

Potential of Bioeconomy for Sustainable Food and Nutrition Security in Kenya

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Abstract

Bioeconomy is a complex mechanism involving agriculture, forestry, fisheries as well as partially the chemical, biotechnology and energy sectors. The importance of bioeconomy is increasing due to the rapid population growth, climate change and depletion of non-renewable resources as it is perceived to be a tool for sustainable and inclusive economic growth and job creation. Though food and nutrition security has improved globally in the last few decades, around 30% of the population in sus-Saharan Africa is still faced with various forms of food insecurity. This paper reviewed government and institutional frameworks, strategies and programs in agriculture, forestry and fishery laid down as a foundation for the growth of a bioeconomy. It therefore, presents the existing potentials and pointers to the sustainability of the three primary sectors for bioeconomy growth and as a contributor to a sustainable food and nutrition security in Kenya. Currently, agriculture, forestry and fishery contribute to over 34% of the Kenyan Gross Domestic product (GDP). If the resources from these three sectors are exploited well, their potential is likely to increase.

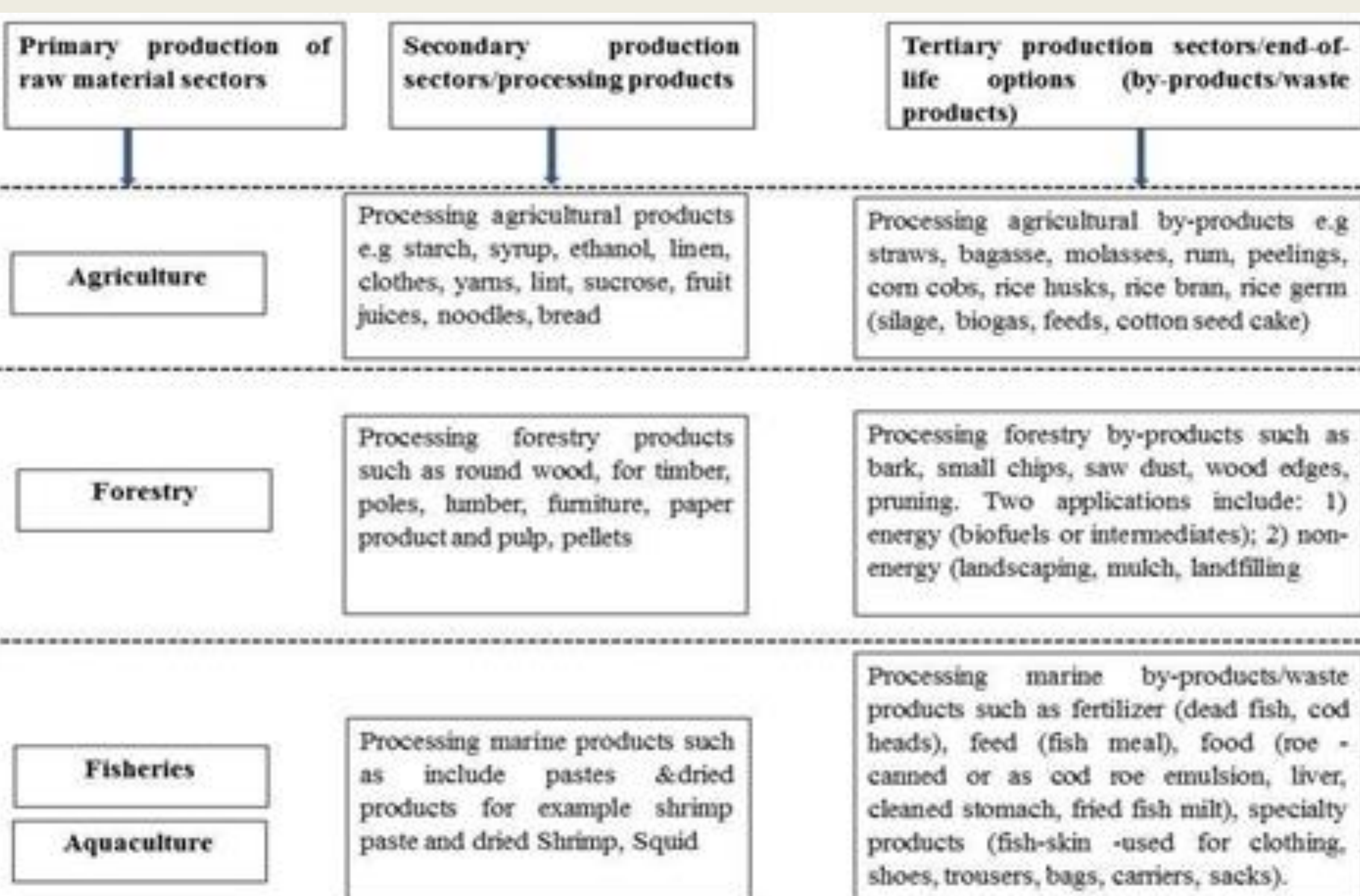
Introduction

Bioeconomy encompasses all industries and economic sectors that produce, manage, and otherwise exploit biological resources and related services (Priefer et al., 2017). It has also been described as circular Bioeconomy since it allows transformation of certain industry by-product into resources of a second industry hence enabling resource efficiency (Carraresi et al., 2018). Bioeconomy includes three concepts: (i) biotechnology (ii) bio-resource and (iii) bio-ecology which highlight the importance of ecological processes that optimize the use of energy and nutrients, promotes biodiversity and avoid soil degradation (Bugge et al., 2016). The three concepts are synergized in a way they can supplement each other (Hausknot et al., 2017). Bioeconomy has been projected as the new economic system to address a wide range of sustainable development challenges (Heimann, 2019; Lewandowski et al., 2019). The focus of bioeconomy is biologisation of the economy as a circular economy with an industrial strategy. It involves