2nd DRAFT

LAND DEGRADATION AND THE FOOD CRISIS IN THE ASEAN REGION

Trends indicate that accelerated land degradation and related environmental problems will continue to impede economic and social development in ASEAN. There are particular problems in the agricultural sector in ASEAN countries because of the direct links between production and the natural resource base, and high dependence on agriculture for income and employment. The current food crisis is exacerbated by global economic conditions, including the impetus to produce more and more biofuels, and by the increased climate variability induced by global climate change. The complexity of the interactions between these drivers and the highly dynamic conditions in ASEAN countries poses considerable challenges for the government and the people.

A Discussion Paper prepared for the ASEAN- UN summit

EXECUTIVE SUMMARY

A major challenge facing ASEAN governments and the broader society in member countries is to achieve sustainable economic growth in a way that alleviates rural poverty without jeopardizing the quality of the environment. This is a task that presents particular problems to the agricultural sector in ASEAN countries because of the direct links between production and the natural resource base, and high dependence on agriculture for income and employment.

Assessment of arable land in SE Asia suggests that large areas of most countries are vulnerable to land degradation. The natural resource base (principally soil, water and biota) is environmentally fragile and easily degraded. Land resources lie at the heart of social, cultural, spiritual, and political and economic life of most people in SE Asia. SE Asia's ability to conserve and manage land resources is the key to sustainable development. Major trends to land degradation and agricultural productivity include loss of water (that was once available for agriculture) to other uses reduction of soil and water quality, and loss of farm land, forests and wetlands to non-food crops.

In recent years, more attention has been given by ASEAN to an integrated approach to combat land degradation in the context of the environmental, economic and cultural milieu and against a background of climate change, globalization and demographic shifts within the region. Such an approach involves policy development, legislation and regulation, scientific research, engineering, and the application of comprehensive and coordinated measures to stabilize and reverse and degradation. Against a background that is saturated with questions and uncertainties (economic, environmental, social and cultural) this discussion paper seeks to tease out those aspects that are amenable to intervention by policy makers, by regulators and decision makers. Common drivers for governments are food security, energy security, environmental concerns (including accelerated land degradation and loss of biodiversity) and rural development issues that address rural poverty.

Even though some 'solutions' will require regional cooperation there are many difficulties in implementing multi-lateral environmental agreements. Based on the differences between the ASEAN member countries there is no regional mechanism for coordinating land management issues at the regional level and this provides a void that could be filled through new initiatives. The new approach should emphasize the need to address these in an integrated manner. For example, the development and implementation of an integrated and sustainable 20 year preventative infrastructure master plan. Sub-sectors might include transport (roads, airports, ports and harbours), water, sanitation, solid wastes, electricity and energy, telecommunications, cyclone shelters and maintenance facilities. At the same time, the improvement of soil fertility and reforestation for protection of soil erosion would contribute to the national economy and environment as well as to regional and international environments.

This discussion paper aims to examine the current state of affairs in ASEAN countries and provide a summary of the UN's[1] expectations for future developments. Additionally, measures that could be usefully followed are outlined and a series of recommendations is made. These relate to five key areas:

- Mitigation of land degradation and environmental damage
- Food security
- Energy security and ASEAN's contribution

[1] UNESCAP, FAO and the UNCCD,

- Rural development and poverty alleviation
- Biodiversity conservation

Each country, and the region as a whole, must formulate policies, plans and institutions that will impact positively on agriculture and land use, ensure that the increasing demand for land and water resources be sustainably met, while supporting the development of a vibrant rural sector for food and income needs.

As ASEAN countries are in the tropics they have favorable conditions for growing biomass, which can strengthen their self-reliance in terms of energy. Clear and consistent policies are needed to make the most of this. Modern power generation from biomass sources should be further developed.

It is important to facilitate transfer of know-how within the region. It may be desirable to develop and institutionalize a system for facilitating information sharing and technology transfer within the region.

The active participation of the ASEAN in an eventual global climate change regime, consistent with the principle of common but differentiated responsibilities, is essential to achieving the ultimate objective of climate change mitigation. There are technologies ready to implement now, after years of research, which can deliver a shared vision of global sources of energy being gradually moved to renewable and sustainable sources, harnessing the power of the sun, wind and water while improving the living standards of the local populations.

It is recommended that energy policy makers in ASEAN member countries acknowledge the important role of biomass energy and its future potential, since only then can biomass energy be integrated in overall energy policy making and planning. In particular the potential of modern applications for power generation should be given serious consideration as a way of ensuring optimal utilisation of each country's biomass resources.

LAND DEGRADATION AND THE FOOD CRISIS IN THE ASEAN REGION

1. Objectives and scope of the paper

The objective of this paper is to provide background that could assist the ASEAN to produce an in-depth and consolidated review of land degradation and food security, especially the current food crisis faced by many member states. It should allow the ASEAN to identify policy options to address key challenges. This background paper is intended to stimulate discussion on the theme of land degradation[2] and food security[3] at the ASEAN Summit.

The problems of definition impinge on the way that ASEAN governments approach these important issues. For example, many countries focus on self sufficiency in food, often in ways that are not cost effective. Similarly, the question of just what is the real significance of land degradation and the linkage with the task of feeding the population needs further analysis.

Desertification and other forms of land degradation impact on economic and social development heavily, threaten the survival of the human environment, restrict the regional economy, widen the gap between the regions, and act as one of the great incentives for ASEAN to take a fresh look at the challenges and prioritize the actions needed.

Seven key questions are addressed:

1) what are the demonstrable links between land degradation and guarantees of food supply?
2) to what degree has land degradation and desertification (loss of soil and vegetation resources) accelerated in recent decades?
3) what are the regional differences in the rates of both land degradation and mitigation?
4) what are the links between accelerated land degradation (and other forms of desertification) and poverty?
5) what are the actions taken by the respective ASEAN governments to mitigate the effects of land degradation and poverty?
6) how successful are the efforts?
7) what further measures need to be taken to improve the situation?

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[2] Land degradation refers to the reduction or loss of biological or socio-economic productivity and complexity of rainfed cropland, irrigated cropland, or rangelands, pasture, forest and woodlands resulting from a variety of causes

[3] There two widely different ideas embodied in the term "food security". For example, the OECD define it as "A concept which discourages opening the domestic market to foreign agricultural products on the principle that a country must be as self-sufficient as possible for its basic dietary needs". Yet FAO (and others) define it as "All people at all times have both physical and economic access to the basic food they need".

2. Setting the Scene

There is growing concern in SE Asia over land degradation. Land clearing for agriculture and other development initiatives is increasingly exposing vulnerable soils to erosion forces, leading to significant problems in some areas. Of particular concern, there appears to be low potential for yield increases across approximately 50% of SE Asia's cultivated areas due to severe soil quality problems. Soil infertility has been recognized as one of the most serious constraints to crop yield improvement in SE Asia.

Desertification and drought cause land degradation and affect sustainable development through their interrelationships with important social problems such as poverty, poor health and nutrition, lack of food security, and consequences arising from these such as migration, social conflicts and unrest (UNESCAP 2007 *a* and *b)*).

In ASEAN countries, desertification and other forms of land degradation have been addressed under the umbrella of the United Nations Convention to Combat Desertification (UNCCD) since 1994. As part of the National Action Programme (NAP) of most ASEAN countries national and local monitoring systems were developed attempting to quantify the extent and rate of environmental change, aimed at providing decision makers on both national and local levels with relevant information to enhance their decision making. In general national level monitoring systems are intended to support decision-making on national and regional levels and it is therefore essential to verify to what extent results agree with actual environmental conditions and perceptions held by local land users

The new approach should emphasize the need to address these in an integrated manner. For example, the development and implementation of an integrated and sustainable 20 year preventive infrastructure master plan. Sub-sectors might include transport (roads, airports, ports and harbours), water, sanitation, solid wastes, electricity and energy, telecommunications, cyclone shelters and maintenance facilities. At the same time, the improvement of soil fertility and reforestation for protection of soil erosion would contribute to the national economy and environment as well as to regional and international environments.

Most SE Asian countries' NAPs aim to identify the factors contributing to desertification and other forms of land degradation and the practical measures needed to combat the problems they create. The major challenges are: sustainable land management, rehabilitation, and protection of the vulnerable land and water resources;

- land tenure systems that discourage investment in sustainable land use
- climate change impact in catchment areas that affect the availability of water for irrigated agriculture (and for the burgeoning urban areas) and on rain-fed cropland as the principal food basket areas of SE Asia.
- biofuel energy vs. food challenge
- rural poverty and malnutrition

- governance, equity, legal frameworks, stability
- food security
- climate change

2.1 To what degree has land degradation and desertification (loss of soil and vegetation resources) accelerated in recent decades?

Data on the area of each ASEAN country that is affected by land degradation is reported regularly to the UNCCD as part of the COP reports. Regrettably, the rate of degradation is accelerating in most member countries.

