CHALLENGES TO KEEP INDONESIAN FOOD, WATER, AND BIODIVERSITY SUSTAINED: FROM BIOENERGY DEVELOPMENT IMPACT POINTS OF VIEW

ARINAFRIL[1,2)]

[1)] Department of Agroecotechnology, Faculty of Agriculture, Sriwijaya University, Indralaya Campus, Ogan Ilir, Indonesia, [2)] International Program on Environmental Science and Management, Thai Nguyen University of Agriculture and Forestry, Thai Nguyen, Vietnam

E-mail: arinafril@daad-alumni.de

ABSTRACT

Non-renewable fuels, such as fossil fuels and natural gas as sources of energies, still play very important role in Indonesian energy sectors. Use of these non-renewable fuels is not environmental friendly, because it is finite and gradually depleting ozone layer in the atmosphere due to its contribution to the emission of greenhouse gases. Government's budget and fuel shortage in major areas of Indonesia have been drained due to the recent increases in global oil prices and higher domestic demands. A national plan to reduce the dependency on oil is announced by Indonesian government. It is aimed to increase the use of new and renewable sources to produce energy from currently 0.2 % to 4.0 % in 2025. As with some other fast developing economies, Indonesia is characterized by economic growth and a widening middle class as social prosperity grows.

Unsustainable use of resources was led by some factors, such as the growing demand for resources, widespread poverty due to rapid population growth and urbanization. These factors increase demand for food, water, energy, and other natural resource.

It is cleared that food and water are essential for primary human needs. Rapid development to produce bioenergy by converting forests to oil palm plantations as main resource of bioenergy has caused several environmental deteriorations in Indonesia, i.e. biodiversity loss, overgrazing, deforestation and forest degradation, landslides, erosions, floods, et cetera. People recognize that new paradigm should be implied to manage efficient use of these limited or declining resources to be sustainable. Great attention has been turned from biodiversity exploitations to the concept of the food, water, and energy nexus.

Indonesian government ensures food security and provides access to safe drinking water and modern energy for all. This action remains a key challenge for Indonesian's sustainable development, where more than 20% of the people are still poor and some 51% of the population is food-energy deficient.

The nexus approach recognizes the interdependencies of water, energy, and food production should be approached and recognized by interconnecting of frameworks for assessing the use of all resources wisely.

Key words: Food, Water, Biodiversity, Energy, Renewable Energy

Introduction

Indonesia is one of the most populous countries in the world. Based on the 2010 National Census there are 237.641.236 people residing in Indonesia or 124 inhabitants per km2. More than 80 % persons are living in rural areas and being employed in agricultural areas, as farmers, fishermen, *et cetera*. Indonesia is also known as the world's 10th biggest agricultural producer and as a leading country for palm oil and rubber producer. It is also recognized that Indonesia also has one of the largest forest area countries (950.000 km2) (BPS, 2012).

Although Indonesia is a country with the highest biodiversity richness and agricultural county, but it is known world-wide that Indonesia is also one of the imported countries for agricultural products, such as rice, maize, soybean, onion, garlic, *et cetera*.

Agriculture is the key sector but Indonesia is scarce in agricultural land, while it is just 0.20 ha per person on average. Agricultural land encompasses 54 million ha representing circa 30 % of the land area. It represents 24 million ha of arable land, 20 million ha of permanent crops and 11 million hectares of permanent pastures and meadow (OECD, 2012).

Agricultural sectors, like other sectors of economy, have undergone profound structural changes in the second half of the 20th century. In many provinces in Indonesia, the number of farms decreased dramatically. New cities, properties or resettlements, companies or industries, have been build, where these attracts more people to work. Attracted by better incomes, many farmers left agriculture for the service and industrial sectors.

Agricultural development programs are still being revitalized. Priority programs are: 1) to increase food security system, 2) to develop agribusiness sectors, and 3) to increase the welfare of the farmers.

Increasing food security system is needed to fulfill basic food need of people. Crop intensification, land development for new paddy and other food crop lands, efficiency in using

of irrigations, optimum use of farm machineries, and reduction of agricultural yield losses due to plant pest and disease attacks are chosen to increase food production. Another program is agribusiness development which is included in diversification of agricultural products, and increased in quality of products. Agricultural engineering schemes should be also implied in the rural areas while the people use the traditional technologies in their works.

