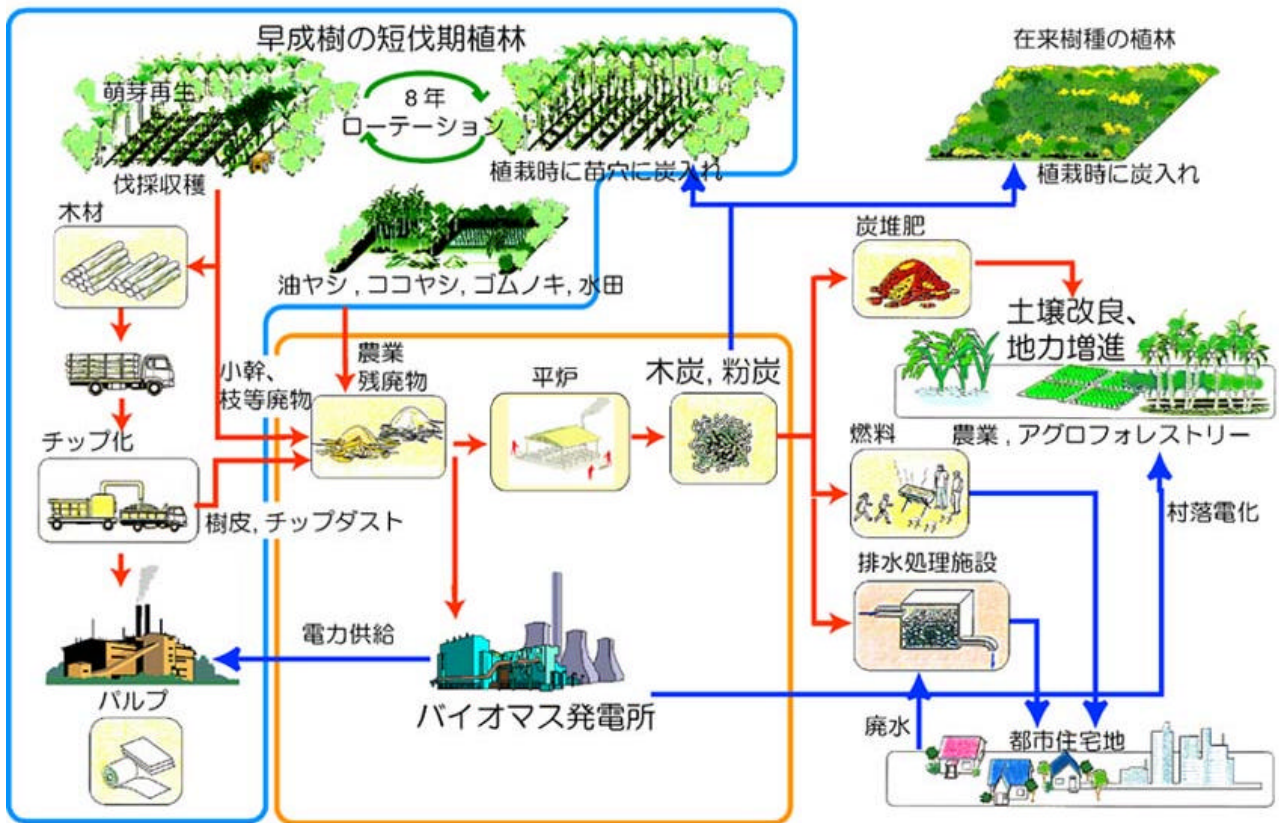


CO₂ fixation by carbonization of biomass residue and non-fuel charcoal use aiming at sustainable development

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Kyoto protocol in 1997 admitted a carbon sink by plantation forest as a measure of global warming prevention. It is required to innovate a method to maintain a high CO₂ fixing ability of trees with utilizing the forest products and inactivating the massive amount of fixed carbon in trees simultaneously. Carbonization could be one of effective methods to solve the request. We proposed an idea of Carbon sequestration by Forestation and Carbonization (CFC scheme) that implies biomass utilization and land conservation by carbonizing biomass residue and waste from tree plantations and wood industries incorporated into their non-fuel uses of agents of soil amendment, water purification, etc. for fixing the carbon in charcoal for a long time. 1) Charcoal characteristics Approximately half of the carbon in woods could be retained to charcoal by carbonization. Charcoal is a mostly stable inorganic carbon converted from high molecular hydrocarbons of plant by pyrolysis. The surface area of charcoal is considerably wide due to the porous structure composed by various minute pores of the cell wall structure remained. The porous structure permits charcoal to have high adsorption capacity to keep water or air. Besides, charcoal has usually no organic substances for saprophytic microorganisms due to pyrolysis. Alkalinity of charcoal is likely to permit some symbiotic microorganisms to propagate in the charcoal minute pores. Thus, charcoal can play a function of soil improvement for plant growth. Once it is buried under ground or kept in water, charcoal would not be weathered, consequently contribute to a carbon sink in soil. Since these characteristics has developed the new non-fuel use of charcoal, the charcoal consumption of the use in Japan exceeded over 50,000 ton annually. The CFC scheme could become a sustainable carbon cycle to sequester the CO₂ generated by consuming fossil fuels, and confine it into the spatial area of agricultural farms, forests, and greening for a long term 2) Feasibility studies in three countries We have been performing some joint feasibility studies in three sites; humid tropics in Indonesia, semi-arid area in Australia and Miyazaki in Japan under the CFC scheme. a) Study in Indonesia : The study site is a large-scale plantation forest of fast-growing trees and a big pulp mill in South Sumatra. The unused wood residue and waste reaches around 200,000 t-DW a year. The study was focused on carbonization of wood residue after harvesting *Acacia mangium* trees and wood waste from the pulp mill. b) Study in Australia : The study was performed at a tree plantation of multipurpose project of mallee eucalyptus in a large wheat cultivation region where the problems of salinity and acidity seriously arise. We studied to carbonize the wood waste after extracting oil, and use the charcoal for soil amendment to improve acidic and saline soil in arable land. c) Study in Miyazaki, Japan : The project in the urban area is focused on the carbonization utilizing the surplus heat in the garbage incineration plant. Meanwhile, the biomass resource in the rural region comes from saw mill, thinned tree wood, and the charcoal are used in the compost production of livestock excretions, sewage disposal, deodorant and so on



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