2.*2 Regional differences in the rates of both land degradation and mitigation* As the data presented above show, some countries face a more serious challenge than others. Partly this is due to differences in the rate of overall population increase or the rate of urbanization. But it also due, in large part, to a failure to engage the land users in the mitigation effort. Most soil and water efforts, as stand-alone interventions are not attractive to rural households, as the effect of reduced soil loss is long term and virtually imperceptible to local land users. Successful programs include livelihood improvement implemented along side soil and water conservation measures. Poor farmers have little or no money to invest in conservation measures and have no incentive to change their land use if this increases the risk of not producing enough food for the family. Consequently, these farmers and herders need long-term loans to enable them to invest in changing their land use. Often enough there is no rural credit that lends money over a term that is long enough. Short term loans, especially for livestock raisers, can only be re-paid by buying more animals and increased herd sizes – often exacerbating the over-grazing that is already on-going.

Mitigation projects in the past have often been characterized by inadequate long-term outcomes. They are either non-replicable or cannot be easily scaled-up (or both). A participatory approach should be used to ensure involvement of the local land users in both project *planning* and in *implementation, monitoring and follow-up.* This is to ensure that local knowledge is effectively integrated into the program *design* and that it is well – adapted to the local biophysical and socio-economic situation. In this way the outcomes are likely to be more sustainable.

The perception of land users and other relevant stakeholders as to the extent of environmental change may not be closely aligned to the “official” assessment. The debate about the threat of negative environmental change in ASEAN countries, often referred to as land degradation and desertification by various authors, caused by both natural and human factors has been high on the agenda of the United Nations, the international donor community, the scientific community, and national and local politicians. The driving force behind much environmental policy and project implementation SE Asia is a set of powerful,

widely perceived images of environmental change, e.g. desertification of croplands, overgrazing, deforestation and mining of soil and vegetation resources caused by rapidly growing populations. The occurrence, causes and effects of these phenomena are generally regarded as common knowledge among development professionals in government bureaus and international donor agencies, and non-governmental organizations. The power of these commonly accepted truths about environmental change is exemplified by the formulation of international conventions such as the United Nations' Convention to Combat Desertification and the Convention on Biological Diversity. The body of knowledge forming the basis for these widely accepted phenomena is here referred to as received wisdom.

The origins and persistence of received wisdom about environmental change in SE Asia lie in the substance of science, many times making science the primary definer of what constitutes an environmental problem. There have been some questions about the validity of the science forming the basis on which policy frameworks and international conventions are built. Significant in much of the research of environmental change in SE Asia is that knowledge about the function of the environment held by local land users is often not acknowledged. Instead, the users of the land are frequently seen as the cause of negative environmental change and are the focus of interventions and often restricting remedies believed to halt or reverse negative trends of change.

In 1992 the United Nation's Conference on Environment and Development (UNCED) approved Agenda 21 as an international action plan for sustainable development. Chapter 40 of Agenda 21 calls for improved environmental information as a prerequisite for reporting on progress toward sustainability. Further, it was recommended that each nation develop environmental indicators and environmental monitoring systems to strengthen decision-making. In response to the lack of information about extent and rate of desertification on national, regional and continental levels, UN recommends that countries that are signatories to the UNCCD develop indicator based monitoring systems to support development and evaluation of policy and National Action Plans (NAPs).

The use of indicators has the advantage of providing simplified, synthetic information on the state and tendency of complex processes. Further, indicators can generally be easily communicated to the public and policy-makers. In response to decision-makers' increasing needs for information about environmental conditions on global, regional, national and local levels, the development and use of indicators for environmental monitoring has become a common approach. Indicators, as a measure of environmental health, should ideally determine the present state of the environment and be able to identify changes in measured environmental conditions in a timely way. Indicators should be developed to represent quantifiable properties, symptoms or parameters of a phenomenon relating to a feature of the environment as precise and unambiguous as possible.

The development of indicators for national state of the environment reporting and benchmarks and indicators in the countries in SE Asia is such that there are still many uncertainties and contradictions regarding the general concept of indicators. Some clarity and consensus are required about the definition of what an indicator is, as well as in the definition of related concepts such as threshold, index, target and standard. . There is currently a variety of different definitions of indicators e.g. “An indicator is a measure that summarizes information relevant to a particular phenomenon, or a reasonable proxy for such a measure” and “…a parameter, or a value derived from parameters, which provides information about the state of an environment with a significance extending beyond that directly associated with a parameter value” (OECD, 1993). This means that the indicator not only provides us with a value, but also explains the significance of that value in relation to what is being monitored, e.g. the value means that the state of the environment is good or that the risk of land degradation is high. Due to the diverse meanings assigned to the concept of indictors there is a need to develop a unified, generic and rigorous definition of indicators.

Indicators should:

- assess conditions and trends;
- be comparable across places and situations;
- assess conditions and trends in relation to goals and targets (threshold values),
- provide early warning information; and
- anticipate future conditions and trends.

An increase in human population and economic motivation have encouraged adoption of land degrading cropping practices which are reflected in soil erosion and declining fertility, reduced livestock feed and deteriorated environmental conditions.

Land degradation will remain an important issue for the 21st century because of its adverse impact on agronomic productivity (food production) and the environment, and its effect on food security and the quality of life. Productivity impacts of land degradation are due to a decline in land quality on-site where degradation occurs (e.g. erosion) and off-site where sediments are deposited. However, the on-site impacts of land degradation on productivity are easily masked due to use of additional inputs and adoption of improved technology and have led some to question the negative effects of desertification. The relative magnitude of economic losses due to productivity decline versus environmental deterioration also has created a debate.

Some economists argue that the on-site impact of soil erosion and other degradation processes are not severe enough to warrant implementing any action plan at a national or an international level. Land users (farmers, livestock raisers and foresters), they argue, should take care of the restorative inputs needed to enhance productivity. Agronomists and soil scientists, on the other hand, argue that land is a non-renewable resource at a human time-scale and some adverse effects of degradation processes on land quality are

irreversible, e.g. reduction in effective rooting depth. The masking effect of improved technology provides a false sense of security.

General indications are that many of SE Asia's soils are prone to drought. They tend to have low moisture-holding capacity and physical characteristics, such as low organic matter content, which restrict effective rooting depth and subsequent yields. Unfertilized rice yields vary widely depending on soil type. On poorer soils yields are as low as 600 to 900 kg/ha. Some good soils do exist in the active floodplain of the major rivers e.g. the Mekong, but it is in these areas where development pressures are also most intense. Unfertilized yields on better soil types can reach as high as 2,000–2,500 kg/ha. In addition, fertilizer use in ASEAN countries as a whole is one of the lowest in the world.

Each country, and the region as a whole, must formulate policies, plans and institutions that will impact positively on agriculture and land use, ensure that the increasing demand for land and water resources be sustainably met, while supporting the development of a vibrant rural sector for food and income needs. Climate change, especially as reflected in drought frequency and severity, is already showing that this challenge must be met in a context of increasing risk, and cost of adaptation to long-term effects.

Only limited opportunity exists for exchange of information and sharing of experiences with regard to the use of modern technologies amongst implementing organizations within ASEAN. It is important to facilitate transfer of know-how within the region. It may be desirable to develop and institutionalize a system for facilitating information sharing and technology transfer within the region.

3. Climate change, drought and other weather-related phenomena

The impact of drought is more severe now as a result of land degradation. Drought impacts are in three main categories:

(i) Drier conditions and less soil water storage necessitate the use of supplementary irrigation (where water is available), often requiring the tapping and abstraction of ground water. This creates increasing demand in an already water-short environment.

(ii) Reduction of above-ground biomass production which has implications for soil protection and for livestock production. The latter is simply because when rains fail there is no carry-over forage (even as standing dry) for animals and this is the natural outcome of the lack of vision or willingness to invest in integrated rangelands management.

(iii) Changes in botanical composition. There are many examples where the net above ground biomass has increased such as the brush encroachment in the rangelands and invasion by noxious and poisonous species but because of changes in vegetation composition, where high value grazing species are

disappearing particularly perennial grasses, forage production and feeding value of the vegetation declines.

Causes of the loss of the grazing lands throughout the SE Asian region are not easy to explain. It is certainly a result of cumulative effect of sectoral interventions aimed at increased animal productivity and ecological misconceptions that led to the current almost irreversible situation and certainly the impact of drought on vegetation weakened by continuous misuse has had its effect.

Impacts of climate change are also being felt in the dryland cropping areas that depend on rain-fed agriculture. e.g. Cambodia has experienced a lengthening of the dry season in recent decades and crop failure is more common. Even where crops succeed, the grain production is drastically reduced.

