

# **Resilience of the European Food System to Calamities**

**Charlotte WERGER**

Wageningen University

Food security is an issue of growing concern. With an increasing world population, changing diets and growing demand for energy crops, agricultural productivity will have to increase, probably at rates exceeding those experienced so far. This might lead to a tightened supply-demand balance for agricultural commodities, in which fluctuations due to climatic, economic and political factors have a magnified impact on food prices and availability. The conducted study analyzes the impact of possible calamities on the food security of Europe (EU-27) in a context of further globalization. The reason for doing so is the hypothesis that Europe might be at risk at least for some basic food commodities, if further globalization would lead to geographical specialization, and even more so under a scenario of trade liberalization, or with biofuel targets competing with an additional demand for food crops. Baseline projections towards 2020 show that the food situation of the EU-27 is expected to remain virtually unchanged, also under trade liberalization. However, under a free trade scenario, structural changes in the agricultural sector lead to concentration of production in North-Western Europe, where institutional and infrastructural conditions are favourable. Also climate change will favour this area, although the overall impact of climate change towards 2020 is relatively small. Data on production, consumption and trade shows that the EU-27 is and will be self-sufficient in 2020 for most commodities. Two exceptions are soybeans (imports are 98% of consumption) and vegetable oils and fats (direct imports are 37% of consumption).

An assessment of single biophysical calamities (e.g. the drought of 2003, the fires in Greece, and the Chernobyl nuclear disaster) in Europe shows that their impact appears to be limited. However, an exception could be trade risks for the import dependent commodities, such as soybeans and vegetable oils. The impact of a total collapse of soybean imports on the livestock and feed sector is further assessed in this study. If soybean (meal) imports were suddenly disrupted, 80-90% can not be substituted currently and the EU livestock sector will suffer irreversibly with the loss of up to 44% of its poultry and 35% of its pig production. Direct coping mechanisms would be reducing meat consumption (after reduction the diet is still 'affluent'), or increasing meat and feed imports. Another possible scenario could be to substitute the soybean deficit. Trade patterns show that soybean substitutes are not available in these quantities on the world market and would thus require cultivation of these crops in Europe. Another solution could be to keep stocks, which has both advantages and disadvantages. Land use patterns show that cultivation of protein crops might be possible in the future (2020), without decreasing current nature areas. The main conclusion is that there is currently no contingency plan for such a calamity and this remains a challenge for policy makers.

## **Creating Opportunities in the Food Crisis**

**MINJIGDORJ Sansarmaa**

Mongolian State University of Agriculture

Although Mongolia is a country of animal husbandry and our stock products are nutritional, many people in Mongolia are not healthy. Specialists explain that air pollution, junk food and stress are causing trouble for new births' unhealthiness. It is a painful fact that there are increasing birth defects, various kinds of tumors killing our adults and also young people, caused by the intake of junk food and unsafe products.

In order to recover from illness and stress, the whole world must aspire to return to nature and the fields of food, medicine and beauty are trying to produce ecological safe products. Millions of people cannot find safe food because of such factors as global change, environmental degradation, increasing population, poverty, unsafe food processing.

There are such many factors involved, but in my paper I write about the source of the main reason and the optimal way that we must follow, by trying to answer the following questions and appealing to friends everywhere to make changes in our approach together:

- Why do people produce and sell poisonous products. Do they know about it or don't want to know?
- Why are they polluting and destroying the soil which is the source of our food? It can't be re-created ...

I can say today's crisis is the result of selfish and greedy people, who want to earn money easily and look for easy gains.

In my opinion, nations have the following opportunities:

- First of all, to change our hearts tendency...
- Re-establish and practice our traditional communication with nature on the basis of today's conditions
- To have an ecological education and follow ethical practice
- Participate and unify together in the rehabilitation, use and protection of rangeland and other natural resources
- To implement an environmental protection policy by appointing local citizens to oversee natural resources within their community

## **Tanzania's Creative Solutions in Response to the Global Food Crisis**

**Khadija Saidi MAJID**

Sokoine University of Agriculture

In Tanzania, the Agriculture Sector is the main pillar to Food Security at the household levels and national levels especially in the rural areas. During the years 2007/08 farming season, the Sector managed to produce 10.78 million tons of food compared to estimated food demand for the 2008/09 at about 10.34 million tons.

Tanzania is endowed with enough fertile arable land, good climatic conditions, plenty of water sources (lakes, rivers, seas, wells, springs etc) all across the country. Despite of the 44 million hectares of land that gets enough rain and is suitable for farming, only 24 percent of it is under cultivation, mainly by smallholder farmers. The planted area has been stable for several years in spite of the growing population, indicating that land expansion has ceased to be a major source of agricultural growth. Furthermore, out of 29.4 million hectares with irrigation potential, only 290,000 hectares, which is about 1 percent, is currently under irrigation. Traditional food crops such as maize, rice, sorghum and millet now occupy only 50 percent of total planted areas, while non-traditional export crops such as oilseeds, pulses, vegetables, roots and tubers have increased their shares. Nevertheless, all these crops are still mainly produced for subsistence, and the incentives to produce them for the markets are not in place due to inefficient food markets within the country. It is also exacerbated by the poor state of transport infrastructure within Tanzania and the undeveloped Market Information Systems regarding prices and needs of other Regions.

Tanzania has about 18.8 million herds of cattle, the third largest in Africa, yet the livestock sub-sector contributes only about 4.7 percent to the GDP. Most of livestock stocks are of inferior genetic potential thus do not contribute much to the global food security. Furthermore, value addition to animal product is at juvenile stage hence not playing its role in the value chain of beef and milk globally. Tanzania's most important non-traditional agricultural exports are fish and fish products. Available statistics indicate that in 2006, fish and fish products earned the country 138.6 million USD which is half as much as all traditional agricultural exports. Nile Perch from Lake Victoria constitute about 80 percent of Tanzania's total fish exports.

Creative solutions which could be used by Tanzania in alleviating global food crisis at same time improving food availability and accessibility in both urban and rural areas includes; providing targeted subsidy to selected food crops; identifying and promoting modern farming technologies; and providing support for increased utilization of improved technologies, for crop and livestock production. Identifying research activities would promote food storage technologies/facilities, enhance agro-processing as well as environmentally friendly farming technologies and practices, especially for rural areas. This would then improve stock management and monitoring of food situation, undertaking a review of the food crops supply chain, management and monitoring of emergency food supplies. Further, it clarifies the regulation and means of enhancing trade. Improving road network connectivity will facilitate flow of food crops. By utilizing modern fishing equipments for fish industry, it is also required to comply with quality and sanitary standards for fish products to fetch markets globally.

## **Farmers Whose Annual Income is At Least One Million NT Dollars!**

**Yu-Chun YEN**

National Chung Hsing University

The main idea of this report is to show how agriculture in Taiwan changed over the past ten years. It is a story about a group of farmers called 'Dounan New Farmers Team'. This team invented a new approach to manage their crops and therefore made a lot of difference. First, they rented a large area of land, and used modern machines to cultivate it. They also used huge refrigerators to store their produce, and later sold their products collectively. In this way, they could earn ten times what traditional farmers earned.

Most of Taiwan's grain is imported. In other words, our production cannot meet the demand for food. In spite of this, our farm land still decreases day by day. Rural areas have faced problems such as emigration, and an aging population. Most people believe that a farmer's income is relatively low, and that farmers are unable to enjoy a good life.

However, every Dounan New Farmers Team farmer's field is thirty times larger than the ordinary farmer's field. Instead of just cultivating, their jobs combine farming, marketing, and market research. Every land unit has a land manager, who tries to control the costs. Bonuses are shared depending on how efficient they are. Their annual income can even reach a million NT dollars.

The most important factor is that this farm team is made up of a group of young, well-educated people. This shows that young people are willing to dedicate themselves to agriculture. By being a farmer, one can not only earn a good living, but also be fulfilled.

### Reference

Lu Kuo-Chen. *Business Weekly 1043: Millions annual income farmers*. City Publishing. 2007

## **Philippines: A Rice Export- or Import-Country?**

**Normalyn Yap TIBAO**  
National Chung Hsing University

Just as the pain of a little finger could be felt and experienced by the entire body, so also is the crisis in every nation leading to global crisis. The rapidly increasing population, the lack of food supply, the shortage of energy, and the degradation of environment suffered by one area, region or nation affects the entire human kind, the entire world situation.

