Promoting Environment-friendly Agriculture and Fisheries in Korea

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Abstract

Agriculture has made a great contribution to solving food shortage in Korea. In recent years, however, the agriculture and fisheries is threatend by the increasing pollution. The examples are pollution by overused chemicals and pesticides, pollution from livestock manure, pollution in the intensive fishing farm. In this regrad, food quality including food safety is a great concern to domestic consumers.

Also, raising quality rather than lowering prices of the products is better strategy for Korean agriculture and fisheries facing globally open economy. Environment-friendly agriculture and fisheries(EFAF) is an alternative way to highten the quality of the products, and hence to have competitiveness in the world market.

In addition, agriculture has non-market benefits, i.e., environment conservation. Soil conservation, water resource developement, flood control and air refreshment are good examples.

The underlying issue is how to maximize the positive effects, minimizing the negative effects. As alternative ways to current production technologies, some suggestions are made. Organic farming/natural farming, reuse of animal manure, and hydroponic farming are some types of EFAF emerging in Korea.

Policy change should be made and government support is needed to promote EFAF. Related institution and investment programs for EFAF should be carefully designed and carried out.

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Agriculture, forestry, and fishery is something done in the environment which also has a close relationship with it. It means, an ecology that is altered in a way that it produces more food is called agricultural ecology. It will be able to exist only if there are managements and energy put into it. But if there are too much managements and energy put into this ecology, that will be when the system breaks down and causes pollution. Since agricultural system is, too, a part of the ecology, when there are just enough things done within the limits of the system, we will be able to keep it for a long time with productivity kept high.

Agriculture does other things than just producing food. Agriculture and agricultural activity also conserves the environment and the earth.

Up until now, Korea's agriculture has done a good job of providing the food it needed. Soil pollution caused by the pesticides and fertilizers used in producing and water pollution caused by pollutants from factory, houses and oil leak are lowering the fertility of the soil and breaking the marine ecology.

The consumers are now considering more of the quality and the safety than the quantity of the food they are buying. they take the rural areas as more of a place where there are crystal clean water and green forest you can rest that they are demanding a reconsideration of the value of the modern agriculture.

Up to recent years, Korea has experienced out-migration from the rural area due to rapid economic growth, resulting in increasing idled area and depopulated houses. This situation has led to loss in vitality in rural community and industrial activities in local area. In addition, the change in international economic condition - including establishing WTO - made agriculture in Korea exposed to the open market. Should domestic agriculture and fishery products survive from the imported goods, and producing safe and high-quality agricultural commodities is essential to be competitive in the world market.

Recent change in domestic and international relations call for an introduction of new agricultural policy, requring re-evaluation of the role of agricultural and rural sector. Policy concerns on agricultural and fisheries sector tend to be moving from production increase and structural adjustment to environment-friendly and sustainable agriculture and fisheries. It is well known that EC has employed environment-friendly agriculture (EFA) as a strategic pivot facing UR negotiation. Also, it is expected that EFA will be one of the key issues in the forthcoming Green Round as well as in domestic policies. In the following chapters of this the concept of environment-friendly agriculture and fisheries (EFAF) will be addressed, the current policy issues examined, and finally how to promote EFAF will be discussed briefly.

I. Significance of EFAF

EFAF is based on the idea that the natural resources in the world should not be wasted. It is not allowing us to be optimistic about the future availability of global natural resources in the future, due to competition-like economic development in each country and because of the radical population increase in the wake of the Industrial Revolution. In addition, there is ever-growing doubt whether the resource-exploiting economic development programs have increased and would increase the quality of human life.

P.A. Samuelson argues that Net Economic Welfare (NEW), instead of GNP, is more proper yardstick to measure welfare, because the negative by-products of economic development such as air and because water pollution has to be considered. In this regard, all of the countries participated at the UN Conference on Environment and Developemnt (UNCED) held in Rio de Janeiro in June 1992 agreed that resource-wasting and environment-damaging economic development is not beneficial to the welfare of human being anymore. In the meeting it was argued that environmental problem and economic development should not be separated.

