

**- PARADISE LOST -
The International Response to
North Korea's Agricultural Crisis**

by

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INTRODUCTION

Since the fall of 1995, North Korea's approximately 22 million people have been the focus of a sustained global humanitarian effort to minimize the tragic human consequences of persistent food shortages and a pervasive public health crisis in the Democratic People's Republic of Korea (DPRK). More than thirty governments, over 130 non-governmental (NGO), private voluntary (PVO) humanitarian relief organizations, and virtually every major international relief organization has contributed to this effort. Their combined contributions of food aid between September 1, 1995 and October 31, 2001 amount to nearly 6,000,000 metric tons of food worth close to US dollars one billion. Additional assistance in the areas of public health, agricultural recovery and development, sanitation and education increased gradually from approximately \$8,000,000 in the winter of 1995-96, to \$10,000,000 in 1998, and then jumped to \$60,000,000 in 2001.

United Nations (UN) relief organizations, responding to the DPRK government's request for emergency aid through the UN Development Program (UNDP) Office in Pyongyang, and the International Federation of Red Cross and Red Crescent Societies (IFRC) initiated the endeavor in the wake of extensive floods that caused widespread devastation in August 1995, particularly the DPRK's northwestern provinces. European, American and Japanese humanitarian organizations rushed to assist the UN World Food Program (WFP), the World Health Organization (WHO) and the IFRC with contributions of cash, food, clothing, bedding, kitchen equipment and medicine. The governments of Japan, China, South Korea, and Syria were among the first to send large amounts of food aid in the form of rice, maize and wheat. Beginning in the summer of 1996, the United States government assumed the lead as the largest donor of food aid to North Korea, a position it maintained until 1999. Japan leaped to the forefront in 2000 with a contribution of 320,000 metric tons of rice. In 2001, the Republic of Korea (ROK) took the lead in terms of total assistance to North Korea. The ROK government, working both through international organizations and a maturing network of Korean NGOs, sent North Korea more than 200,000 metric tons of food aid, 200,000 metric tons of fertilizer and nearly \$30,000,000 worth of agricultural equipment and seeds, clothing, medicine and medical equipment, vehicles and related materials.

This effort intensified the debate within the foreign policy communities in Seoul, Washington, DC, Tokyo and Beijing over how best to deal with Pyongyang. In all the capitals, excluding Pyongyang, the debate has centered on two schools of thought: so-called hard line advocates of a "hard landing" and self-styled moderates who advocate a "soft landing." Their initial concern in the early 1990s was whether North Korea was "opening" itself to the outside world. Once its opening became apparent, the debate centered on whether North Korea's authoritarian political and centrally managed economic systems would collapse, as had been the case in Eastern Europe. By 1998, the debate had been overtaken by events. North Korea's collapse ceased to appear imminent after its launching of a three-stage ballistic missile in September 1998. Both schools of thought then shifted their focus to whether North Korea was changing. Again, once change was discerned in North Korea, the terms of debate were

redefined. Most recently, the concern has focused on whether North Korea is capable of reforming its dysfunctional economy.

Both schools of thought remain at an impasse over how to change North Korea. “Hardline” advocates assert it is necessary to compel North Korea, for some this means even risking war, to reform. Those in the “soft landing” camp insist reform can be induced and achieved on a gradual basis so as to minimize the risk of war on the Korean Peninsula.

Regardless of which national capital one is referring to, champions of a “hand landing” urge their governments to pursue policies they believe will narrow Pyongyang’s options to either abandon its communist oriented political and economic system in favor of radical reform and movement toward a capitalistic market style economy and political liberalization, or else collapse and be reconfigured along lines ordained in Seoul. The primary tools for transforming North Korea are armed deterrence, economic sanctions and diplomatic confrontation.

Hardliners tend to point to the international humanitarian effort, particularly its significant amount of food aid, as both deterring systemic economic reform and prolonging the political life of Kim Jong Il and his regime. South Korea’s policy under former President Kim Young Sam between 1993 and 1997 favored the “hard landing” line of thought. As one U.S. government economist put it at a seminar in June 2001, food aid is “cruel” because it perpetuates Kim Jong Il’s authoritarian rule. Others in the “hard landing” school have been more tactful in their selection of words, but likewise hold the humanitarian effort responsible, at least in part, for Kim Jong Il’s continued rule. In Tokyo, public sentiment swings back and forth depending on North Korea’s attitude toward Japan. Since North Korea fired a missile over Japan’s northern most island of Hokkaido in September 1998, Japanese public sentiment has tended to favor the “hard line” school.

“Soft landing” advocates argue any abrupt or radical change in North Korea could destabilize the Korean Peninsula and usher in war in Northeast Asia, possibly even between China and the United States. They contend North Korea can be transformed gradually into a less hostile, authoritarian and militarized nation that is better able to provide its population basic human necessities. In their view, the effort to gradually transform North Korea is best promoted through engagement - diplomatic and commercial interaction and humanitarian aid and education. Humanitarian assistance, specifically food aid and medicine, facilitate access to North Korea’s rural areas and, in some cases, its population. The interaction between relief providers and its beneficiaries is seen as an educational process, one that defuses the government’s long inculcated fear and hatred of foreigners, demonstrates the benefits of engaging the outside world and of emulating some of its methods. At the same time, diplomatic recognition, it is believed, draws North Korea into a network of obligations and responsibilities which temper its previous preference for coercive diplomacy and reliance on military might to intimidate its foes, particularly Seoul, Washington and Tokyo.

Since 1998, South Korean President Kim Dae Jung has been the foremost advocate of the

soft landing approach. In Washington, the initiative shifted in the fall of 2001 from the “soft landing” to “hard landing” school. In its final months, the Clinton Administration pressed North Korea hard to forego its missile development program in exchange for diplomatic normalization and economic assistance. Kim Jong Il balked. Hopes for a “soft landing” faltered further when Kim Jong Il again balked on his pledge to return Kim Dae Jung’s official visit. The election of President Bush in December 2001 returned the political initiative to the “hard line” school, at least in Washington. Pyongyang intensified the Japanese people’s alienation by adamantly refusing to attempt to account for the disappearance of two dozen Japanese citizens believed in Japan to have been the responsibility of some affiliated with North Korea. North Korea also intensified Japanese citizens’ distrust by dispatching yet another “spy” boat, some say drug smuggling boat, to Japanese waters in December 2001. Japanese advocates of engagement and a “soft landing” for North Korea appear to be at an all time low.

In China, there also is intense frustration with North Korea, but for reasons distinctly different from those in Washington, Seoul and Tokyo. The small number of Chinese concerned with North Korea tend to favor a “soft landing” and an engagement strategy. The source of Chinese frustration is rooted more in culture than ideology. They are displeased with Pyongyang’s refusal to recognize the perceived superiority of the so-called “Chinese” economic and political model, i.e. perpetuation of an authoritarian regime aligned with the communist ideology, but an economy that has adopted some of the principles of market economics. For these Chinese observers, North Koreans are arrogant, stubborn and culturally backward. Such sentiment echoes that of early modern Chinese attitudes toward Koreans, i.e. if only Koreans would do things the Chinese way all would be better for both China and Korea.

We cannot ignore the “landing” debate because the international humanitarian effort has been drawn into it. But our primary purpose here is not to resolve this debate. Rather, our focus is to assess the characteristics and impact of the humanitarian effort in North Korea. Doing so, it is hoped will benefit both schools by bringing greater clarity and depth to our understanding of North Korea. Ultimately, this should better enable all concerned parties to address the fundamental issue of how best to end the human suffering in North Korea, and to set the stage for a durable peace in Northeast Asia.

We will have to look beyond the obvious if we are to gain a fuller comprehension of the Korean Peninsula. The two Koreas have more in common culturally and politically than their differing capitalistic and communistic economic systems suggests. They share a common world view, one which reveres the Confucian values of social stability, respect for authority and kinship. This common world view accents pride in one’s “Korean ancestry and culture,” and a deep sense of nationalism underscored with distrust of the Chinese, Japanese and Americans. Since the Korean War in 1950, the two Koreas diverged more economically than politically. Both nations were dominated by authoritarian regimes. In South Korea, former generals ruled between 1963 and 1992. Only in the past decade has South Korea broken with its authoritarian past and moved with impressive speed toward democracy. North Korea remains dominated by one man, Kim Jong Il.

Economically, central government planning was the cornerstone of both nations' post war reconstruction. In Pyongyang, the State Administrative Council ran the economy. In South Korea, it was the Economic Development Board working through a few huge corporations (*chaebol*). Agriculture in North Korea was "collectivized" after the Korean War, and subsequently achieved impressive levels of production. In the South, agriculture floundered until the central government reorganized it into "farm associations" under the auspices of the Saemaul or New Village Movement initiated in the early 1970s.

No one can deny that today there are profound differences between the two Koreas. The true nature of these differences, however, will remain in the realm of conjecture until we have a fuller, more accurate knowledge of North Korea. The international humanitarian effort was launched out of a concern for the people of North Korea. Yet one of its fortunate collateral consequences has been unprecedented access to that long cloistered nation, and a cornucopia of knowledge about it.

Nature's Whim

Torrential rains in August 1995 wrecked havoc in the nation's four western provinces: North and South Pyongan and North and South Hwanghae provinces. In the western provinces, flooding washed away fields, crops, homes, dykes and roads. Electric power lines were knocked down, bridges and railroad beds washed away. These four provinces account for an estimated 70% of the nation's annual rice harvest and 53% of its maize production.¹ According to the IFRC's December 1995 appeal, 100,000 families had been rendered homeless and 400,000 hectares of arable land destroyed. Of the approximately 480,000 homeless persons, an estimated 77% lived in the three northwestern provinces of North Pyongan, Chagang and North Hwanghae. Damage in the nation's capital, and its northeastern and eastern provinces was marginal in August 1995. These areas, however, sustained significant rain related damage the following August.¹

The combination of heavy rain and flooding severely damaged the rice, maize and vegetable crops. High water in the flooded rice paddies prevented pollination, which must occur in August if there is to be rice by the September harvest. Blight afflicted the ears of corn, turning them red and hard as stone. The staple vegetables in kimchi, Koreans' favorite dish, consist of cabbage, radish, cucumber and red chili. All these vegetables, plus the potato crop, rotted after the August rains. Hunger, starvation, and disease followed.

Torrential rains in summer, however, are the norm for the Korean Peninsula. Annual monsoons sweep the entire peninsula from south to north beginning in late June and continuing until the middle or latter half of July. Typhoons follow in August and September. Alternatively, drought is also a frequent visitor to the peninsula, as was the case in the summer of 1997 and spring and summer of 2000. Nature's whim alone cannot explain the calamity that befell the people of North Korea in the fall of 1995.

BEFORE THE STORM - THE SETTING

North Korea covers a larger land area than South Korea, but its topography and climate do not favor agriculture. Only about 11 percent of North Korea's 110,000 square kilometers are suitable for crop cultivation. This places North Korea second in the world behind Egypt in terms of population density per hectare of cultivated land, according to agricultural experts at the UNDP office in Pyongyang. Mountains cover 70,000 square kilometers. Another 13,000 square kilometers is forest covered hilly or steep land. Range or pasture land covers 13,000 square kilometers in the central region of North Korea, but here the cold, arid climate severely restricts the ability to cultivate crops. Of the remaining 4,000 square kilometers, about 5500 square kilometers are appropriate for rice paddies. Crops and grazing land occupy the remaining land.¹

Nature favored North Korea's western region when it comes to arable land. Broad flat lands support rice and maize cultivation in the four western provinces of North and South Pyongan and North and South Hwanghae provinces. Here orchards and vegetable crops also abound. The northeast provinces of North and South Hamgyong have only narrow strips of arable land that border the East or Japan Sea. South of this region, rugged mountains limit the arable land in Kangwon province.