4. Food crises under the pressure and impacts of land degradation in ASEAN

This paper discusses food insecurity and related problems in SE Asia in general and proposes the adoption of strategic measures to mitigate human and environmental vulnerability. It argues that ensuring food security is a key strategy for achieving this objective. Projections on food production estimate that SA Asia as a whole needs to increase its grain production by almost four times and its animal production by seven times, given a likely doubling of population by the year 2050. Ideas on how to meet this challenge vary enormously; some are optimistic, even complacent, others are darkly pessimistic. Some indicate that not much needs to change; others argue for fundamental reforms to agricultural and food systems. Some indicate that a significant growth in food production will only occur if new land is taken under the plough; others suggest that there are feasible social and technical solutions that would increase yields from existing farmland.

The guiding premise of this paper is that without deliberate changes from the normal course of events, many of the food security problems of today will persist and some will become worse. Action needs to be taken now to promote poverty-reducing growth and agricultural development as well as to put agriculture on to a more sustainable path. A second hypothesis of the paper is that *modern agriculture undermines food security and health by putting the rural poor at a disadvantage, threatening their land tenure, and degrading resources such as water soil and biodiversity.* Agricultural production in the future therefore needs to take into consideration the issue of sustainability.

There are four important *principles for sustainability* :

- *imposed technologies are not sustainable* : if coercion or financial incentives are used to encourage people to adopt sustainable agriculture technologies (such as soil conservation, alley cropping, integrated pest management), then they are not likely to be sustainable;

- *imposed institutions are not sustainable*: if new institutional structures are imposed, such as cooperatives or other groups at local level, or Project Management Units and other institutions at project level, then these were rarely sustained beyond the life of the project

- *expensive technologies are not suitable*: if expensive external inputs, including subsidised inputs, machinery or high technology hardware are introduced with no thought to how they will be paid for, they too will not be sustained beyond the projects ;

- *sustainability does not equal fossilisation or continuation of a thing or a practice forever*: rather it implies an enhanced capacity to adapt in the face of unexpected changes and emerging uncertainties

According to FAO, tracking trends in food security requires two interrelated variables The first is the *per caput availability of food* for direct human consumption (also called per caput food supplies). It can be used to construct the *pattern of distribution of food supplies* to show what part of the population lives in countries with given levels of per caput food supplies for consumption.

The second variable concerns the *distribution of the food supplies within each country*, i.e. given the national average of the preceding variable, what proportion of a country's population has access to any given level of per caput food supplies. One such relevant level for food security analysis is that of per caput food supplies (Calories/day) equal to 1.55 times the *basal metabolic rate (BMR).* If a person's access to food is below this level, s/he may be classified as chronically *undernourished*.

Food security has three dimensions (UNEP 2002:288):

- availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports ;

- access by households and individuals to appropriate foods for a nutritious diet; and

- optimal uptake of nourishment, thanks to a sustaining diet, clean water and adequate sanitation, together with healthcare.

It is however important to note that *food production is not the same as food availability* (production minus exports plus imports), and that *aggregate availability and the ability to acquire food (food entitlements) are very different things*.

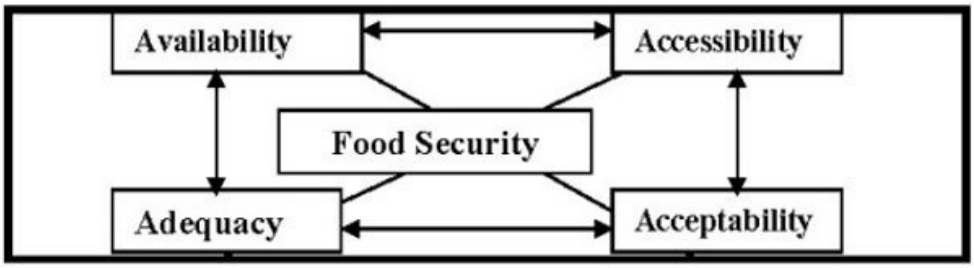
Whilst food production undoubtedly influences food entitlements, the connections are complex and there are also other matters involved.

People's *access to food* depends both on the purchasing power of their income, and on their *non-market entitlements*, such as rights to land for subsistence farming and foraging purposes. Households seeking to preserve *food security levels* may resort to a number of *coping strategies* to gain *access to food*. These include: maintaining normal income generating patterns; adaptation by means of innovative use of available resources or some divestment of liquid assets; divestment of productive assets, such as stock or land; and out-migration and destitution. However, the *market economy* is not expected to grow rapidly, and many *non-market entitlements* are in danger of decline. *Food entitlements* for *urban dwellers* are most often mediated through the market, whereas for *rural dwellers* in general, and *subsistence farmers* in particular, these *entitlements* tend to depend more on the local production.

Clearly, f*ood insecurity* is basically a problem of poverty, affecting those social groups with the weakest or most fragile food entitlements, both in terms of access to social networks and safety nets or productive assets (capital, land, agricultural inputs).

Malnutrition can thus be a threat to urban and rural dwellers at different times and for different reasons. *Urban-rural links* are often created in the pursuit of *food security*, and hence urban dwellers will maintain rural contacts, or even land, to provide *food security* in case their purchasing power is disrupted, whilst rural dwellers will maintain urban contacts, in part to ensure against the loss of local food entitlements.

These factors are directly and indirectly interrelated. Available food must be accessible to all members of the populace. What is available must also be adequate and the populace must be willing to eat that is what is available must be accepted as a preferred food.



Expansion and intensification of agriculture has often been associated with the build up of pressures that have led to *resource degradation* and *adverse impacts* on the wider environment. Such pressures will continue to increase in the future and a major issue will be how to minimise the negative effects on the resources, the environment and the sustainability of agriculture. This is particularly important for countries where the exploitation

of agricultural resources is the mainstay of their economies and the deterioration of their resources threatens both their food security and overall economic well-being. At the same time, it is in these countries that continued poverty and further increases in the population and dependence on agriculture intensify pressures that contribute to degradation and to lack of sustainability.

4.1 Extent and nature of the "food crisis in ASEAN"

Although the global food crisis has slipped from the headlines and prices have fallen, the emergency remains as critical as ever, demanding improvements in production and distribution, and credit, seeds and fertilizers for developing countries. The current food crisis has several dimensions. Firstly, the price increase in major food grains in response to droughts, to accelerated land degradation and to encroachment of non-food crops e.g. biofuel feedstocks onto cropland. Secondly, the reduction in supplies reaching the market as result of government policies and through the action of exporters and other entrepreneurs.

Another important dimension relates to the way food shortages and higher prices impact on the various sections of society. The consequences are different for households (both rural and urban), for the local level with its knock-on effect on the rural economy and the impact at national level.

Government policies both within ASEAN and externally have often exacerbated the food security problem. By enacting controls on rice exports, exporting countries are hurting their own rice farmers. Export controls do not allow price signals to be fully transmitted from the international to the farm level, leaving farmers—often among the poorest groups in developing Asia—unable to benefit from higher commodity prices. The pressure on Asia's poor has been intense.

Moreover, the spiral in rice prices is now exacerbating hunger in countries that need help the most. The UN World Food Program is now facing major difficulties in sourcing the food stocks it needs to feed displaced populations and refugees particularly the hungry populations of North Korea, the Sudan, and the many other pockets of deprivation in the world.

Other policies that have contributed to the present crisis include:

1. Allowing grain stocks to decline – the present grain stocks are the lowest since 1987
2. Declining government support and subsidies in agriculture
3. Increased privatization of agricultural support sector and state trading enterprises
4. Shift in food policy and agribusiness strategy

The food crisis is hitting the poor the hardest. ASEAN is home to over half a million poor or near-poor. Food expenditure accounts for >60 of total spending[4] in a number of ASEAN countries (70% in Cambodia) thus soaring food prices will considerably reduce their purchasing power resulting in a drastic decline in their food intake and basic nutrition as well as expenditure on other necessities such as education and health. Food shortages will impact many and result in absolute poverty of low income groups like farmers, settlers, indigenous peoples, artisanal fishers and urban poor. It will increase the vulnerability of women and children.

A doubling of food prices in the past three years[5] could push up to half a million people into deeper poverty, according to a World Bank estimate. Hundreds of thousands may starve as food costs jump. Those likely to be hurt the most by the sharp increase in food prices are the urban poor, the residents of Asia's sprawling mega-cities. Slum dwellers in the Philippines, the world's largest rice importer, are among the worst off in the region. Even before the spike in food prices this year, poverty and food insecurity were on the rise. According to a government report released in March, the number of people who do not have enough income to meet basic food needs in the Philippines rose to 12.2 million in 2006 from 10.8 million three years earlier, an increase of about 13 percent.

Bad weather and increased consumption have caused rice supplies to shrink, experts say, but the world is not in immediate danger of running out. Indonesia had a record harvest last year and after years of importing rice will have a surplus of 1.2 million tons FAO predicts that an overall good harvest in 2008 will increase rice production by 12 million tons, or about 1.8 percent globally.

