



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:
Socio-ecological transitions and bio-cultural shifts”

An Interdisciplinary Framework for Sustainability Assessment in the Global Bioeconomy

JAN BÖRNER, LISA BIBER-FREUDENBERGER, NEUS ESCOBAR, JAN JANOSCH FÖRSTER, ANGELA
GUBELT, KIRSTEN SELBMANN-LOBBEDEY

University of Bonn, Center for Development Research (ZEF), Germany

Abstract

A stronger reliance on the use of biological resources and processes in most, if not all, economic sectors, i.e. a bio-based transformation, is often proposed as an alternative to our current predominantly fossil resource based economies. Modern concepts of bioeconomy go far beyond bio-based energy provision and include the substitution of fossil resource based inputs to various productive sectors, such as the chemical industry and the construction sector, more efficient cascading uses of biomass, and a low bulk, but high-value biologisation of processes in food, pharmaceutical, and recycling industries among others. However, we expect sustainability outcomes of bio-based economic transformation to be context-dependent and contingent on appropriate governance measures. In this paper, we present a theory of change that identifies the main mechanisms through which bio-based transformation can translate into positive or negative outcomes in the key sustainability domains of the Sustainable Development Goals. Based on our framework we derive theoretical pathways of sustainable versus unsustainable bio-based transformation and identify related knowledge, data, and methodological gaps for future research. Using case studies from three bioeconomy sectors, we illustrate how these pathways may operate in transforming landscapes (through innovation in South American agriculture), industries (through innovation a value chains), and societies, for example, by changing production and consumption behaviour. Furthermore, we discuss the implications of the previously described transformative pathways for sustainability governance and argue that sustainable bio-based transformation requires a mix of strategies including governance for transformation, governance of transformation, and transformation of governance. We conclude with directions for future research on the sustainability of bio-based transformation.

Keywords: Bioeconomy, impact assessment, sustainability, theory of change