Climate: Winters are cold and long, making for a short growing season. Late October to late March, little or nothing can grow in the DPRK. North Korea has only 180 to 190 frost free days between May 1 and October 20. The number of frost free days declines as one moves from south to north, or from the low to the high lands. According to the DPRK Ministry of Agriculture, the mean temperature in winter is 12 C degrees, with the coldest being minus 35 C degrees. In summer, the mean temperature is 20 C degrees, with the hottest being 33-34 C degrees. Rain fall is concentrated in the months of July and August with about 1,000 millimeters falling during this monsoon season. Typhoons sweep the peninsula in September, bringing additional rain. The snow fall in the western low lands tends to be light between October and February. Spring and fall tend to be dry seasons.

Food: About two million hectares of land (one hectare or *ha* equals 2.47 acres) are farmed in North Korea. The main crops are rice, maize and potatoes. About 1.4 million hectares are devoted to these three crops. The proportion of paddy and maize are about equal, 600,000 hectares each, leaving about 200,000 hectares for the cultivation of other grains (barley and wheat) and potatoes. Another 300,000 hectares are devoted to vegetables, soybeans and fruit orchards. The optimum annual harvest of rice and maize is estimated to be about six million metric tons. Climate and other factors, however, make this a rare achievement. In recent years, the average grain harvest has been between 4 and 5 million metric tons of grain.

The favored lentil is soy bean, a drought resistant bean cultivated throughout East Asia. Rich in protein, it is usually consumed in the form of soy sauce, a fundamental condiment in East Asian cooking, bean curd (*tubu* or *toufu*) and a chili seasons bean paste (*kojujang*). Like potatoes, soy beans are often planted as a "double" crop on the borders of rice paddies and corn

fields. A hectare devoted to soy beans yields an average of two metric tons.

The favorite vegetables are the same as in South Korea: cabbage, cucumbers, radishes, squash, pumpkins, carrots, sweet and chili peppers and spinach. Each November, following the grain harvest, these vegetables are combined into a spicy and salty salad called *kimchi*. The salt and North Korea's cold winter temperatures serve to preserve the *kimchi* for consumption through the winter months.

The main sources of protein, according to DPRK Agricultural Ministry officials, in the North Korean diet are: fish, bean curd, poultry (chickens, ducks and geese), rabbits, pork and occasionally beef. More ocean fish is consumed than meat. Poultry, primarily chickens, provide eggs and is the main source of meat. Pigs rank second after poultry, but unlike China have not been a favorite animal in North Korea because they consume large amounts of grain. Small herds of cows and goats are raised as a source of milk for infants and children.

Seeds of Disaster - DPRK Agricultural Policy Prior to 1995

According to official DPRK data, as reported by the International Monetary Fund (IMF) in November 1997, North Korea's agriculture sector is the largest contributor to the nation's Gross Domestic Product (GNP). Before 1990, North Koreans enjoyed an ample, reliable abundance of grain, vegetables, poultry and fish. The harvests of rice and maize soared between 1977 to 1987. Actual harvest figures are difficult to determine, but annual production exceeded five million tons annually during that decade. Some grain was imported, primarily wheat from the former Soviet Union and China, but North Korea also exported rice in the 1970s. Food was generally equitably distributed throughout the nation. Those who could afford it purchased or bartered for additional food and specialty foods in government-authorized stores and "peasants markets."

The period of greatest accomplishment in agriculture came at the height of the Cold War. The global rivalry between the Soviet Union and the United States was matched on the Korean Peninsula by the intense dueling between North and South Korea. Both Koreas benefitted from their benefactors' contest. The superpowers sought to turn the Koreas into show cases for communism and capitalism. North Korean leader Kim Il Sung endeavored to exploit the situation to the maximum extent possible. He relied extensively on aid from both Moscow and Beijing. He adapted selected aspects of the Soviet model for economic development to his economic planning, and then refined this into a model for developing nations in Africa, the Middle East and Southeast Asia. Relying on considerable financial and technological aid from Moscow, plus low priced crude oil from China, Kim pursued his goal through centrally managed six and seven year economic development plans.

According to official DPRK figures, the 1971-76 Six Year Plan and 2nd Seven Year Plan (1977-84) achieved amazing gains. Industrial output is said to have increased between 1971 to 1979 by an average of 15.9% annually. Coal production is said to have reached 50 million metric tons per year, and steel production climbed to 4 million metric tons (M/T). Gains in agriculture were equally astonishing. Production is said to have exploded from 7 million tons in

1974 to 8.5 million in 1977, and then to 9 million in 1979. Chemical fertilizer production rose, increasing the per hectare distribution from one ton to 1.5 tons between 1975 and 1979. The number of tractors reached six or seven per one hundred hectares of farm land.¹

**Chart I. DPRK Economic Development Plans
1971 - 1993**

	6 Yr Plan 1971-76	2 nd 7 Yr Plan 1978-84	3 rd 7 Yr Plan 1987-93
Electricity (million Kwh)	28,000	52,000	100,000
Coal (metric tons = M/T)	50,000,000	70,000,000	120,000,000
Steel (M/T)	4,000,000	6,730,000	10,000,000
Nonferrous Metals (M/T)			1,700,000
Cement (M/T)		12,000,000	22,000,000
Grain (M/T)	8,250,000	10,000,000	15,000,000
Marine Products (M/T)	1,600,000	3,500,000	11,000,000
Fruit (M/T annually)			2,000,000
Meat (M/T annually)		550,000	1,700,000
Eggs			7,000,000
Chemical Fertilizer (M/T)		5,200,000	7,200,000
Fabrics (meters per year)	600 million	430 million	1,500 million
Land Reclamation (hectares)		100,000	300,000
Apartments (urban)	414,000	60,000 (est.)	150-200,000 total
Housing (rural)	472,000		

These amazing gains reportedly continued until 1984. Between 1978 and 1984, the DPRK claimed industrial output increased in value 2.2 times. Data for gains in other sectors became less specific. Comparing 1977 levels to those claimed in 1984, electricity production increased 78%, coal production 50%, steel 85%, machine tools 67%, tractors 50%, trucks 20%, chemical fertilizers 56%, cement 78%, fabrics 45% and marine products 220%. Grain production is said to have reached 10 million tons in 1984.¹

“Juche Farming”: During the years of bountiful harvest, Kim Il Sung labelled his farming practices the “Juche Farming” system, and pointed to it as a model to be emulated by the so-called “third world.” His “Juche” system accented government ownership of all land, centralized management of agriculture, and collectivization of all farms. After the Korean War (1953-54), traditional farms and their residents were consolidated into either “collective” or “state” farms. According to Ministry of Agriculture officials, in 2000 there were 3,000 cooperative farms and 540 state or government owned farms. The WFP reported 3,220 collective farms in its spring 1996 nutritional assessment.¹ Of these farms, 3,000 cultivated food and the remaining 220 were devoted to fish farming. Collectives encompassed the populations of traditional rural villages. Each collective has its own day care and educational facilities, a

cultural hall and a small clinic staffed by a nurse. WFP, citing DPRK Ministry of Food Administration, put the 1995 population of collective farms at 8,145,200 persons, or 37% of the population. They average about 300 hectares, but the largest collectives cover 10,000 hectares. Each farm is headed by a manager selected by the collective's membership and sanctioned by the Ministry of Agriculture. The farm manager chairs an advisory committee of elders. Farm workers are organized into labor battalions, each numbering about 100 people, which are further divided into sub-work teams of 15-20 people.

Collective Farms: Members of collective farms are not eligible to receive food through the Public Distribution System (PDS), the government's nationwide food distribution system (see discussion later). Instead, sub-team members earn points for their daily labor, ranging between 0.8 to 1.2 points per day. At the end of each harvest, a portion of the farm's grain production is sold to the central government. This income is then divided among each farm's management and workers according to his or her total number of accumulated work points. Payment is not in cash. Rather, the monetary value is converted into grain. Any surplus production above the farm's quota is divided among a collective's members either for their personal consumption or sale in peasant markets. In all cases, minimum work requirements must be met before the allocation is made. Each worker is required to invest a minimum number of work days each year in the collective - 290 days for men and 260 days for women. Each sub-team must have produced 20 M/T of compost each year. Bonuses beyond compensation for work points is possible only if a sub-work team achieves 90% or greater of the production quota assigned it by the farm's management. On the other hand, if a sub-work team achieves only 85% or less of its quota, each team member loses 15% of their labor points. Additionally, each household within the collective is allowed to cultivate vegetables for personal consumption on so-called "kitchen plots" which measure between 30 and 90 square meters. Collective farm members are allowed to sell or barter farm produces at regularly scheduled "farmers markets" (see discussion later).

This is the theoretical ideal as described by officials in Pyongyang. Farm managers agree with the basic outline of the system, but point out that actual practice differs from farm to farm according to local conditions and needs.

State Farms: These farms are under the direct supervision of Korean Workers Party (KWP), North Korea's communist party, officials. They produce food for distribution either by the Agriculture Ministry or the Ministry of the People's Armed Forces. State farms numbered 1,241 in 1995, but apparently their number declined to 540 by September 2000, according to Ministry of Agriculture officials. Most state farms specialize in the production of livestock, poultry, silk worms, seeds, and fruit orchards. In 1995, 1201 state farms supplied meat, milk, and eggs to selected urban populations, i.e. ranking KWP members and the military. Another forty nine state farms specialized in orchards, animal husbandry, crop seeds, and sericulture. Workers on these farms are employed by the state and receive monthly salaries in 1995 that ranged from DPRK Won 80 to 180 or 1,320 Won per year. The average salary for government officials at the time, according to several DPRK officials, was about DPRK Won 150. Like collective farms, there is a bonus system. Half of the production above the government quota is

distributed to members of a farm, and the remainder is passed on to the central government.

Converting DPRK Won to US dollar equivalents is misleading since the official exchange rate is only DPRK Won 2.14 per US dollar. All government employees, including those on state farms and in provincial government offices, receive rent free apartments (one's rank determines the apartment's floor space and height within a building, an important consideration since elevators either were not installed in high rise apartment buildings or do not always work). They do pay a small charge for utility use, about Won 5 monthly for a 160 square meter apartment in Pyongyang. All education and medical service is provided to these officials free of charge. Only a small number of officials own or have access to official vehicles. They rely on very inexpensive public transportation in cities or catch rides on city-bound trucks if living on a farm. Most of one's salary is available to purchase clothing, home appliances and furnishings and food. Color television sets are common in Pyongyang, but rare elsewhere. A color TV set made in North Korea costs about Won 600, a man's suit Won 400, if made from domestic fabric but three or four times that amount if tailored from imported cloth. Cigarettes cost half a DPRK Won, and lunch in the Koryo Hotel (for a North Korean officials) costs about the same amount. Officials traveling overseas receive money to purchase clothes, gifts and toiletries.¹

The specifics of farming - crop distribution, the use of chemicals and other technical aspects of farming are determined at the Academy of Agricultural Sciences in Pyongyang. These technical experts rely on a network of experimental farms to develop the data for the policy proposals they submit to the Ministry of Agriculture. The Academy is responsible for the development and distribution of most crop seed. Seeds are cultivated on 186 seed farms. The conventional recommended ratio of urea, super-phosphate and potassium chloride fertilizers has been 100:100:50, as set by the Academy. In the 1980s, approximately one ton of chemical fertilizer was applied to each hectare of crop land.¹

Despite the traditional emphasis on the nation's heavy industrial sector, the agricultural sector appears to have received ample attention, at least until the decade of the 1980s. Kim Il Sung in the 1970s paid close personal attention to agriculture. He was at the peak of health, and made frequent "on the spot guidance" visits to numerous farms. His instructions came to be defined as the *Juche* agriculture method.¹

Rice requires 150-180 days for cultivation, the maximum growing period in North Korea. The hand transplanting of rice seedlings begins in early May and continues into June. Paddies must be irrigated during the growing period. Pollination occurs in August after the July monsoon. The harvest commences in late September and is completed by mid-October. To increase rice production, Kim promoted the cultivation of rice seedlings in "cold beds." This method supposedly allowed rice seedlings to be planted 7 to 10 days earlier than previous methods, permitting them a longer growing period before being transplanted to rice paddies. In cold climate regions, this allowed the rice plants to be ready for harvesting prior to the first frost in the fall.

