

# **Environment and the Agro-Industrial Sector in Thailand:**

## **Focusing on Soil Degradation in the Northeast Region**

Date: 9 November 2002  
Venue: Wako University, Tokyo

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Good afternoon, professors, all my colleagues and all the students. This is the first time that I present my study with a translator that is not simultaneous. Okay, I am using rather low technology due to my computer problems. Last night I wrote these transparency sheets until four o'clock this morning. I hope it will be clear for today's presentation. I think that you have all the copies of the tables for my presentation. I will go slowly. I will guide you through the tables as well as making some sort of summaries when I present the tables.

My presentation will be basically divided into three parts. The first part will be an overview of the Thai agricultural sector. Then we will discuss GDP, infrastructure, agroprocessing, and land salinity. The second part will be basically the study we have conducted in Tung Kula Rong Haii in terms of special characteristics, incomes and rice production. The third part discusses the ongoing policies on environmental issues, especially salinity and our King's new theories.

### **1. Overview of the Thai Agriculture**

Let me start with the first part of the presentation. This shows you the so-called socioeconomic plan of Thailand, the first of which in fact started in the 1960s. I just want to focus on plans five, six and seven, and to compare all the growth rates of GDP by sector. First, you can see the first ones from the fifth plan, the sixth plan and the seventh plan (Table

1). The growth of agriculture is actually decreasing. You can see that the growth rate of agriculture increased from the fifth plan to the sixth, and then decreased. On the other end of these three periods, you can see that the average growth of agriculture is 3.8%, for non-agriculture it is 9.1%, that is, a total growth of 8.3%. For those of you who know the Asian financial crisis, you can see that it is actually at the end of 1997. You can see that this sixth plan and seventh plan, there is some kind of a restructuring within the economy so some of the growth rates are decreasing.

Let us quickly go to the second table (Table 2). You can see here that the first one here, this is the share of agriculture GDP to the total GDP. You can see that it started at 19% and decreased to only 11.4%, while non-agriculture is increasing from 81% all the way to 89%. In order to show you the importance of the agricultural sector in Thailand, I will make a sum of these two lines—number one and number two. We see number one here is agriculture and number two is agricultural manufacturing. If these two numbers are added together, it will give you these figures that are: 32.9%, 29.7% and 24.0%. So you can see that if you consider agricultural GDP and agricultural manufacturing GDP, the total contribution of agriculture in Thailand is 33% and decreasing to only 24%. So with that agriculture, contribution-wise, is still at least 24%.

Now we will consider Table 3. In Table 3, this is the agricultural GDP as 100%. You can see that more than 63% goes to crops that include rice, rubber, cassava and others. Within these major sub-sectors, the livestock sector was increasing a little bit, but it is on the decrease. The fisheries sector increased from 9.7% to as much as 15%. Also this last row we can see the simple agriculture processing is increasing from 8% to as much as 12%. Within the sub-sector itself, there has been some restructuring. Within the so-called crop sector, we also have some sort of a restructuring. You can see that we go away from crops to vegetables and fruit. But almost 60% still depends on the crop sector.

Now let us see the population and labor in Thailand in Table 4. You can see here that the population in agriculture is 64% and decreased to 61%. Also, the agricultural labor force is decreasing from 61%, but is still at 58%. So you can see from Tables 3 and 4 that agriculture is still remaining a big sector in terms of population as well as employment. However, if you look at Table 5 here, you can see that the per capita income of agriculture is much less than the non-agricultural sector. In terms of ratios, the non-agriculture was more than eight times in the fifth plan and has increased to 12 or 13 times as the agricultural sector. As development goes, those in the agricultural sector become poorer as compared to those in the urban areas or in non-agricultural sectors. You can see very clearly that rural development is still a key of a

direction for poverty reduction in Thailand. Okay, this is a sort of summary of the plans five through seven. For the annual figures, you can see in Tables 6, 7 and 8. I will not discuss here as the details are almost the same.