Rice is the major staple food of Asia, and an important source of employment and income in rural areas, particularly in low-income countries like Philippines, with food as their largest expense. Agriculture is the source of food supply, and it has always been under pressure to feed a growing world, yet is compounded by competition in energy demand and increasing competition for natural resources.

The Philippines is endowed with natural resources, agriculture, forestry, minerals, fertile and arable lands, mineral deposits, diverse flora and fauna. Despite these riches, why does the Philippines still import rice? Why can't the country produce enough to supply its population? We may not be familiar with complex concepts of economics or mathematics, but in order to understand the arguments, what is necessary is an open mind and willingness to think.

Many answers have been given, but the important reasons are: Philippines is an island nation without any river deltas and bears the brunt of numerous typhoons making rice production more difficult and risky. Farm laborers do the bulk of the work of producing the nation's rice, and they face problems of seasonality of production and openness to trade, poor infrastructure and low levels of mechanization.

Solutions are: use of hybrid rice variety in suitable areas to improve farmer's yield and income. (Three main components of the program: technology, improvement, and hybrid seed production). Seed subsidies for certified seeds: foundation, registered, certified and good seeds. A program called Golden rice harvest (Ginintuang Masaganang Ani or GMA), potential crop diversification, rice trade liberalization, mechanization and improvement of infrastructure (government's side).

It is important to achieve higher productivity with less land, less water, less labor, increase the yield potential of rice in irrigated system, reduce crop maturity period and achieve yield stability by developing resistance against major insects and diseases, to close the yield gaps in the rainfed system through developing resistance of high yielding varieties to abiotic stresses, develop durable varieties to reduce farmer's dependence on agrochemicals, and increase efficiency in the use of water, labor and fertilizers (researchers community).

# **Critical Extension Factors Affecting Crop Quality, Productivity and Safety in Malaysia**

**Ahmad Fikri Bin MOHD SAMSUDIN**  
Universiti Putra Malaysia

Private sectors including entrepreneurs and individual farmers as well as government agencies are equally important in ensuring sufficient and quality food supply in Malaysia. This concern can be resolved successfully through the extension program that is being carried out by the Ministry of Agriculture and Agro-based Industry. The Department of Agriculture Malaysia is the leading government agency under the Ministry of Agriculture and Agro-based Industry that is involved in extension activities in food production. This paper briefly describes the current extension programs undertaken by the Malaysian Department of Agriculture in food production from farm to table. Transfer of technology and providing the related supporting services become the main focus in the implementing of extension programs. The focus of consideration is to ensure good quality and safe crop yields produced from farms for human consumption and at the same time aspects of sustainability, Good Agriculture Practice (GAP) are being emphasized throughout crop production activities. Critical factors affecting crop yield quality, crop productivity and food safety are also discussed.

**Keywords:** *farm to table, extension perspectives, critical factors, food safety, good agricultural practices*

# **Increase Rice Production: Solution to the Global Food Crisis**

**Jirawut WUTHI-ARPORN**

Kasetsart University

Global warming, environmental crisis, plant diseases and pests, including biofuel needs, have been factors acting to decrease food production in many countries all around the world. At this time when the world's population is increasing rapidly and the demand for foods is high, these problems have endangered nations' food security. This paper analyzes the idea of "Increasing Rice Production", which could be another way to solve or at least decrease the severity of the global food crisis by putting more foods out to domestic and world markets.

Rice is the staple food of more than three billion people all around the world. At least 114 countries grow rice and more than 50 have an annual production of 100,000 tons or more. Rice is the main food for most countries in Asia, while some countries in Africa and South America consume rice in comparable quantities to wheat and corn. At this time when the world's population already reeling from higher food prices, many countries have already banned or restricted their rice exports, which has caused rice prices to become even higher and the rice amount is not enough for export. For example, Brazil banned rice exports last year, which prompted protests in Peru, Africa, and other countries in Latin America, which will now be 500 kilotons short of rice as Brazil becomes the latest country to ban rice exports.

The main idea of the strategy is to increase quantity and quality of rice production to ensure that there are enough amounts of rice for domestic market needs with some left for export, and to promote rice as an alternate crop in non-rice-production countries so they do not have to import rice. Governments could support rice farmers by such activities as providing farmers with new technologies or techniques of growing rice, promoting agricultural extension to farmers in rural areas, providing support to farmers in preventing post-harvest loss and in marketing their crops.

The governments of the ASEAN countries have been providing a wide range of assistance, financial and technical, to increase the production of rice. Production inputs support in the form of fertilizer subsidies and the provision of high yielding varieties are almost a common policy in the ASEAN countries. Another important domestic policy affecting the level of supply and demand quantities and price of rice in ASEAN is marketing intervention, both at the domestic and international levels. In Africa, Catholic Relief Services (CRS) is carrying out a broad-based response to the crisis by helping small-scale farmers to boost local rice production, increasing their incomes and putting more food on the market, which will lower prices for all food.

# **Spirulina and Malnutrition**

**Baptiste ROUHIER**

Institut Polytechnique Lasalle Beauvais

After more than 100 years, the development of industrialised countries has shown its limits. Today, globalisation enables countries which have resources to use the resources of those countries which have less. Therefore, whereas industrialised countries have improved their prosperity and quality of life, non-industrialised countries haven't changed, blocked by the development of the others. Today, 95% (798 million) of the undernourished are in developing countries and almost one quarter (198 millions) of them are in Sub-Saharan Africa.

Therefore, Africa seems to be the area where troubles caused by malnutrition are the worst. Besides the insufficiency of food, people suffer from deficiencies of essential vitamins and minerals. More than 3.5 billion people are affected by iron deficiency, 2 billion are at risk of iodine deficiency and 200 million pre-school children are affected by insufficient vitamin A.

This situation affects intellectual and economic development and these countries are unable to react. 200 million of the 850 chronically undernourished are children under five years old. During this period of growth, malnutrition causes irreversible problems of growth retardation and illness. Under these conditions, children can't study properly and compromise their future capacity of working. Furthermore, women touched by malnutrition carry on the vicious cycle of malnutrition by giving birth to low birth-weight babies.

Against this plague which mainly affects Africa, European and French NGOs tried to find single solutions to help these people to face the problem by themselves. Spirulina has been found to be one of the most adaptable nutritional supplements in this nutrition crisis. The Blue-green algae cultivated for its richness in oligo-elements seems to correspond to the nutrition deficiencies. The culture of the algae is very easy and only needs light and warm water with nutriment.

In this way, students from Lasalle and a charity association from Beauvais tried to give their time and energy in a project which aimed at suggesting, developing and speaking about the benefits of spirulina in undernourished countries.



# **Food Demand and Supply of Mongolia**

**TUMURTOGOO Enkhbayar**  
Mongolian State University of Agriculture

As a car moves with the help of petrol, humans get energy to live from food. Thus food plays a key role in our everyday life. The agricultural field is the main producer sustaining us. We get and use many benefits from agriculture such as vegetable, meat, flour, rice and milk. From this point of view, food supply and sustainable agriculture is one of essential concerns of every nation. This time I focus on food demand and supply of Mongolia and ways to improve it in the future. Today, Mongolia has not yet become an independent country in food supply. Nowadays we see many effective and positive changes in the agricultural sector as well as some disadvantages, too. After I did my research on the Mongolian food supply, I came to the conclusion that the nearest and biggest goal for Mongolia is to promote opportunities to strengthen the domestic food supply as soon as possible.

My paper has following sections:

## 1. Introduction

I write briefly about Global food crisis, hunger and malnutrition issues because we know that currently Mongolia still can not supply its food needs and that means we are much dependent on global economy. Furthermore, restoring the balance of food supply and demand is a global task.

## 2. Brief history and current situation of Mongolian agricultural system

Here, I introduce Mongolia, its agricultural history and present situation. In order to talk about the future we should remember our past mistakes, experiences, achievements and today's reality.

## 3. Challenges

I will discuss some important factors that caused decrease in agricultural production. I divide these into 4 main parts: economic, social, climate and technology.

## 4. Government policy

One of the main government responsibilities is to provide people with natural, ecologically pure and healthy products. The Mongolian government and Ministry of Food, Agriculture, and Light Industry is pursuing relevant policies on food supply and approved numbers of action plans.

