

عنوان مقاله:

Life cycle assessment of coconut plantation, copra, and charcoal production

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خلاصه مقاله:

BACKGROUND AND OBJECTIVES: Coconuts and their derivatives, such as copra and charcoal, are leading commodities of Indonesia contributing to local consumption and exports. Life cycle assessment is a tool for evaluating the inputs, outputs, and potential impacts of a product system throughout its life cycle and is associated with product sustainability. The cradle-to-gate life cycle assessment of copra and coconut shell charcoal aims to determine the impacts of coconut, copra, and charcoal production from copra byproducts quantitatively and identify scenario improvements to reduce the impacts and enhance sustainability. **METHODS:** Field observations were conducted in tall coconuts in Agrabinta, South Cianjur, and in copra and coconut shell charcoal factories in Sukabumi, West Java, Indonesia. The life cycle assessment method comprises the following four stages: goal and scope definition, inventory analysis, impact assessment, and interpretation. The scope of this study was based on land preparation, nurseries, planting, fertilization, harvesting of mature coconuts, transportation of mature coconuts, copra production, transportation of coconut shells, and charcoal production. Ten impacts were calculated using the Center of Environmental Science of Leiden University Impact Assessment baseline method with Simapro software. **FINDINGS:** This study obtained ten impact categories, not only the global warming potential impact similar to most studies of perennial crop products in Indonesia. Normalization results showed that the category with enormous impacts on humans from coconut cultivation and copra processing activities had terrestrial ecotoxicity potential. The largest impact on charcoal production was on the human toxicity potential. Separated coconut factories from plantations have a high impact because of high fuel transportation. Four recommendation scenarios were formulated: ۱) utilization of smoke from pyrolysis into liquid, ۲) implementation of organic coconut cultivation practices, ۳) integration of coconut plantations with copra and charcoal processing plants and processing smoke into liquid, and ۴) combining scenarios ۱, ۲, and ۳. In scenario ۳, seven of ten impacts showed the lowest value among other scenarios. This scenario potentially decreases the impact from ۶۸.۳۵ to ۹۹.۶۲ percent. The human toxic potential of coconut shell charcoal decreased from ۲.۹۲×۱۰۵ to ۱۰۹.۴۳ kilogram ۱,۴-dichlorobenzene equivalent, terrestrial ecotoxicity potential decreased

... from ۵۹ to ۱۹ kilogram ۱,۴-dichlorobenzene equivalent, and the global warming potential decreased fro

کلمات کلیدی:

Coconut shell charcoal, Copra, Life Cycle Assessment, Sustainability, Tall coconut, Toxicity

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