the creation of an economic system where non-renewable resources are replaced by sustainably produced renewable biological resources (Devaney and Henchion, 2017; Oguntuase et al., 2018). It also embraces advanced knowledge of genes and complex cell processes to develop new processes and products, efficient bioprocesses to support sustainable production, and integration of biotechnology knowledge and applications across sectors (Leitão, 2016). Both developed and developing countries around the world are adopting resource-based and knowledge-based bioeconomy policies and strategies to shape their developmental efforts. However, despite its potential to help solve sustainable development challenges facing the continent, bioeconomy has not been adopted in Africa. The policy implication of this is that the starting point of employing bioeconomy in Africa is to formulate a dedicated national bioeconomy strategy. This paper tried to examine and review existing frameworks, strategies and programmes that will as a foundation for a bioeconomy growth. Most of the documents existed online, but a few were availed by officers from their respective sectors



The potential and pointers to the sustainability of agriculture, forestry and fishery for bioeconomy growth and contributor to food and nutrition security

The role of bioeconomy in agriculture, forestry, fisheries and aquaculture sectors



Agricultural sector in supporting bioeconomy

Agriculture has impacted the rural population by providing food, income, and alleviating poverty, worldwide (FAO, 2005). Value addition in agriculture has been identified as the backbone of Kenya's middle-income economy (Ntale et al., 2014).

Contribution to	(%)	Potentials in value addition
GDP	33	1. New markets and increased profit margins
Revenue	45	2. Job creation along the agricultural value chain
Industrial raw material	75	3. Reduction of agricultural loss due to quality deterioration and post-harvest
Employment	60	4. Agricultural residues for bio-energy
Livelihood	80	

Potential of bioeconomy in forestry

The Bio-economic value of forests in Kenya can be measured in terms of employment creation, industrial output, income generation, food security and export/import value. Forest provides raw materials for pharmaceutical industry, absorption of pollutants, water purification, herbal medicine and improved nutrition.

