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LESSONS FROM TAIWAN

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Countries other than Taiwan improved their agricultural production between 1960 and 1970, a period for which good figures are readily available. Russia was among them, but Russia's long-term track record was dismal compared with Taiwan's. Russia was the prototype of large-scale mechanized farming under what would elsewhere be corporate management, and agriculture never being considered a priority, the best managerial talent was directed elsewhere. As so often was the case in very large scale operations, the workers concentrated on doing as little as possible, with frequent cheating and ripping off tools and other items from the corporation.

Perry Prentice, vice president of Time/Life, now retired, commented that the profit motive is a vital motivating force, and that Taiwan had hitched this force to the front of the wagon, whereas the Russians had somehow got it hitched up cross-ways in back. Certain it is that the private plots, permitted in almost all iron curtain countries, outproduced acre for acre the large scale collective farms. The collectives have turned out to be a way of marshalling and controlling farmers who otherwise tend to display attitudes of personal independence, inimical to the communist system. Aside from this they are just plain inefficient. Furthermore, they are immune from any long-term personal interest in preserving the integrity of the farm. The managers hope to be promoted

and moved to positions of greater bureaucratic responsibility, and lack the personal feeling that a third generation farmer feels towards providing a good farm for the fourth generation. As many of America's very large western farms pass from personal owner management to corporate management and tenant operation, the same set of circumstances is set up; the corporate owner wants all the rent it can get and the operating tenant wants all he can get out of his share, and who cares about tomorrow?

Land use planners in the Republic of China on Taiwan had problems in the 1980's quite different from those they had in the 1950's. Like western planners, they were intensely worried over the disappearance of good cropland as Industry outbid agriculture in terms of price per hectare. The Taiwan experience is of value because it shows what can be done with a very small area under quite adverse conditions and with a large population, growing at 2.2 percent per year including a heavy influx of refugees which in the early 1980's was still unabated.

During the 30 years between 1942 and 1982 the Republic of China, by plain hard work of the 1850 Yankee variety plus very wise planning, built its own prosperity largely by its own efforts. USAID helped in the earlier years, with massive grants totalling almost 1.5 billion in the first ten years. After that, the amounts dwindled to very little and stopped in 1968.

The prevailing problem in 1952 was rural poverty. At that time 52 percent of the population, just over half, lived on farms or in farm villages. As long ago as 1906 Dr. Sun Yat-sen made it clear in the

San Min Chu I that an agrarian country in the incubating stages of development had to get its poverty population in a position to buy; otherwise it could produce but sales would have to be into the international export market, competing with experienced and rather ruthless operators like Japan. Since the poorest element in the population was the peasantry, the tenant farmers or sharecroppers, this meant upgrading their incomes.

When Japan returned Taiwan to China in 1946, having held and managed it for fifty years since the treaty of Portsmouth in 1896, the Chinese government of Chiang Kai-shek was determined to put Dr. Sun's precepts into practice. The Japanese years had been burdensome. Japan had accumulated a very large public domain which was run as a massive operation involving hundreds and hundreds of sharecroppers. They also established four trading corporations, food, cement, timber, and miscellaneous, and these four companies and the public domain were all ceded to China in 1946. On the positive side, they had built large water storage facilities up in the mountains, and brought irrigation water down to the western plains. These dams also powered larged hydroelectric generators and a surprisingly large part of the island was provided with unreliable electric service in 1946.

The island has a native population of aborigines who are much like the Igorots of northwestern Luzon Island in the Philippines, and they speak a similar language. The Japanese did not treat the aborigines well, but drove them back up into the high mountains. The Chinese went to considerable lengths to make amends. They carried education to remote

villages, provided first-class medical service and generally accepted the aborigines as full members of society when they came out of the hills and sought "ordinary" employment. Their numbers which had dwindled under Japanese rule have increased substantially since the Chinese resumed control.