ASEAN already has a base to build from in serving as a framework for multilateral dialogue and collaboration in the management of food supplies and prices. ASEAN members include two of the world's leading rice exporters, Thailand and Vietnam, as well as the leading rice importers, the Philippines and Indonesia. In the wake of the food crisis of the early 1970s, ASEAN has been, in fits and starts, organizing and tinkering with the ASEAN Food Security Reserve—an agreement among members to set aside and share rice stocks for situations just like this. It's high time that these discussions were accelerated and implemented.

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[4] Singaporeans on average spend only 8 percent of their income on food, compared with 15 percent in Malaysia, 26 percent in Indonesia and Thailand, and around 40 percent in Vietnam, according to the U.S. Department of Agriculture.

[5] In one year alone, world wheat prices have climbed 130 percent, while rice is up 74 percent according to UNESCO. Higher fuel prices are a major factor, pushing up planting, transportation, and fertilizer costs. New demand for biofuels has diverted food sources such as corn. But greater demand for grain and meat in emerging countries such as China has also played a part.

4.1.1. Effect of land degradation on household-level food security and possible increase in vulnerability to food crisis,

- As indicated above, many nations seek to be self-sufficient in food and there is some potential contradiction between food self-sufficiency at the national level and food security (as defined by FAO) at the household level whether that household is in the rural or urban area. As the area of degraded land expands the ability to produce staple crops declines. Land degradation takes many forms, the most insidious of which is the loss of soil fertility as soil erosion strips away nutrients and as the rising costs of artificial fertilizers reduces replenishment of essential elements. Accelerated soil erosion, landslips is now more obvious in many areas.
- Each ASEAN country may need to re-examine its policy on food-self-sufficiency, especially as competition for arable land increases and there is potential to grow alternative crops with higher returns per hectare. The drift of surplus rural labour to cities has two affects (i) less dependency on farmland for income as labour is diverted to manual labour in construction and in small-scale entrepreneurship (.e.g. food stalls, etc) and (ii) greater vulnerability to food shortages and or rising prices as the direct link with the land is severed.
- Any possible push factor of land degradation to rural migration to cities where more vulnerability to increased food prices.

5. Principal Agricultural Systems and their Impact on Food Security

5.1Traditional Agricultural Systems

Farmers of *traditional* and *low-input agricultural systems* have long favoured crop diversity. Even today, there are still a huge variety of crop combinations cultivated, including cereals, legumes, root crops, vegetables and tree crops. Cereals may be intercropped, producing, in some cases, highly complex patterns, with up to 10 species grown in close proximity.

5.1.1. Genetic Diversity in Traditional Agriculture

In very variable conditions, farmers rarely standardise their practices. They maintain diversity, develop a variety of strategies and so spread risk. Mixtures of crop and varieties clearly provide farmers with a range of outputs, and also represent a logical approach to coping with variable environments. *Mixed crops* can also be less variable in time and space, and combined yields are often greater, particularly if differences in root and shoot geometry allow the crops to use light, nutrients and water more efficiently *Intercropping* can reduce weed problems, so influence labour requirements, returns to labour can be increased, and erosion and runoff may be reduced because of the greater ground cover given by the mixture.

5.1.2. Importance of Agriculture Genetic Diversity

Crop *genetic diversity* provides security for farmers against pests, disease and unexpected climatic conditions. In the highly variable environments of SE Asia crop genetic diversity can help small-scale farmers obtain higher yields than they could with *monocropping*. Higher yields are obtained from a mixture of crops and crop varieties, each one specifically adapted to the microenvironment in which it grows. Genetic diversity also provides farming

communities with a range of products with multiple uses and value. Some varieties of a particular crop may be good for immediate consumption, for example, while others are better for long-term storage.

The *mixed farm* can be an almost closed system, making little impact on the outside world: crop residues are fed to livestock or incorporated in the soil; manure is returned to the land in amounts that can be absorbed and used; legumes fix nitrogen ; trees and hedges bind the soil and provide valuable fodder and fuelwood, and habitats for predators of pests. The components of the farm are thus complementary in their functions, with little distinction between products and by-products. Both flow from one component to another, only passing off the farm when the household decides they should be marketed.

Erosion of Genetic Diversity in Agriculture is a problem. It is only recently that fields restricted to single species and varieties have become common. The introduction of *modern varieties and breeds* has almost always displaced *traditional varieties and breeds*. The 20th century saw the loss of some 75 percent of the *genetic diversity of agricultural crops*. Only about 150 *plants species* are now cultivated, of which just three supply almost 60 percent of calories derived from plants.

Such *erosion of genetic diversity in agriculture* represents a major threat to the food security of the majority of the region's producers. Modern, *uniform crop varieties* will only reach their potential if the environment is also uniform, which means high quality land where the fertility and water status have been evened out with the use of fertilizers and irrigation. In areas where mono-cropping is prevalent, diseases and pests can spread quickly and cause devastation. Whilst improved methods of controlling animal and crop diseases are now available, the costs of these services have become increasingly prohibitive for the farmer.

It is also important to keep in mind that, in some circumstances, modern agriculture undermines food security and health by putting the rural poor at a disadvantage, threatening their land tenure, and degrading basic resource such as water and soil.

Many of the environmental problems associated with agriculture are a direct result of intensive and specialised farming. Intensification of agriculture has meant greater use of pesticides, fertilisers and water inputs, and a tendency to specialise operations. The inputs, though, are never used entirely efficiently by the receiving crops or livestock and, as a result, some are lost to the environment. Some 30 to 80 percent of applied nitrogen, and significant, but smaller amounts of applied pesticides are lost to the environment where they contaminate water, food and fodder, and the atmosphere. Water is often wasted or used inefficiently, leading to *groundwater depletion*, water logging and salinity problems. This is not only wasteful, but costly to those who want to use these resources and expect them to be uncontaminated.

Many *environmental and health-related impacts* have increased in recent years, whilst others have persisted, all efforts to reduce them notwithstanding. Water systems have become increasing contaminated. *Nitrates* in water can give rise to *methaemoglobinaemia* in infants, *pesticide contaminated water* can harm wildlife and pollute drinking water, and nitrate and phosphates from *fertilizers*, together with organic wastes from livestock manure and silage, all contribute to algal growth in surface waters, de-oxygenation, fish and coral deaths, and cause a general nuisance. Eroded soil also disrupts watercourses, and runoff from eroded land causes flooding and damage to housing, irrigation systems and natural resources.

6. Agricultural Systems, Poverty, Food Insecurity and Hunger

In the developing countries, 70 to 75 percent of *the poor and hungry live in rural areas.* Farming is, therefore, at the heart of their *livelihood strategies*. The International Fund for Agricultural Development (IFAD, 2001) and the new World Bank Rural Development Strategy (FAO 2002a : 8) have reiterated the importance of farming as *worsening standards of living in rural areas* drive desperate people to the cities, thereby exacerbating *urban poverty* and a further decline of agriculture and the rural sector.

Many of the rural poor are subsistence farmers or landless people seeking to sell their labour. They depend on agriculture for their earnings, either directly, as producers or hired workers, or indirectly, in sectors that derive from farming. For example, trading, transportation and processing involve large numbers of small entrepreneurs and are necessary for agriculture but, at the same time, such entrepreneurs depend on farming activities for their survival. Food-insecure people neither consistently produce enough food for themselves nor have the purchasing power to buy food from other producers. During times of famine, food may simply not be available at any price. Fortunately, few places in SE Asia experience famine but many suffer from food insecurity

Given that concerns for the integrity of natural habitats will limit significant further areal expansion of agriculture, other strategies must be found to feed a global population that may exceed seven billion in 2010 (FAO, 1996). A number of alternative scenarios have been suggested which fall into two distinct groups.

6.1 Scenario 1: Developing Countries Should Import Food

Some of the developed ASEAN countries have considerable unused production potential, given their *technological expertise* and their *marketing infrastructures*. For this food to reach the food-insecure in poor countries, the development of effective *national food security policies* will be required. These must ensure higher *food entitlements* for both the rural and urban poor through wider access to food made possible by income generation and employment. But it does not directly follow that greater volume of supply will influence

household food security for the poor in these countries as a group, or secure greater access to food in remote localities.

Increasing the supply of food from large-scale commercial agriculture or imports and lowering food prices are more likely to improve food security among *urban* than *rural* dwellers, and this is one of a number of issues around which urban and rural interests can come into conflict. Interventions that depress urban prices are not, however, likely to prove an efficient means of improving urban food security. Moreover, some of the most vulnerable urban dwellers rely on rural links to ensure their food supply.

6.2 Scenario 2: Poor Countries should Increase Own Food Production

The *second scenario*, thought by many analyst to be more realistic, advocates that poor countries must increase their own food production significantly and in such a way that it specifically alleviates *food insecurity*. A number of mechanisms may be required to achieve this goal:

- increased *agricultural research* and development efforts aimed at increasing productivity per hectare of land and unit of labour ;
- improved *extension services*, through governmental and non-governmental channels, that will enable all farmers to use the results of research and reap the benefits from technological advances ; and
- improved *infrastructural and socio-economic arrangements*, including enabling policies (e.g. fiscal policies, land tenure policies, good governance, popular participation, suitable credit schemes and institution-building) that will allow all sections of the community to sustain the increased production.