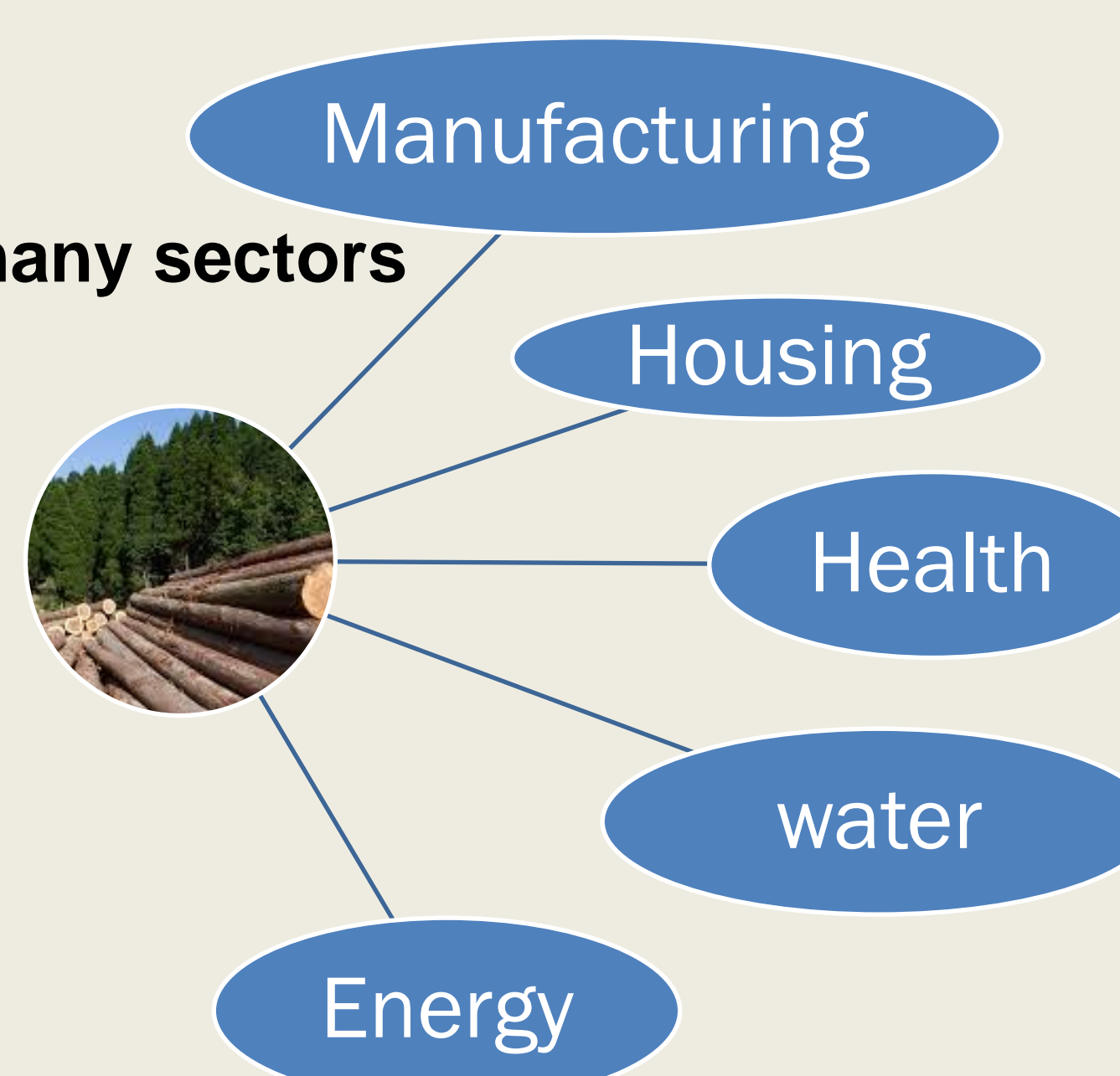
Potential of bioeconomy in fisheries and aquaculture industry

Contribution to	
GDP	0.5%
Food for local consumption	Over 90%
Employment	Over 2 million jobs
Livelihood	Over 2 million people
Per capital fish consumption	5kg

Potentials in by-products

1. Fertilizer from dead fish
2. Feed (fish meal)
3. Fish skin for clothes, shoes

Forestry links many sectors



Contribution to	Value
Save imports worthy	15.6 B
Employment	350,000PX
Revenue	7B
Food/fodder	Over 6B
Irrigation water worthy	Over 3.4B

Conclusion

Bioeconomy constitute an important key for empowering people in addressing and finding solutions to food insecurity, environmental degradation, climate change and reduction of energy dependence of fossil resources.

Acknowledgements

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