## 5. Conclusion

Food supply problem is a crucial issue and should be the top priority of the government: food supply status ensures national independence, sustainable economy and safer society. Even though we had hard times in the agricultural sector after the 1990s under economic and social transforms, I feel optimistic about Mongolian sustainable development from the perspective of food supply because I can see various opportunities for us to improve it in the future.

## 6. Recommendations

According to the sub-theme of the summit I tried to find some effective ways to improve food supply in Mongolia.

# **Social and Ecological Implications of Sustainable Agriculture**

**Adam Michael WILSON**  
Michigan State University

Globalization and the industrialization of agriculture over the past half-century have changed the composition and nutritional value of food cultures around the world. Rather than seeking out new technologies in the form of genetically modified organisms to increase our food security we, as a global community, might assess our attitudes and relationships with ourselves, each other and nature, adjusting our behavior to lead more sustainable lifestyles. Community supported agriculture and sustainable agriculture are exemplary methods of how this can be accomplished. This paper will explore the different methods of sustainable, community supported agriculture that are currently being employed worldwide and how they can be put into practice at larger scales in order to mitigate human impact on the environment while providing necessary sustenance and basic human interactions.

Artisanal forms of harvesting food are being abandoned in favor of corporately owned and operated methods of resource extraction that seek to maximize profit and yield at the expense of the environment. As a result consumers have become increasingly disconnected from the farmers, ranchers, and fishers who produce the food they eat. These changes however have given rise to global initiatives, such as the slow foods movement and community supported agriculture, which aim to increase the utilization of sustainable agricultural techniques and the reinstatement of local food systems.

Small and large-scale implementation of sustainable, community-based agriculture is being conducted throughout the globe; from Cuba to Africa to East Lansing. Through the use of case studies and empirical evidence this paper will investigate how a shift from the current global-industrial model of agriculture to a locally-based sustainable model can increase food security and assist in alleviating pressures associated with environmental degradation and energy consumption. Sustainable agriculture, when applied in the context of local food systems, may diminish the amounts of environmental pollutants emitted without compromising the ability to produce suitable amounts of food. Furthermore, regionally grown and consumed foods are less susceptible to economic and climate variations than their industrial counterparts due to the decreased dependence on long-distance delivery systems. These types of systems also have the potential to bring communities closer and stimulate regional economies while preserving traditional food cultures.

## **Counterbalance by Cropping System: Changes Less, Gets More**

**Panpatchara TONGNUAL**  
Kasetsart University

The energy crisis is an important question that many countries have to encounter and try to resolve. Decrease of natural crude oil and its production is a cause of increase in prices. So, several countries are accelerating efforts to invent new technology for producing alternative energy, by emphasizing Gasohol and Biodiesels.

The Thai government supports the production of Gasohol and Biodiesel in domestic agricultural. Promotion to consumers has also been conducted by reducing the price of alternative oils. In production, there are plans to increase the planting areas of raw materials, for example, sugarcane, cassava, oil palm, physic nut and corn. Production plan can be a cause of food crisis if it is not well thought out. The increasing of oil material's planting area is decreasing food planting areas, leading to higher prices of food and the decrease of food supply. So, planning is the most important thing which we must concentrate on. Our goal is to increase production efficiency to ensure enough food, feed and energy at lower investment and we can use Cropping System to design an appropriate plan.

However, there are many difficulties in using cropping systems, for reasons of climate, geographical feature, water, seasons, life span of plant, demand of market and price of product that determine what farmers decide to plant. The government should create an interesting plan for a cropping system that farmers agree on and can use easily. The plan should give satisfying rewards to the farmer because the government cannot force farmers to grow particular crops. Moreover, we must have different plans for different places, under instructions from researchers and based on local potential and constraints in each area. Furthermore, promotion and efficient implementation of the plan are of importance for success.

# **The Prospects for the Wooden Biomass in Japan**

**MURAKAMI Tatsuya**

Tokyo University of Agriculture

The issues of energy have been brought to public attention for a long time. We worry about the exhaustion of fossil energy. Because the underground resources such as oil coal, natural fossil fuel are limited and use of fossil fuels are one of the causes to discharge greenhouse gas. We have been studying about alternative energy to replace the conventional energy. Now the biomass is the most expected and attracted resources in point of protecting environment.

Biomass is organic resources which can be used as energy or materials. When you use those resources for fuel, carbon dioxide exhausting will not be calculated as carbon dioxide emission. Accordingly, it has been said that using biomass energy is effective to reduce carbon dioxide emissions. Biomass has been expected from all over the world. Also Japanese government has launched a policy called “Biomass Nippon strategy” to promote transportation fuel from biomass like ethanol and biomass not used since 2002. Many governments and autonomies have been exerting themselves.

Japan is one of the world’s most prominent forest country, because 66 percent of our country is forest land. Usage of rich forest resources for the biomass energy of the country is worthy. However it needs well keep forest and thinning out regularly to use forest resources because most of the forests in Japan are artificial forests. Unfortunately, there are many problems to use it practically now. For example decreasing forest worker, steady management, lack of gather materials system, and so on.

The use of the wooden biomass is expected to be promoted by the domestic credit system and the offset credit system (J-VER) These are plans that ‘quantity of forest absorbability’ by planting new trees for a propose to reduce carbon dioxide. or exchanging fuels from natural resources to wooden biomass can be business. that attests the amount of the exhaust reduction as credit by the approach for the control of exhaust carbon dioxide.

Now various types of biomass energy such as biomass ethanol have been invented all over the world. We think that the expansion of wooden biomass energy in Japan is necessary, because these effects such as activation of the regional economy, creation of the employment and environmental safeguard, are expected. This time, we study about situation of domestic wooden biomass, and we consider this potential.

## **Improved Agave Cultivars (*Agave Angustifolia* Haw) for Sustainable Bioethanol Production in Mexico**

**Antony Emanuelle MALDONADO-SANCHEZ**  
Chapingo Autonomous University

Biofuels are good gasoline (MTBE) substitutes. However, their production in Mexico is problematic, since maize volumes produced across the country are insufficient to fulfill the demand requirements, and because sugar cane is produced at a high cost.

An alternative solution hereby discussed is the use of genetically improved “agave mezcalero” (*Agave angustifolia* Haw) cultivars to produce bioethanol in a sustainable way. Agave plantations do not need farming lands; they require fewer fertilizers, less water, and less labor than traditional crops.

With a density of 3,500 plants/ha, the improved agave cultivars produce cores of 150 kilograms after a period of six years, which means 82.5 tons per hectare. Those cores have a sugar concentration of approximately 27%. The total cost to produce a liter of bioethanol from agave is \$0.61 US dollars, of which \$0.13 dollars corresponds to the cost of raw material (agave cores).

Bioethanol from sugarcane is produced at a cost of 0.60 US dollars/liter, almost as expensive as bioethanol from agave improved cultivars. Nevertheless, production of bioethanol from agave is more sustainable, since it does not require crop lands, irrigation water or so much investment.

The average cost of imported gasoline in Mexico is \$0.32 US dollars/liter, which is 48% less expensive than both agave and sugarcane ethanol. This means that it is not profitable to substitute gasoline by ethanol obtained from agave or sugarcane at current market prices; it can only change if oil barrel price surpasses \$100 US dollars or agave ethanol falls 48%.

It is required that the Mexican government gives a \$0.29 dollar/liter subsidy to agave ethanol refineries to support the transition toward a sustainable economy based on renewable sources of energy. The government of the United States grants subsidies of approximately \$0.28 dollars/liter for the ethanol obtained from corn.

**Keywords:** Biofuels, bioethanol, agave-improved-cultivars.

# **Bioenergy as the Solution of Energy Crisis in Ukraine**

**Iryna KULYK**

National Agricultural University of Ukraine

Global energy demand is growing rapidly. This demand is mostly met by fossil fuels. Energy demand is expected to double or perhaps triple during this century. Thus, security of energy supply is a global issue. A large proportion of known conventional oil and gas reserves are concentrated in politically unstable regions, and increasing the diversity in energy sources is important for many nations to secure a reliable and constant supply of energy. In this context, bioenergy can play a pivotal role. Some of the main reasons for the people shifting their interest to biofuels were the exhaustion of fuel resources, rising prices of oil, natural gas and to a lesser extent coal, emission of the greenhouse gases and interests like rural development. Bioenergy is now a key option in energy policies.

