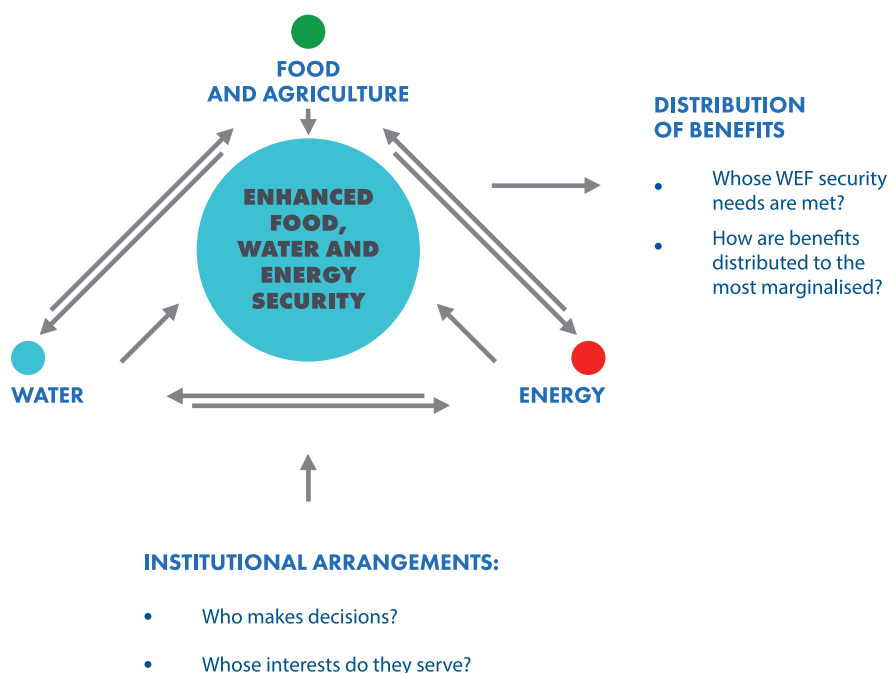
Energy demands have thus impacted on the food and water sectors through deforestation which leads to land and water degradation, as well as through the use of water and land to grow biofuels.

An additional source of competition for water is found in the demands of hydropower versus irrigation. Although it is seen to be a non-consumptive user of water, hydropower water demands are highest during dry spells – at the same time when demand for irrigation is highest. 70% of Kenya's hydropower lies on the Tana River, impacting negatively on farmers downstream with dams being closed during the dry season when farmers need water, and too much water during floods when KenGen releases excess water to protect their dams.

As demands for water, food and energy increase, the trade-offs between the sectors will become increasingly complex, placing even greater emphasis on the need for an integrated approach. In that integrated approach, however, the issue of who benefits and who loses under different circumstances must be addressed. Scarcity of water, land and energy is socially determined, resulting people living in poverty and vulnerable groups being particularly excluded from access to these resources<sup>17</sup>.

<sup>16</sup>Republic of Kenya. 2002. Study on Kenya's Energy Demand, Supply and Policy Strategy for Households, Small Scale Industries and Service Establishments. Nairobi: Republic of Kenya (Ministry of Energy).

<sup>17</sup>Mehta, 2010; Hall, et al., 2011; and Scoones, et al., 2014 cited in Middleton, et al., 2015



**Figure 1: WEF nexus and poverty eradication**

Source: Pegasys Institute, 2016

Thus, in taking an equity-driven approach to managing the WEF nexus, it is critical to ask: “food, water, and/or energy security for whom, by whom and from whom, security of what and for what?”<sup>18</sup>, to identify the potential winners and losers in “nexused” natural resource decision-making<sup>19</sup>, to pay specific attention to the means by which the needs of the marginalised will be prioritised<sup>20</sup> (see **Figure 1**).

## Institutional complexity in Kenya

Kenya is currently implementing devolved governance arrangements under the 2010 Constitution which resulted in two tiers of government: national and county. Within each tier, a number of different departments and public agencies are responsible for carrying out WEF related functions.

