

## The world's complex problems need complex solutions

Link: <https://www.worldagroforestry.org/blog/2021/02/03/worlds-complex-problems-need-complex-solutions>

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Management of on-farm tree seedlings in the Gambia using locally available technologies, such as tree guards and drip irrigation. Such technologies are crucial in increasing the likelihood of survival of seedlings, especially in areas such as the Gambia that have erratic rainfall and high temperatures. Photo: World Agroforestry/Kennedy Muthee

*Scientists are arguing for integrating water, energy and food nexus with ecosystem-based adaptation practices in the same framework.*

Global challenges are becoming more complex, driving the need for more integrated and nuanced solutions. Scientists are responding, with increasing interest from the research community on how different approaches to problems can work together to achieve more significant results and have greater impacts.

Environmental and livelihoods' systems have already been experiencing the impact of complex issues, such as climate change, increasing populations and unprecedented rates of development, ultimately creating threats to sustainability.

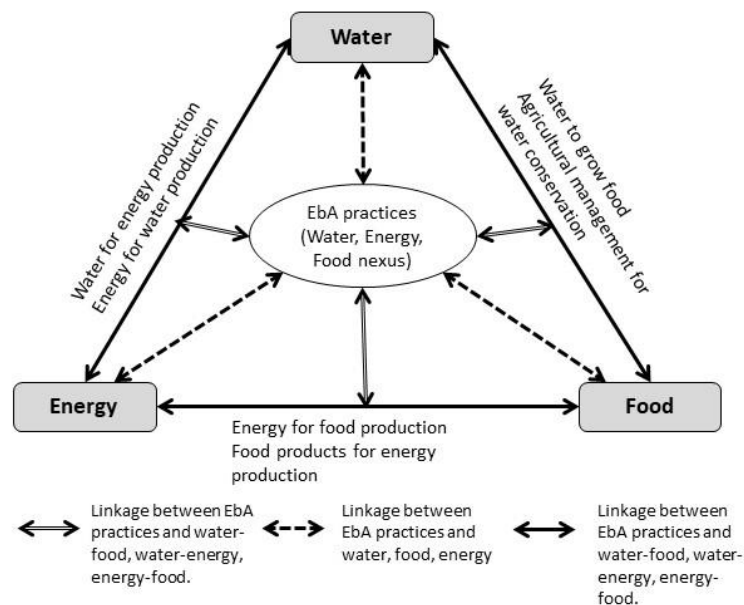
To address these challenges, scientists have recognized that the world needs to move from a traditional 'silos' approach that looks at the world as a collection of individual parts to a 'systems' approach that views the world as integrated and interdependent. By doing so, it becomes possible to simultaneously address shortcomings and synergize strengths presented by different components and units within the system.

### **Ecosystem-based adaptation and the water, energy and food nexus**

A [new study](#) by World Agroforestry (ICRAF) scientists is arguing that integrating ecosystem-based adaptation practices and water, energy and food can help the world better understand the problems inherent in each and lead to a range of solutions.

According to [Lalisa Duguma](#), ICRAF senior scientist who works on sustainable landscapes and integrated climate actions and who is a co-author of the study, both concepts revolve around the environment and society, so integrating them can bring about a balance.

'An integrated framework that encompasses ecosystem-based adaptation and water, food and energy can help practitioners appreciate the interdependence of different units and sub-systems, which then can yield integrated solutions,' he said.



A proposed framework that integrates ecosystem-based adaptation practices and water, energy and food issues to achieve multiple environmental and livelihoods’ goals and at the same time address weaknesses of individual frameworks. Source: World Agroforestry

In this theoretical framework, two levels of links are described. The first level links together water, energy and food, recognizing that water is needed for energy and food production, energy is necessary for water supply and to support food production, and food production requires both energy and water.

The second level integrates ecosystem-based adaptation practices within the nexus of water, energy and food.

‘Such an integrated approach can go a long way in addressing social, economic and environmental drivers that affect system functioning and simultaneously yield multiple ecosystems and livelihoods-related benefits,’ said [Peter Minang](#), ICRAF principal scientist, leader of the Sustainable Landscapes and Integrated Climate Actions research group and a co-author of the study.

His statements were echoed by [Judith Nzyoka](#), assistant scientist with the research group and also a co-author.