Energy safety is an important compound of national and economic safety of each country. Ukraine is a country with a lack of domestic energy sources and rather high dependence on imported energy carriers. This fact encourages the search of alternative energy sources. According to official data, by the end of 2008 own extraction of natural gas amounted to 19,8 bln. cubic metres, extraction of crude oil reached 3,1 million tons and 59,3 million tons of coal were produced but this extraction of fossil fuels covered only a small amount of energy consumption in the country. That is why successful development of bioenergy is of vital importance for Ukraine.

There are three main types of modern bioenergy products: bioethanol, biodiesel and biogas. In this paper we will focus on biodiesel production in Ukraine and its perspectives.

Biodiesel is a renewable fuel made from farm products such as vegetable or animal oils, fats, or recycled cooking greases. Almost all biodiesels are derived from soybean oil; however sunflower oil, rapeseed oil, recycled vegetable oils, and animal fats can also be used. Biodiesel can be mixed with petroleum diesel in any ratio. In Ukraine it is common to mix such a fuel in the ratio from 10% to 40% depending on the season. It can be used in diesel engines without any modification.

National University of Life and Environmental Sciences of Ukraine is one of the initiators of the development of biofuel production in Ukraine. It founded its own biodiesel plant in 2004. In this article we will estimate the effectiveness of biodiesel production in Ukraine using the example of this plant.

Further development of the biofuel industry is mainly determined by state regulation. There are several state programmes that foresee increase of the level of ecological and energy security of Ukraine, decrease of dependence on imported fuels and provision of agricultural sector and transport with competitive biodiesel. The main aim of the "Programme of development of the biodiesel production for the period till 2010" was biodiesel production at a level of 623 000 tons in 2010 but the real production volume by the end of 2008 amounted to 20 000 tons. As we can see, the governmental support programmes are not fulfilling the plan.

But despite all the negative tendencies, biodiesel production in Ukraine grows every year and attracts much attention from agricultural producers.

# **Germany's Renewable Energy Policy as a Response to Energy Crisis - the Example of Biogas Production**

**Christian RANK**

University of Applied Sciences Weihenstephan

Energy demand is growing, but long used resources are limited. The world needs more and more energy. Economic growth, linked with social prosperity and expanding populations, are the driving factors for this rapid development. According to the "Official Energy Statistics 2008" from the US Energy Information Administration, the world energy consumption is projected to expand by 50 percent from 2005 to 2030. To secure energy supply, states are looking for new possibilities to replace conventional energy carriers. Against the background of sustainability and in responsibility to the following generations, the German Government is searching for approaches and solutions to meet this global challenge. One reasonable possibility of an energy conception is to integrate renewable energy technologies like biogas plants.

Referring to this, renewable energies such as biomass, photovoltaics, wind energy and hydropower play a key role in national energy politics. They have already replaced 7 percent of the national primary energy consumption in 2007. Since renewables were not competitive on the market up to the year 2004, government subsidized the start of these ecological energy carriers. As the German government wants to raise the share of renewables to about 18 percent of the energy consumption by 2020, the economic framework was secured by a law called EEG ("Renewable Energy Heat Law"). With this legal background investors and contractors have secure framework conditions for investments for the next 20 years. In summary, the introduction of renewable energy production is already now a great success in Germany. Besides environmental issues and to secure long-range energy supply for the population, a new industrial sector was developed. Furthermore the whole national industry actually employs approximately 278.000 people

This growth also plays an important role for income and diversification possibilities of sustainable farms. In particular, agriculture provides opportunities to use biomass in a closed material cycle. Biogas plant technology is sophisticated in Germany and according to forecasts, will reach an installed capacity of electricity generation of 1,600 MW, by means of 4,780 separate factories. In this regard the operators generally use organic fertilizers like slurry and manure from cattle, hog or poultry together with renewable commodities like grain, silo corn or meadow grass, to generate biogas. This raw product can be used in different ways. The major field is to use the biogas to produce electricity and heat in combined heat and power units (BHKW). Another possibility is to clean and purify the biogas and to inject it in central gas distribution systems. And a third innovative alternative is to install a filling station as a fuel for biogas-powered cars.

In 2008, energy crops were grown on about 2 million hectares in Germany, which equates to 12 percent of the arable land. According to a study by the Federal Ministry for the Environment, by 2030 this area could be more than doubled without encroaching on the food supply!

# **Innovative Solutions to Global Warming**

**LIU Jie**

China Agricultural University

Some global environmental problems have definitely been getting worse, such as global warming, ozone destruction, acid rain, desertification and other problems. With such increasing effects and consequences, people are paying more attention to global warming. This is not only because it is occurring on a global scale, but also because it has had more and more significant effects on people's daily lives. In this paper, some creative measures are suggested, to solve this crisis, which is becoming more severe with each passing day. This paper begins with how global warming occurs, that is to say, explaining the mechanism. Then, some ecological concepts and principles in it will be set out. Following that, every possible consequence for people will be listed. Nowadays, many scientific achievements on global warming indicate that many people are doing something to avoid the worsening of the problem. For instant, the government takes measures to organize many people to plant trees and increase the forest coverage to store up carbon dioxide. Finally, I will present some effective ways to slow down the speed of global warming, including what people have already done and some new measures. This paper focuses on two particular areas: one is the technology of controlling the emission of carbon dioxide and improving energy use efficiency; the other is the exploitation of the technology of sequestering carbon dioxide.



# **The Strategy of Saving Energy for Convenience Stores in Taiwan**

**Hao-Yu WENG**

National Chung Hsing University

To face the challenge of global energy crisis, Taiwan government is very eager to finding alternative energy and to save energy. In Taiwan, convenience stores are so popular that it is very easy to find several stores in a small region. It was estimated that there are approximately 10,000 to 12,000 convenience stores and the number is still increasing. Perhaps Taiwan has the highest density of convenience stores in the world.

The business style of convenience stores is 24-hour open with abundant illumination, air condition, cold storage, freezing and cooking facilities offering hot meals and cold drinks, so the electricity consumption is quite high. A recent study shows that in Taiwan the electricity used by convenience stores is 4 times that of department stores and 1.6 times common markets. So, convenience stores are targets for saving energy. Furthermore, because of the enormous numbers of convenience stores in the country, even saving a small amount of energy in each store would save a surprising amount of energy overall.

To reduce the power-consuming cost, Taiwan's convenience stores have focused on three main aspects to save energy: freezing and cold storage, illumination, and air condition system. The aim is to improve those facilities or use them more efficiently to achieve the target of saving energy. For freezing and cold storage, high efficiency converted technology could be adopted, improving the inside-display of goods, and adding anti-fog equipment. For air condition system, high-efficiency converted air conditioning could be adopted, adjusting temperature of the selling field to match the outside weather conditions, and using air curtain to prevent the escaping of cold air. For illumination, LED light bulbs could be used, instead of the traditional illumination, and light Auto-induction installed.

Recently, a new technique of energy monitoring systems has been developed. This is a network-based energy management and control system. It integrates an energy saving monitoring system to control the in-store temperature in order to provide optimal conditions for customers while also saving energy cost. Through this system, the operating status and temperature setting of the energy consuming facilities can be continuously monitored and recorded, even from a remote, centralized office. It demonstrates that by introducing this integrated energy-saving system, most convenience stores which participate in the project could save up to 15% of their electricity consumption.

At the same time, the convenience stores are also considering adopting a solar-energy system to cut down their dependence on city power. Although solar energy is a new area and not yet a mature technology, it does offer new promise.

It is expected that by the year 2020 total energy saved in Taiwan's convenience stores could be 28% of the current figure. I am optimistic about the awareness of saving energy reflected in recent efforts by Taiwan's convenience stores.

# The Construction of a Sound Material-Cycle Society at a Regional Level with Atsugi as a Model City

**OMORI Tsuginosuke**

Tokyo University of Agriculture

We have, until now, constructed a “One-way Society” with mass-production and mass-consumption methods. In order to ease the burden on the natural environment, *The Basic Act for Establishing a Sound Material-Cycle Society* was approved in the year 2000 at the 147th ordinary session of the Diet. This was started by the Japanese Government to form the Sound Material-Cycle Society, which will not only cut the amount of natural resources taken from the environment to the minimum, but also use the resources effectively to minimize waste material produced.

