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Simulation for input-output energy structure in agriculture: Bangladesh.

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Abstract : This paper presents a computer simulation model based on system dynamics methodology for analyzing the dynamic characteristics of input energy structure in agriculture and Bangladesh is used here as a case study for model validation. The model provides an input energy structure linking the major energy flows with human energy and draft energy from cattle as well as tractors and/or power tillers, irrigation, chemical fertilizer and pesticide. The evaluation is made in terms of different energy dependent indicators. During the simulation period, the energy input to agriculture increased from 6.1 to 19.15 GJ/ha i.e. 2.14 fold corresponding to energy output in terms of food, fodder and fuel increase from 71.55 to 163.58 GJ/ha i.e. 1.28 fold from the base year. This result indicates that the energy input in Bangladeshi agricultural production is increasing faster than the energy output. Problems such as global warming, nutrient loading and pesticide pollution can associate with this increasing input. For an assessment, a comparative statement of input energy use in agriculture of developed countries (DCs) and least developed countries (LDCs) including Bangladesh has been made. The performance of the model is found satisfactory to analyze the agricultural energy system for LDCs.

Keywords : Agriculture, energy indicator, system dynamics, energy flows.
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