The Industrial Revolution in the 18th century brought about changes in many aspects of human lives. Taking advantage of new technology, people overcame fear of nature and now enjoy economically-affluent life style, which of accelerated in the increase of the population. After the Revolution, the world population increased of one billion in 1830, which was as four times large as the world population when Jesus Christ was born. The world population increased so rapidly that there were two billion in 1930, four billion in 1975. It is forecasted to be Six billion by 2000.

As a result, natural environment was damaged by increased population: to cope with the pressure of population increase, land was tilled for food production and forest was cut down for fire wood. The research by FAO in 1963 showed that the forest was only twenty-nine percent of the worlds total land. During the last two decades, one hundred and twenty million hectares of soil turned into desert. The destruction of forest is accelerating the mass-perishment of living creatures. It is reported that up to three hundred species of living creatures including animals and insects are disappearing each day. Fishery resources are also being exploited are by the modern fishing technology.

In addition to the environment-damaging effects discussed above, agricultural technology itself is another source of pollution. The agricultural technology after World War II is characterized by development of new breedings, irrigation and drainage, chemical fertilizers and pesticides, mechanized and large-scaled farming.

In fact, the innovative agricultural technology partially resolved the ever-growing

food demand caused by increasing population. However, it deteriorated the global envirnment tremendously. Overuse of chemical fertilizers and pesticides polluted surface and underground water, and destroyed ecological system. Specialized, large-scaled and mechanized farm management are worsening the composition of soil and lowering productivity.

Another related issue is decreasing population in the less favored rural area. Migration toward urban area occurred in the process of industrialization, mostly due to lower profitability of farming and less convenient living conditions of rural area. Consequently, marginal lands which are located as favored areas are to be left idled. Agriculture, forestry, and fishery are something that is to be managed properly constantiy. When it's not, the whole system will go down, making its job impossible. In this regard, the idea of EFAF emerged to cope with the growing demand for agricultural and fishery development program in harmony with environment.

II. Why EFAF is Necessary?

Agriculture has environment-protection effects as well as environment-damaging effects. These effects depend on the types of agricultural production, government policy, and farmers' behaviours.

The positive effects of agriculture and fisheries on environment are soil conservation, water resource development, flood control, air refreshment, forest and wild animal protection, and harmful insects removal. The negative effects are water and soil pollution by chemical fertilizers and the pesticides, harmful chemical remains in agricultural products, and damaging diversity of living creatures. The positive effects, i.e. social effects, generally benefit non-farmers, whereas the negative effects has to be taken by the general public including farmers.

The underlying issue is how to maximize the positive effects and to minimize the negative effects, harmonizing agriculture and fisheries with its environment. EFAF is emerging as a policy alternative in many countries. The policy change in developed countries such as the U.S. and EU reflected the growing demand for production control, food safety, and environment conservation. Policies for low input sustainable agriculture (LISA) or less favored area (LFA) are the examples.

What do policy change in many countries imply to Korean agriculture?

First, quality and safety of agricultural product tend to be more preferred as the living standards rise. To Korean agriculture that now faces competition in a market that it had all by itself, gaining competitiveness by raising product quality seem to be more advantageous than by lowering product prices. In this circumstance, it is inevitable for Korean government to incorporate environment-conserving production

programs.

Second, how to maintain adequate amount of agricultural production is questionable to support stable growth of national economy in the open market. If the environment-conserving unintensive farming is adopted by many countries, the capacity of food production in the world will decline and the grain price will go up. Country with lower self-sufficiency ratio of food would face serious danger of food security. A study shows that decrease in the supply, equivalent to one percent of world grain consumption would bring 47 percent of grain price increase in the world market (J.H. Lee, 1991).

III. Target Areas for EFAF

Agriculture in every country has different role and value that there is not a standard way to be environment-friendly, but there are many areas of agricultural production that are associated with EFAF. Agricultural and fisheries technologies that are widely adopted these days should be considered. These are addressed as follows (Citizens' Enviroment Club, 1995, pp 302-305):

1. Pollution caused by overused chemical fertilizers

Korea ranks as one of the most intersively chemical fertilizers-using countries in the world. In 1993, chemical fertilizers used per hectare is 548kg, which is higher than Japan's 430kg, and Germany's 423kg. Meanwhile, the amount of fertilizer used in the U.S. and Israel are kept at 106kg and 173kg, respectively.