Kim Il Sung is also credited with having developed the “humus-cake” bed planting and “close” planting of maize seedlings. Maize, North Korea’s second crop, has an average growing period of 125 days, making it more suitable than rice for the cooler, elevated regions of the country. Like rice, maize seedlings are hand transplanted in early spring. Planting the maize seeds in “humus-cake” give the seedlings about a fifteen day earlier start over conventional methods. About two thirds of maize is irrigated, especially in the southwest provinces. During pollination in July, the soil must remain moist for three days. Otherwise pollination will be impeded and the yield reduced. Harvesting begins in August and is completed in mid-September. In 1974, Kim was credited with developing “close planting.” This involved increasing the per hectare number of maize plants. Subsequently, the grain yield per hectare of maize reportedly increased 52%. The average yield for maize is about 3.5 metric tons per hectare.

“*Juche* farming” placed increasing emphasis on the cultivation of rice and maize, less on barley and wheat. Rice yields twice the amount of grain as wheat, about seven tons compared to wheat’s four metric ton yield. Wheat also requires 100 days to mature so is destined to remain a secondary crop in North Korea. Buck wheat noodles, however, are a cherished dish in North Korea, requiring the importing of wheat flour. Barley is considered the “poor people’s” food and is used primarily to feed poultry and to make beer. Eventually even potatoes cultivation declined. Once a main crop, potatoes gradually became a “double” crop in many areas and were planted between rows of maize. In a field devoted strictly to potatoes, traditional farm methods produce a yield of about 9 or 10 metric tons per hectare. The decreased cultivation of potatoes appears to have been more due to political than other considerations. As Kim Il Sung pressed for greater and greater grain production, more and more land was devoted to rice and corn.

Other important crops are fruit, soybeans, vegetables, mulberry plants for sericulture and opium. Large fruit orchards, particularly apples and pears, were established in the 1940s in the hilly areas along the west coast. American missionaries are credited with having first planted apple trees in these areas. Kim Il Sung loved apples and occasionally visited these orchards. Concrete billboards commemorating his visits are still visible north of Nampo, the main west coast port, in Onchon County of South Pyongan Province about an hour’s drive west of Pyongyang. Soy beans, like potatoes, gradually became a “double” crop planted next to the foot paths and borders of rice paddies and maize fields. Sericulture, centered in the Nyongbyon valley one hundred kilometers north of Pyongyang near the nuclear research center, was continued but not expanded. Instead, the textile industry focused on the production of synthetic fibers like vinalon. Opium was cultivated in relatively small fields both for medicinal use and to supply the international demand for heroin. Until the summer of 1995, small crops of opium were visible within the grounds of the Nyongbyon Nuclear Research Center and the army garrison nearby.

The goal of Kim Il Sung’s agricultural policy was to increase grain production as evident in his annual New Year’s addresses. He often proclaimed, “We set irrigation, mechanization, electrification, and chemicalization (sic) as the basic tasks of the technical revolution in the rural areas, and we exerted great efforts in accomplishing these tasks.”¹

Irrigation: DPRK official reports recognized that floods and severe drought “visit our country every year.” In the 1970s, improving the irrigation of farm land was a primary target of the economic development plans. In 1976, Kim Il Sung delivered a speech entitled, “On Promoting Projects to Remodel Nature for the Goal of Ten Million Tons of Grain.” In this speech, he called for the irrigation of all dry fields, the building of terraced rice paddies and corn fields, the realignment of fields and improvement of their soil, forest and water conservation, and the reclaiming of tidelands. He called for the irrigation of 400,000 more hectares of farm land, the building of 200,000 hectares of terraced farm land, and the reconfiguration of 100,000 hectares.¹

Official publications in 1988 claimed 1.4 million hectares of agricultural land were irrigated by 124,000 wells and 1,700 water reservoirs which feed 40,000 kilometers of waterways serviced by 25,210 irrigation pumping stations and “more than 180,000 irrigation structures.” The entire system, however, relied on 32,200 pumps and 1,990 kilometers of pipe, not to mention an ample and uninterrupted supply of electricity. As of 1988, rural areas consumed annually 2,500 million kilowatts of electricity. This was equal to approximately 5% of the nation’s total electricity generation of 52,000 in 1986. It is important to note that an estimated 60% of this electricity was hydro power, and the remainder thermally generated using oil and coal.¹

The center piece of North Korea’s irrigation system is the West Sea Barrage, an eight kilometer long tidal dam, the world’s longest as of 1992, across the western mouth of the Taedong River where it empties into the Yellow or West Sea. The Taedong River drains the central region of North Korea as it slices from east to west through Pyongyang and forms the boundary between South Pyongan and North Hwanghae Provinces. One of North Korea’s proudest civil engineering accomplishments, the West Sea Barrage was completed in June 1986 after five years of grueling effort by the North Korean People’s Army (KPA) and at an estimated cost of US \$4 billion. It reclaimed 6,200 hectares of new land from the mud flats of the Taedong River delta. The dam forms a reservoir that supplies irrigation water to 100,000 hectares of farm land in South Pyongan and North Hwanghae Provinces. Further inland, an additional four dams form reservoirs which irrigate additional farm land east and south of Pyongyang.¹

“Chemicalization:” National production of chemical fertilizer reportedly rose from 3 million tons in 1976 to 4.7 million tons in 1984, but then fell to 3.5 million tons by 1990.¹ According to official publications, the application of chemical fertilizer between 1975 and 1979 increased from one to 1.5 M/T per hectare. Two tons of fertilizer were claimed to be spread per hectare of paddy by 1988. The supply of herbicides tripled and insecticides increased 5.4 times between 1977 and 1984. As of 1988, 97 percent of paddy fields were being weeded using chemicals.

The claims about fertilizer production and usage, when compared to declared crop land, do not add up. When the DPRK claimed it was using in 1977 one ton per hectare of cereal crop land, it declared production of chemical fertilizer was 3 million M/T. If so, the supply compared to demand left an 1.8 million M/T surplus. Even if fertilizer was spread at the same rate on the

nation's remaining 600,000 hectares of cultivated farm land, this would have left a 1.2 million ton surplus. In 1984, fertilizer consumption was claimed to be 1.5 M/T per hectare, and production was put at 4.7 million M/T. If applied at the declared rate to 1.8 million hectares, this would consume 2.7 million M/T, leaving a 2 million M/T surplus. But then in 1988, the DPRK claimed it was using two tons of fertilizer per hectare, yet production of fertilizer had actually declined. Subtracting declared use from production of 3.5 million M/T would mean a 100,000 M/T shortage by 1990.

All of this points to several possibilities. Obviously, North Korea's declared production statistics cannot be taken at face value. In the case of chemical fertilizer, inflating production figures would serve the interest of officials at the producing facilities. Such an explanation is not likely to account for the very large surpluses suggested above. An additional, possible explanation is that a considerable amount of the chemical fertilizer production was actually going into the manufacture of explosives, either for the domestic mining industry or to produce munitions for the North Korean People's Army and to export.

Chemical fertilizers were produced primarily at the Hungnam facility on the northeast coast. The plant requires ammonium sulphate to produce fertilizer. Its annual production capacity was once rated at one million tons, but the massive plant and its equipment date from the 1960s and are of Soviet design. The UNDP estimates retrofitting the plant could cost more than US \$60 million. Construction of a second large plant, the Sariwon Potassium Fertilizer Complex, began in 1988. Located an hour's drive south of Pyongyang in South Hwanghae Province (it is visible from the Tongil Expressway that connects Pyongyang to Kaesong), the plant is designed to produce 500,000 tons of urea or potassium fertilizer, plus aluminum and cement. A second, even larger petro-chemical plant was begun in 1986, the Sunchon Vinalon Complex. In addition to producing the synthetic fiber "vinalon," it was designed to produce 900,000 M/T of nitrogenous fertilizer. The portion of the plant designed to produce the synthetic fiber was completed in 1989, but the fertilizer producing portion of the plant was never completed. North Korea's economic planners aspired to produce 7.2 million M/T of chemical fertilizer between 1986 and 1993. They failed to do so, for reasons discussed later.

Mechanization: The number of tractors assigned to each 100 hectares of farm land was set at seven in the plains (generally the western provinces) and six for farms in hilly and mountainous regions. Tractor production was said to have reached 70,000 to 80,000 by 1974. Official DPRK publications claim this was sufficient to provide six or seven tractors for each 100 hectares of land. Additionally, 1.5 trucks and 5.5 rice-seedling transplanting machines were said to have been assigned to each 100 hectares of land. It was further claimed that during the first Seven Year Plan (1977-1984), the production of tractors increased 50% over the previous economic plan's achieved goal of 70,000 tractors, and truck production climbed 20%. Not explained is whether the new tractors replaced old ones or increased the total number available. Nor was an explanation offered regarding trucks. In the Second Seven-Year Plan, 1986-93, the government envisioned rice planting would be entirely mechanized and there would be 10 to 12 tractors per 100 hectares of cultivated land by 1993.

Farm Labor: The DPRK government claims 3.4 million people or 15.5% of the total population (as of 1998) routinely perform labor. (Elsewhere, however, it claims 37% of the nation's population resides on collective and state farms.) An unknown number of military personnel are also involved in the cultivation of food. An additional one million persons are mobilized on a temporary basis during peak labor needs, particularly during the fall harvest. During the peak periods of farm labor, May's crop transplanting and the fall harvest seasons, students, some soldiers, factory and office workers are required to spend a varying number of days working in the fields. Each Friday, office and factory workers plus students and housewives are required to spend the day doing manual labor. The manual labor demands of the rural population are substantial, intense and virtually continuous from February to November.

The crop cycle begins in February with the spreading of compost in fields. Plowing begins in late March. Seeds for rice and maize seedlings are planted in April while the plowing and repair of irrigation dykes and ditches continues. May is spent spreading fertilizer, usually by hand, and hand transplanting rice and maize seedlings. Weeding also begins in May and continues till the monsoons arrive at the end of June. There is a brief break in July and August during the monsoon season and the subsequent hot season. Some weeding and irrigation system repair continues, but the level of activity subsides until late August.