The Japanese Government has been promoting *Biomass Nippon Strategy*, a strategy to promote effective use of biomass, since the year 2002. The *Biomass Town Plan*, a synthetic system to apply the most suitable process to connect the production and utilization of biomass, along with the *Zero Emission Plan*, are amongst the promoted plans for the strategy.

Miura City in Kanagawa Prefecture produces compost from residues of locally harvested vegetables and marine products, the only city in the prefecture that is authorized by the Ministry of Agriculture, Forestry and Fisheries as *Biomass Town*. Atsugi ISF will investigate the approaches of Miura City, and consider the process for Atsugi City to be authorized as a *Biomass Town*.

- ① We will investigate the broken part of the society’s cycle, compare the problems with other cities, and seek the conditions that need to be adjusted to make the society circulate, in order to make Atsugi City into a Sound Material-Cycle Society.
- ② We will carry out nutritional education in cooperation with the city hall and *Odakyu Electric Railway Co. Ltd.*, in order to gain awareness of a Sound Material-Cycle Society amongst the citizens of the city.
- ③ With the above two points as the backbone, we will construct a society where universities, companies, and the city can cooperate to perform urban husbandry.

We will focus on two keywords: *local production for local consumption*, and the *garbage matter*. *Local production for local consumption*, thought to be difficult in urbanized areas, is possible by operating a rooftop farm on the roof of the department store *MYLORD Hon-Atsugi*. Compost produced at Tokyo University of Agriculture, as part of the *Kitchen Recycle Project* organized by the Ministry of the Environment, can be used at the farm to contribute to the plan. For the latter plan, we will cooperate with the team of Atsugi City’s Department of Resource Management.

By opening up and sharing these actions with other regions, we hope that it will create the opportunity to plan a sound material-cycle society in those regions. The amount of waste materials will decrease on a global scale as sound material-cycle societies begin to be constructed at a regional level in cities and rural areas around the globe, and the world will develop into a sustainable world that we aim for.

# **Energy Mix and Alternative Energy for Sustainable Development**

**Alia Farhana Binti JAMALUDIN**

Universiti Putra Malaysia

Malaysia is currently adopting the Five-Fuel Diversification Strategy energy mix which was implemented in the year 1999 under the 7<sup>th</sup> Five Year Malaysian Plan (1996-2000). In this strategy, the energy mix in Malaysia is contributed by five main sources, namely natural gas, coal, oil, hydro and renewable energy. Among the fossil fuel resources for energy generation, coal is offering an attractive solution to the increasing fuel cost. The consumption of coal in Malaysia is growing at the rate of 9.7 % per year since 2002. The total coal consumption for electricity generation in Malaysia is projected to increase from 12.4 million tons in 2005 to 36 million tons in 2020. With uncertain future supply and volatile fossil fuel prices and also the concern for environmental degradation, nuclear power could be viewed as a proven insurance base load power generation option to prevent runaway gas and coal prices. This paper outlines the possibilities of utilizing other sources of alternative energy such as nuclear and solar energy that are respectively sustainable and environmentally friendly. In addition, this paper will also discuss the photovoltaic as the most promising of the renewable energy resources. It also includes discussion on the energy mix for sustainable development in the future and strategies taken by the Malaysian government in addressing issues on green environment and green energy.

***Keywords:*** *Alternative energy, renewable energy, environmentally friendly, sustainable development, green environment.*

# **Impacts of Climate Change on the Agricultural Sector in Korea**

**Han Sol JANG**

Kyungpook National University

Through extensive research and analysis of global warming, the average temperature of the earth has risen 1.5°C over the past 100 years, while the winter seasons have been reduced, and summer seasons have lengthened, thus advancing the flowering season later in during spring. As a result, the agricultural cultivation area has been extended northward and the damage by blight and harmful insects during the winter has increased. This has caused the decrease in agricultural productivity. Therefore we need to devise a strategy for this environmental situation, such as considering raising a variety of fruits and vegetables. Nowadays, it is possible to cultivate different tropical plants in Korea.

Scientific diagnosis and evaluation of the impacts of climate change on the agricultural sector is very important in establishing future visions of the agricultural industry and the direction of its policies. This provides useful information for establishing adaptive plans such as long-term regional agricultural and farming plans.

With the different issues concerning our cultivation practices and environmental conservation, a new policy should be in effect. Recently the Korean government announced a new policy, named Low Carbon and Green Development. The purpose of this policy is to reduce environmental pollution and carbon-dioxide in agriculture. The promotion of related measures is being carried out in various ways. This is a popular topic in Korea now.

The Korean agriculture sector is decreasing, and the impact of climate change will be a serious problem. It is time to change our actions concerning agriculture and the environment.

# **Improvement of the Rural Education Environment by the 'Nong-Whal' Program**

**Sung ho SEO**

Kyungpook National University

Korea experienced rapid economic growth through a policy of development that was primarily industrial, with the promotion of high-technology industry in the 1980s. However, investment in agricultural districts lessened with the efficiency of economic growth. The rapid changes in the industrial structure and converging of population into the city resulted in an aging society and greatly decreased population in agricultural districts. This has caused educational conditions in agricultural districts have become greatly worse.

The numbers of parent of students wanting their children to study in better educational conditions and sending them to the city are rapidly increasing. Rural institutions, private educational institutions, culture and welfare are suffering from poor surroundings. This kind of movement to send students from the country to the city is also causing families to move to the city and has become one cause of the flow of people from the country into the cities. This situation further worsens educational conditions in agricultural regions.

I considered three type of causes that worsen educational conditions in an agricultural district: (1) social environment, (2) home environment, (3) educational environment in the country.

Students in the country decrease in population because of a phenomenon that moving people from country to the cities. As a result, some schools have merged to a center in the country; so many students who are living near the city have difficulty in commuting. Moreover, parents of students don't have time to teach their children enough or take care of them because they are so busy with agricultural work. The reality in the country-side is that parents entrust their children to the school and can not concentrate on children teaching in addition that not enough chairs and desks from their physical environment. There are not enough teachers in comparison with the cities, and not enough educational institutions make smart students who are living in a country sent to the cities. That's why the study gap of country and city is becoming wider.

I learned that the government has tried many ways of solving these kinds of problems. But there are many that have not yet been solved, despite such efforts.

Therefore, in this paper, I first look at the educational gap between the city and the rural areas. I then suggest how to solve educational problems in agricultural districts through the efforts of university students. I hope that every agricultural district will adopt these solutions to improve the educational environment in the future.

## **The Palm Heart Strategy**

**Mario Ferreira WHATELY**

University of Sao Paulo

The rapid population growth nowadays requires a compulsory expansion of food production. This expansion may be done in several ways, searching for corresponding possibilities in each agricultural area. Recently, after it was understood that the solution is not immediately available, the term “innovation” became part of the search for solutions. Brazil has developed a very innovative project to solve a particular environmental problem: the illegal deforestation of Juçara palm tree (*Euterpes edulis* Mart.) for the production of edible palm heart in the Atlantic rain forest that represents one of the most devastated forests in Brazil. Although, it is an environmental problem it is also important to consider economic and cultural factors.

The Juçara palm has been extracted for several decades by local communities living inside the forest. The adverse consequences of this activity are vastly affecting both many tropical levels and also consumers themselves, since the processing is done under unsanitary conditions.

The objective of this project is to gather different researches in order to develop a consistent strategy for the solution. The problem is deforestation, and the solution seemed to be the development of a sustainable source of palm heart, which would be the intensive cultivation of alternative palm tree species. For that, it was necessary to find a species with good characteristics for cultivation combined with a feasible production system. It was found that the production of pupunha palm (*Bactris gasipaes* Kunth) represented a very profitable activity which was, moreover, attractive for farmers. However, the deforestation of Juçara palm was not being made by farmers, but by those communities living inside the forest, and which would continue these activities until other options were found. In search of new and sustainable alternatives for the communities, researches found similarities between the fruits from Juçara palm tree and the açai palm (*Euterpe oleracea* Mart.) from the Amazon. The popular fruits from the açai palm are sold in form of tablets, juice, smoothies, instant drink powders, and as whole fruits in Brazil and some parts of the world. It was found that the fruits of Juçara palm tree are suitable to produce the same products with same flavor and nutritional characteristics as the açai palm. These findings facilitated the introduction of these Juçara fruits products to the market. Today, with the implementation of programs to collect the fruits, its industrial sales result in higher profits than for palm hearts, and gained in a legal and sustainable way.