The overuse of chemical fertilizer reduces the amount of organic substance in soil, which would wind up acidifing soil, thus lowering productivity. In 1960's, organic substance in paddy lands in Korea was found to be 2.6 percent, but it is reduced to 2.3 percent in 1980's. On top of that, overuse of chemical fertilizer could contaminate the water in the river or the lake. Also, heavy metal in the chemical fertilizer, which are accumulated in the soil for a long time, would hinder plant growing and pollute the agricultural product, and even affect people.

2. Side effects of overused pesticides

Another pollution on ecology and soil is caused by excessive use of pesticides. In 1993, pesticides used per hectare in Korea was 15.2kg, which ranks next to Japan's 22.3kg, compared to 0.75kg for the U.S. and 13.1kg for Italy. The pesticides kills not only harmful insects but also natural enemies, breaking ecological balance and

generating new kind of insects immune to pesticides.

3. Pollution by intensive livestock husbandary

In 1993, thirty-three million tons of animal manure were produced in Korea and most of them were unproperly treated, causing water and soil contamination. Another issue is the lowered safety of livestock product by antibiotics and hormones taken in during the animal growing. It is noted that the amount of remains allowed in the livestock product is established in the international trade.

4. Weakend physical function of soil

The amount of wastes produced from a household in was rural area was 1.5kg per day in 1985, but it increased to 1.74kg in 1993. This situation is indebted to the "White Revolution" which was widely spread in rural area since 1980's. ("White Revolution," like "Green Revolution," refers to the great increase in vegetable production generated by green house with vinyl coverings.) In 1993, the total amount of vinyl coverings provided to the rural area was about 740 thousand tons, among which twenty-four percent of them were not re-collected. The vinyl coverings accumulated possibly damage ventilation and drainage of the soil, because they are hard to be decomposed in the soil.

5. Increase in idled farm land

Farm lands, especially lands in less-favored area or lands with low fertility, are increasingly becoming idled due to low profitability and labour shortage. Statistics shows that there were sixty-three thousand hectares of idled farm lands, and the idled lands increase by ten thousand hectares a year. It would account to 10% of the farmland in Korea by 2000 if this tendency continues. Moreover, soil erosion is hazardous to the continuous development of Korean agriculture. About sixty-eight percent of annual precipitation is concentrated on the period from June to August. Rainfall reduces the fertility of the hillside farm land, which accounts to more than half of the farmland, by eroding the soil.

6. Pollution in the fishing shore

Seashore fishing grounds are becoming contaminated by the incoming sewage and wastes from the industrial and urban area. Red tides which was frequently observed

in recent years are becoming a policy concern (Ministry of Agriculture, Foresry & Fisheries, 1994, p.202). Accumulated excreta in the fishing farm ground are also the source of pollution, especially those that are from the collectively-gathered fishing farms. The increasing pollution is spoiling the seashore environment and reducing fishery resources and productivity.

Ⅳ. Examples of Foreign Countries'

Nowadays, EFA is adopted by many countries. Yet, sustainable EFA is different from country to country, depending on the specific conditions for each country (B.S. Kang, 1992; Commission of the European Communities, 1992, pp. 87-91). Some countries use EFA as a policy tool to overcome the overproduction problem. For example, the U.S. and France employ EFA to achieve policy goals such as reducing overproduction, stabilizing prices of agricultural products and farmers' income, and maintaining productivity for the future.

Programs adopted in the U.S. are: introducing natural process of production; reducing inputs such as chemicals and pesticides; utilizing the biological and genetic capability; keeping agricultural productivity in harmony with the chemical, physical, and biological ability of soil; protecting soil erosion and water resource pollution, etc.

In Swizterland, keeping the beautiful scenery in the Alps by promoting dairy farming is regarded as one of the important policy issues (J.K. Sung, 1992). Germany and Netherlands have policy goals to maintain the rural landscape, conserving the traditional farmhouses or stone fences. Pastures are raised to protect fire in the mountain in these countries.

As shown above, the programs for EFA is different from country to country under their given conditions.

Ⅴ. Evaluation on the Current Policies in Korea

The environmental issue emerging recently in the area of international politics and trade requires adjustment in every aspect of it including industry, technology, energy, trade and foreign policy. The agricultural and fisheries are no exception.