Now we come to the next one, Table 9, which is the basic indicator of infrastructure. We depend a lot on road transportation. The unit for road access is 1,000 kilometers and it increased from 51,126 in 1995 to as much as 51,762 in 1998. For power generation, we have had a big increase from 80,000 gigawatts in 1995 to 96,000 gigawatts in 1998. So now a day in Thailand we have electricity in all villages. However, in the irrigated areas, you can see there is very little development, from 5.58 million ha in 1996 to only 5.67 million ha in 1998, a very small increase in irrigated land. This entire basic infrastructure indicator may show some sort of tendency that the development of infrastructure is biased toward non-agriculture.

Now let me show you some of the figures for food factory in Table 10, the number of food factories by group in 1997. Most of the food-related enterprises are small enterprises. For the large enterprise a percentage-wise is very low. Most of large food factories are sugar cane factories as well as the fishery canning factories. Whereas the rice, I am sorry you do not have this table with you, but this is the number of rice mills in Thailand. This table shows the 1994 survey of rice mills divided by horsepower- (1) small, less than 51 horsepower; (2) medium, 51 to 500 horsepower; and (3) large, more than 500 horsepower. The total is 66,000 in which more than 78% are small ones. Only 5% are large ones with a horsepower of more than 500. You can see that most of small rice mills (47% of the total) are located in the northeastern area. Rice is very important commodity and product in the northeast area.

Okay, before I go to the land, I will just try to summarize what we discussed for the last few minutes. This is the summary of the socioeconomic plan. We were comparing the fifth plan and seventh plan. The GDP growth of agriculture is only 3.8% that is less than that of the non-agriculture that is 6.2%. The share of agriculture's GDP decreased from 19% to only 11.4%. If we add the agricultural manufacturing GDP contribution to the agricultural GDP, the percentage is decreasing from 33% to 24%. So this shows you a very macro picture that agriculture is still a very important sector in terms of GDP contribution. Within the agricultural sector, rice still plays a very important role while the share decreased from 28.7% to 19%. The share of cash crops involving cassava, sugar cane and maize decreased from 10.3% to only 8.3%. While vegetable, fruit, livestock, fisheries, all these percentages increased. The shares of agricultural population and labor force remained 60% and 58%, respectively, in the seventh plan. In terms of GDP per capita or income per capita, non-agriculture is eight times more than agriculture and it has increased to 12, almost 13, times

more than agriculture. For infrastructure development, you see still is in roads and big expansion in power generation with very limited development in irrigation. For food manufacturing enterprises in 1997, they were mostly small enterprises. For rice mills, they are mostly small and only 5% are large. Most of them are located in northeastern areas. You can see that rice is still a very important commodity for Thailand as a whole, especially for the northeastern region of Thailand.

Now let us move to the next topic of unsuitable land in agricultural cultivation . You can see that between 1980 and 1992, the total unsuitable land in agricultural cultivation increased from 30 million rai to 35.6 million rai, or an increase by 19%. In this particular period, in the northeast it was increased from 12 million rai to 21.2 million rai, or an increase by 75.7%. The major problem in the northern areas is salinization. In 1996, in terms of salinization level, 1.5 million rai had the highest level, 3.7 million rai had the medium level, and 12.6 million rai had the low level. The total is 17.8 million rai. In addition, there is 19.4 million rai with the potential of salinization.

Let me show you what salinated land looks like. This is a picture (omitted in this publication). This is a paddy field. You can see rice. This is the land after harvest, it is very dry, and there are salt and rice also. The major cause of salinity in northeastern areas can be divided into three major reasons. One is the underground salt rock. The other is salt production in the northeastern area. The last one, which is the most important one, is forest destruction. So these three are the major causes of salinity in the northeastern area of Thailand.

## **2. Land Salinization in the Northeast Region:**

### **A Case Study in Tung Kula Rong Haii**

This (in Map of Thailand) is Tung Kula Rong Haii. First, let me show you where this area is and what it looks like in Tung Kula Rong Haii. This is the map of Thailand, we divide this nation into four regions, and this area here is the northeast area. You can see it looks like the head of a duck. This area is Tung Kula Rong Haii. Consisting of five provinces, the total area is 0.337 million hectares. The special characteristic of this particular area is the problem of droughts, a very long dry drought season. During the hot season, it is very hot. During the rainy season, it floods. Most of the land has low fertility. Also, there are a lot of saline lands. With all of these, it creates limited agricultural activities. So as a result, the income per capita is very low. I do not think that I have much time, so I will go on to the summary of what I have derived from Tables 12 to 15.