‘Ecosystem-based adaptation brings on board strong environmental and community aspects,’ she said, ‘which can help policy planners and decision-makers design intervention pathways

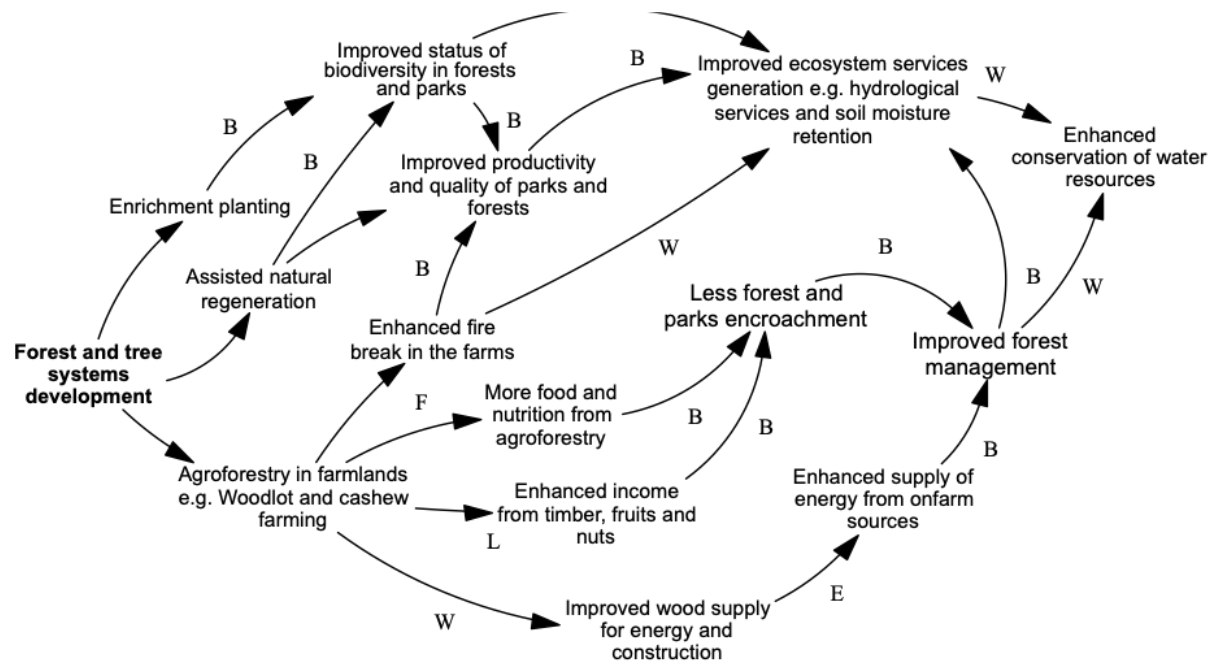
that could lead to meeting a water-energy-food balance, with additional benefits related to enhanced livelihoods and biodiversity conservation.’

## Connecting the dots in the framework

One of the areas in which the framework can be applied is in developing forest and tree systems for various landscapes. Some of the practical aspects of ecosystem-based adaptation that can be used to develop such systems include enrichment planting, assisted natural regeneration and agroforestry. These practices can take various pathways to achieve a balance among water, energy and food and at the same time address issues beyond the system.

For example, establishing robust agroforestry and woodlot systems on farmland can increase the supply of food and enhance nutrition for households through products such as fruits and nuts and simultaneously increase energy stocks for firewood and charcoal to meet demand without depleting other sources, such as forests.

Lesser encroachment into forests translates to improved quality of forests, resulting in enhanced conservation of biodiversity and water. Increasing land cover through forests and tree systems plays a crucial role in soil moisture retention reduced evapotranspiration, thus directly enhancing water resources conservation. Further, increased tree cover enhances recharge of groundwater and reduces loss of water from surface runoff. Healthy forest and tree systems can also directly contribute to improving rural livelihoods through income from the sale of ‘ecosystem goods’, such as timber and fruit. In a nutshell, multiple benefits related to water, energy, food can be realized by just developing forests and trees systems in a given landscape.



A typology of how forest and tree systems developed using ecosystem-based adaptation practices can help balance water, energy and food issues, with additional benefits related to enhanced livelihoods and conservation of biodiversity. Source: World Agroforestry

The study also puts forward other typologies and pathways through which climate-smart farming, management of water resources and nature-based businesses can also meet multiple benefits.

In essence, the research team argue for the increased integration of different frameworks and approaches to help meet multiple benefits and overcome other challenges associated with individual frameworks.

### **Read the journal article**

Muthee K, Duguma L, Nzyoka J, Minang P. 2021. [Ecosystem-based adaptation practices as a nature-based solution to promote water-energy-food nexus balance](#). *Sustainability* 2021(13)1142.



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