Productivity increase, balanced regional development, and public goodness of the agricultural and fisheries are long-term policy goals. To achieve these goals, promoting EFAF is essential for the future Korea. The EFAF should be directed to maintain productivity, safety, to raise farmer's income and to maximize external positive effects.

As short-term policy goals, high-quality product is necessary to compete the

imported goods, because limitation exists in achieving competitiveness by enlarging the farm scale. In this sense, EFAF is a good alternative to achieve the goals.

Also, regulations on the source of pollution are expected to strengthen - regulations on the amount of chemical fertilizers and pesticides used, livestock excreta discharged and so on. Adopting EFAF is inevitable both to cope with fast-increasing globalization, growing domestic demand for food safety and to achieve balanced regional development.

Up to recent years, Korean government has made its great efforts to increase the agricultural production and to provide food at lower price to consumers. Hence, it would be difficult for Korean government to change the current policy stream, adopting full-fledged EFAF. However, there are some related policies being implemented by Korean government.

1. Organic/Natural farming

Organic or natural farming has appeared in recent years as an alternative farming technology to the current farming. Many farmers have taken part in the organic/natural farming since late 1980's. (The term "organic farming" is used in the U.S., Japan and Korea, while different terms are used in EC.) Organic farming in Korea, though not clearly defined indicates farming without using chemical fertilizers, pesticides and/or growth hormones. The significance about organic/natural farming is worthy of discussion:

* Organic/natural farming is one type of sustainable EFA which is actually conducted by farmers.
* Commodities produced by organic/natural farming have higher safety than those by traditional farming.
* Natural environment could be less harmed by prohibiting or minimizing the chemical fertilizers and pesticides.
* Sewage and excreta generated by livestock industry are reused for organic/natural farming.

However, organic/natural farming is not immune from managerial difficulties such as lower land productivity, increased labour input and lower income. Also, quality guarantee and whole sale markets for the products are not established.

2. Hydroponic farming and plant factory

Hydroponic farming is artificially-providing nutrition to plants: it uses chemical fertilizers, but as little pesticides as possible. Currently, hydropony farming is spread

mainly in suburban areas. The total planted area is estimated at ten hectares and it is still increasing. The main products are lettuce, kale, and sesame leaf, tomato and cucumber (H.S. Oh, 1992, pp. 18-20) Hydropony farming is advantageous to raise the food safety and to reduce water or soil pollution. Land and soil can be highly utilized, because all-year-round production is possible by controlling the growing condition.

Plant factory is a more developed type of farming than hydroponic farming. Higher land productivity is attainable by controlling light, temparature, humidity and carbon acid gas and can ignore weather change outside. Although it is popular in Netherland and Japan, in Korea, it is still in beginning stage, with experimental farms run by Rural Area Promotion Corporation, or Agriculture-Fisheries Marketing Corporation, and Hanyang Marketing Co. However, it is expected that it will be expanded soon to meet increasing demand for safe and high-quality agricultural product.

3. Reuse of animal manure

Traditionally, animal manure was regarded as good organic fertilizer for crops and vegetables. However, domestic livestock industry, depending heavily on imported feed stuff, is not linked with crop and vegetable farming, and mostly concentrated on the

〈**Table 1**〉 Chemical fertilizer consumed and element of fertilizer from livestock manure produced (1989)

(unit: thousand tons/year)

region	chemical fertilizer consumed			livestock manure produced			B/A(%)		
	N	P	K	N	P	K	N	P	K
kyunggi	45.2	18.7	21.8	33.4	34.3	21.8	74.0	183.4	100.0
kangwon	30.0	13.4	15.6	6.0	5.6	4.3	20.1	42.1	27.4
chungbuk	26.6	12.1	14.4	5.3	5.1	3.7	20.0	42.1	27.4
chungnam	56.8	23.1	27.6	19.1	20.3	12.4	33.6	87.7	44.8
chunbuk	53.8	22.8	27.3	9.6	5.7	16.5	16.5	41.9	21.0
chunnam	83.3	34.4	37.7	8.8	8.7	6.0	10.5	25.4	16.0
kyungbuk	74.4	34.2	39.6	13.2	13.6	9.5	18.4	39.9	24.1
kyungnam	49.9	22.5	23.1	13.2	13.9	8.4	26.4	61.9	36.4
cheju	18.7	12.5	15.2	1.7	1.7	1..1	8.9	13.3	7.0
total	438.8	193.6	222.2	112.8	112.8	72.9	25.1	58.3	32.8

Note: Livestock farm with five or more cows, twenty or more hogs, or chicken house with 1,000 or more square meters are included.