## **Green Wall- A Creative Solution in Response to the Urban Heat Island Effect**

**Yu-Peng YEH**

National Chung Hsing University

Taiwan has had a reputation for its beautiful and magnificent landscape. With economic advance and industrialization, people's material life has become better than before, but there have also developed serious environmental problems. Taiwan is a small island with high population density. In order to accommodate such a huge population, a substantial portion of vegetation spaces have already been replaced by artificial constructions. Furthermore, being an overpopulated island community, the phenomenon of the so-called Heat Island Effect is one of the most serious problems in Taiwan, especially in the western part, which is the major dwelling area for residents. Hence, finding ways to lower the temperature is an important issue, which concerns everyone.

In order to solve this problem, many architects started to blend green elements into their housing design, like green roofs and green walls, to atone for the decrease in vegetation space. For example, the Park Lane of CMP, which is a shopping mall located in the metropolitan area in Taichung city, has made use of this idea. The architect used over 150 thousand pots of plants to decorate the outside concrete wall. It is so far the most massive green wall in Asia (0.2 ha.). Scientific report said that a green wall of this size would be able to absorb 200kg of CO<sub>2</sub> while producing 150kg of O<sub>2</sub> everyday. It can also lower the in-door temperature of the building, thus reducing the wastage of air conditioner. This fact strongly proves the efficiency of green walls in fighting Heat Island Effect. Another example is Xinyi District Office of Taipei, which has already had their roof transformed into a green roof. Many schools, companies and residents are also planning to follow their example.

Energy Saving and Carbon Reduction should become part of people's lifestyle. In fact, the aim of building green walls is not only to solve environmental problems and beautify the surroundings, but also to provoke residents' environmental awareness. By popularizing the idea of building green walls, sultry cities will surely change into comfortable ones that are more suitable for comfortable living.

## **Ecological Assessment of Dynamic Soil Parameters in the Megapolies's Protected Areas**

**VIZIRSKAYA Mariya and RASCATOVA Tatiyana**

Russian State Agrarian University – Moscow Timiryazev Agricultural Academy

Nowadays it is almost impossible to find undisturbed natural ecosystems on the Earth. That's why it's so important to save such territories. Investigating them is a wonderful opportunity to find answers for many exciting questions. The importance of the realization of ecological monitoring in those territories and estimation of its data connect with possibility of using them as the control in the analysis of human impact. It is also interesting to observe the soil changes which are results of anthropogenic influence.

The main goals of this research are to investigate and assess the basic dynamic soil parameters and estimate the results of anthropogenic influence on them.

The main object of the investigation is the «Petrovsko-Rasumovskoe» reserve located in the northwest part of Moscow. We chose five key sample plots on its territory for further analysis. These sample plots are situated at the top of a hill and its slopes with different exposition, form and steepness. The lowest level of human impact served as the criterion for a choice of the platforms.

We use the method of the regime supervision in this research. This method includes three blocks: physical, physicochemical and biological parameters. The group of physical parameters consists of soil moisture, bulk density and temperature. Physicochemical parameters include pH, mobile form of NPK, humus content, cation-exchange capacity, and hydrolytic acidity. Emissions of CO<sub>2</sub> and cellulose decomposition rate are integral biological parameters. We observed these characteristics every month from May till October during 3 years.

As the result of this research we discovered the essential spatial differentiation of soil properties on studied key plots. The location of key sample plots on different elements of a relief and different level of moisture can explain this differentiation. The investigations have shown that soils on a slope of a southwest exposition (low concave slope) are less firm, contain more mobile form of phosphorus, have smaller significance of the cation-exchange capacity and have smaller exchange acidity. We have found seasonal dynamics of the next soil parameters: pH, emission of CO<sub>2</sub> and cellulose decomposition rate. These parameters strongly depend on soil moisture and temperature. Besides we have revealed the connection between conditions of soil moisture and biological activity in years with various weather conditions.

Thus we have found accurately expressed time and spatial variability of soil parameters on key plots. Variability of dynamic soil characteristics is determined by moisture conditions and the location of key plots on different elements of a relief. Moreover we have observed the sample with indistinct relief. And we have found out that the form of relief influenced the soil parameters more than exposition in these areas.



## **Promoting Carbon Footprint Labeling in Regards to Climate Change in Korea**

**Inyoung LEE**

Kyungpook National University

Carbon labeling is the process in which targets the amount of carbon dioxide greenhouse gas emissions equivalent with the amount of the dose that is brought out.

Abroad, Europe, Japan, and the United States are active in the introduction of carbon labeling systems and industrial products; compared to other carbon-labeling of foods and drinks they are much more actively promoted. Agricultural and seafood domestic manufacturers and distributive are also proactive.

In reality the results of the carbon labeling system, the economic incentives that are provided to facilitate the promotion of this have led to a spread of the consumer culture for low carbon steel products.

By providing quantitative information to consumers with regards to domestic agricultural and seafood manufacturers we can increase consumer preferences towards less carbon greenhouse emissions along with enhancing the competitiveness of the domestic manufacturing front.

In addition, the environmental information disclosed regarding the active carbon labeling will help customers choose not only choose a more environmentally friendly manufacturer but also enhance the competitiveness of domestic food contributors, especially in the agricultural and seafood sectors.

Carbon labeling regulation, rather than just the production of low carbon products, can help facilitate the transition to a market-friendly, carbon reducing economy, the effect being the reduction of carbon emissions.

For labeling of carbon for the process of agricultural output there shall be an established database, similar to one in Europe and the United States that is widely used, although that particular one is not used in business at all.

This reduction of greenhouse gas emissions from carbon labeling contributes to the effort to reduction as a whole, and as climate change reform the new requirements of this specific marketing will be environmentally friendly. From this point 'carbon labeling' for the company helps on how to prevent global warming, and the marketing is effective as the consumer feels they are in the spotlight as helping to fight global warming.

However, due to a lack of publicity, and despite six months of the system in operation, many do not even know the purpose of the system. Getting the report and knowing the meaning of carbon, and carbon labeling, should be one of the first things to be done. This will help because you will have a basis for knowing about carbon labeling systems.

## **Solutions on Global Energy and Environmental Crises: The Philippine Creative Approach**

**Mary Grace V. BIROG**

University of the Philippines Los Baños

The Philippines has one of the highest cost and energy consumption rates in Asia because of inefficient generation and supply of electricity. The demand for energy grows exponentially and over half of its Greenhouse Gas (GHG) emissions are attributed to the energy sector. These sources of excessive atmospheric pollution contribute to global warming, posing severe environmental problems (Global climate change: country and regional information, 2008).

Several international, national and local initiatives have been made in response to the energy and environmental crises.

At the international level, Philippines participated in the Earth Hour. On March 28, 2009 lights were off for one hour and saved 611 Megawatt-hours nationwide. This brought the message of practicing energy conservation and daily environmental consciousness.

At the national level, the country aspires for more efficient use of energy and maintenance of resources. The Renewable Energy Act of 2008 endorses the use of renewable energy sources like solar, wind, water and biomass, and grants fiscal incentives to companies that invest in renewable energy projects. The Philippine Energy Efficiency Project focuses on efficient lighting that will reduce greenhouse gases by way of promoting the use of compact fluorescent lamps (CFL). The Ecological Solid Waste Management Act of 2000 is a broad-based and comprehensive approach to solid waste management that puts the principles of reduction, reuse, and recycle into practice. The Philippine Clean Air Act of 1999 aims primarily for air quality control.

At the local level, the country challenges its localities to exhibit their potential in averting GHG emissions. The Quezon City Waste Disposal Facility has turned the Payatas Dumpsite into a Controlled Facility that captures methane gas from the dumpsite and uses it as an alternative energy source. The Lakbay Aral on Solid Waste Management for the Province of Oriental Negros provides a venue for participants to learn practices and initiatives on Solid Waste Management. The No Plastic Policy in Los Baños prohibits the use of plastic bags by any establishment doing business in the locality, and recharges the people's interest to use the traditional *bayong* that is environment-friendly.

Such attempts have been designed with hope of success and sustainability, to serve as a driving force to invite people to unite in fighting the problems.