The creation of a policy environment, both internationally and nationally, that is conducive to poverty reduction is a fundamental requirement in the countries of SE Asia. At the international level, this implies measures that contribute to peace, political and economic stability as well as a trading environment for agricultural commodities which, by creating a level playing field, protects the *development and food security interests* of developing countries. Nationally, it implies the adoption of macroeconomic policies that provide the stability required to encourage savings and investment. In most cases, this will call for *increased budget allocations for agricultural and rural development*. Such policies emphasise broad *participation in policy decision-making and implementation*, combined with *institutional decentralisation* in ways that increase the *accountability of governments* to their rural populations and strengthen the capacity of communities and local organisations to place effective demand on service providers. *Policies* that define transparent and secure rights and promote a more equitable access to natural resources, such as land, water and fish stocks, contribute both to their sustainable use and poverty reduction.

Increasing the supply of food from large-scale commercial agriculture or imports and lowering food prices are more likely to improve food security among urban than rural dwellers, and this is one of a number of issues around which urban and rural interests can come into conflict. Interventions that depress urban prices are not, however, likely to prove an efficient means of improving urban food security. Moreover, some of the most vulnerable urban dwellers rely on rural links to ensure their food supply.

It is impossible to achieve *food security* and *sustainable development* without *good governance*. Good governance in ASEAN some countries is challenged by various issues, including the collapse of the state in countries where governments hardly have the capacity to govern and maintain law and order. Narrow political considerations, personalised power and corruption have undermined the process of democracy and responsive governance. *Inequity* in social, economic and political systems, including *gender inequity*, has been a barrier to achieving good governance. As such *poverty alleviation* represents the greatest challenge to good governance. There is also the challenge of how to manage effectively financial and natural resources, promoting decentralization based on trust, transparency, accountability and capacity.

Another key element in the discussion of *land reform processes* is the effect of different tenure systems on investment in resource management and on productivity. Other issues of concern and continued discussion include: the means for developing effective, legitimate institutions for the management of land rights; the implementation of market-based instruments for the redistribution of land; the question of land restitution; and the continuing marginalisation of women, indigenous peoples, and pastoralists or hunters-gatherers. The role of the state in facilitating or administrating land reform is also under the spotlight.

7. Water Resources Management

In most countries situated in the *drier regions*, *water availability per caput* is already below the level that would allow enough food to be grown locally to feed the population. Between 30 and 40 percent of food production comes from irrigated areas. In the developing world, about 18 percent of total *arable land* is irrigated, but irrigation intensity varies widely by individual food crop. Average yield increases in irrigated vis-à-vis rain-fed land in the developing countries are significant, generally ranging from 50 to 200 percent for most crops.

7.1. Investments in irrigation in Asia

This is widely perceived to be a poor investment, and there are innumerable alternatives, notably urban investments, competing for the limited amount of financing. Investment in medium-and small-scale irrigation schemes in SSA is believed to be relatively more attractive than investments in large-scale irrigation for the following reasons :

- small-scale irrigation technology can be based on farmers' existing knowledge ;
- small-scale irrigation technology is more compatible with the existing physical and human environment ;
- local technical, managerial and entrepreneurial skills can be utilised, and migration or resettlement of labour is not usually required ;
- planning and development of small-scale irrigation are more flexible ;
- social infrastructure requirements for small-scale projects are reduced; external input requirements for small-scale technology are lower.

The scarcity of water calls for the recognition of the links between economic development and protection of *natural ecosystems* and the need for co-operative frameworks in the management of water resources. Future developments will be dictated by a whole set of factors, including political choices, investment capacity, technological improvements, as well as social and environmental requirements.

Efficiency of resource use is the conversion of scarce resources (natural, social and financial) into products and services in a way that is economically viable but that minimises the impact on the environment. However, the *introduction of more sustainable, environmentally sound agriculture* will not advance evenly; food production will still involve *negative environmental impacts* for the foreseeable future. Thus, future strategies must have a dual objective to accommodate long-term transformation of food production into *sustainable and environmentally sound resource use*; and to mitigate any harmful short-term effects.

Although there is a scientific foundation for the belief that food production can keep pace with projected *population growth* and be environmentally sound, the aggregate picture is clearly misleading. Many areas where marginal land is farmed today are also those where *population pressure*, *poverty* and *food insecurity* are intense. These are areas usually difficult to reach and lacking in *infrastructure and investment capital* as well as in *technical expertise*. They are usually not endowed with the necessary resources for the production of *market commodities* and are therefore frequently excluded from food production initiatives. Governments have a special role to play in assisting and promoting rational development in these areas.

Appropriate *planning and implementation frameworks* are required to facilitate and diffuse *science and technology* and to put policy into action. In some countries this will

require *diversification* through creation of employment in other economic sectors, more efficient transportation infrastructure and the removal of obstacles that impede efficient market mechanisms. In other cases, income and employment opportunities should be promoted within the agricultural sector itself, in areas such as processing, marketing and support services.

Environmental conservation and enhancement plans are essential to building a lasting *national food security system*. In addition to the usual elements of conserving land, water and biological diversity and controlling pollution, such plans should be integrated with efforts to reduce the loss of high-potential arable land to other uses, to improve food security and to use integrated planning approaches and processes in order to assess population-supporting capacity, so that planning national investment in food and agriculture can be directed most efficiently.

The *environmental price of food production* is usually found in the loss of natural vegetation and biological diversity, soil erosion and surface and groundwater depletion. Inevitably, there are divergent views about how land should be used, whether for industrial crops, food, nature conservation or industry. These conflicts exist for coastal and inland areas and common property resources (e.g. forests, grazing lands, oceans and seas). Thus, clearly defined procedures are required to resolve different needs and interests in society, not only of current generations but also taking into account future needs. This means involving the stakeholders (farmers, local land managers, NGOs, government, consumers and others) and evaluating the environmental costs of different land-use options.

Transformation of current and future food production system requires a land or resource-use planning approach and the formulation of explicit goals for alternative land uses. Planning is also necessary to define incentives for sustainable use and to promote changes of attitudes and values for improved land-use options. The severe pressure currently on marine fish stocks is an example of how misguided policy and lack of planning can lead to indiscriminate use of a common natural resource.

Market forces seldom respond well to environmental problems unless encouraged or directed by government policy. The political and administrative framework within which food production can increase without leading to widespread environmental damage should have at least four main elements:

- *initiation of dynamic, participatory land-use planning processes* that identify and mitigate the risks of natural resource degradation and other environmental impacts ;

- *carefully crafted social and economic policies* to improve the capacity of food producers in the poorer areas to manage efficiently their soil fertility, soil moisture, pest population and biological diversity through holistic management systems. In many cases, success will depend on first addressing major social or economic constraints such as the equitable distribution of productive resources, access to capital, or unemployment ;

- *greater investment in human capital and rural infrastructure* including the improved use of information and communication technology and training and empowering agricultural advisers to work with farmers to apply *environmentally sound production methods* and to promote private sector development ;

- *ongoing assessment, monitoring and evaluation of environmental impacts* in all segments of the food production chain through information management, decision-support systems, indicators of sustainability and geographic referencing of information (especially by linking AEZ characteristics to district and national planning units).

8. Climate change: impacts and implications for ASEAN

Food production in developing economies in the Asia-Pacific region would be the most affected by climate change, said a report released on Wednesday by the Pacific Economic Cooperation Council (PECC)[6]. According to the PECC report, over the next century, agricultural productivity is expected to increase by 9 percent in the United States and Canada, but decline 20 percent in Latin American countries and 9 percent in Southeast Asia.

Southeast Asia, and a number of the Pacific islands are particularly vulnerable to rising sea levels because significant agricultural production and food system infrastructure are located in low-lying coastal areas. This is of great concern because of the concentration of food-insecure people in the very region which will be affected negatively by climate change, Adequate measures need to be taken to address the issue, even though the impact of climate change on food security remains *modest compared to non-climate factors*.

Dangers of global warming that only a decade ago seemed exaggerated have suddenly become crucial global issues with growing evidence of greenhouse-gas-driven climate change. The most direct threat to ASEAN posed by global climate change is the increasing number of meteorological hazards (drought, heavy precipitation, high temperature/heat wave and intensive typhoon). Sustained global climate warming will lead to increasing number of extreme weather and climatic events with more serious impacts.