Source: C.H.Yoo, et. al. "A Study on Processing the Livestock Manure and Sewage," Korea Rural Economics Institute, 1990.

〈**Table 2**〉 Processing cost and revenue of livestock manure (hogs, 1990)

no of hogs	annual processing cost (A)	value of processed manure(B)	revenue (B-A)
head	thousand won	thousand won	thousand won
1,000	27,334	2,993	-24,351
3,000	48,000	8,946	-29,061
5,000	59,946	14,892	-45,054
10,000	99,198	29,784	-69,414
20,000	163,498	59,568	-103,930

Source: C.H.Yoo, et. al. "A Study on Processing the Livestock Manure and Sewage," Korea Rural Economics Institute, 1990.

outskirts of large cities. Thus, current livestock industry failed to reuse the excreta for crops and vegetable farming. The amount of animal manure produced each year is about 300 thousand tons of fertilizer, amounting to one third of domestic chemical fertilizers consumed as shown in Table 1 (C.H. Yoo, 1990).

More than 90 percent of farmers with large-scaled livestock farm, those that needed permission to run their business from government, have adequate excreta processing facilities. However, small-sized farms are mostly equipped with simplified processing facilities so that their wastes are not properly processed. The reason is that the cost of building and operating the facility is too high for small-sized farms. A study shows , as Table 2 shows, twenty-four million won's loss occurs annually to livestock farm with one thousand hogs (C.H. Yoo, 1990). Also, small-sized livestock farms are neither regulated nor financially supported by governemnt.

4. Regulation on highly-poisonous pesticides and remains in the products

In Korea, regulation on highly-poisonous pesticides began since 1990. The regulation aimed for food safety rather than sustainable agriculture. It was reported in many cases that the remains in the agricultural products were found to be below the permitted level. However, despite government's regulation, highly-poisonous pesticides are commonly used in farms and golf courses.

5. Policies on land development and environment-conservation

In addition to the policies addressed above, the construction of dams or reservoirs and forestation activities could be counted as examples of devotional efforts to

promote sustainable EFAF.

VI. Policy Direction to Promote EFAF in Korea

In Korea, the industrial structure changed so dramatically during past decades that the inputs of agricultural production including labour migrated from agricultural sector to non-agricultural sector. During the course of industrialization, rural area became so depopulated that the labour shortage raised the wages, ecouraging to use large amount of chemical fertilizers and pesticides. Fishing farms were also contaminated due to incoming sewage and wastes from the land. On the other hand, labour shortage in the agricultural sector idled the farm lands and depopulated the rural area.

The change in social-economic conditions brought about the change in the structure of agricultural sector, which in turn gave undesirable sideeffects on the environment and ecology. The policies for developing EFAF in Korea should be comprehensive enough to resolve environment problems both outside and inside of agricultural sector. Government programs for various fields are addressed as follows:

1. Development program to minimize damages to the nature

All development programs should be assessed in terms of environment-conservation to minimize the damaging effects on nature. In Germany, for example, when planning development projects, environment-conservation and scenery-conservation program are required to be presented to the government in addition to the report on environment-effect evaluation

2. Adjustment of agricultural production structure and land utilization

The success of EFA depends on the production structure and land utilization, because environmental pollution, food safety, and agricultural conservation are deeply related to the agricultural production structure and land utilization. Policy alternatives to be considered are development of production technology that reduces pollution, rearrangement of the composition of domestic products, and diversification of oversimplified or specified farming. Examples of new production technology to use less chemicals and pesticides and to reduce emissions from livestock manure are organic/natural farming, hydroponic farming, fermented sawdust stall, etc. These production technologies are characterized by natural barriers to enter - unstability due to possible fluctuation in production and considerable amount of investment needed. These 'natural barriers' would discourage farmer's participation. Considering the

benefits from EFA given to farmers and non-farmers as well, the costs needed should be paid by the society as a whole. Technological, marketing and financial support should be given to the farmers to induce their participation.