Chinese rule from 1946 to 1952 left a great deal to be desired. The number of well trained bureaucrats was small and the opportunities for venality large. In 1952 the Chinese Kuo-ming-tang left the mainland which had fallen into the clutches of Mao, and fled to the island. Chiang was born in 1887 and was 65 when he took over the administration of the island. Opinion of him obviously varied greatly. To some of the western press he was a villain incarnate. He was often called a dictator, and in the first few years of confusion on the island he exercised a lot of personal power; but in fairness he never used the tactics which were perfected by experts like Mao and Stalin. One thing he did quite apart from the farming and land issues was to establish the Retired Service Men's Associations. Any retired soldier automatically could have a job in an enterprise operated by the Association, that is, by the government. Through this device government became the employer of last resort. Virtually every male eventually became a serviceman and in due course a retired one. Had this device not been established, the hordes of soldiers who came pell-mell in 1952 could easily have turned into bands of land-based pirates, armed, accustomed to killing and with small regard for the islanders. As it worked out, decorum was rigidly established, and the Retired Service Men's Association became a model of

effective "workfare." The Association operated every kind of enterprise from extensive farms to restaurants to marble works.

The liberal western press rather expected that Chiang would rape the island and mistreat the locals. They, at least, would not have been surprised if he had parcelled out the public domain to a handful of favorites and kept a large amount of the swag for himself. On the contrary, he forthwith put into effect the principles of Sun Yat-sen, and decreed a rent control regulation limiting the rent to 37½ percent of the gross crop, with a written lease for a definite term, terminable by the landlord only for cause. This replaced the traditional Asian share-cropping system in which leases were verbal, fully understood by the landlord and vaguely so by the share-cropper. The landlords' share was traditionally 66 2/3 of the crop, and the landlords' agents in practice squeezed everything they could get out of the tenant and turned over to the landlord as little as they could get away with. The tenants became highly expert at cheating the agents, but did not acquire like skills in production and land use.

A rent control law by itself is remarkably hard to enforce, but simultaneously with the control decree, the government began to sell off the public domain in small parcels* of paddy land or correspondingly large areas of upland. Each farm was sold to the man tilling it, if possible; otherwise, to a working farmer. Regulations prevented the accumulation of land in large amounts by investors. The process of the sale of public land set a pattern and made the tenants realize that the government meant

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*1.2 A of prime, 2.4 A of medium and 4.8 A of low grade irrigated paddy, and correspondingly larger areas of dry land.

business. Terms of the sales were a 10-year mortgage with annual payments geared to 37½ percent of the crop according to estimates made at the time of sale.

The third phase of the land reform program was called the "land to the tiller" phase. Land was bought from former landlords by the government and sold in small parcels to the sharecroppers who had been operating it.

The land reform was accompanied by the introduction of a tax system that also owed its genesis to the genius of Dr. Sun. As early as 1906 Dr. Sun was preaching a tax system which would take all, or at least most, of the profit out of real estate transactions, for the benefit of "all the people." A constitutional provision to this effect was included in the document which Dr. Sun prepared for the fledgling Chinese Republic.

When Chiang Kai-shek came to the island in 1952 he lost no time in introducing the system in Taiwan. It consists of two parts, a land tax with a penalty for leaving unused a plot of urban land. The penalty doubled the land tax after a short period and eventually raised it still higher. Buildings were also taxed but the building tax was locally imposed and collected whereas the land tax is a state level (provincial) levy. The land tax is based on a self appraisal, which must however be within 15 percent up or down from the public assessment which is made periodically in much the same way that a tax assessment is made in the United States. If the self assessment was lower than the government assessment, the government had the right to take the property at the

declared figure. If the declared value was higher than the government figure, the owner had to pay taxes at the latter basis, and pay at a higher base for the computation of the land value increment tax.

The land value increment tax is the second part of the system. At times this has taken as much as 80 percent of the profit out of the top dollar on a speculatively enhanced land price. At the present time, the tax starts at 20 percent on the first doubling (i.e., sale for $4,000 of property bought for 2,000), 40 percent on the next increment, (i.e. sale for $6,000 of property bought for $2,000) and finally 60 percent for all further increments (i.e., sale for $8,000 or more of property bought for $2,000). This works in such a way that the actual tax on an $8,000 sale would be $2,000 @ 20 percent = $400, plus $2,000 @ 40 percent = $800,plus $2,000 @ 60 percent = $1200, total $2400. While this conglomeration is far from wiping out all profit from urban expansion, it is nevertheless a lot stronger attack on the problem than is found in most countries.

This tax protocol reached Dr. Sun's attention in a way sufficiently interesting to warrant a brief comment. Henry George's book, Progress and Poverty, was by no means an instant success. Indeed, quite the opposite; it was largely ignored in the United States but the whole book was translated into German and published in Germany before it was three years old. There it fell into the hands of Alfred Damaschke, leader of the larger of two land reform leagues, each of which included a large number of intellectuals within and without the university communities.