For ASEAN, adaptation to climate change is more realistic and urgent than climate change mitigation. The key for ASEAN in response to climate change is to improve their capabilities

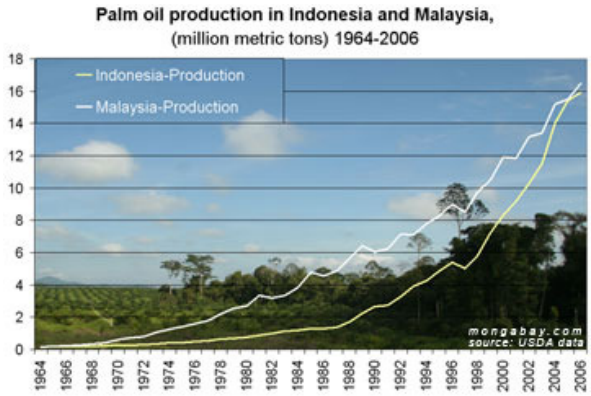
[6] The PECC is a non-government group consisting of 26 member committees in the Asia-Pacific region

to address extreme weather and climatic events, to ensure food and water supply and to achieve sustainable development.

The usual story with the food crisis is that the production of bio-fuels is causing food prices to go up. However the intersection between agriculture commodities, oil and bio-fuels isn't always that simple, because in some cases rising food prices is impeding the production of bio-fuels as well.

9.Biofuels: facts and fallacies

With rising concerns over energy security and environment, ASEAN governments have been aggressively encouraging biofuel production. Current biofuel technologies use agricultural feedstocks such as grains, and sugar for ethanol and rapeseed and palm oil for biodiesel.



Indonesia has overtaken Malaysia as the world leader in palm oil production. The country is forecast to produce 18.3 million metric tons of palm oil in the 2007/08 year, a 10 percent increase from the 2006/07 year. Malaysia and Indonesia account for about 87 percent of world production.

Southeast Asia is emerging as a major producer of biodiesel, and is expected to become a leading supplier by the end of this decade. Southeast Asian governments and companies have announced huge investments to develop their countries' biodiesel. Palm oil is now the world's largest traded edible oil and in Malaysia it has enjoyed an impressive success..

The fruit of the oil-palm tree, *Elaeis guineensis*, is wonderfully versatile. Oil squeezed from it goes into everything from biscuits to shampoo. Surging global demand has led Malaysia and Indonesia, which produce most of the world's palm oil, to plant ever greater areas (see chart), reducing the acreage of other plantation crops such as rubber and cocoa.

Plant-derived fuels are nothing new. For South-East Asia, with its huge scope for producing plant oils, it is an idea whose time has come. Malaysia has approved 52 new biodiesel

processing plants and will mix 5% biodiesel into the fossil-fuel diesel sold at its pumps, increasing the share eventually to at least 20%. Thailand, Myanmar and the Philippines are also planning big biofuels plantations. Singapore has no land for plantations but intends to be a big refiner of its neighbors' plant oils.

Besides reducing fossil-fuel dependence and boosting trade balances, biofuels have another advantage: they create lots of jobs. Indonesia's palm-oil industry already directly employs about 1.5m people and could create work for millions more. Of course, using palm oil and vegetable oils to make fuel will become uneconomic if the price of fossil fuels continues to fall. The break-even value is about $50 a barrel.

There are other potential catches. Oil palms take several years to start bearing fruit. In the meantime, the rising demand for biofuels is pushing up the price of palm oil and the other edible oils with which it is interchangeable, making food and cooking oil more expensive for the poor. Some commentators claim that it was “morally inappropriate” to turn food crops into fuel while people are still food insecure.

9...1 Implications for food security

While biofuels could offer the potential of huge new markets for agricultural producers, there are also growing concerns on its implications for food security, poverty and environment protection. There is the risk that a large part of the world’s food supply will be diverted away from traditional food marketing channels. And, to the extent that food demand remains at the present level (or grows as populations increase), there is no doubt that that the emergence of biofuels will have a major impact on world food [prices that could hurt the poor, both in rural and urban areas. The consequences are already being felt with unprecedented rises in the price of staple grains like rice, wheat, soybeans and maize.

It is worth noting that the changes in the prices of maize and other related commodities were associated with only a small increase in bioethanol production in the US. The recent world food price movement was a consequence of an initial stage of a biofuel development program in the US... with other countries following. However, the concerns multiply by hundred folds on the possible implications of emerging global biofuel industry to food supply, food security, and the plight of the small rural farmers. The high food prices will benefit maize, soybean, sugar cane and palm oil producers, but what will happen to the small farmers who produce rice, horticultural crops, livestock and other commodities that cannot be used as feedstock for biofuel? Several important questions must be raised:

- Will poor food producers and resource-limited farmers in countries like Malaysia and Indonesia with big biofuel programs be able to take advantage of the higher prices?
- Will farmers in poor countries that do not have biofuel programs benefit or will they suffer more?

- Will the livestock producers and others that use feed grains as inputs still earn decent net incomes?
- What about those hundreds of millions of citizens of in ASEAN countries that are net consumers, including the tens of millions who live in cities?
- Likewise for the households in rural areas that are net consumers (because they either landless farmers or cultivate farm plots that are too small to feed the entire family for the whole year) what do they stand to gain from the increasing move towards biofuel production?

Resource availability is a concern, especially in SE Asia where most lands have been intensively used in agriculture? Will there be an expansion of sown areas (the usual response by farmers to higher commodity prices). Where will the land come from? The Indonesian archipelago? The Malaysian forest lands? Thailand paddy fields? The Philippines new land? What will be the net effect of these entire changes on the agricultural and rural development?

Biofuels are likely to have significant spatial implications in large countries. For example, what will be the effects of biofuel development on land use and water availability, especially as it is constrained or enhanced by regional, geographical, and physical factors across the spatial landscape? The problem (as in the real problem faced by policy makers) is that the availability of feedstock for biofuel is dependent on the availability of local resources (e.g. land and water) and substitutability of different crops locally. Decision makers need to know the stocks of local resources (and their degradation status) and whether or not one crop can substitute for other crops in regions where biofuel is produced. This is important for large countries like Indonesia and those in the Mekong basin.

The next generation of biofuels, specifically feed stocks derived from farm waste, weedy grasses (switchgrass, miscanthus), and fast-growing trees (poplar, sweet gum) must be considered. Researchers say such "second generation" biofuels offer a higher net energy balance with lower greenhouse gas emissions. Further, such feed stocks can be grown with fewer fertilizer and pesticides, and are viable on marginal agricultural lands so they don't compete with food crops.

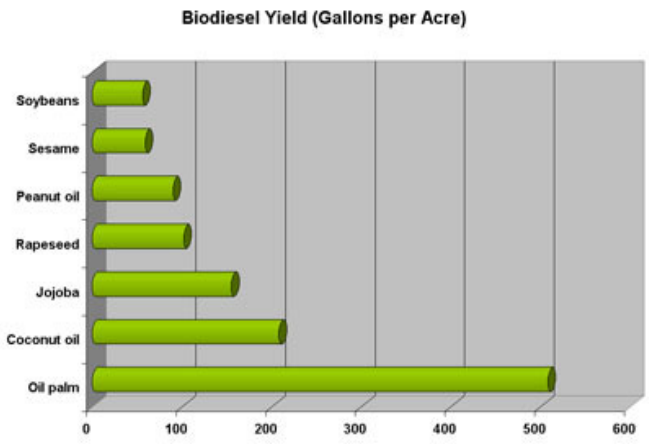


Chart showing annual palm oil production relative to output from alternate crops

Box 2 The impacts of palm oil production

Palm oil is the cheapest to produce of the vegetable oils, Between 1985 and 2000, the development of oil-palm plantations was responsible for an estimated 87 per cent of deforestation in Malaysia. In Sumatra and Borneo, some 4 million hectares of forest has been converted to palm farms. Now a further 6 million hectares is scheduled for clearance in Malaysia, and 16.5m in Indonesia.

Almost all the remaining forest is at risk. Even the famous Tanjung Puting National Park in Kalimantan is being ripped apart by oil planters. The orang-utan is likely to become extinct in the wild. Sumatran rhinos, tigers, gibbons, tapirs, proboscis monkeys and thousands of other species could go the same way. Thousands of indigenous people have been evicted from their lands. The forest fires which every so often smother the region in smog are mostly started by the palm growers. The entire region is being turned into a gigantic vegetable oil field. Before oil palms, which are small and scrubby, are planted, vast forest trees, containing a much greater store of carbon, must be felled and burnt. Having used up the drier lands, the plantations are now moving into the swamp forests, which grow on peat. When they've cut the trees, the planters drain the ground. As the peat dries it oxidizes, releasing even more carbon dioxide than the trees. Wetlands International, a non-profit group supported by Western governments and conservation groups, and the Dutch water-research institute Delft Hydraulics warned in a recent joint study that about 20 tonnes of carbon dioxide is released from each tonne of oil palm grown on peat. The draining of peat swamps in Indonesia results in large carbon dioxide emissions -- some 2 billion tons per year according to estimates by Wetlands International. These releases have made Indonesia the third largest emitter of greenhouse gases after the U.S. and China, despite the country's small industrial base.