For sustainable EFA, paddy-land farming is better than dry-land farming; grass-feeding livestock husbandry is better than the livestock husbandry by imported feed stuff. It is problematic unbalance that domestic livestock industry depends on imported feed stuff, while paddy-land crop, mainly rice, is overproduced. As long term goals, changing a portion of paddy land into dry land, making pastures, and developing new varieties of feed plants should be considered. Various technologies to protect soil erosion should be developed - for instance, now clovers are planted on the orchard, rice straw are put over the dry land plants, planting rye or Italian ryegrass during winter, etc.

The problem is that environment-protecting technologies such as pasture develop-emnt are misunderstood and are not easily adopted by farmers. Farmers do not grow grass for feed even on the idled lands. Livestock in Korea heavily depends on imported feed stuff. To correct the biased doestic production structure of agriculture, domestic livestock industry based on pasture rather than imported feed stuff should be restructured. Financial support for pasture making should be made. Research on making pasture and hay should also be supported by government.

Soil erosion and environmental pollution are deeply affected by specified farming, concentrating on one or two crops or animals. Large scale farming by mechanization and the development of chemical inputs brought specified farming, which reduced production cost to a large amount. However, soil erosion was accelerated by overspecified farming. Also, livestock was not linked with plant-growing agriculture and agricultural by-product became source of pollution, not used as resources. The problems can be solved by diversifying farm management and restructuring regional agriculture.

Grass-feeding livestock husbandary, for example, could be complemented with rice farming in the sense of land and by-product utilization. As in Japan and China, fish or duck farming is complementary with rice farmig. Also, livestock husbandary and horticulture or crop-raising farms in the same region could be complementary. For example, excreta produced by livestock farm and by-products such as rice straw produced by rice farm could be exchanged. In Japan or Europe, there are many manure-processing facilities in the rural area.

3. Support program for safe agricultural commodity production

Competitiveness in the international market could be obtained both by raising quality of domestic product and lowering price. The prices of domestic products are

two or five times higher than international market prices. Competitiveness in terms of price could be obtained by lowering production costs, which is in turn possible by enlarging farm size and mechanization. However, it seems very difficult for Korean agriculture to have price competitiveness, compared to western countries, where farms are completely mechnized with farm size varying from one hundred and fifty to two hundred hectares. For Korean agriculture with paddy farming in the majority, it is difficult to enlarge farm size into even ten to twenty hectares.

In terms of quality, food safety is a top priority. Raising EFA, maintaining adequate land productivity with less chemicals, is one of the important policy tools to cope with changing international market. So, policy alternatives should be elaborated to extend organic/natural farming or hydroponic farming.

Remained toxic element in imported agricultural product is another issue concerned with food safety. Standard for remained toxic for domestic agricultural product should be consistent with that for imported products. It is well known that developed countries use animal and plant quarantine as one of the nontariff barriers. The food safety could be raised by sustainable EFA and the related policy tools should be developed.

Recent research indicates that idled lands are likely to be more easily destroyed than cultivated land. Forest lands are less likely to be more destroyed, but they are exposed to flood or erosion. So, changing idled lands into forest lands is not always desirable. Once-changed forest lands cannot be easily turned into farming lands, even if government wants to do so to cope with food shortage.

Most of the places where idled farm lands are increasing are the regions economically falling behind such as mountain village. It is not desirable to neglect those regions since balanced regional development and food security are worth pursuing for a country like Korea. Government programs to financially support farmers in those regions are allowed in WTO agreement. So, government policies should be developed and implemented for the purpose of developing sustainable agriculture and conserving environment. Examples are tourist farm, resort facilities in rural area, large-scaled pasture, recreation farm for the retired.

Maintaining various kinds of animal and plant genes is necessary for agricultural development in the future. It is expected taht the competitiveness for the agricultual commodities in the international market for 21st century depends on the agricultural technology. Especially, developing new varieties or solving environmental problems largely depends on modern technologies such as genetic engineering or molecular biology.