The whole idea found great favor in German advanced thinking and when Germany established a colony on the Chinese coast known as Tsing-tao,

with Admiral Tirpitz in overall charge, civil affairs were turned over to Dr. Schrameier who had been a long-time German consul in Shanghai, a follower of Dr. Damaschke, a fluent Sinologue, and a reasonably close acquaintance of Dr. Sun. Dr. Schrameier installed a land value increment tax in the new colony.

With a whole colony to build from the ground up, urbanization proceeded apace, and as it did land values rose greatly. As this happened so did the yield from the land value increment tax. The revenue produced was large enough so that the new colony financed itself largely out of the increment tax and had handsome tax surpluses. This so impressed Dr. Sun that he persuaded Dr. Schrameier to become his secretary and draft the appropriate parts of the new constitution.

The idea thus travelled from Philadelphia in the United States to China via Germany. Despite the distance travelled and the devious route, it emerged relatively unscathed at the end. On Taiwan the system had been immensely productive and most cities had a fiscal surplus. It must be pointed out that this happens only in dynamic periods of development when property is rising rapidly in value.

In America and England the later history of Progress and Poverty is well known; the book took off and for a book of this sort, became a run-away best seller. In America, however, the intellectual community remained personally hostile to Henry George. In England he did better, but the field of his greatest triumph was Germany.

The third phase of the land reform program was made feasible by two factors, unrelated to each other. The first was the set of excellent cadastral records bequeathed by the Japanese. This showed the

legal owner of each tract in the nation, and while it did not carry the names of the tenants, they were fairly easy to get from the villages themselves. The second factor was the experience that the sharecroppers had had in managing the rice crop.

These factors are currently vital in other third world countries which seek to emulate Taiwan's experience. Few third world countries have any cadastral records; or, if they do, they are in bad shape and not up to date. Vietnam had this problem; the French had left the skeleton of a cadastre, but it was not definitive enough to be used by itself. As a result, low level aerial photographs were taken, and field crews took them out into the villages and sat down with the elders to discuss ownership and tenancy. In many cases there was no dispute, in others ownership was much disputed and, in a few, changes in tenancy brought the latter into question.

The Philippines also had to deal with the cadastral question. Thousands of titles had been issued by the central government but delivery to the new owners had been held up in either the courts or by the bureaucracy because of squabbles over ownership. Usually these seemed to involve fractional interests, which had arisen because heirs had scattered, some doing office work in Manilla, some working in a local rice mill, and a few left in the village. The very large families which characterized the Philippines 25 and 30 years ago had been an aggravating factor. Marcos had appointed Jerry Montemayor, former president of the Philippine Federation of Free Farmers and a life-long advocate of real land reform, as vice minister to break the title logjam. The idea was to get the titles

distributed, as Taiwan did, leaving the squabbles unresolved on the ground that the latter could be unscrambled at leisure.

Other third world countries are on the horns of the same dilemma. As Taiwan was in 1952,El Salvador, for example, needs land reform as badly as any country on the globe. The campesinos have generally had a good deal of experience working as hired hands for the latifundia, a bit like the minority field hands who worked the plantations of the deep south. Someone was always on hand to tell them what to do next. This was the opposite of the Taiwan peasant rice grower who had made his own decisions for generations, when to plant, when to flood the paddy, when to take the water off, when and how to weed the paddy, and finally when and how to harvest the crop.

El Salvador had only an inadequate cadastral record dating before the present effort at land reform. As was done in Vietnam, low-level aerial photography would make an "instant cadastre" possible. Furthermore, as in Vietnam, it is more important to do the job quickly than to do it perfectly. Had we had six more months to work in Vietnam before the great pullout, we would have completed the bulk of the land reform; and the evidence was persuasive that, where it was completed, support for the guerrillas virtually disappeared.