Environmentalists say as much as 87% of Malaysia's deforestation between 1985 and 2000 was caused by the expansion of oil-palm plantations. Malaysia has now reached its natural land limit for new plantations and most of the new oil-palm cultivation areas are being cleared in neighboring Indonesia. An estimated 30% of oil-palm plantations in Indonesia are currently controlled by Malaysian interests, according to official industry statistics. The Indonesian government has recently earmarked 6.5 million hectares of idle land for biofuel-related crops,

including 3 million hectares for oil palm, 1.5 million each for jatropha and cassava, and 500,000 for sugarcane. Currently more than 25% of all palm oil produced in Malaysia and Indonesia is cultivated on peatlands. The burning, draining and clearing of organic peatlands has resulted in the release of massive amounts of carbon dioxide into the atmosphere, frequently shrouding the region in smoke and turning Indonesia into the third-largest greenhouse-gas emitter in the world. That's raising hard new questions about the net global environmental value of palm-oil-derived biofuels.

The main environmental risks are likely to be those concerning any large expansion in biofuel feedstock production, and particularly in South East Asia (for palm oil plantations). The current biofuel boom has lifted palm oil prices by nearly half, leading to oil palm plantation expansion in Indonesia and Malaysia at the expense of carbon-rich peat swamps and species-rich tropical rainforests. Burning of Indonesian forests is causing widespread pollution. But it's done to grow crops for environment-friendly—and lucrative—biofuels.

9.2 Complex interlinkages on resource and product use

In a rush to promote biofuels, few people have actually considered the questions enumerated above. And even for those who have asked these questions, the answers are even fewer and perhaps none. The complexities however, are enormous: there are linkages among crops because different crops are planted on the same land. There are linkages among agricultural commodities because if the demand for one product rises and its price goes up, consumers will switch to other crops or products. There are linkages between crops that are produced and those that are used as inputs. There are linkages among crops that are grown in is different regions of a country and among crops that are grown in different countries altogether. There are linkages between the price of food and a person's status as a net buyer of food (or net seller of food). There are linkages between production and environment. Against this background that is saturated with questions and uncertainties this discussion paper seeks to tease out those aspects that are amenable to intervention by policy makers, by regulators and decision makers.

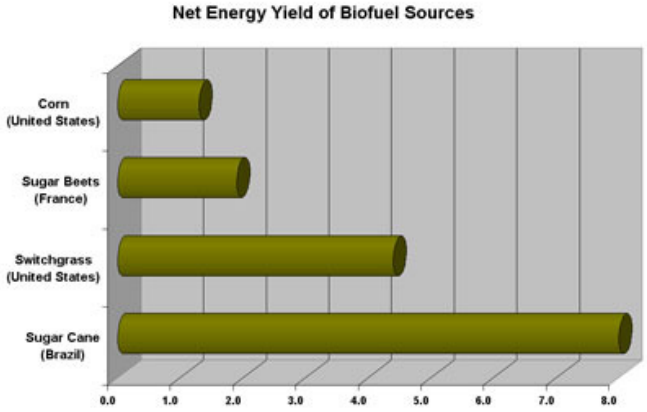
10.. Biomass energy: a factor in the equation

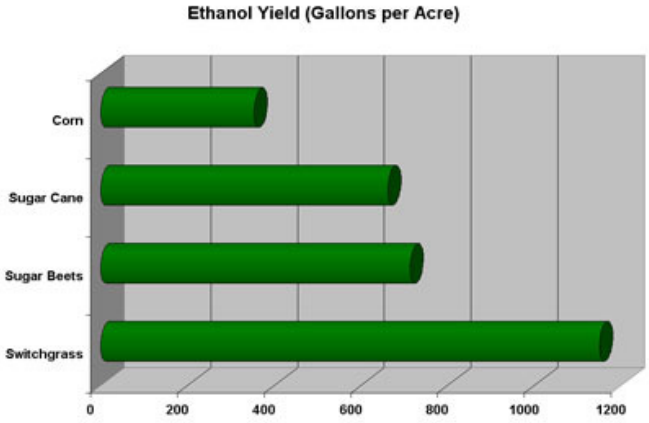
Biomass is an important source of energy in ASEAN member countries[7] and its use is still increasing. In ASEAN, energy from biomass (such as wood and agricultural residues) represents about 40% of the total energy consumption – more than 2.5 million Terajoules per year. The bulk is from wood fuels, with an estimated value of US$ 7 billion per year.

[7] Biomass Energy in ASEAN Member Countries *RWEDP in cooperation with the ASEAN-EC Energy Management Training Centre (AEEMTRC) and the EC-ASEAN COGEN Programme (COGEN*

Main applications are in the domestic sector and small-scale industries, but also increasingly in modern systems for combined heat and power generation.

As ASEAN countries are in the tropics they have favourable conditions for growing biomass, which can strengthen their self-reliance in terms of energy. Clear and consistent policies are needed to make the most of this. Modern power generation from biomass sources should be further developed.





It is recommended that energy policy makers in ASEAN member countries acknowledge the important role of biomass energy and its future potential, since only then can biomass energy be integrated in overall energy policy making and planning. In particular the potential of modern applications for power generation should be given serious consideration as a way of ensuring optimal utilisation of each country's biomass resources.

There are several factors limiting the potential for large-scale fast-growing fuel wood plantations on a commercial scale: international petroleum fuel prices, remaining subsidies

on commercial fuels, large initial investment requirements for wood fuel plantations, long gestation period between planting and harvesting, and conversion and transportation costs.

This implies that the development of wood fuel should focus on the by-products of agroforestry and on the use of wood and biomass residues from relevant processing industries at their source. Feasibility studies on utilizing sugarcane in the production of ethanol have been set up in the Philippines. Ethanol production could potentially serve as one method that could help modernize the country's sugar industry as well as contribute to the supply of biofuels.

Biomass fuels are mostly used in the household sector, primarily by the rural and urban poor and middle-class people in small towns. These people usually end up paying more for their household energy than their counterparts in larger urban centres. Cost-benefit analyses should incorporate avoided costs.

Box 3 FAO Regional wood Energy Development Programme (RWEDP) in Asia

RWEDP is a long-term project implemented by FAO (Food and Agriculture Organization of the United Nations. The project is funded by the Government of The Netherlands and based in Bangkok. RWEDP has 16 member-countries in Asia, including 8 ASEAN Member Countries (Indonesia, Malaysia, Philippines, Thailand, Vietnam, Cambodia, Laos and Myanmar).

RWEDP focuses on wood/biomass energy and aims to (1) strengthen institutional capacities for databases, (2) assist in policies and planning, and (3) develop capabilities for implementing programmes.

Main areas of expertise are wood energy resource development, wood energy conservation, and wood energy planning and policy development

11. Population displacement and migration

Effects*:* Climate change-related natural disasters put lives and livelihoods of the inhabitants of affected areas at risk, resulting directly or indirectly on the temporary displacement in the case of natural disasters and permanent relocation in the case of long-term changes in climate and the environment. Rising sea levels, altered patterns of desertification and dry lands degradation are likely to lead to ever larger waves of internal and international migration. In addition, extreme environmental events, such as hurricanes, cyclones, tsunamis, coastal and riverbank flooding, earthquakes and volcanic eruptions, can cause mass human displacement and widespread destruction.

11.1 Environmental sustainability:

- There is an acknowledged causal relationship between a degraded environment and higher disaster risk. Environmental degradation erodes the natural adaptability of ecosystems, which in the past has ensured their resilience in the face of disaster and saved lives and livelihoods. Deforestation and soil erosion increase mudslides, landslides and flash flooding; destruction on mangrove forests exposes coastlines to storm and cyclone damage.

- Increases in extreme weather events and sea-level rise, combined with societal vulnerabilities to hazards arising from stresses on water availability, agriculture and degrading ecosystems demand for compatible strategies for environment and disaster risk reduction in order to increase community resilience.

12. Cost-effectiveness of disaster risk reduction strategies as adaptation measures

Disaster risk reduction offers cost-effective approaches to reduce the negative impacts of flooding, landslides, heat waves, temperature extremes, droughts and intense storms and cyclones (hurricanes or typhoons) as well as erosion and other impacts of climate change. The benefits can be calculated not only in money saved, but also in more secure livelihoods and saved lives.

13. Constraints to more sustainable land management

The limited capacities in local technical personnel and support facilities combined with weak data and information management capabilities will hamper future progress in planning biodiversity, climate change and land degradation programmes, let alone meeting the obligations of all three UN Conventions.

The following are the key areas of capacity constraints and needs:

- limited numbers of local technical personnel and researchers;
- limited enforcement capacities;
- key sectors lack appropriate legislations, policies and strategies;
- roles and responsibilities of stakeholders not always clear;
- weak institutional structures for forestry, water, land use and survey management;
- limited capabilities of laboratories and research facilities;
- lack of database on technologies and detailed assessment of technology needs and transfer processes;
- lack of quality data and poor data management; limited numbers of functioning computer networks and databases;
- limited trained staff in media educational programmes; and
- Inconsistency in the levels of resources committed by government and donors for NAP initiatives.