The harvest of maize begins in late August in northern regions, and continues through September. The maize is air dried at this time and then usually threshed before being placed in storage. The rice harvest runs from late September into November. Rice stalks are cut, piled in fields for drying and then threshed. After the harvests, both paddy and dry fields are plowed to from compost by folding plant matter back into the soil.¹

Grain Production: North Korea claimed impressive grain production between 1977 and 1985. Per hectare yields were set at 7.6 tons for rice and 6.5 tons for maize. Grain output reportedly reached 8.5 metric tons in 1977, 9 million tons in 1979 and 10 million tons in 1984. Kim Il Sung predicted in 1980 that grain production would reach 15 million metric tons by the end of the decade. That goal proved unrealistic. (See chart below)

Any discussion of North Korea's grain production requires clarification. North Korean production claims are bloated by weighing not husked rice and undried maize still on the cob. Also common was inclusion of potato production as part of the grain harvest. Obviously, such practices considerably inflated tonnage. Adjusting for these practices, Kim Il Sung's claim in 1984 that North Korea produced 10 million tons of grain meant an actual harvest closer to 6,560,000 metric tons of which rice amounted to 3.5 million tons and maize to 2.6 million tons. The remaining 432,000 metric tons probably consisted mostly of potatoes plus some barley and wheat. Nevertheless, this is impressive production, especially since it exceeds the UNDP optimum grain production estimate of 6 million metric tons by almost ten percent. North Korea apparently had sufficient surplus grain at the time to export significant amounts of rice between 1974 and 1979.¹

**Chart. IIa. DPRK Grain Production and Imports
1961-2000 - 1,000 Metric Tons***

Year	Rice	Maize	Total	Production	Imports/Exports (-)
1961	1,809	1,245	3,045	3,583	322
1962	1,897	1,305	3,202	3,725	186
1963	2,073	1,430	3,503	4,053	122
1964	2,176	1,505	3,681	4,212	84
1965	1,905	1,315	3,230	3,707	408
1966	2,128	1,465	3,593	4,073	529
1967	1,976	1,365	3,341	3,788	354
1968	1,913	1,320	3,233	3,662	292
1969	2,343	1,620	3,963	4,378	162
1970	2,328	1,610	3,938	4,365	219
1971	2,407	1,670	4,077	4,499	495
1972	2,312	1,595	3,907	4,309	820
1973	2,600	1,790	4,390	4,817	964
1974	2,710	1,915	4,625	5,068	- 101
1975	2,814	1,985	4,799	5,232	- 53
1976	2,854	2,060	4,914	5,351	- 321
1977	3,061	2,210	5,271	5,709	- 798
1978	2,957	2,180	5,137	5,578	- 391
1979	3,061	2,260	5,321	5,766	- 58
1980	2,646	1,990	4,636	5,042	151
1981	3,045	2,345	5,390	5,800	232
1982	3,294	2,419	5,713	6,033	181
1983	3,290	2,477	5,767	6,184	557
1984	3,496	2,632	6,128	6,560	525
1985	3,369	2,536	5,905	6,333	317

*See page 32 for grain production and imports after 1985.

Animal Husbandry: Animal husbandry emphasized poultry prior to 1995. Chickens reportedly numbered 20,000,000 in 1988 and produced 100 million eggs. The number of pigs ranked second to poultry, 3,100,000. Cattle followed with 1,350,000 claimed in official reports. Relatively small numbers of sheep (372,000) and goats (285,000) were maintained at the end of the 1980s. Interest in ducks, geese and rabbits had begun, but the numbers of these animals remained relatively small.

Fishing: Fish have traditionally been a major food source for all Koreans. The fishing industry enjoyed a surge in production between 1960 and 1970 with marine products increasing from 465,000 metric tons to 1.4 million metric tons. Gains in the industry stalled at about 1.6 million metric tons in 1989 and then subsided to 1.5 million tons the following year. Aging equipment combined with increasingly pronounced shortages of diesel fuel during the early 1990s significantly reduced the annual catch. Beginning in the winter of 1995, ice fishing became an increasingly popular past time as people attempted to supplement their meager diets with fresh water fish. Not until the late 1990s did North Korea begin to invest in the development of fish farms on a significant scale.

The Diet: North Korea's population of approximately 23,000,000 requires an estimated minimum of 340,000 metric tons (M/T) of grain per month, or approximately 4,100,000 M/T annually, according to UNDP experts in Pyongyang. This estimate assumes 50% of the nation's caloric intake comes from domestically produced grain. The balance of nutritional requirements is obtained from vegetables, fish, poultry, fruit and, in some places, wild foods.

Basic Nutritional Parameters in a Normal Diet

Protein -	- 12%: 60% from vegetables 40% from animal/fish -only source of 11 basic amino acids needed for human development/energy
Carbohydrates -	60% Human brain requires a minimum of 120 grams of carbohydrates per day.
Fats	- 28% 70% from vegetables and 30% from animal origin (saturated fats)

Optimum grain production (rice, maize, barley and wheat), achieved with ample supply of water, seed, fertilizer, pesticides, farm machines and fuels, would yield a harvest of about 6 million metric tons. This would provide each person 263 kilograms of grain per year, or 712 grams of grain per day. Good production would produce a harvest of about 5 million metric tons, sufficient grain to provide each person 219 kilograms of grain per year, or 600 grams per day. Daily caloric intake would reach an estimated 2,100 Kcal per day per person, but could readily be raised to the nutritional standard of 2,500 Kcal per day with the consumption of vegetables, fish and/or poultry. In a third scenario, grain production would be limited by a shortage of agricultural inputs, holding grain production to 3,489,000 M/T per year. Each person would receive 158 kilograms of grain per year, or 419 grams per day. Daily caloric intake would equal 1,466 per person per day. Based on these scenarios, and available grain production figures, it would appear North Koreans enjoyed ample food from at least 1970 until 1990 when grain harvests annually exceeded 5,000,000,000 metric tons. After 1990, however, annual grain production dropped below this level. As of the 2001 fall harvest, grain production has yet to return to a level above minimal human need.

Chart III. DPRK Grain Production and Consumption Scenarios Compared¹

Grain Production	Kilograms/person/year	Grams/person/day	Kcal/person/day
6,000,000 M/T	263 Kg	712 grams	
5,000,000	219 Kg	600 grams	2,100
3,489,000	153 Kg	419 grams	1,466
2,914,000	128 Kg	251 grams	1,229
2,000,000	88 Kg	241 grams	843
Normal Diet			2,500

Food Distribution: The DPRK government oversees the distribution of grain to urban populations and the military via the Public Distribution System, or PDS, according to a national wide standardized grain ration system. Based on a discussion with a Korean Workers Party member in the fall of 1995, cooperative farms sell their rice to the State for 82 *chon* per kilogram (about US 40 cents at the official exchange rate) and maize for 58 *chon* per kilogram (US 29 cents). This grain is then sold through the PDS system for 8 *chon* per kilogram of rice and 6 *chon* per kilogram of maize.¹ Collectives and state farm residents are not eligible to receive grain through the PDS. As discussed earlier, they share their farm’s harvest with other residents, and usually receive 110 to 150 kilograms of grain each fall.

**Chart IV. DPRK Daily Grain Ration per Capita
Rice and Corn¹**

Occupation/Age Group	Daily Ration (Grams)	Ratio Rice to Corn	
		Pyongyang	Other
Special Security	800	7:3	7:3
Heavy Laborer	800	6:4	3:7
Government official	700	10:1	10:0
Military	700	6:4	3:7
Regular Laborer	600	6:4	3:7
College Students	600	6:4	3:7
Secondary School Students	500	6:4	3:7
Primary School Students	400	6:4	3:7
Children under 3 years	100-200	6:4	3:7
Aged and disabled	300	6:4	3:7

Peasant Markets: So-called “peasant markets” have been a standard feature of life in North Korea even before its establishment as an independent nation. North Korea’s founding father Kim Il Sung in a 1969 essay recognized the existence and need for these markets. He wrote, “... the peasants sell directly to people part of the agricultural and animal produce, both of the collective economy of the cooperative farms and the sideline work of individual cooperative members. ... prices are determined naturally according to supply and demand ... at the socialist stage the peasant market cannot be completely abolished.” Kim saw merit not only in the markets, but also the need to increase the state’s control over the food supply,¹

As for individual sideline products, the producers should be allowed to consume them and take the surplus to the market to sell or barter for other goods according to their wishes. As for the animal products and industrial crops produced by the collective economy of cooperative farms, the greater part should be purchased by the state, but part should be divided amongst the peasants. They may consume them, or sell them to the purchasing agents, or take them to the peasant markets for sale.

Kim cautioned against the “Left tendency” of officials who called for abolition of peasant markets. If peasant markets were outlawed, Kim predicted, “The marketplace would disappear, of course, but the black market would remain.” He concluded that “as long as the state cannot produce and supply enough of all the goods needed by the people, we must strictly guard against the “Left” tendency to abolish the peasant market so hastily.”

Peasant markets are held on the 1st, 11th, 21st and 31st of each month. Prices are set according to supply and demand. Payment is in so-called “brown” currency, the paper money circulated among the general population. (Circulation of a second “red” currency is restricted to use by foreigners and authorized party and government officials for the purchase of imported goods in State owned stores.) As grain production rose after 1970, the State apparently exercised increasing control over collective farms’ food production, but peasant markets continued to operate. In 1984, the central government authorized provincial administrations to establish retail outlets for the distribution of local products (excluding grain).

After the floods of August 1995, peasant markets grew in number and size as the food shortage spread across North Korea. Officials condoned small-scale road side peddling, which became widespread by the summer of 1996. Women frequently were seen selling cigarettes (usually of Chinese origin), cooked “snack food,” seasonal fruit and vegetables, fire wood and coal, and small quantities of other daily necessities. Peasant markets grew both in size and number. In Pyongyang, very large scale markets were visible in front of the Pyongyang Central Railroad Station, at the Potonggang Station, the Kwangbok district in northeast Pyongyang where middle rank party and government officials reside and the poorer eastern district of Pyongyang. At the central Pyongyang station, poorly fed and dressed people, usually women, appeared early every other day just after the early morning train arrived from Sinuiju. These people carried large cloth bags stuffed full of Chinese beer, cigarettes, shoes, pot and pans. Elsewhere in the city, various vegetables were sold in the summer months. Similar markets were visible in Kaesong to the south and Anju north of the capital. In every one of these markets, uniform police were always visible. The use of US dollars and Japanese Yen also became increasingly common. Sample prices (spring 1996) in “brown” won (approximate exchange rate in 1996 was 150 won per US dollar) follow:¹

Pyongyang: potatoes - 62 won/kg
bean sprouts - 18 won/kg
chicken (live) - 350-500 won each
rabbit - 200-400 won each.
Sinuiju: radish - 10 won/kg

mushrooms - 10 won for two bowls
wild root - 10 won for two bowls
Piglet - 32 won each

Black Markets? Researchers in South Korea, and a few in the United States, confused these authorized peasant markets with illegal “black markets.” They interpreted this phenomenon as evidence of capitalism creeping into North Korea’s communist system. To further strengthen their argument, they pointed to the large, international free marketplace established by DPRK authorities in the early 1990s on the northern edge of the Najin-Sonbong Special Economic Zone.. Positioned near the Wonjong Bridge, which links the zone to the Chinese city of Hunchun, foreigners are allowed unrestricted access to the market. No visa is necessary. The market operates three days a week: Monday, Wednesday and Friday. No customs duties are collected. North Korean trading firms exchange fish products, antiques and nonferrous items for grain and various foodstuffs from China and other nations. The transactions are usually by barter, although foreign currency in the form of US dollars and Japanese Yen is known to be used. South Korean researchers believe the market’s purpose is to restore order to the North Korea-China border trade, and to reduce the amount of illegal smuggling along the two nations’ border. The Chinese government announced in 1997 it would open similar markets in Tumen, Sanhe and Chongsan, all on the northeast end of the Sino-Korean border.¹

In light of Kim Il Sung’s 1969 essay on peasant markets, it would appear inappropriate to label peasant markets as being “black markets.” It would also appear premature to suggest such markets are indicative of a shift toward capitalism at the local level. Rather, these markets have long been, and obviously remain a common feature of daily life in North Korea. During the height of the food shortage, 1996-98, Pyongyang appears to have relaxed its controls over these markets, allowing them to increase in number, size and the diversity of goods sold at them. Since 2000, however, the government appears to have moved to reassert its control over these peasant markets.