In this respect, efforts to conserve seeds, species, wild animals and plants should be made by government rather than individual farmers. Moreover, low input agriculture

should also be supported by government. To cope with WTO scheme and forthcoming international environment negotiations, both environment-conserving and environment-damaging aspects of domestic agriculture should be analyzed as soon as possible. Programs on EFAF should be designed and implemented on the basis of the analysis.

4. The establishement of market conditions on EFAF products

In domestic markets, products from organic/natural farming or hydroponic farming do not enjoy quality-guarantee supported by reliable authorities. Also, the marketing channels for the products are very limited. Systematic marketing schemes should be designed considering all kinds of related aspects such as production, marketing and demand. For efficient marketing of EFAF products, follwing policy alternatives should be considered.

* Quality standard for the EFAF products should be established and quality-guarantee by reliable authorities should be provided. It is desirable for the local governemnt's or producers' cooperative forces to guarantee quality.
* The marketing efficiency for EFAF products is very low, since the products are sold mostly by direct transaction between producers and consumers. Hence, separate marketing channel for EFAF products should be developed for ordinary consumers. It is noted that sixty percent of organic/natural farming products does not have differentiated market.
* To help farmers, who do not have enough routes to circulate their goods, it is desirable for government to develop and extend standard contract model. For example, fixed-price system is recommendable for the products with fluctuating price, and linked price system - e.g., linked with market price - is desirable for the products with stable price.
* To differentiate EFA products from common ones, it is necessary to advertise EFA products to consumers. The exhibition of EFA products is one example. Advertising EFA product with unique brand is an alternative way.
* It is necessary to give financial support to the market dealers or processors, since production control or new demand creation depends largely on the marketing agents. In some cases, government support is necessary.

5. Shaping landscape

Maintaining environment and natural resources, and keeping local community active are primarily attributed to local agriculture and fisheries. These functions of agriculture have public good characteristics, which are not traded in the market. Government

should make efforts not to limit their non-market values by directly supporting them. For example, direct payment associated with EFAF is one alternative.

Only conserving landscape is not enough; it is necessary for government to take measures to improve landscape such as planting trees. Environmental plans should be linked to the integrated regional development plans. In other words, to conserve the ecology of agriculture and fisheries and to maintain productivity, modern production technology and environment improving plans should be harmonized. By doing this, non-market positive effects could be maximized and the negative effects could be minimized.

Ⅶ. Conclusion

For the last three decades, macro policy goals such as increase in production for food grains, and price stabilization have been pursued, while, micro policy goals such as increase in farmers' income and welfare have been seeked at the same time. Whenever conflicts occurred between two goals, macro goals have had priority over micro goals.

Importing foreign agricultural products to stabilize domestic price was a hinderance to the increase in farmers' income. Criticism about government rice purchase program continues to exist, mainly due to government policy priority in price stabilization, despite government's enormous financial burden,

Decrease in land price has been observed, since farm land has been limited to use for non-agricultural purpose. The decrease in land price has put a curb on the increase in the asset value of farmers'.

In this process, the agicultural sector shrinked very quickly. It was misunderstood by farmers that marketing opening forced by WTO threatened the existence of Korean agriculture in the future.

It is supposedly inevitable that Korean government pursued national economic policies which gave less return to agricultural sector in order to rapidly change traditional agrarian economy to industrial economy. However, the excessive shrinkage of agricultural sector is becoming a burden to the national economy of Korea on the road to post-industrial society.

Also, now is the right time to change policies to support farmers' welfare. Otherwise, migration from agricultural sector would be accelerated and thus, making it difficult to keep proper size of agriculture and fisheries to support the stable growth of national economy. This is why we should promote EFAF.

Internationally, the Rio Conference in June, 1992 became a turning point to all the participating countires, realizing that environmental pollution should not be neglected

any more. Current environment-damaging agricultural production technology should be changed into environment-friendly one. In other words, positive external effects of agriculture should be maximized, minimizing negative effects. The positive externalities are discussed in the following:

First, agriculture has the function of flood control. In Korea, sixty-eight percent of annual precipitation focuses on June to August. If there is no rice farming, it is essential that about four more dams, each one equivalent to Choongjoo Dam, which is one of the largest dams in the nation, are needed to control the flood. The cost including building and operating cost would be 1,200 billion won as of 1991 (J.K. Sung, 1991).