14. Priority issues faced by the people and governments of SE Asian countries.

The following are the priority issues:

14.1 Urban population growth

The perception of better prospects of employment, more opportunities for income generation, better access to medical facilities and better education has led to an unsustainably high rate of urban migration. The challenge for governments in the medium term is to manage the causes of rural –urban drift, promote rural development to address

urban social problem. Much arable land has been taken up for housing, industrial and commercial developments, often associated with the rapid urban growth.

The population growth of the past 40 years has increased demand for agricultural land and consequently has put a significant amount of pressure on arable land. This has resulted in land degradation, reduced productivity, lower yields, reduced food security and an increase in poverty.

14.2 Rural condition

Despite an absolute decline in rural population over the last decade, a high proportion of populations still reside in rural areas. The governments are concerned about the inequitable distribution of resources amongst the rural and urban community. The challenge for the government is to make rural funding allocations to ensure development is complementary and sustainable.

14.3 Poverty

Recent indications are that poverty has increased significantly. As a response to this, most governments have increased assistance to poverty alleviation in upgrading programs in all areas. The vicious cycle of poverty can easily be inherited by subsequent generations. Breaking that cycle is a challenge.

14.4 Environment vulnerability

The climate in most SE Asian countries is characterized by climatic extremes in the form of hurricanes, cyclones, floods and droughts. These extremes have serious economic, social and environmental consequences that require prudent macro economic management, proper land use planning and watershed management.

SE Asian countries face some serious environmental problems that are exacerbated by the ineffectiveness with which they are being treated. These particular problems include the degradation of land resources; climate changes and drought, increasing risk of flooding and inundation to coastal settlements, unsustainable exploitation of marine resources and waste management problems.

Most SE Asian governments recognize the important role of land and the focus is on the following priority areas:

14.5 Land resources development & management

1. Promotion of the rural land use policy at provincial level;
2. Enforcement of the respective land conservation and improvement legislation;
3. Ensuring sustainable land utilization & management practices;
4. Promoting sound land use planning;

5. Promote the organization of community groups involving all stakeholders in different localities for resource conservation;
6. Promote strategic partnership;
7. Develop and enhance land resource information system [GIS];
8. Education, training and awareness on sustainable land management;
9. Legislation review and amendment where appropriate

14.6 Environment

1. To minimize degradation of natural resources and protect biodiversity;
2. To maintain a healthy and clean environment through the reduction and elimination of pollution and proper management of wastes;
3. To raise awareness of the importance of sustainable development;
4. Sustainable management and development of exotic and indigenous tropical forests with the certification of tropical timber for trading;
5. Initiate environmental audit in organizations' operations.

14.7 Education

Education and training is a priority in nation building as it is the medium for nurturing a well educated, high skilled, motivated labor force, as well as responsible citizens with high moral and ethical values. ASEAN countries need to improve the quality and delivery of education at all levels. Many governments are focusing on raising education standards in rural schools to be on par with urban schools. And also education is increasingly being aligned to technology developments and future skill demands such as Information Technology.

14.8 Disaster mitigation and management

1. To mainstream Disaster Management into the national development decision making process;
2. To invest in infrastructure to mitigate the impact of disasters;
3. To improve community awareness of risk, preparedness and response

14.9 Crop-farming and livestock

1. To accelerate agricultural diversification into areas of competitive advantage;
2. To promote food security;
3. To ensure sustainable development in non-sugar agriculture.

14.10 Forestry

Forest resources cover an immense area in SE Asia but deforestation is becoming a threat to biodiversity.

1. To provide the appropriate institutional and physical infrastructure to support the development of the sector;
2. To ensure sustainable development and management of forestry resources;
3. Promotion of community-owned and managed forestry processing and value adding facilities based on indigenous forests and community owned plantations;
4. Promotion of the production and export of value added timber products.

14.11 Tourism

1. To increase economic contribution and the retention of the tourist dollar;
2. To increase resource owner's participation in the tourism industry;
3. To promote Human Resources Development in tourism;
4. To promote sustainable eco-tourism development and public awareness at all levels of society.

14.12 Minerals and groundwater resources

The demands for minerals and groundwater are increasing and becoming more complex. The growth of population and the economy is putting pressure on the quality of water resources. Development of water sources to provide water for essential domestic needs and water is a must but water should also be available for agriculture, commerce and industry, mining and tourism, to promote the growth of the economy.

1. To ensure security of land tenure and occupational health and safety standards;
2. To increase public awareness of resource exploration and development;
3. To ensure sustainable development of groundwater resources.

In summary, if the ongoing encroachment of marginal to steep and fragile land continues without preventive measures, many SE Asian countries will experience further land degradation, lower yields and increase poverty. These trends are being exacerbated by conversion of forests, wetlands and existing cropland to production of biofuels (see below).

12. Summary of main findings in the report:

Land and resource use and management have emerged as principal issues due to competition to use the limited resources to support the growing national economy. Changes are also being seen in patterns of land areas being transformed as development pressure

increases. Most SE Asian nations are signatories to the UN Convention on Desertification and Drought (UNCCD) have developed National Action Plans (NAPs)

The NAPs typically address priority areas such as biodiversity, climate change impacts and adaptation, agricultural land use, wetlands and drainages, coastal and foreshore development and protection, housing development, water catchment areas and streams, inland, coastal forests, aggregates mining and quarrying, as well as waste management, research and technology development, education, training and awareness, knowledge, data and information management, and financial mechanisms.

The NAP provides policy makers with an analysis of root causes and identifies priority action directions to combat desertification The NAP contains a complex of prime and preventive activities. The NAP is a document that allows political decision-makers to effectively allocate means to combat land degradation and to reduce social and economic consequences of desertification.

Limited availability of land for waste disposal and management concerns and a growing awareness of negative impacts from pollution and contamination of resources have pushed the management of waste, chemicals and hazardous materials to the fore as priority issues. Many countries continue to collate baseline data and establish databases for future reference. This is a priority area and has been identified as a national constraint due to the lack of quality data and functional databases. Furthermore, the need to translate data into spatial information context (i.e. geographic information systems) to assist with decision making at all levels has been highlighted widely as a key component for alleviating land degradation.

12.1 Conclusions

However, because of the fragile ecological condition, poverty in the affected areas, existence of natural and social factors resulting in desertification, the possibility of climatic variation induced droughts, the challenges ahead are still huge and the task still arduous.

The most direct threat to ASEAN posed by global climate change is the increasing number of meteorological hazards (drought, heavy precipitation, high temperature/heat wave and intensive typhoon). Sustained global climate warming will lead to increasing number of extreme weather and climatic events with more serious impacts.

For ASEAN, adaptation to climate change is more realistic and urgent than climate change mitigation. The key for ASEAN in response to climate change is to improve their capabilities to address extreme weather and climatic events, to ensure food and water supply and to achieve sustainable development.

The active participation of the ASEAN in an eventual global climate change regime, consistent with the principle of common but differentiated responsibilities, is essential to

achieving the ultimate objective of the UNFCCC. There are technologies ready to implement now, after years of research, which can deliver a shared vision of global sources of energy being gradually moved to renewable and sustainable sources, harnessing the power of the sun, wind and water while improving the living standards of the local populations.

The ASEAN region has a unique opportunity to address the woes of land degradation by working together to achieve SLM. It is an opportunity which should be entirely supported, especially in building capacities among the various stakeholders, employing a systematic approach in order effective results throughout the ASEAN region, particularly at the local community level.

Box 4 The way forward (From FAO 2007)

From a food security perspective, the most immediate risks arising because of climate change are from extreme events. As storms, floods and droughts become more frequent and intense the magnitude of asset losses that impact on agricultural production and purchasing power of low-income consumers is also increasing. Managing these risks is an imperative necessity for many countries, particularly developing countries where insurance cover is limited. At the same time, it is equally urgent to begin now to adapt to foreseeable shifts in agro-climatic zones, availability of water and related changes in species composition and disease vectors have to be anticipated, since it will take time for appropriate adaptive practices to take effect. In many parts of the world, there is still considerable uncertainty about how these more gradual changes are actually going to play out, so there is also a fundamental need to improve the information base for selecting appropriate adaptation options in the face of these uncertainties.

Mitigation is also a major concern in the sense that, if we do not get global warming under control, we could face large-scale disruption of food systems down the road that could be beyond our ability to manage. Moreover, in view of the important contribution of the agriculture sector to emissions, and its equally important potential contribution to emissions reduction and carbon sequestration, mitigation merits greater attention than hitherto. However, mitigation in the food and agriculture sector will make more gains if coupled with adapted agricultural practices and aligned with farmers' interests.

Food and agricultural practices that would provide environmental services and/or reduce emissions or sequester carbon in developing countries represent good adaptation options for vulnerable livelihood systems.

Further reading

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