Food and Population: North Korea’s population distribution does not match the natural distribution of farm land. The four western provinces produce a surplus of grain compared to their populations. In the southeast province of Kangwon, there is a balance between grain production and human consumption. But the two central provinces (Ryanggang and Chagang) and two northeast provinces of North and South Hamgyong cannot produce sufficient grain to satisfy human consumption. The population in these regions must receive the grain surplus of the western region to maintain basic nutritional requirements.

The imbalance comes into clearer focus when we compare population with grain production. The four western provinces produce 66% of the nation’s rice and maize in a region that is home for 60% of the nation’s population. This makes for a 6% surplus of grain over basic human need. The surplus must be shifted to the grain deficient central and northeastern provinces. The grain shortage is most pronounced in the mountainous central region where 8.4% of the population produces about 4.5% of the nation’s grain, or half the grain needed by the

population. The population of these two provinces are engaged more in mining and timber cutting than in food production.

Unlike the grain producing southwestern provinces, the northeast provinces are more urbanized and industrialized, making a greater percentage of the population dependent on grain brought from other areas of the nation. Additionally, the urban populations of the northeastern industrial and sea port cities of Hamhung, Kimchaek, Chongjin and Najin-sonbong, plus the coal mining city of Musan, do not have access to so-called “kitchen” plots which allow the inhabitants of rural areas to cultivate vegetables, beans and some maize which can be retained for family use or else sold or traded for other commodities.

Instead, urban dwellers across North Korea, Pyongyang included, turned to “balcony gardens” to raise tomatoes and other small vegetables in the summer as well as chickens for eggs. To feed these chickens, the elderly and young children could be seen early each morning cutting grass in public parks. Some visitors to Pyongyang erroneously reported the grass was being collected for human consumption.

Transportation: North Korea’s transportation network lacks the capacity to transfer food supplies efficiently from the southwest, where there is a surplus of food, to the northeast, an area of pronounced shortage. Railroads form the back bone of the transportation network. The approximately 5,000 kilometers of rail haul about 90 percent of the nation’s freight. The entire network has not been significantly altered since Japanese engineers first designed the system 75 years ago to facilitate the Imperial Japanese Army’s reliance on the Korean Peninsula as a land bridge to Manchuria and the Asia continent beyond.

Railroad: Pyongyang is the rail hub. On the west coast, a main line runs north from the southwest port of Haeju through the rice growing areas of South and North Hwanghae Province to Pyongyang, and then continues north through the rice and corn producing provinces of South and North Pyongan to Sinuiju, the major western border city with China. Only one line runs from west to east, linking Pyongyang to Wonsan, a major port on the east coast. The third main line runs north from Wonsan along the east coast to the Chinese border, along the way connecting the industrial cities of Hamhung, Kimchaek, Chongjin and Najin-sonbong. The fourth main line runs north from Pyongyang through the central mountain region to the Chinese border. Most track, moreover, is single line, requiring that trains travel one direction during the day and in the opposite direction at night.

Chart V. DPRK Distribution of Population and Grain Production - 1997¹
(Hectres)

Locality	Rice		Maize		Total		% Total Population
	Area	% Total	Area	% Total	Area	% Total	

Pyongyang	26,302	4.4%	16,289	2.3%	42,591	3.3%	12.9%
N. Pyongan	104,951	17.5%	105,213	5.0%	210,164	16.2%	11.3%
S. Pyongan	98,495	16.4%	72,208	10.3%	170,703	13.1%	13.5%
Nampo	15,529	2.6%	8,640	1.2%	24,169	1.9%	3.5%
N. Hwanghae	49,852	8.3%	85,270	12.2%	135,122	10.4%	9.5%
S. Hwanghae	150,117	25.0%	105,378	15.1%	255,495	19.6%	7.1%
Kaesong	12,412	2.1%	2,633	0.4%	15,045	1.2%	1.6%
Ryanggang	1,975	0.3%	9,599	1.4%	11,574	0.9%	3.0%
Chagang	6,859	1.1%	39,915	5.7%	46,774	3.6%	5.4%
Kangwon	36,208	6.0%	41,828	6.0%	78,036	6.0%	6.2%
S. Hamgyong	59,868	10.0%	53,212	7.6%	113,080	8.7%	12.9%
N. Hamgyong	22,954	3.8%	59,296	8.5%	82,250	6.3%	9.7%
Other (a)	15,000	2.5%	50,000	14.3%	115,000	8.8%	3.4%
Total	601,000b	100.0%	650,000b	100.0%	1,251,000b	100.0%	

Roads: The nation's roads are in dismal condition. Of the estimated 25,000 kilometers of roads, only about 2,000 kilometers are paved. Only two roads have been built to facilitate the movement of people and goods between the east and west coasts. One is a recently rebuilt, multi-lane asphalt paved highway from Nampo, the nation's primary port on the West Coast to the capital city. The second, concrete paved highway links Pyongyang to the east coast port on Wonsan. A four lane super highway runs north and south through Pyongyang from Kaesong in the south to Myohyang Mountain National Park. The one hundred and fifty kilometer highway south of Pyongyang is in such bad repair that trucks are not allowed to use it. North of Pyongyang, the highway is much newer, completed in 1995, and is in much better condition. Its use, however, is limited to ranking officials and visiting dignitaries. Trucks, buses and other vehicles (such as tractor pulled wagons) must use side roads. A few short sections of some secondary roads are paved, but all are poorly maintained. Virtually all other roads are two lane wide dirt strips.

Water Transport: Like other means of transportation, this sector has received only marginal attention in recent decades. None of the major rivers, specifically the Taedong and Chongjong Rivers, are used for transport. Tides on the west coast regularly reach upwards of forty feet during a 24 hour period, making coastal shipping impractical. Coastal traffic is heavier on the east coast where deeper waters permit shipment between the ports of Wonsan, Chongjin and Najin-Sonbong. North Korea has a fleet of about sixty cargo ships, but all are small and aging.

North Korean Ports: Grain Handling Capacity¹

Port	M/T per Month
Nampo	60,000
Songjin	20,000
Haeju	20,000
Wonsan	20,000
Najin-sonbong	20,000
Chongjin	20,000
Hungnam	20,000

Nampo Port has two bulk grain berths, one equipped with a pneumatic vacuuming device and the other with a screw elevator. Their respective off loading capacities are 1,000 and 3,000 metric tons per day. Up to 20,000 metric tons of grain can be stored in the port's concrete silo. Ships entering Nampo must pass through the locks at the West Sea Barrage, limiting their size to a maximum of 50,000 metric tons. Small, 20 foot containers can enter the port, but off loading equipment is dated by international standards, making it slow and inefficient. Much of the grain and other bulk cargo, such as chemical fertilizer, arrives in bags and must be manually unloaded. Except for Haeju, the other ports can also off load bulk grain, but on a much slower basis than Nampo.

THE HUMAN FOLLY

Behind the well fed smiles that always appear in all of North Korea's publications, a quiet disaster was in the making. For two decades, gross imbalances and unrestrained excesses in economic planning and resource allocation were quietly taking a toll on the land, people and resources of North Korea. By 1985, the downward economic trend was becoming evident. The annual rate of increase for industrial production slowed from 15.9% during the the period 1970-78 to 12.2% between 1978 and 1984. Additional evidence is reflected in a comparison of the goals and accomplishments of the so-called 2nd Seven Year Economic Plan. The plan's goals originally were to have been achieved between 1978 and 1984. When results fell short of goals, the plan was merely converted into a seven year plan by extending the period it covered by one year. Even then, there were significant short falls, as evident below. The production of electricity, steel, and fabrics fell short of the goals despite the additional time for achieving them. Coal, chemical fertilizer, grain, marine products and cement production reached their

quotas. After 1990, as industrial production declined, agriculture also declined, yet its portion of the GNP rose from 37.4% in 1992 to 45.1% in 1996.

**Chart VI. Second Seven Year Plan - 1978-1986
Goals and Achievements¹**

	Goal	Actual (1986)	Difference
Electricity(KWH)	56,000 million	52,000 million	- 7.1%
Coal (M/T)	70 million	70 million	achieved
Steel (M/T)	7.4 million	6,730,000	- 9.1%
Fertilizer (M/T)	5 million	5,200,000	+4.0%
Cement (M/T)	12 million	12 million	achieved
Grain (M/T)	10 million	10 million	achieved
Marine Products	3.5 million	3.5 million	achieved
Fabrics (Meters/yr)	700 million	430 million	- 39%

Kim Il Sung prior to 1980, and his son and heir apparent increasingly since 1980, defined the nation's priorities in consultation with a small circle of close advisers. Given their regime's authoritarian nature, accountability was limited to subordinates. Transparency was encouraged only when the data enhanced the policy makers' credibility. Marxism-Leninism and the Soviet economic model may initially have played a key role in the formulation of economic policy, but after the DPRK's establishment in 1947, national priorities reflected Kim Il Sung's interpretation of what he believed best for all Korean people. His foremost, and enduring goal was national unification, whether through peaceful dialogue or armed might. In 1950, he pursued armed might. Although the combined forces of the United Nations frustrated his endeavor, he never relinquished it as an option.

Since 1953, North Korea's national priorities have not been altered. National reunification remains primary. Economic development is designed to facilitate achievement of this goal. For this Kim Il Sung built the world's fifth largest military. Heavy industry has always taken priority over agriculture and light industry. The military establishment has always received preference over the needs of the civilian sector in all areas - natural resources, industrial output, food, energy, transportation and manpower, etc. In exchange for the "Great Leader's," (whether it is Kim Il Sung or his son makes no difference) protection from foreign aggression and capitalistic exploitation, the entire population is expected to devote its mind and body to their "Great Leaders."

Kim's quest for reunification propelled him to a new ambition in the 1970s. Given the intensifying international rivalry with his primary opponent, the Republic of Korea, Kim sought to assert his leadership over the so-called "Third World" of developing nations. This sizable bloc of nations was not aligned, at least ideologically, with either the communist Soviet Union or the capitalist United States. Kim waved the banner of "*Juche*," his interpretation of Marxism-

Leninism, as an alternative. His red flag countered Marxism's universalism with the particularism of nationalism, but retained collectivism and Lenin's anti-imperialism. The newly emerging and economically developing nations of Africa shared North Korea's strong sense of nationalism, agrarian characteristics and distrust of the superpowers and their ideologies. Kim's Juche offered greater pragmatism than communism, yet justified authoritarian rule as practiced in many newly emerging African nations. Man was designated the prime mover of history rather than Marx's inhuman historical phases and dialectical materialism. For developing nations, this meant they need not await evolution through a series of historical phases but rather, relying on the leadership of a single man, they could leap forward economically.

Kim Il Sung, intent upon deterring his foes and impressing his Third World friends, pressed his subjects unrelentingly to fulfill the astonishing goals set forth in his economic development plans. These goals appear to have been wed more to his political aspirations, i.e. national reunification and leadership of the Third World, than to economic realities and needs. North Koreans nevertheless responded by achieving amazing levels of industrial and agricultural production in the 1970s and early 1980s, at least until the mid-1980s.