Second, agriculture and forestry conserve water-resource. In Korea, paddy land captures sixty-four percent of total national land acreage, which plays the role of reservoir and underground water tank. The annual precipitation in Korea is 114 billion tons, among which only 23.7 billion tons of water is used. Hence, eight percent of water-demand is short annually and six percent of them still depends on underground water. Also, forest embraces water-resource. Sixty-five percent of national land is forest land, and it is estimated that 25.2 billion tons of water is conserved annually by the forest (K.J. Lee, 1992, p.54)

Conserving land is another function. The soil in Korea is mostly composed of acid rocks, and it is easily acidified in the summer. However, the soil loss and erosion are curbed by the forest and the cultivated land. One study shows that 500 billion won's worth of soil is conserved by the forest.

Air refreshging is another important function of agriculture and forest. Plant absorbs carbon acid gas in the air, and emits oxygen. The increased density of carbon acid by damaged forest would threat the future of human being. Rice farming in Korea gets rid of twelve percent of total emitted carbon acid gas and produces oxygen equivalent to the amount that twenty-three thousand and five hundred people need to breathe in a year. In addition, crops and forest plays the role of filter to absorb or purify the polluted material in the air and irrigation water.

A related issue to be considered is migration from agricultural sector. Arable land is becoming increasingly idled and the rural community is becoming depopulated. This situation would raise many problems - soil loss and erosion by poor earth management, and breakdown of local community. The poublic would have to pay the cost generated by the environment damage such as flood. Overpopulation in the urban area associated with the migration from the rural area would increase the social cost such as traffic, housing, crime, etc.

Thus, it is concluded that an adequate size of agriculture and fisheries should be maintained in the rural area from the view point of national economy. The cost paid

by all the public when the agriculture and fisheries is excessively damaged or totally collapsed is more than the cost needed to maintain agriculture and fisheries. Government support policies for less-favored area in EU or in Japan are good examples. Also, many countries give subsidies to farmers in compensation for the non-marekt value of agriculture.

It is widely acknowledged that the value of agriculture and fisheries serving environment and natural resources shoud not be assessed only in the market. In this context, UN recommends Green GNP as an alternative concept to GNP. Therefore, national consensus is needed to support the adequate size of agriculture and fisheries in the midst of open global economy. Institution and investment program should be designed on the basis of the national consensus.

Notes

1) The author is Director-General of Food Grain Policy Bureau, Ministry of Agriculture & Fisheries of Korea. This paper was written when he was under the National Policy Program of Graduate School of public Administration, Seoul National University in 1995. The views in this paper represents the author's, not necessarily the Ministry's.

References

Citizens' Environment Club, *The Report on the Environment in Korea for 21st Century*, Seoul, Shink-wang Moon-wha-sa, 1992 (in Korean).

Commission of the European Communities, *Agriculture in Europe*, Brussels, 1992.

B.S. Kang, "The Situation of the Agriculture in EC and the Mainstream of Common Agricultural Policy," The Regional Research Institute, Seoul National University, 1992 (in Korean).

K.J. Lee, "Environment Conservation and Forest," *Journal of Agricultural Economics*, 1992 (in Korean).

J.H, Lee et al., "The Socio-economic Development and the Change in the Role of Agriculture and Fisheries," Research Report 236, Korea Rural Economics Research Institute, 1991 (in Korean).

Ministry of Agriculture, Forestry and Fisheries, "The Projects for Rural Development and Agricultural Reform Plan," 1994 (in Korean).

H.S. Oh, "Harmonization between Natural Environment and Agricultural Production," *Journal of Natural Environment and Agriculture*, The National Agricultural Cooperative Federation, 1992 (in Korean).

J.K. Sung, *The Agrarian Value and Role of Agriculture*, Seoul, Eul-yoo Moon-wha-sa, 1992 (in Korean).

————, "The Precondition of Market Opening," *Journal of Korean Agicultural Economic Society*, 1991 (in Korean).

C.H. Yoo, "A Study on the Process of Livestock Manure and Sewage," Korea Rural Economics Institute, 1990 (in Korean).