In terms of how to implement the programs, some objectives have been proposed in developing agriculture to develop agricultural management development system which is focused on develop farmer's skill and knowledge. One point is also proposed, namely to increase added value and competitiveness of agricultural products.

Policies of agriculture have been implemented since 1967 with one goal to pursue food self-sufficiency and successfully reached in 1984. Unfortunately, the highest economic cost caused many side effects, such as the reduction of agricultural products, increasing of the demands on fertilizer, pesticide and water for irrigation.

By the years Indonesian goal to achieve food self-sufficiency decreased due to un-sustainability of government's will. Political situation played very important roles. The awareness of this obstacle has increased politician concern how important sustainable agriculture development is. Indonesian Government pays now much attention on sustainable agriculture development and how to integrate natural resource management strategies into agricultural development policies.

Government efforts to make agricultural development sustained must be followed with the development of appropriate strategies, i.e. the integration of agricultural development with environmental concerns.

Some weaknesses in increasing Indonesian agricultural products are soil fertility decrease due to excessive use of pesticide; less educated of the farmers and family members; less knowledge and skills in managing postharvest products; unsuitable places to apply technology due to the weakness of technology transfer system; and the needs of market information to monitor agricultural product prices in global or national markets.

Renewable Energy Condition in Indonesia

Indonesia is known as one greenhouse emitters in Asia. Fire and land-use change are two main factors which are responsible for releasing greenhouse to the atmosphere, and deforestation as well.

Many activities from industries, transportations, agriculture, et cetera, produce carbon-dioxide which can contribute to ozone depletion layer. Study showed that the energy consumption will increase up to three times in 2025 if Indonesia still uses energy from fossil.

A commitment has been shown by Indonesian government to mitigate climate change. Greenhouse gas emissions will be reduced up to 26 per cent in 2020. Fossil fuels dominate the country's energy supply. To mitigate the local environmental impacts and diversify the fuel mix as a hedge against fossil fuel price volatility, the government is launching a program to develop 10,000 megawatts of generation capacity by 2014 through a program of predominantly renewable energy.

Government of Indonesia provides $400 million to support Indonesia's goals of providing 17 percent of total energy use from renewable energy and improving energy efficiency by 30 percent by 2025.

Specifically, it is aimed for two areas: the scale-up of large-scale geothermal power and the acceleration of initiatives to promote renewable energy (especially from biomass) and energy efficiency (Groom, Gray and Townsend, 2008).

Renewable Energy Project and Biodiversity Threat

A report issued by the Intergovernmental Panel on Climate Change (IPCC) warns that carbon emissions have soared in the past decade. Its analysis found that rapid action can still limit global warming to 2 ℃, if low-carbon energy triples or quadruples by 2050. Global scale environmental degradation and all effects related to fossil fuels have driven highest interest in generating electricity from renewable energy resources, such as sun, biomass, gasified coal, hydrogen, sea wave or ocean energy, water, geothermal, et cetera. (Gill 2005).

Needs to develop renewable energy can cause conflict on biodiversity richness. Hundreds of hectares of forest have been converted to oil palm plantations. Farmers sell their rice fields to investors who are looking for land for oil palm cultivation. One key factor should be considered, i.e. the potential impact of climate change on the environment and biodiversity. Hydropower is also known as a renewable battery. To build hydropower plant how many water is needed? Which impacts on biodiversity can occur? Direct mortality can be caused by destruction and collisions and electrocution. Habitat loss and fragmentation also can occur. (Schwartz *et al*., 2000)

Ecosystem Function Roles

The nexus approach provides a framework for addressing competition for resources and enhancing resource use efficiency. However, the nexus discourse has yet to appreciate the

value of ecosystems, their functions, and their services in water, energy, and food production (Pasari *et al*., 2013)

The ecosystem functions and services provided by nature, for example − including freshwater, energy, biodiversity, forest products and services, food and medicinal products, and fish and other aquatic products − are central to food, water, and energy security. Combination of researches to answer and create coherent understandings among species, why all species are being threatened by development of renewable energy, should be proposed to develop methods and ways to decline and mitigate bad or negative impacts on renewable energy development on biodiversity richness (Huston, 1997).

Conclusion

1. Indonesian government is facing problem on biodiversity loss threat due to renewable energy development.

2. Renewable energy development has consequences to increase in extinction probability for many plant and animal species.

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