A summary of Tung Kula Rong Haii area: You can see that the minimum and maximum per capita income in 1997 is US\$520 per year and US\$577 per year, respectively. In terms of national ranking, this per capita income is ranked at the 66th and the 74th. As for household income in 1998 and 1999, the farm income is 26,432 baht. Non-farm income is 43,794 baht. Percentage-wise, more than 62% of the income is non-farming. Let us look at the composition of farm income. You can see that 60% is from crop production. The next one is 28% from livestock and the others are only 12%. That is due to the weather and land conditions in Tung Kula Rong Haii.

Table 14 is a detailed table. Let me summarize five items of Table 14 here with the general information regarding Tung Kula Rong Haii. The average age of the head of family is 42 to 55 years old. The data shows that those high salinity areas tend to have a high age of the head of family. For education, the high salinity areas have low education. As for the average number of family members, it is about from four to six persons. There is not much difference among the three categories of land types. Family laborers working full-time vary from two persons to three persons. For part-time, it is only two or three persons, or one person. Family laborers not participating in farming vary from 0.25 to 3.75 persons. The data shows that in high salinity areas there is a higher rate of non-participation of family farming. As for average non-farm income, it is varied very wide from 4,000 to 91,000, because the availability of employment in each province differed.

In Table 15, the average land holding varies from 8 rai to 37 rai, mostly owned by the families themselves. Water availability is from mostly rainfall or small streams. You can see that rice is still 89% to 100% of the total land cultivated. This is from Table 16. For the rice production, you can see the rice yield in kilogram per rai, which varied from 133 to 385. The high salinity land has a comparatively low yield, it is from 133 to 276. Fertilizer use (look at the right) varied from 24.9 to 96.47 kilograms per rai. High salinity lands tend to use less fertilizer. They use 24.9 to 40 kilograms per rai. For the use of family labor—in rai per day—for rice cultivation, the lowest family labor is 2.06 per day and the highest is 8.3. However, the high salinity land tends to use more family labor.

To summarize the fact of salinity land in Tung Kula Rong Haii, we can see that most of the heads of families are growing old, have low level of education and high participation of family labors in farming. That means they work in the farm more. However, the rice yield per rai is low compared to other areas and the amount of fertilizer used is low, too. They also depend more on the family labor. These are general findings.

### **3. Government Policies and King's New Theory**

I am sorry maybe time is up now, so I will just briefly say that the government is try to promote a policy of planting this kind of tree (the picture is omitted). This type of tree is from Africa. It is very drought tolerant and can also be grown in the salinity land. It will improve the land fertility, according to those who have done a lot of research.

Basically the government's policy tries to promote appropriate crop production as well as improve the nutrients of this high salinity land. You can see, as I mentioned earlier, the major cause of land salinity is forest destruction. The forest destruction is mainly due to the poor farmers. They want to have more land. They go to the forests, cut down trees and grow some cash crops. In order to stop these poor farmers from further destroying the forests, we must find ways to make these farmers self-sufficient in terms of income generation.

After the financial crisis in 1997, His Majesty the King proposed a theory that we call the New Theory of the King. Basically, it is for those small farmers to divide their land into two or four kinds of activities. For example of an average land holding of 15 rai per farm family, it is recommended to allocate 30% to be rice fields, 30% for small reservoirs, 30% for horticultural crops and 10% for settlement or housing. This is a reservoir. The one you see is with ducks. With this, you can use the water for irrigation and also to raise fish. Another 30% to the land will be used for horticulture or fruit trees. There are bananas, mangos, and also some vegetables—they are basically trees. The remaining 10% will be for settlements. With this 10% you can raise some livestock—chicken, pigs and cattle. The farmers after growing rice; they can raise fish; they can have livestock; they will take care of their horticultural crops, so they are busier almost everywhere. They have rice for their home consumption; they have fish for home consumption; they have livestock for sale and also their fruit. So they do not have to buy anything outside. This means that farmers, who can also generate their own income, will provide their own food. This means that they will not destroy the forests and grow more trees. So this is a picture (omitted) of the farm model. This is the end of my presentation. Thank you for your attention.