Returning to Taiwan, the landlords were paid at the rate of 2½ times the "average crop" at the time of sale. They received ten-year bonds plus stock in the corporations which the Japanese had left behind them on retrocession. The bonds, in turn, were written not in cash terms but in terms of the cash value of a certain quantity of commodities,

especially rice. The idea was that, if inflation took hold and the Taiwan dollar became much depreciated, the landlord would not be wiped out, but would get the dollar value of the designated poundage of rice. This did not make the bonds entirely inflation proof but it went a long way towards it. The Japanese land reform which preceded the Taiwan effort by a couple of years had issued bonds written only in terms of yen, and the inflation of the early post-war years in Japan had virtually pauperized the landlords or their survivors. Many of these landlords had been samurai who had fought in World War II and the casualty rate had been very high; therefore, in a large number of cases, the burden fell on widows and orphans. Public sympathy with the samurai was at low ebb right after the war, and General MacArthur's staff shed few tears over the economic devastation of the group as a whole. The American team that had advised the Japan reform moved almost intact to Taiwan and introduced the commodity bonds to avoid a recurrence. The idea of the commodity bond, incidentally, came from the 1923 German experience with inflation. After the flight from the mark, a surprising volume of commodity-bound currency circulated in the form of notes redeemable in terms of so many kilos of rye or coal.

The Taiwan landlords fell into three categories. The small village landlords, who were retired farmers or the widows of erstwhile farmers, were unsophisticated in business matters and did not know what to do next. Many were bilked out of their assets by slick-talking conmen, this trade by no means being geographically limited to any country. The second group were "middle-sized" landlords, and many of them adapted

well to the new situation, found other outlets for their considerable talents, and wound up as successful middle-sized businessmen. Others in the middle group, especially the older ones, suffered the same fate as the unsophisticated village landlords. The great landlords, of whom there were never many, almost to a man prospered. They were persons of demonstrated entrepreneurial talent, and the land reform put them in funds which they then invested in major industries; and they have wound up, as a class, fabulously rich. A certain number of former landlords decamped to America and forthwith began to complain that Chiang was a dictator and unfair to the Taiwanese. As usual, a segment of the media was ready to listen to a complaint, without investigating all sides of the question, and the cause of the disgruntled landlords was played up without equal space for the euphoria of the new freeholder yeomen who outnumbered them, dozens to one.

With the completion of the first phase of land reform the new yeomen farmers began to get better yields. Partly they did this by following the advice of "county agents," the Chinese agent system being patterned exactly on the American model familiar to every backyard farmer in New England who has asked when and how to thin turnips.

A major element was what Henry George called the "assurance" factor. "Give a man the assurance that if he plants a crop he will be able to harvest it, and he will plant one." Such assurance came with the land reform that guaranteed occupancy and immunity from the exactions of rapacious estate agents. A lot of rice paddy in Taiwan can be double-cropped. Furthermore, by planting vegetables between the rows of rice

shortly before harvest, the rice acts as nurse crop for the vegetables, and the latter get a good start for the short period before the rice is cut. This system produces two rice crops a year and two intervening vegetable crops. None of this was done under the old landlord arrangement, because the tenant farmer or his family would not benefit from the extra exertion. With freehold ownership, the assurance factor was high; the farmer would get the benefit, if he lived, and, if he died, his widow and children would benefit.