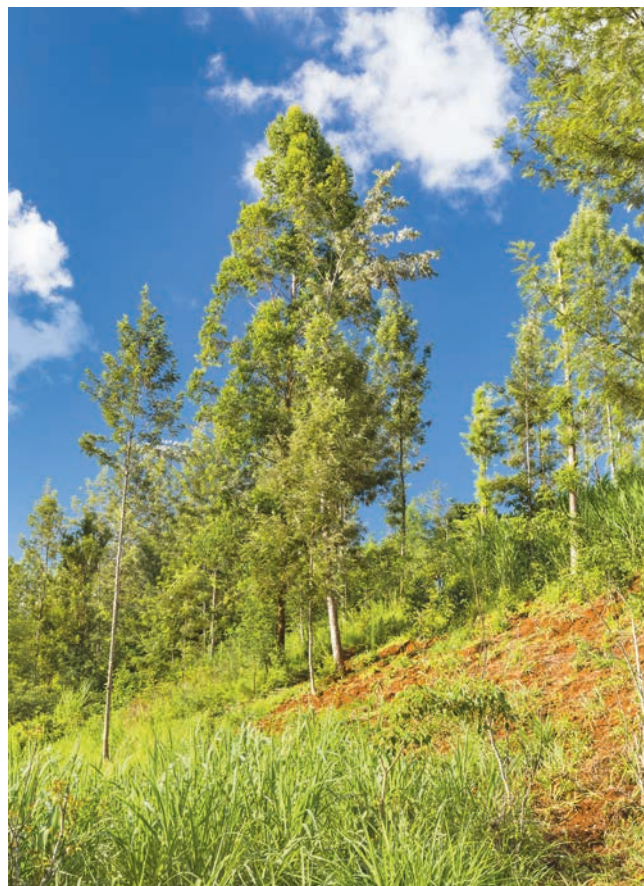
As can be seen from Figure 2, the landscape of departments and public agencies responsible for WEF related activities is extremely complex. Figure 2 sets out the key WEF players at national and county

<sup>18</sup>Brauch 2011, p.62

<sup>19</sup>Middleton, et al., 2015

<sup>20</sup>Allouche, et al. 2014

level in Narok county. The arrangements in other counties are similar and as complex.



