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Farmers’ and academia’s views”

Bioeconomy based on agro-ecological principles: Integrated approaches to food and energy security

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Abstract

Rising food and fuel prices exacerbate food and energy insecurity among low-income households in both the Global South and North. This is particularly a challenge for smallholder households whose limited access to land makes it difficult for them to meet their needs for food, income, and energy. They strongly rely on woody biomass for energy, while the production of firewood and charcoal is often associated with unsustainable management of forest and tree resources. Policy and development interventions tend to address food and energy issues in isolation. In reality, however, they are intertwined.

In response, we propose integrated approaches to food and energy security which focus on bioeconomy opportunities and are based on agro-ecological principles. Such opportunities are identified with a view on value chains for diverse bioeconomy products, such as food crops, woody biomass for energy, and non-timber forest products. In terms of agro-ecological principles, emphasis is put on measures to increase soil fertility and the diversity of plant and animal species, and on improving pest and disease control, water management, and the combination of multi-structured land uses.

We illustrate the versatility of such approaches with examples from across diverse geographies and settings. In Sub-Saharan Africa, a balanced agroforestry approach considering demand and supply dynamics in wood energy value chains, food production, recovery of waste bioresources for energy, and the use of improved kilns and stoves has significant impact on improving smallholder livelihoods and reducing the pressure on forests. In Southeast-Asia, integrated approaches to climate-smart agroforestry produce a variety of food, energy and biomaterials while restoring degraded landscapes. In the Western Balkans, the combination of short-rotation plantations of fast-growing tree species (willow, poplar), agroforestry borders, and permanent tree areas enhances energy security, income generation, and biodiversity in landscapes otherwise dominated by the production of wheat, maize, and sunflowers, while at the same time contributing to the urgently needed energy transition away from coal.

We conclude that integrated approaches to bioeconomy based on agro-ecological principles are an overlooked pathway to produce healthy foods, provide sustainable energy, reduce greenhouse gas emissions, create equitable jobs and prosperity, and conserve biodiversity at global scale.

Keywords: Agroforestry, biodiversity, bioeconomy, energy transition, food security