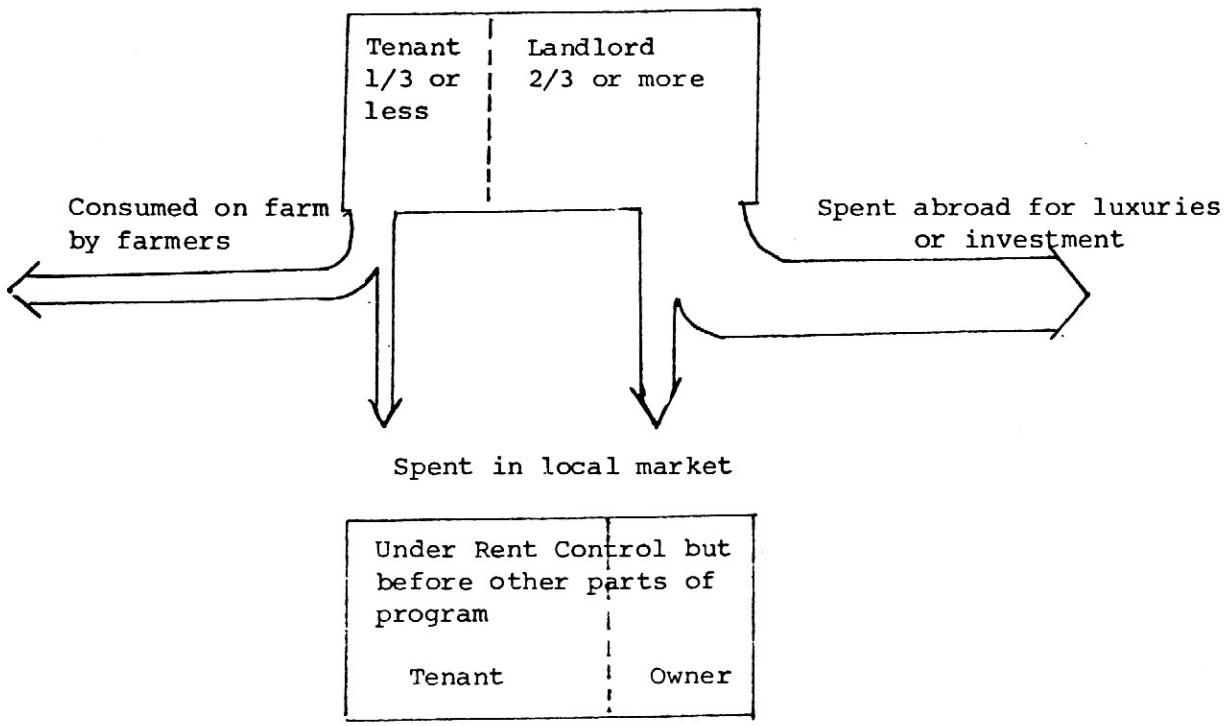
The result of the implementation of these various measures was a massive redirection of income flows. (Table I) Previously the farmer had had disposable income of 1/3 of a crop of, let us say, 10,000 NT dollars (NT: New Taiwan). After the first phase of land reform his income increased to 5/8 of the crop. Assuming the same size and value of crop, this increased his disposable income from 3350 NT to 6250 NT. If he buys the farm at stipulated price of 2½ times the annual crop at time of purchase, he will pay 25,000 NT, and his payments will be adjusted to 37½ percent (3/8) of the basic crop figure of 10,000. If he now increases the crop from 10,000 to 20,000, he still pays out 3,750 NT for his mortgage, but he gets to keep 16,250 NT which happens to be a little over 4 3/4 times what he kept in the first place. Only a genius could go broke under these circumstances. (Table II)

The landlords in the old days had been classic "over-savers" in the sense in which Keynes used the word. They bought more land, or following the immemorial practice of the east, bought gemstones which compacted a lot of value into a chamois sack that could be secreted on