**Tree growing and land cultivation, Kenya.**

Copyright: IndustryAndTravel / shutterstock.com

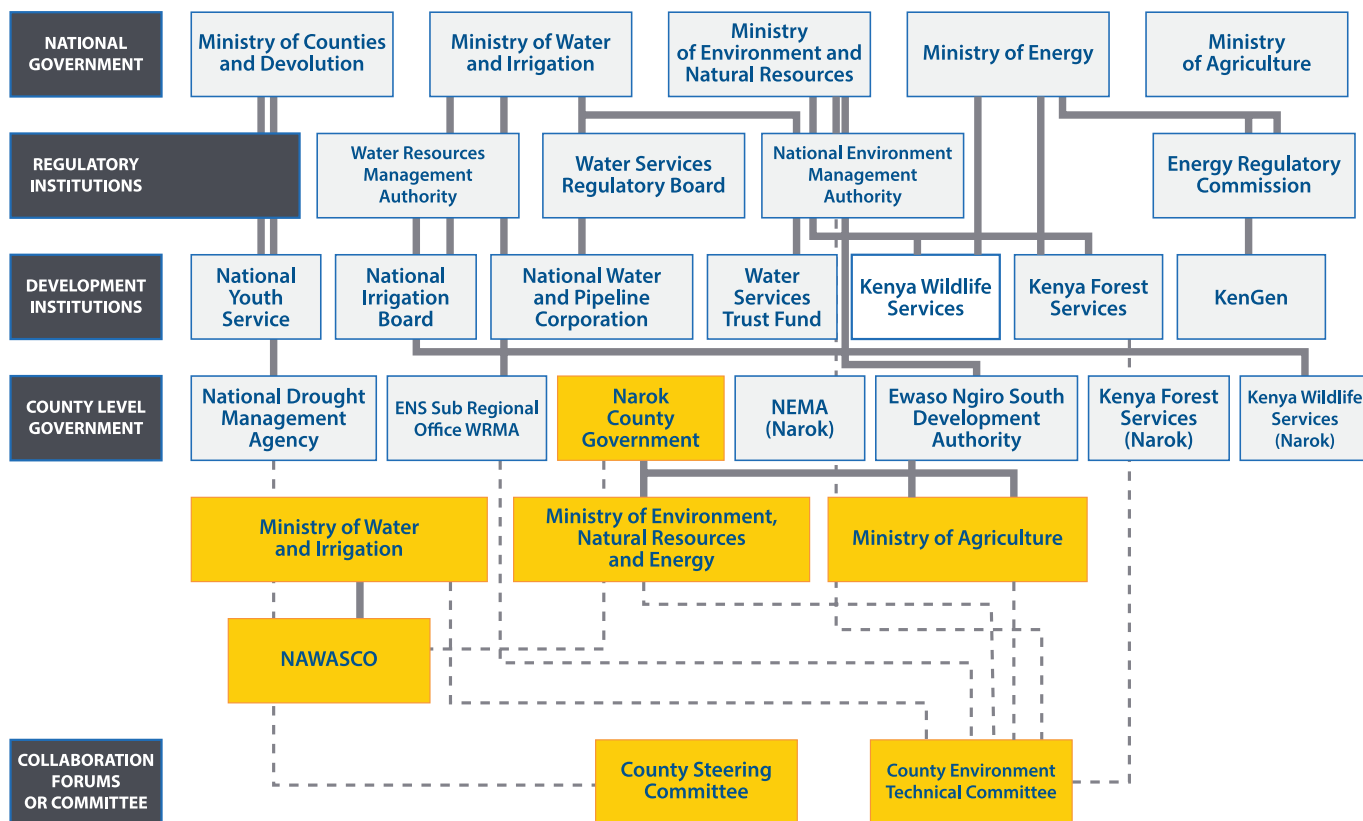


Figure 2: National and county departments and agencies responsible for WEF related functions in Narok (own elaboration)

In order to achieve effective integrated WEF planning and management there is a need for integrated approaches between different departments and agencies at the national level, and separately at the county level (horizontal integration). However, because of the division of WEF related functions between county and national departments and agencies, there is also a need for integrated approaches between national and county levels (vertical integration) (see **Figure 3**).

The number of departments and agencies responsible for WEF functions makes this level of integration complex and difficult to achieve effectively. It is further complicated by a lack of clarity on mandates, and a resulting duplication of functions being performed by different departments and agencies<sup>21</sup>.

However, there are a number of actions that could be put in place to improve integration. For these mechanisms to address the WEF issues in a truly pro-poor manner, it is critical that their mandate and

approach is framed in this way, and that indicators for success are specifically targeted to measure impacts on poverty and the well-being of people living in poverty.

## Recommendations

### Act Now

The time for acting to improve integrated WEF planning for poverty eradication and climate resilience in Kenya is now. The institutional change arising from the implementation of the new Constitution means that it is an opportune time to insert into the change the necessary institutional arrangements and systems to improve integrated WEF planning in support of poverty eradication.

<sup>21</sup>Key Informant Interviews 2015



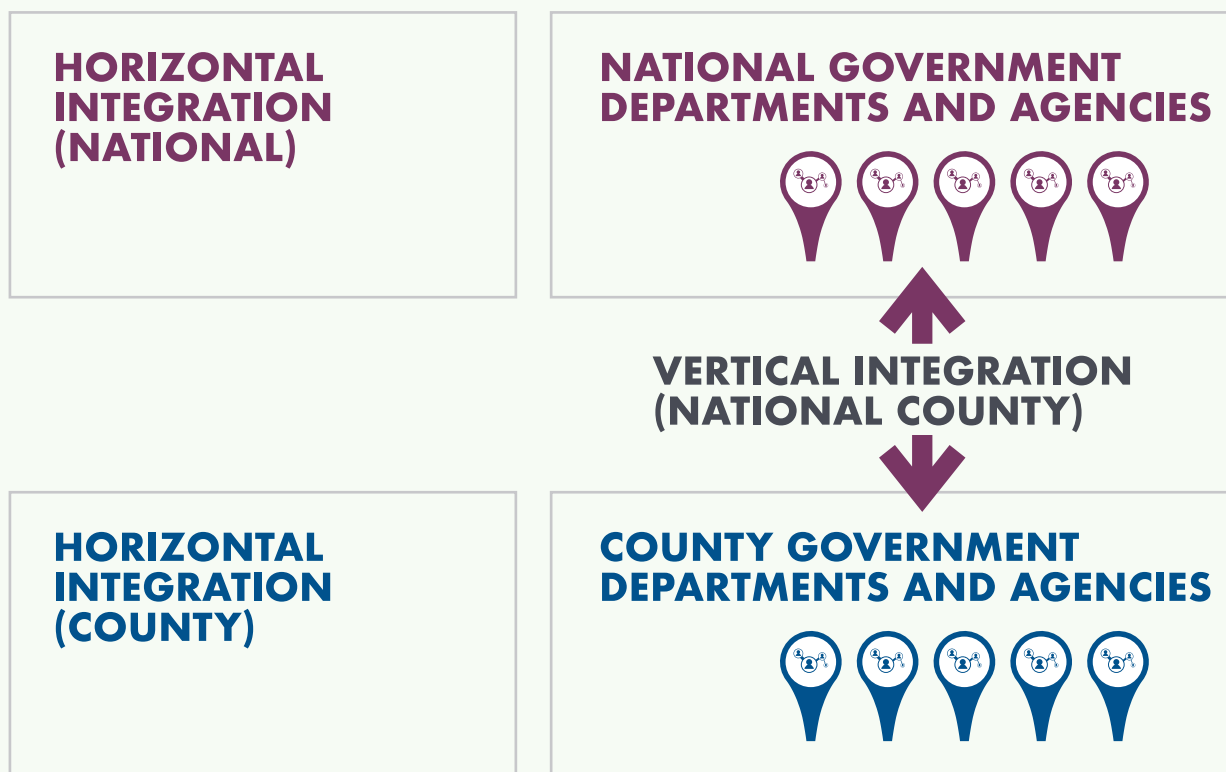


Figure 3: Horizontal and vertical integration needed to implement WEF planning in a decentralised context (own elaboration)