# **Creative Solutions to Global Environmental Crisis**

**NGUYEN THI LAN Chi**  
Hanoi University of Agriculture

Significant economic growth, especially in industry, has improved the quality of life for people, in some respects. However, this growth has contributed to a serious and growing crisis in the environment. Our planet is slowly but surely dying, the ozone layer is depleting, and global warming has become more evident than ever, leading to drought, famine, floods, misery, and diseases. Undoubtedly, the Earth is in danger and our life is threatened.

What are some ways we can protect our environment? This paper proposes some solutions. But let us first examine possible causes. Undeniably humans are the most severe culprit. We damage our Earth by polluting our air, water, the atmosphere without awareness and conscience for the consequences. First, carbon monoxide and other poisonous substances continue to be emitted from factories and vehicles into the air causing humans to breathe toxins which are damaging to our respiratory systems and leading to various types of cancer. Second, deforestation is on the increase, depleting our forests and jungles; disappearing canopies can no longer offer sanctuary to animal as protected refuge. Finally, the large amount of waste produced by households, factories and hospitals is dumped into the environment without being processed.

In my opinion, there are some effective and creative solutions to be carried out both by individuals and governments to confront these challenges. First, people should use alternative sources of energy such as wave power, wind power or solar power instead of burning fossil fuels, which will reduce the amount of energy. Second, environmentally-friendly forms of transport should be implemented to reduce pollution. Third, consumers can also help the environment by buying green products and organically-grown foods. Fourth, recycling waste, such as paper, glass, etc., needs to be supported by the government by providing regular collection service and improving recycling schemes. Fifth, education is key to these types of global challenges. The public needs to learn about the vitality of the environment and strict policies must be enforced to discipline violators of the environment.

Our life is in our hands. The world is being harmed by the uninformed and irresponsible acts of communities. Therefore, we must all take responsibility for the alarming impact on the environment we live in.

## **Facing New Challenges: Environmental Policies and the Implementation of Solutions in Peru**

**Lucila Nathali PINTO CIEZA**

La Molina National Agrarian University

Peru as a developing country faces serious environmental problems caused by the poor implementation of environmental policies through the years. It is thought that our problems are caused by extractive activities, such as mining, but this is not completely true. We face other problems such as bad solid waste management and uncontrolled automotive fleet growth in cities. Meanwhile, deforestation is a recurring problem for our forests.

However, Peru is facing a change in environmental policies with the creation of the new Ministry of Environment. For many years our policies have not been effective, creating serious problems in important aspects for the population. Peru is rich in biodiversity and culture, which need to be protected and preserved. We have the capacity to create and implement solutions to the problems that we face everyday and that, directly or not, involve every one of us.

Recently, there is a new trend concerning environmental issues and social responsibility. In June 2009, one year after its creation, the Ministry of Environment released the National Environmental Policy. This policy involves each Peruvian citizen and institution, private and public, in order to achieve sustainable development for our country. This is the big first step: there is still a long way to go.

Our challenge is to see every problem as an opportunity. Since a couple of years ago, Peru has been one of the most attractive countries for new technologies in environmental issues. As part of the Kyoto Protocol, Cleaning Development Mechanism (CDM) has an active role in the solution of the problems. According to the last EXPO CARBON, held in Spain in May 2009, we are having investments for almost a million dollars in one hundred and fifty CDM projects in many areas, such as renewable energy, biomass and biofuels, and forest.

One of the first projects in this area is Huaycoloro landfill gas recovery. This project consists of capturing the methane produced by solid wastes and converting it into gas. The gases that are emitted are certified and sold on the international carbon market. Other programs are related to reforestation: one great example is in Piura, located in the northern part of the country. It is the first effective project in the region, which has a special type of vegetation.

As students we have an important role here: we are part of the solution. We can create our own environmentally friendly projects and apply them in many areas in order to preserve our most valuable resources.

# Protecting Landscapes in a Man-Made Environment

David SCHUHWERK

University of Applied Sciences Weihenstephan

Conservation of biodiversity plays a major role for the environment but also ensures production possibilities for mankind at present and in the future. Therefore, among the resources on our planet, which are most worthy of protection, are not only commodities, but also naturally evolved landscapes as well as those altered due to human activities.

In such a highly utilized and densely populated area as Central Europe, it might be surprising to many that there still exist quite a few habitats which are of utmost significance because of their special features, endemic species, importance for biodiversity and aesthetic value. This paper emphasizes the relevance of forests and forest-related landscape types; Central Europe (in particular Germany) would naturally be composed only of several forest associations according to the respective sites and conditions.

On the one hand I would like to turn towards naturally developed forest associations. For instance, the endemic European beech forest associations (*Fagus sylvatica* – *Fageta*). This is the main dominant stand forming species in the western part of the continent and therefore there are many different organisms attached to its occurrence. Among an enormously high number of wildlife species there are about 5000 insect species, including approximately 1400 deadwood related beetles and a high diversity of fungi. Several different unique and endemic beech associations are important elements of the FFH directive (Flora, Fauna, Habitat), also called Natura 2000. It is an ecological network of comprehensive protected areas in the territory of the European Union. In Germany there also exist legal regulations to protect important and valuable habitats, such as the German (or Bavarian) law on nature conservation (Article 13d at the Bavarian Law on Nature Conservation). Among the areas falling under this category are for example certain alpine forest types, riparian areas and peat lands. Furthermore there are also interesting plans such as the dead wood concept or the plan of nature conservation by the Bavarian forest enterprise.

On the other hand it is important to understand that there are several forms of forest related cultivated landscapes which evolved because of anthropogenic land use. Despite, or sometimes precisely because of, the artificial origin, these special sites and associations frequently contain a rich composition of rare or endangered species, providing important habitats and key structures. The cultural landscape in Central Europe is deeply affected by agricultural land use up to the 20<sup>th</sup> century, which led to various habitats and biotopes extremely rich in biodiversity, including traditional and mixed orchards and arid grasslands.

Important and alternative strategies and instruments to manage these biotopes are mandatory for successful conservation and protection efforts. Biotope maintenance, nature conservation contracts, traditional forms of forest pasturage and advancement of dynamic natural processes are important key strategies.

A sustainable conservation of landscapes worthy of protection in Central Europe can therefore only be ensured by a combination of different preservation and protection arrangements and strategies, which have to be engaged on varying levels.

# **Cassava: Solving the World's Crisis**

**Pattaranat WUTTIWAI**

Kasetsart University

Thailand is the world's largest exporter of cassava and cassava products, but is ranked the third largest producer of cassava, after Nigeria and Brazil. Thailand is also the leader in breeding, planting, producing and trading of world cassava. Cassava is one of the crucial trading products of Thailand, and is used for human consumption, animal feed, and made into other products such as chips, pellets, starch, MSG, citric acid, medical products, paper, plywood, and textile industries. More importantly, in face of the world's food and energy crisis, cassava can be used in the renewable energy industry, as ethanol.

As the world is facing food and energy shortages, cassava, which can be used as both food and energy, will definitely be a buffer and alternative in alleviating such shortages. The key to success is the stabilization of the cassava price. Emphasis should be put on the reduction of raw material costs, and policy that advocates the production of bio-fuel. In this connection, prices can be stabilized, and new products will be created by higher technologies and innovation.

The government has the primary responsibility to address the impacts of the food and energy crisis and to ensure a conducive environment for sustainable responses to increase the availability and access to food, energy and environment by fully supporting the development of cassava in various stages, from cultivation through harvest, production and trade, as well as research and development and also raise it to National Policy.

The paper will discuss the following five topics;

- How to use cassava products in agro-based raw materials both for animal feed and human consumption.
- Will the cassava production in Thailand provide sufficient alternative energy in the new century?
- How Thailand can apply environmentally friendly technology in cassava production
- Current National Policy of the Thai government on cassava production.
- Future direction and challenge of using MIS technology to sustain cassava production in Thailand.