For reasons yet to be fully deciphered, North Korea's economy faltered in the 1980s. The economic downturn, it is critically important to note, began at least five years before the Soviet Union's collapse in 1990. True, North Korea's economy was closely linked to that of the Soviet Union. Also, Pyongyang's economic woes paralleled those of Moscow. Pending further research, however, available data suggests a more complex scenario for Pyongyang's economic decline than its linkage to the Soviet Union.

Lost Friend: The Soviet Union's inability to follow through on some of its promises to North Korea adversely affected, but was not solely responsible for the DPRK's decline. In 1983, Moscow announced it would help Pyongyang build a huge petro-chemical complex, the Sunchon Vinalon Complex. The plant was to have produced annually 100,000 M/T of fabric, one million M/T of carbide, and 900,000 M/T of nitrogenous fertilizer. By 1989, only phase one of construction had been completed. Ever since, the plant's 50,000 M/T of vinalon has not been exceeded and further construction was not resumed. Construction of the Sariwon Fertilizer Plant began in 1986 with Soviet help, slowed dramatically after Moscow pulled out of the project.

Moscow had also announced in 1986 that it would build two modern nuclear power plants on North Korea's east coast. The plants' completion were crucial for attaining the Second Seven Year Plan (1986-93) goal of 100,000 million kilowatts of electricity generation. This goal was never achieved, and the Shinpo project never got beyond the planning stage until 1997. That year the South Korea, Japanese and European Union funded Korea Peninsula Energy Development Organization (KEDO) assumed responsibility for the project in exchange for North Korea's discontinuation of its nuclear weapons program.

1990 Oil Shock: North Korea until 1990 was able to rely on a steady supply of crude oil at favorable prices and credit terms from China and the USSR. The supply from the USSR ended when that nation collapsed in 1990. The reduced flow of crude oil severely disrupted the

production of chemical fertilizers, and the generation of electricity at the 200 megawatt thermal power plant at Unggi (Sungni) near the Najin-sonbong Free Trade Area. China continued to supply crude oil, but in 1992 shifted from charging North Korea its discounted “friendship” price with long term, favorable credit to requiring cash or barter payment prior to delivery. Iran and Libya became other important suppliers of crude oil.

**Chart VI. DPRK Crude Oil Imports
1989-1996 (Metric Tons)¹**

Exporter	1989	1990	1991	1992	1993	1994	1995	1996
China	1,140	1,160	1,100	1,100	830	1,050	1,020	1,000*
Russia	500	410	-0-	-0-	-0-	-0-	-0-	-0-
Libya	-0-	-0-	200	200	80	100	80	-0-
Iran	920	980	220	220	-0-	210	-0-	-0-
KEDO	-0-	-0-	-0-	-0-	-0-	500	500**	
Total	2,650	2,450	1,890	1,520	910	1,360	1,600	1,500

*Extrapolated from statistics for the first two quarters of 1996.

**Korea Peninsula Energy Development Organization supplied heavy fuel oil.

The dependence of North Korea’s industry and railroad system on oil products is surprisingly small, as suggested in the estimates below. Of the eight power plants North Korea built in the 1980s, six burn coal and two rely on hydro-power to generate electricity. Ninety percent of the railroad network is electrified. Coal, abundantly available in the nation’s northeast mountains, also sustains steel production and is the most common fuel in cities for heating residences and cooking food, wood being the preferred alternative in rural areas.

**Chart VII. Estimated DPRK Energy Supply
by Type - 1996¹**

Coal -	59%
Wood -	33%
Crude Oil -	3%
Hydro	2%

The best estimates available for petroleum fuel consumption suggests the leading users are the military, transportation, agricultural and industrial sections, in that order. Between 1990 and 1996, the military’s consumption of diesel oil nearly doubled while that of the agricultural sector declined by one third (see chart below). The transportation sector’s consumption also

declined during the same period while that of the military increased. Apparently, the military received preference in the allocation of petroleum products, a conclusion consistent with perceived political priorities. After 1990, the shortage of fuel for civilian impeded the use of farm machines and production of chemical fertilizer. Farm productivity subsequently suffered.

**Chart VIII. Demand for Refined Petroleum Products
by Sector - 1990-96¹**

Sector	Diesel Oil		Gasoline		Kerosene/Jet Fuel	
	1990	1996	1990	1996	1990	1996
Industry	12%	5%	0%	0%	0%	0%
Transport	35%	30%	74%	60%	3%	8%
Residential	0%	0%	0%	0%	55%	60%
Agriculture	16%	11%	0%	0%	0%	0%
Fisheries	3%	4%				
Military	27%	50%	26%	40%	14%	32%
Other	6%				28%	

In 1994, the DPRK asked the United States to compensate its discontinued construction on two nuclear power plants by supplying annually 500,000 metric tons of heavy fuel oil (HFO) until completion of the two light water nuclear reactors promised by Washington as part of the US-DPRK Agreed Framework. (HFO is the thick black residue remaining after lighter fuels like gasoline, kerosene and diesel fuel have been extracted from crude oil. Used primarily as a fuel for power generators and marine engines, it usually must be heated to move it through pipes.) Beginning in December, 1994, the Korea Peninsula Energy Development Organization (KEDO), based in New York City and funded largely by South Korea, Japan and the European Union, have supplied North Korea the agreed upon amount of HFO.

Despite this huge supply of HFO, the generation of electricity declined through the 1990s. North Korean officials complained loudly and often that KEDO was not supplying the promised HFO on a timely basis. KEDO did struggle to keep the deliveries on schedule. The decline in electricity, however, was due more to the dilapidated state of North Korea's thermal generating plants. Power generating equipment at North Korea's main thermal power plants at Sungni, near the northeast port of Najin-sonbong, and Pakchon in eastern South Pyongan Province, and Pyongyang's main thermal generating plant was installed in the 1960's. At the

Pyongyang plant, a coal burning facility, HFO was mixed with coal to increase the fuel's heat producing capacity. But both the boilers and generators were prone to frequent mechanical failure.¹

Fertilizer: The Soviet Union's inability to fulfill its pledge to help construct the Sunchon and Sariwon complexes, plus the discontinuation of its supply of inexpensive crude oil, undercut North Korea's ability to achieve its Second Seven Year Plan (1986-93) goal of 7.2 million M/T of chemical fertilizers. But this may have been more a blessing than a handicap. In 1991, the UNDP's resident representative Farug Akizad, a Massachusetts Institute of Technology educated career UN civil servant of Pakistani ancestry, warned in an "advisory note" to the DPRK government that its practice of intense use of chemical fertilizers had led to "land degradation." His warning appears to have gone unheeded, at least until 1996. Already by 1989, excessive use of chemical fertilizers had severely depleted the soil's fertility in rice paddies and maize fields.¹

After 1989, the average application of chemical fertilizer to cereal crop land declined from a reported one metric ton per hectare to 750 kilograms in 1994, and then to 500 kilograms in 1995. The reduced application was more a consequence of declining supply rather than a concern for the soil's fertility. Agricultural officials and cooperative farm managers across the land were hard pressed to achieve the unrealistic goal of 15 million M/T of grain by 1993.

In their relentless quest to satisfy their "Great Leader's" political goals, these officials further damaged North Korea's future economic prospects in the agrarian sector. Hills and mountain sides were stripped of trees and brush to move room to plant more fields of maize. Erosion followed, filling irrigation systems with silt and washing away dykes and revetments. The increasing run off of rain water polluted with large amounts of chemicals increased soil acidification, further depleting the farmland's fertility. Wells for drinking water became unsafe for human and animal consumption. Pollution of lakes and rivers reduced fish populations. The nation's ability to produce food was severely impeded by the early 1990s.

In 1995, DPRK authorities reportedly told UN WFP officials the nation's supply of chemical fertilizer totaled 590,000 metric tons - 350,000 M/T of urea and 240,000 M/T of phosphoric fertilizers. Potassium fertilizers had previously been imported, usually from China, but the lack of international credit and shortage of hard currency for commercial purchase had halted the foreign supply. As of March 2000, North Korea's stock of chemical fertilizer stood at 60,000 metric tons. At the time, the spring transplanting of rice and maize required the distribution of 750,000 metric tons of fertilizer. Later that same year, South Korea donated 200,000 metric tons of fertilizer to North Korea. Nevertheless, a critical shortage of fertilizers and herbicides persists in North Korea.¹

Irrigation: By 1993, North Korea's extensive irrigation system was in disrepair. After its completion in the late 1970s, the government invested little in its maintenance. The UNDP estimated that in 1998 North Korea had 1.9 million hectares of farm, of which 980,000 were irrigated. This is nearly a 30% drop from the 1,400,000 hectares claimed a decade earlier. Most

of the irrigation system's 32,000 pumps were installed in the late 1960s and early 1970s. All are of Soviet design, making spare parts virtually impossible to obtain. These pumps, plus 950 kilometers of steel pipe (out of a total network of 1,990 kilometers) must be replaced, according to UN FAO studies based on data provided by DPRK officials in 1997. The estimated cost is US \$10.5 million over a two year period.

Where pumps and pipes are still in working order, the pronounced shortage of electricity frequently disrupts the flow of irrigation water. This is particularly true when irrigation water is needed the most, as was the case during droughts in the spring and summers of 1996, 1997 and 2001. When drought conditions lower water levels at reservoirs, the government preserves the stored water to flood rice paddies during the spring planting of seedlings. This, however, reduces the generation of electricity which is essential to run the pumps needed to distribute irrigation water to the rice paddies. As a consequence, the entire planting cycle can be disrupted.

Building more dams and thermal power plants is not the solution. The problem is not one caused by a shortage of energy. Rather, it is an excessive reliance on electricity that is the root of the problem. The only way to rectify the situation is to shift the entire irrigation system from dependence on electric pumps to gravity to distribute water. Nature's less mechanical, but more reliable and environmentally compatible system - gravity - was ignored, at least until 1997. At the behest of the International Fund for Agricultural Development (IFAD), major portions of North Korea's irrigation system are now being reconfigured to take advantage of gravity.¹

Mechanization: The DPRK government claimed in 1979 that its farms were equipped with 70,000 tractors. What happened to these machines and tractor production in subsequent years is not explained. In 1998, the government told UNDP officials the nation only had sufficient fuel for 20,000 tractors. It also asked the UN to supply it 7,500 agricultural vehicles and 30,000 tires. That year the UNDP estimated "motorized" farming had declined by as much as 60% in recent years. Anecdotal evidence suggests the relatively small number of tractors still being used in North Korea are in need of repair and new tires. Anyone who has traveled outside Pyongyang has seen the very old, worn out red Soviet designed tractors with two small front tires and two very large ones in the rear. More of these tractors are used to haul people and farm products than to plow fields. Rather than six tractors per 100 hectares of farm land, it would seem each farm has only one or two working tractors. The UN FAO estimates about 800,000 oxen are available nationwide to assist with the plowing.¹

**Chart IX. Estimated Energy Demand
by Sector -1996**

Residential	48%
Industry	29%
Transportation	3%
Agriculture	5%
Fisheries	6%
Military	4%

Public/other 5%

One can only conjecture about the reasons for the decline in farm machines. Not only are tractors few and aging, rice planting machines are equally rare. Trucks are more often seen broken down on the road side than hauling cargo. Harvesting and threshing are done for the most part by hand. UN agricultural experts have been allowed, after considerable effort, to visit in 1997 what was once the nation's major tractor producing plant, the Kumsong General Tractor Plant. Production, however, had been shifted to tracked vehicles for the military, including armored personnel carriers, and four wheel drive military vehicles such as off road scout cars and trucks. The production of tires for tractors had also been shifted to military use tires.