## Institutional arrangements

To achieve improved integrated WEF planning and implementation, the following recommendations are made:

### Simplification of institutional arrangements:

A reduction of the number of departments and agencies active in the WEF field would considerably simplify the implementation of integrated and well co-ordinated planning and implementation. This could include the merging or even disestablishment of agencies. It also, critically, includes a clarification of mandates, roles and responsibilities to avoid the current duplication of functions between departments and agencies that is currently taking place.

### Developing integrated systems and platforms:

Appropriate platforms and systems need to be established to build integrated planning approaches across county and national levels, and between county and national levels. These can be as simple as interdepartmental committees, and as complex as developing software for integrated WEF planning

systems. At the county level, the County Integrated Development Plan provides the ideal opportunity to drive an integrated approach between water, energy and food planning, but for this to be successful, it demands an integrated approach at the national level, through, for example, the Action Plan for achieving Vision 2030.

## Pro-poor planning and development

As was discussed earlier, implementation of an integrated WEF nexus approach should be informed by an understanding of how resources are distributed, who gets priority in access to resources, and how to ensure that the needs of people living in poverty are met in a way that enables development and the eradication of poverty. There is no one-size-fits-all poverty eradication, and country must identify the appropriate economic and social policies for its own context. Nonetheless, a key element of poverty eradication relates to the consideration of the multiple risks that poor people face and the need to **reduce their vulnerability** in this case, in relation to water, energy, food and climate change. Interventions of this nature enables people living in poverty to develop sustainable livelihoods, to participate in markets, and to participate in pro-poor growth.



The approach taken must ensure that **women and vulnerable groups are included in development options and decision making processes**, and that **gender equity is addressed in integrated planning**.

To achieve integrated WEF planning and implementation, and to ensure the mainstreaming of gender empowerment into such planning, state officials, particularly those in newly developed county departments, need **capacity building and training** in WEF planning and in gender mainstreaming.

This Policy Brief arises from the Climate and Development Knowledge Network (CDKN)-funded project *Enhancing Institutional Arrangements for Integrated Water, Energy*

*and Food Security through Improved Planning and Implementation in Kenya* conducted between 2015 and 2016 by Pegasys Institute, Losai Management and IDS.

**Young Maasai boy herding goats**

Copyright: Editorial credit: Aleksandar Todorovic / Shutterstock, Inc.







### Panorama of Tsavo East National Park in Kenya

Copyright: VCharlie / Shutterstock, Inc.

Publications from the project, available on the Pegasys Institute website, include:

- Policy Brief 1/16: Integrating Water, Energy and Food Planning for Climate Resilience in Kenyan Counties
- Policy Brief 2/16: The water-energy-food nexus and poverty eradication in Kenya
- Policy Brief 3/16: Gender-responsive planning for the water-energy-food nexus in the context of devolution - Reflections and lessons from Laikipia and Machakos in Kenya
- Policy Brief 4/16: Integrated Planning for Enhanced Water, Energy and Food Security in Africa - Lessons from Kenya
- Water, Energy and Food Security: A Literature Review of Water-Energy-Food Nexus approaches for Sustainability in the Context of Climate Change

- Managing the water, energy and food nexus in a decentralised system: the case of Kenya

These documents are available on the Pegasys Institute website: [www.pegasysinstitute.org](http://www.pegasysinstitute.org)

An online training course in WEF planning in the context of climate change is available on <https://versal.com/c/e7nipl/integrated-water-energy-food-nexus-planning-in-the-context-of-climate-change>

#### Contact:

Tel: +27 (0)12 342 0815

Fax: +27 (0)86 663 8378

E-mail: [info@pegasysinstitute.org](mailto:info@pegasysinstitute.org)

Website: [www.pegasysinstitute.org](http://www.pegasysinstitute.org)

**Disclaimer:** "This document is an output from a project commissioned through the Climate and Development Knowledge Network (CDKN). CDKN is a programme funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries. The views expressed and information contained in it are not necessarily those of or endorsed by DFID, DGIS or the entities managing the delivery of the Climate and Development Knowledge Network, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them."