# **Econutrition: An Integrated Approach of Safe, Sustainable, and Environmentally Friendly Food Supply to Improve Economic and Health Status in Indonesia**

**Yoghatama Cindya ZANZER**  
Bogor Agricultural University

Econutrition is an interdisciplinary scientific discipline that encompasses the entire nutrition system, with special consideration of the effects of nutrition on health, the environment, society, and the economy. Thus, econutrition describes a new field of nutrition sciences that deals with the local and global consequences of food production, processing, trade, and consumption. Econutrition involves all components of the food chain, including production, harvesting, preservation, storage, transport, processing, packaging, trade, distribution, preparation, composition, and consumption of food, as well as disposal of waste materials. However, the introduction of industrialized agriculture and mass animal production have given rise to various negative influences on the environment and health. Food quality is determined in part by the quality of the environment. The environment, in turn, is influenced by food consumption habits. Research shows that diet based on econutrition principles is well suited to protect the environment, to reduce pollution, and to minimize global climate changes. To maximize the ecological and health benefits, food should be regionally produced, seasonally consumed, and organically grown. As a developing country, Indonesia, with a total population of over than 214.6 million in 2004, also suffered from multiple and complex problems in agriculture and biological resources, nutritional and health status, water, energy, and also environment. Therefore, implementation of econutrition as an integrated approach for a sustainable food supply should be carried out in order to improve health status and sustain the whole national, regional, family, and individual food security in Indonesia. To achieve this goal, government and professionals involved in the nutrition system must inform the public about the principles of econutrition and implement the strategy of pro-farmer sustainable agriculture through clearly focused policies.

**Keywords:** *econutrition, environment, organic farming, malnutrition, sustainability*

# **The (Un)Creative University: A Model for Innovation and Sustainability in the 21st Century**

**Andrea MORGAN**

The University of British Columbia

This past year at the University of British Columbia (UBC), students, faculty, staff and the greater public fought to save the UBC Farm from destruction and market housing development. While there are infinite reasons that this farm is important, the most basic of reasons is this: farms like these are our future. Sitting on 24 hectares of land, the Centre for Sustainable Food Systems (CSFS) at the UBC Farm is a living laboratory and outdoor classroom for people of all ages, ethnicities, socioeconomic classes and backgrounds. Amidst its productive fields and flourishing forests lies an endless network of innovative teaching, research, learning and community building. Integrated learning is at the heart of the farm. People from all walks of life become immersed in stewarding a working, productive landscape as they build on the theoretical and practical skills, knowledge and experience necessary to deal with some of society's most pressing issues. Understanding and dealing with such complex issues is made possible at the UBC Farm by becoming closer to something everyone, everywhere can relate to: food.

Although food production and agriculture are the central activities at the farm, 14 faculties and colleges use the farm for curriculum and studies ranging from engineering to medicine; botany to education; and mathematics to humanities. In hosting such diverse interests, the Centre takes a systems approach in all its activities and projects, recognizing that it is accountable to both the ecological and socio-economic systems that support it. Because of the farm's unique connection to a university, situated in a major urban center at an extensive rural interface, it has the opportunity to act as a demonstration model and microcosm of sustainability in a range contexts.

Until recently however, this incredible asset was overlooked, undermined and undervalued by some of UBC and Vancouver's most powerful decision-makers. In today's world there is a growing discourse and concern about climate change, food security, ecological and economic collapse, and about the breakdown of healthy communities. The UBC Farm is an ideal venue for fostering cutting edge praxis and "walking the talk" in response to these challenges we face. How is it that a major university in a wealthy nation could so easily be willing to (literally) pave such a place over? Why were undergraduate students more able and/or willing to see the vast value and potential of the CSFS and UBC Farm than senior UBC administrators? The UBC Farm and the student-led movement to save it represent a reality of today's world: the need to address environmental, energy and food issues creatively does not stop in agricultural or environmental sectors, nor does it end in the fields, labs, or universities dedicated to these topics. It means expanding our own horizons, it means integrating and exchanging our knowledge with other disciplines, and it means actively participating in and demonstrating "sustainability." Creatively addressing the environment, food and energy means being a teacher, learner, peer, an advocate, a volunteer, activist, and political organizer. It means having an open mind, working hard and being a leader. These issues are not just ours, they are everyone's.



## **Solving the Food, Energy and Environmental Crisis through Locally-Grown Food**

**Alexandria Nicole HENRY**  
Michigan State University

Contemporary consumers are interested in their food long before it reaches the dinner table. They want to know where and how their food was grown, how it ended up in their refrigerator and what impact the production of that food had on the environment. Producers are responding with a proactive solution which combats the global food, energy and environmental crisis, employing a technique from the past: growing food closer to consumers (dubbed the locally grown food movement). Locally grown food is produced closer to those who consume it, therefore reducing transportation and the time food spends in transit. A reduction in travel time correlates to reduced carbon emissions, decrease oil consumption and enhanced food nutrition benefitting consumers, producers and the environment.

Conventional food production amplifies the global energy and environmental predicament. It is estimated that the typical carrot travels 1,838 miles – equivalent to a road trip from the northernmost tip of Maine to the southernmost tip of Florida – to reach the American dinner table (SustainableTable.org, 17). But, analysts speculate that if food was grown within 20 km of where it was consumed, the cost burden on the environment would be reduced from £2.3bn to £230m (approximately from \$3.7bn to \$371m) each year (Pretty and Lang, 11). Locally grown food has the capacity to reduce carbon emissions and oil consumptions, turning back the tides of global warming.

The global food crisis, on the other hand, is defined not only as the challenge of feeding the growing population, but also feeding worldwide consumers safe food. Not only do long food journeys adversely affect the environment, they also deplete the nutritional value of food. Researchers state that “[t]he farther the food travels the less nutritional value the food will have” (Utah State University, 1). Since produce destined for long transport is picked before ripe, potential nutrition isn’t optimized. Therefore, the less time spent in transit and the faster food travels from farm to fork, the more nutrition that food has to offer consumers. In addition, food grown closer to consumers reduces the potential for contamination and other breaches in food safety.

Responding to the overwhelming benefits of locally-grown food, more producers are participating in farmers’ markets and community supported agriculture systems (CSAs) as world-wide numbers have increased. Even large corporations (including Wal-Mart and Meijer – a regional supermarket chain) are beginning to feel the demand of consumers to “buy local”. Agriculturalists from all corners of the globe are growing locally to reduce oil consumption, decrease carbon emissions and bring food closer to consumers. Farmers across the world have used the “old school” production practice (growing food small-scale and closer to consumers) to begin solving the world food, energy and environmental crisis.

# **Bridging the Gap to Create Innovative Thinking for Global Sustainability**

**Jonathan Paul WITA**  
Michigan State University

Water is a resource that is in both essential to life and to how it progresses. The earth is made up of 30% land mass and 70% water. Water usage has increased by a factor of six in the past 100 years, which is twice the rate of population growth. One in five people lack access to safe drinking water worldwide. However we have all the water we need on this planet already; the issue is not if this resource will run out, but the management and use of it. In anticipation of the future, it is vital for all nations to consider water as being at the forefront of both agricultural and environmental policy, and as the pivotal variable in human survival and progress. This and other issues similar to it need to be rectified through new innovative ways of planning for the future, instead of relying on processes of generations past.

Sustainability is a movement for all people to benefit and in return support a shift in the context of the consumer to benefit nations across the board. The “Green Market” has been established and identified by our government as an economic and social responsible area to work on. The big picture is the creation and paradigm shift of new conversations. The human race has for generations learned and worked toward gaining knowledge in an effort to create and capture value. This talent and potential exists within all nations around the globe.

Today’s world is becoming more interconnected. This is in part due to the exponential growth in technology, which has increased our capacity to manage and understand large amounts of data. We can create smarter systems by utilization of this data through new methods and technology. For example the use of Six-Sigma strategies has been identified by many organizations as a starting point for change to the way we see and use water. Forms of Six-Sigma are used in industry to improve systems by eliminating defects and waste, and to set up new systems in support of future and existing business.

The human race has knowledge and skills in many different fields to produce change and drive innovation. The purpose of this paper is to begin new conversations about the stake each of us has in agriculture, energy and the environment to discuss how we as global citizens have the ability to make shifts and apply knowledge and skills in areas previously untailed to meet these macro issues. There is a need to create bridges between traditionally separate industries and fields of study. One way in which this conversation can be started is by leading the way in area water management. This is about the transformation that needs to be made on how we collaborate. It is collaboration not limited to one industry or field of study, but open to all knowledge networks, skill sets and technological solutions. By knowledge sharing we open up possibilities to address many more problems and create solutions on a global effort not constrained to any single nation.