Just when North Korea's production of tractors and other farm vehicles shifted to military use vehicles is unclear. Beginning in the mid-1970's, North Korea intensified its efforts to become self sufficient in the production of many of its weapons and military support materials. Between 1984 and 1992, the army added about 1,000 tanks, over 2,500 armored personnel carries, and 6,000 mobile artillery pieces and rocket launchers. Production of self propelled guns and multiple rocket launchers continued well into the 1990s. Each of these weapons requires several vehicles to transport men, parts and ammunition. Many of these types of vehicles were produced for export, primarily to nations in Africa and the Middle East to pay for oil and raw material imports. The export of arms apparently peaked in 1988 at an estimated US \$700 million. It has subsided ever since, falling to under US \$100 million in 1994.¹

Surge in Construction: Political preferences, more than communist economics, appear to explain some of the shortcomings of Kim Il Sung's, economic development plans. In the 1980's, Kim's soon Kim Jong Il stepped forward and began to assume his father's responsibilities on the domestic front. As we have seen, Kim Il Sung in 1980 set unrealistic goals for agriculture in the forthcoming decade. But during that decade, 1980-89, the government's allocation of resources for agriculture declined. At the same time, there was an unprecedented surge in construction, particularly in Pyongyang. Kim Jong Il was prominently depicted at many of these construction sites, suggesting these projects could have been his initiative.

Some of this building was intended to improve the industrial and agricultural infrastructure. Construction was completed at eight new power plants (five thermal, coal fired with a generating capacity of 3,350 Megawatts (MW) of electricity, two hydro-electric to generate 946 MW, and one 5 MW nuclear plant at Nyongbyon). The huge West Sea Barrage project, with its 100,000 hectares of reclaimed farm land, irrigation network, and three electricity generating dams contributed significantly to the nation's agricultural infrastructure. Five new factories were built: two to forge and press steel, one to process ore, one to make cement and one to produce synthetic textiles.¹ The transportation and light industry sectors, however, were virtually ignored. No new roads were built or any paved. Only 252 kilometers of new railroad track were constructed to link the north central Chinese border town of Manpo with the border town of Hyesan to the east. Port facilities were neither modernized nor expanded.

Instead, Kim Jong Il orchestrated a tremendous surge in construction in Pyongyang and

the production and export of munitions. The concentration of new building in the capital appears to have been motivated by Pyongyang's anticipated co-hosting with Seoul of some 1988 Olympic events. After acts of terrorism against South Korea's precluded such a possibility, Pyongyang turned to hosting the International Youth Festival of 1989. During the five months prior to the festival, seven huge new buildings and a massive stadium were completed in time for the festival. Another fourteen major sports facilities were erected in Pyongyang by decade's end. Specialized gymnasiums contained 282,000 square meters of floor space. Three new stadiums included the largest ever to be built in Asia - the huge May Day stadium. The steel roof, which covers the seats for 150,000 spectators, resembles a parachute. Five huge theaters with seats for more than ten thousand persons, an amusement park, bowling alley and golf course were built. Four hotels were completed, including the 45 story, twin tower Koryo Hotel.

But the most massive erection was the 105 story, 7,665 room Ryugyong Hotel that dominates the Pyongyang skyline. This towering pile of cold, grey concrete almost matches the United State's Empire State Building in height, but the Pyongyang structure is useless. Elevators cannot run in the structure's crooked shafts. The Pyongyang Central Youth Hall (60,000 square meters of floor space with 760 rooms), Pyongyang Circus (70,000 square meters of floor space in five buildings with 3,500 seats and Chongryu Restaurant (12,000 square meters of floor space with room to accommodate 1,000 customers) were also built during the decade.

The surge of construction in Pyongyang served other purposes as well. The Grand People's Study Hall (floor space 100,000 square meters) and Mangyongdae Children's Palace (103,000 square meters of floor space, 690 rooms plus a swimming pool and huge fountain) were completed in 1982 and 1989 respectively. The Changgwang Health Complex (38,000 square meters of floor space) and the Pyongyang Maternity Hospital (60,000 square meters, thirteen stories high, 2,000 rooms and 1,000 hospital beds) were both completed in 1980.

Apartment construction in Pyongyang also surged. At least 40 high rise apartment buildings were built. The Munsu district of Pyongyang was completed in 1983 with the construction of twelve fifteen story towers containing at least 5,250 individual apartments. Pyongyang's Changgwang district was finished in 1985. It contains eighteen buildings, each forty stories high with apartments measuring 150 to 160 square meters each. The largest apartment complex was completed in 1989 in the northeast district named Kwangbok (Liberation). Here there are 20,000 apartment units, each measuring 110 square meters and bordering a 100 meter wide, six kilometer long street, plus the Kwangbok Department Store. The area is connected to central Pyongyang by a newly built trolley system.

Pyongyang's building boom was topped off with the erection of five massive monuments and the 45,00 square meter Mansudae Assembly Hall to house the Supreme People's Assembly during its annual, three day sessions. The monuments included the Juche Tower and Arch of Triumph, both completed in 1982 to celebrate Kim Il Sung's birthday.

Virtually unnoticed at the time was the quiet surge of construction along the northern edge of the Demilitarized Zone (DMZ). Beginning in the late 1970s, North Korea deployed

much of its huge land army and mechanized equipment with a thirty kilometer wide strip of land that parallels the DMZ. This deployment required the construction of a massive network of underground, steel reinforced concrete bunkers, roads and support facilities. The need to maintain the nation's irrigation system and to improve its road and railroad networks could not compete with the emphasis on the qualitative and quantitative upgrading of the nation's already huge military establishment. Instead of producing new tractors, tires, and other farm machines, factories assembled what the nation's military demanded: tanks, armored personnel carriers, artillery, and ammunition.

One can only guess at the resources invested in these two pursuits. Industry must have been heavily taxed to fulfill the demand for steel, cement, glass, electrical wiring, home appliances and furniture, tools and spare parts for military vehicles and construction equipment, etc. The nation's limited inventory of machines - trucks, cranes, bulldozers, etc. - must have been worn out. Little wonder, therefore, that the goals of the second Seven Year Plan were never achieved.

Seoul, South Korea enjoyed a building boom in the 1980s, but this phenomenon enhanced prospects for the nation's economic future. Like Pyongyang, much of the building in Seoul was designed to fulfill the needs of hosting a major international event - the Seoul Olympiad. But in Seoul, unlike Pyongyang, the effort generated new wealth for people across the nation. It improved the nation's infrastructure, including highways and airports, enhancing productivity and encouraging foreign investment. North Korea's building boom had none of these collateral benefits.

The investment of human labor undoubtedly was enormous. Alas, little of this construction benefitted the general population. The monuments and huge meeting hall for the Supreme People's Assembly appealed to Kim Il Sung's ego at the height of his so-called "personality cult." The towering high rise apartment structures certainly catered to the aspirations of the KWP's ranking members, and probably enhanced prospects a smooth political transition from the senior to the junior "Great Leader." But only the elite benefitted since the workers who built these impressive structures received nothing tangible in return other than medals for their overwork and the usual ration of grain.

1980's Grain Production: Something had to give. Farm production was expected to continue rising primarily because of the "Great Leader's" "Juche farming" methods. But in 1990, grain production according to official figures dropped below the 6 million ton mark and imports climbed to one million tons. Kim Il Sung's dream of a 15 million ton harvest proved unattainable. Over lunch in October, 1993, Kim Il Sung claimed to a visiting US Congressman that North Korea's agriculture was in excellent condition. He described how "Juche" agriculture

**Chart. IIb. DPRK Grain Production and Imports
1981-2000 - 1,000 Metric Tons¹**

Year	Rice	Maize	Total	Other	Production (a)	Potato	Imports
1981	3,045	2,345	5,390		5,800	232	
1982	3,294	2,419	5,713		6,033	181	
1983	3,290	2,477	5,767		6,184	557	
1984	3,496	2,632	6,128		6,560	525	
1985	3,369	2,536	5,905		6,333	317	
1986	3,805	2,864	6,669		7,114	569	
1987	3,538	2,663	6,201		6,629	399	
1988	3,394	2,554	5,948		6,371	382	
1989	3,500	2,680	6,180		6,594	528	
1990	3,085	2,380	5,465		5,866	1,056	
1991	2,870	2,120	4,990		5,406	750	1,190
1992	2,500	2,110	4,610		4,973		921
1993	2,300	1,960	4,260		4,593		1,472
1994	2,500	2,140	4,640		4,951		1,205
1995	2,140	1,900	4,040		4,245	183	1,743
1996	2,300	2,000	4,300		4,480	147	879
1997	2,347	1,138	3,485		3,980	32	634
1998	2,155	1,609	3,764	375	3,709		910
1999	2,103	1,525	3,628	189	3,445	1,813	1,057
2000	1,690	1,040	2,730	246	2,920	1,870	
2001	1,340	1,480	2,820	117	3,540	1,880	

*See page 15 for earlier years, Chart 1A.

had been further refined by replacing cold with warm water in rice paddies, further increasing rice production. The aging Kim, citing his son's handling of domestic affairs, could look confidently to the future and continuing bumper harvests of grain.

The reality, however, was one of declining production and mounting imports continued into the 1990s. Unable to import grain from the USSR after 1990, Pyongyang shifted to the United States. When pressed to pay for these imports, it turned to China in 1994. Ultimately, it called upon the international community in 1995 for food aid.

CONCLUSION

North Korea's problems are akin to an onion. Numerous layers enclose the problem. Removal of one reveals yet another layer. Discovery of one more layer does not necessarily invalidate earlier revelations. Rather, they deepen our understanding of the problem's depth and magnitude. Most policy makers and the general public in the nations of North America and

Western Europe paid little attention to the Korean peninsula's problems until 1994. That year, the threat of a nuclear armed North Korea rallied the attention of most nations in the world. The US-DPRK Agreed Framework of 1994 defused the crisis, and subsequently the world's concern. Then came the floods of August 1995. The world rediscovered North Korea. Abruptly, the international news media converted North Korea from a menacing "rogue" nuclear power into a feeble nation of starving people. Yet another layer of North Korea's reality had been revealed.

Ever since, a budding corps of "Pyongyang" watchers has competed to identify the true source of North Korea's problems. The community of international humanitarian organizations diagnosed the problem in 1996 to be a lack of food security, that is hunger. Then the new "experts" rushed to explain the causes for hunger. Some accented nature's whim. Other's pointed to the shortcomings of communism, the lack market economics and the collapse of the "Communist" bloc and the Soviet Union. America's half century of economic sanctions were faulted. So too was North Korea's emphasis on maintaining a huge military establishment despite the cost to its civilian economic sector and citizens. Some well informed experts emphasized North Korea's shortage of energy and its inability to purchase foreign fossil fuels and to generate low cost electricity using modern technology. None can deny that each of these factors, to varying degrees, has adversely affected North Koreans' ability to feed themselves. Each explanation, furthermore, has deepened our knowledge and understanding of North Korea.

Yet responsibility for the calamity North Koreans have experienced since 1995 cannot be assigned to inanimate philosophical systems and institutions, nor to foreign nations. After all, North Korea achieved impressive economic gains under the influence of Marxism-Leninism, communism and socialism. Nor should the "Soviet" model for economic development be the focus of blame. Soviet economic influence must be partially credited with conforming to conditions in North Korea. Its accent on heavy industry and mining was consistent with the industrial infrastructure Japan's colonialists built prior to national division in 1945. This emphasis also conformed to the abundant mineral resources found in North Korea.

The impressive pace of North Korea's reconstruction after the Korean War was a consequence of the North Korean people's eagerness to labor in incredibly difficult conditions, physical and psychological, for marginal material benefit to themselves. Once they had rebuilt their nation, they produced bountiful harvests for more than a decade. Simultaneously, they equipped a one million man army with modern weapons, housed them in an extensive system of underground concrete bunker, built factories inside mountains, huge dams, and a capital city full of high rise apartments and massive monuments. All the while, they were driven by their "Great Leader's" promises of national unification, international respect and safety from the "imperialists." They trusted and respected one man above all others, Kim Il Sung. Those who chose an alternate course quickly found themselves ostracized from society, some even erased from its ranks.

North Korea's accomplishments belong to its people, its failings to its "Great Leader." He alone was empowered to decide national priorities and to allocate its scarce resources. Kim Il Sung was no different from any other dictator. He was a brilliant, arrogant, self centered and charismatic politician. Kim selected elements of Marxism-Leninism, European communism and

socialism, Stalin's Soviet model for economic development and Mao Tse-tung's rural land reform. While crafting his own ideology of Juche, Kim consolidated his political power. For Kim Il Sung, politics was an all consuming preoccupation, first domestically and then internationally. Ideology did not forge him. True, study of Marxism-Leninism and Stalin's political and economic practices influenced Kim. But Kim exploited ideology, and his mentors, to forge himself into the personification of the nation. Kim's domain belonged to no other, and certainly not to either of his benefactors in Moscow or Beijing. Just as political ambition drove Kim, so too did Kim use his nation's thirst for national reunification and distaste for foreign superpowers (i.e. the imperialists) to drive his subjects, the Korean people.

Excesses ensued. Kim elevated himself to the role of "Great Leader." He became infallible, his "on the spot guidance" beyond question. Egalitarianism was rejected in favor of a rigid hierarchy. Members of the military and the Korean Workers Party monopolized the benefits of society to ensure their loyalty to him. The "state" allocated food, education and occupation according to service to the Great Leader. Marx's theory promised workers would rise to a status, social and economic, equivalent to the powerful and wealthy. But in Kim's Juche "paradise," "workers" in factories and farms labored selflessly to serve the Great Leaders, and his goals of national unification and self reliant defense.

Kim's preoccupation with perpetuating his political power and pursuing his political objectives made economic concerns secondary. The nation's economic infrastructure reflected these priorities. National production focused on supporting the military, Kim's political club for maintaining his power and pursuing his goal of national reunification. He pressed his people to produce huge harvests of grain not out of a concern for their welfare. Instead, he sought to impress the leaders of developing, ideologically non-aligned nations and to lend credibility to the claims of his "Juche" philosophy. In the process, he destroyed the fertility of the nation's farmlands, denuded its hillsides, and wore out both the agricultural infrastructure and its farm population. Just as the Chinese political philosopher Mencius two millennia ago warned, the despotic ruler's misdeeds would invite nature's wrath. Nature responded with flood and famine beginning in 1995.

Kim Il Sung and his son alone are not responsible for the calamity that befell North Koreans in the summer of 1995. The Soviet Union's failure to fulfill its promises to build the huge chemical fertilizer factory at Sunchon's vinalon complex, its inability to build the nuclear power plants at Shinpo, and other failures contributed to North Korea's economic downturn. The rains of August 1995 were indeed excessive and unleashed terrible floods and massive erosion. But it was the political preferences and practices of Kim Il Sung and his son that impeded North Korea's ability to minimize the negative consequences of these natural phenomena.

But the international humanitarian effort that has focused on North Korea since 1995 was not born of political considerations. Rather, its focus was to minimize the suffering of North Korea's hapless population. In this regard, the effort clashed with those of North Korea's "Great Leader." Kim's successor Kim Jong Il sought to perpetuate his power, and his father's political

legacy. Others outside North Korea, particularly in Seoul and Washington, sought the opportunity as being one of radically reforming North Korea. The international humanitarian community, however, initially focused on long over looked concerns - the health and welfare of North Korea's people. What ensued was a clash of wills. In Washington and Seoul, the focus has been the political question of whether the humanitarian effort would promote either a "hard" or "soft" landing of the North Korean regime. In Pyongyang, however, the contest of wills centered on a very different political concern - the extent to which the North Korean government would allow the international community to engage and to assist North Korea's long silent and politically disenfranchised majority. Here we turn to assessing the role of the American humanitarian aid organizations in this contest.

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3. US Geological Survey, “Land Form, Land Cover and Crop Use Intensity Mapping for Agriculture Rehabilitation and Food Security in the DPRK,” Sioux Falls, USA, 1998.
4. Dr. Hong Sung-un, *Economic Development in the DPRK*. Pyongyang, Foreign Language Publishing House, 1990. Pp. 45-58. Kim Il Sung, *Report to the Sixth Congress of the Workers’ Party of Korea on the Work of the Central Committee*. Pyongyang, Foreign Languages Publishing House, 1980. Pp. 12-19. Andea Savada, *North Korea, A Country Study*. 4th Edition. Washington, D.C.: Library of Congress, 1994. Pp. 126-139.
5. Official DPRK calculations of crop tonnage muddles more than clarifies actual tonnage harvested. Official announcements in the 1970s and 1980s claimed harvests in excess of six million metric tons, occasionally seven million tons. Such claims, however, included unhusked rice, commonly referred to as “paddy,” and maize still on the cob. Also included was the tonnage of harvested potatoes. Local farm managers and officials undoubtedly exaggerated the size of their harvests to impress superiors in Pyongyang and to compete for resources. In later years, when the harvests declined and food became short, the process in all likelihood was reversed. Local authorities withheld grain from the central authorities, and some crops were concealed from the central government. Illicit practices such as these were traditional copping methods during times of want in pre-modern Korea and during the Japanese colonial occupation, 1904-1945.
6. Lola Nathanail, “UN WFP Food and Nutrition Assessment - DPRK - March 16-April 24, 1996. P. 10.
7. Discussions with numerous DPRK officials between 1992 and 2000).
8. Interviews with Ministry of Agriculture, Academy of Agricultural Sciences and state farm officials and managers. Also see: Trevor Page, “2nd Draft of Report: FAO/WFP Crop and Food Supply Assessment Mission to the DPRK,” December 12, 1995. P. 5.
9. *Glorious Forty Years of Creation. III*. Pyongyang: Foreign Language Publishing House, 1990. Pp. 202-204.
10. Pang Hwan-ju, *Korean Review*. Pyongyang: Foreign Languages Publishing House, 1989. Pp. 135-142. Data in this book is taken verbatim from Kim Il Sung’s 1980, *Report to the Sixth Congress of the Workers’ Party of Korea.... Op. cit.* Pp. 12 and 16.

11. Hong, *op. cit.* Pp. 208-215.
12. Pang, *op. cit.* P. 116; UN FAO, *DPRK Agricultural Recovery and Environmental Protection (AREP) Programme. Volume 2, "Working Paper 1: Irrigation and Civil Engineering."* Rome: UNFAO, 1998. pp. 14-20; Savada, *op. cit.* P. 149.
13. Pang, *Korean Review.* P. 239.
14. Savada, *op. cit.* P. 137. Hong claimed 1984 production reached 5 million metric tons (M/T). *op.cit.* P. 50.
15. UN FAO, *DPRK Agricultural Recovery and Environmental Protection (AREP) Programme. Volume 2, Working Paper 2, Agricultural Mechanisation.* Rome: UN FAO, 1998. Pp. 1-10.
16. Kiseok Lee, "Prospects of Inter-Korean Cooperation in Agriculture," unpublished manuscript, Department of Economics, Kyung Hee University, 2000. Professor Lee does not specify where he obtained this data. It appears to be a composite of data assembled from a variety of sources, both official DPRK data and data obtained from the UNFAO. The final decade of data, 1990-2000, (which appears later in this paper) is definitely taken from the UN FAO's annual crop assessment reports compiled annually since 1996. Total grain production figures exceed US Department of Agriculture estimates. An alternative source could be the Bank of Korea's annual estimates regarding the DPRK economy. Data on "other" grain (barley and wheat) and potato production for the years 1995-2001 have been added to Professor Lee's data from UNFAO annual crop assessment reports, 1996-2001.

Most likely, production figures for years prior to 1995 were taken from official DPRK claims, but appear to have been adjusted to account for rice not husked and undried maize still on the cob. US Department of Agriculture estimates compiled at the US Embassy in Seoul put total rice and maize production between 1985 and 1990 at a low of 4.180 million M/T in 1990 and a high of 5.251 million M/T in 1986. These estimates, however, do not include potato production. DPRK figures usually include potato production and this could account for a major portion of the higher production figures in Chart I. above.
17. This unpublished data was provided by UNDP specialists in Pyongyang.
18. Trevor Page, "2nd Draft of Report: FAO/WFP Crop and Food Supply Assessment Mission to the DPRK," December 12, 1995. P. 5.
19. Interviews with DPRK officials and, Trevor Page, "Draft Overview Paper for US Agency for International Development," March 1, 1996. Pp. 4-5.
20. Kim Il Sung, "The Questions of the Peasant Market in a Socialist Society and of the Way to Abolish It." in: *On the Management of the Socialist Economy.* Pyongyang: Foreign Languages Publishing House, 1992. Pp. 290-294.

21. Personal observation, and Lola Nathanail, *Op. cit.*
22. Kim Yong-yun, *Pukhanin*. Seoul (August 1997) pp. 134-145.
23. UN FAO estimates that include reclaimed tidal areas and hill slopes for maize. Data is rounded to the nearest thousand. See DPRK data reported in: UN FAO/WFP, "Crop and Food Supply Assessment, DPRK." UNFAO, November 25, 1997. Page 8.
24. Trevor Page, "Draft DPRK Mission Report," Pyongyang, December 18, 1995. P. 17.
25. This data was collected from: Kim Il Sung's 1980 Report to the Sixth Congress, *op. cit.*; Hong Sung-un, *op. cit.*; Pang Hwan-ju, *op. cit.* Savada, *op. cit.*; Shyam Hoshy, *Korea People's Paradise*. Pyongyang: Foreign Languages Publishing House, 1995; and Naewoe Press, *A Handbook on North Korea*. Seoul, 1998.
26. David Von Hippel, *Demand for and Supply of electricity and Other Fuels in the DPRK*. Berleley, CA.: Nautilus Institute, 1997. P. 94. Based on data from Chung Woo-jin, *The Energy Industry of North Korea*. Seoul, 1996.
27. Von Hippel, p. 99.
28. Von Hippel, p. 100.
29. Personal discussions, 1995-97, also see Von Hippel.
30. Savada, *op.cit.* P. 137.
31. March and September 2000 discussions with UNDP specialists in Pyongyang, and Trevor Page, "2nd Draft of Report: FAO/WFP Crop and Food Supply Assessment Mission to the DPRK," December 12, 1995. P. 5.
32. UN FAO, *DPRK AREP Programme. Vol. 2*. "Working Paper I," p. 6, and "Working Paper 1, Appendix 3," pp. 1-3.
33. UN FAO, *DPRK AREP Programme, Volume II*, Working Paper 2. Appendix 2. Agricultural Mechanisation Programme (no page numbers).
34. Savada. P. 226. U.S. Defense Intelligence Agency, *North Korea - The Foundations for Military Strength - Update 1995*. Washington, D.C.: 1995. P. 24 and 7.
35. The information for this section was compiled from: Han bom-jik, editor, *Construction in Korea*. Pyongyang: Korea Pictorial, 1991. Hong, *op. cit.* Pang, *op. cit.* DPRK National

Directorate of Tourism, *A Sightseeing Guide to Korea*. Pyongyang: Foreign Languages Publishing House, 1991.

36. See footnote 16 above for source and discuss of data.