TABLE I

CHANGES IN INCOME FLOWS

FARM GENERATED INCOME BEFORE LAND REFORM



AFTER LAND REFORM - FIRST PHASE

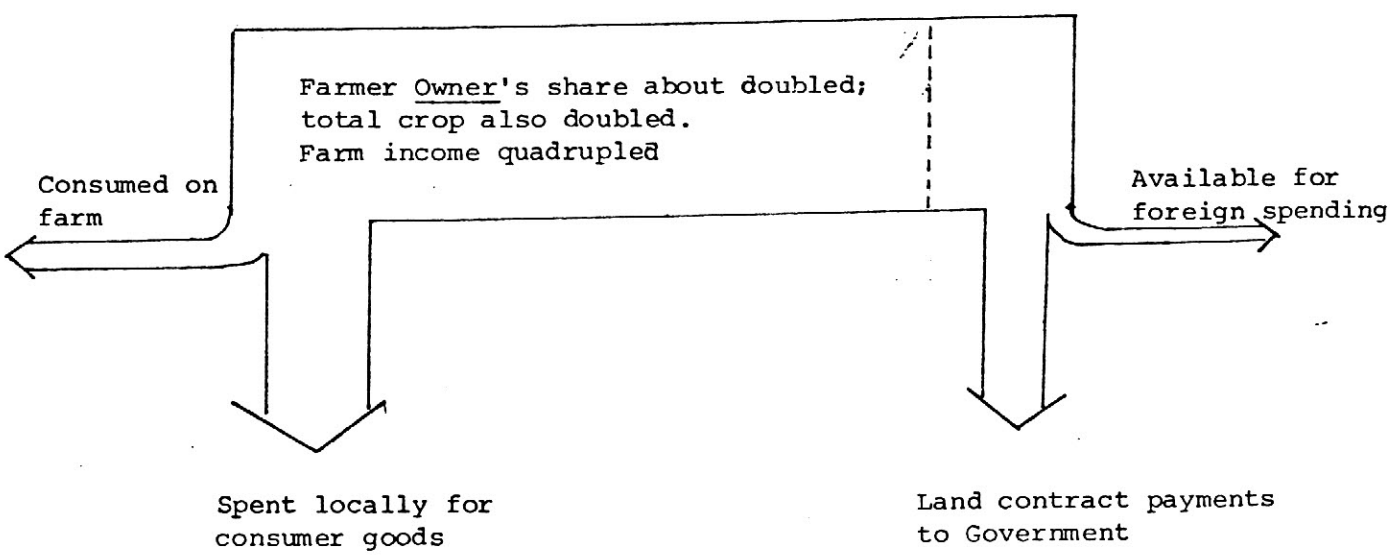


TABLE II

EXAMPLE OF INCOME FLOWS

Farm has income of 10,000 NT (New Taiwan Dollars) before reform	
Farmer pays rent as a tenant of	6,650 NT
retains about	3,350
After rent control income remains 10,000 NT	
Farmer pays rent as tenant	3,750 NT
retains about	6,250
Farmer buys the farm for 25,000 NT based on income of 10,000 yearly	
Pays as owner about	3,750 NT
keeps any balance	
Farmer as owner increases income to 20,000 NT	
As owner still pays about	3,750 NT
keeps now	16,250

a person during whatever flight might be necessary; or they put their money in Swiss banks, or else they bought imported luxuries. The farmers were equally classic spenders; they had a seemingly endless list of genuine unfilled wants, and their new disposable incomes went to partial fulfillment.

The first things most farm families wanted was an electric fan. In a climate which is in the humid 80's for ten months of the year, a fan spells the difference between tolerable comfort and sweaty discomfort. The Japanese had left enough of a power distribution system so that many families could use electric appliances immediately. Fans were something the early industry of the island could manufacture.

While no sequence of wants and purchases was ever established, a lot of farmers next attacked the problem of isolation. In the old days, only the village plutocrat had a bicycle, and this was more often than not a rusty relic. As incomes grew, so did the ownership of bicycles. At first Taiwan became the world's dumping ground for second-hand cycles, and the farmers pedalled about on some very strange machines. These quickly wore out or developed trouble, and a new industry sprang up overnight, repairing bicycles. Before an American could count his fingers and toes, the Taiwanese were manufacturing better bicycles than were available in most of the world and a whole new industry was born. In due course it gave way to the motorbike industry, and the results of this are apparent to the eye of every visitor to the island. Taiwan is not alone in this; Japan is a heavy user of motorbikes, and even Saigon, during the worst of the war, was a traffic nightmare because of them.

Another thing much in demand was a better house. The traditional house in Taiwan was the Fukienese style farmhouse, built in the form of a broad-based U, with adobe walls, a thatched roof, and a dirt floor. In a country that has as much rain as Taiwan, a dirt floor is not a housekeeper's dream; it could not be kept dry since everyone who came in had wet feet, and when it was a bit wet it was surprisingly slippery. The adobe walls required annual patching, and the thatched roof, while providing some advantages in the hot seasons, when it stayed damp and a bit cooler than the ambient temperature, nevertheless was a lovely place to live for creepy, crawly things, and when they fell down on a bed they tended to disturb the sleeper.

The farmers wanted brick houses with tile roofs and cement floors, and when they had the funds they got them. Within a decade the rural sector of the island was rehoused in modern brick homes, many with running water and elementary bathrooms. This put a lot of brickyards to work, baking brick and tile, and gave a large boost to the Taiwan Cement Corporation. Since about 1970 a lot of the small brick works have shut down, but the industrial slack has been taken up elsewhere.

Another widely felt want was better clothes, especially for women and children. In the old days a lot of clothing was made on the farm out of old rice sacks and fertilizer sacks. Shortly after the reform took hold the sacks began to disappear from the family washlines, to be replaced by store-bought ladies and children's ready-to-wear. In Taiwan at this time the prosperity of a family could be estimated from the appearance of its washline.

Still another want was beauty shop service. Prior to the reforms, such facilities were only within the reach of the affluent urban dwellers. In due course they sprang up in virtually every crossroad village, and rows of village maidens and matrons sat patiently under ancient hair dryers.

The consumer goods industry fed on itself and grew fat in the process. More and more workers were attracted from the farms to these early industries and these workers spent their money for other consumer goods. This produced a multiplier effect; the pump was initially primed by money coming from the rice fields, but every dollar from that source was multiplied manyfold as it circulated within the manufacturing sector. This is exactly what Dr. Sun Yat-sen had foreseen happening; he could hardly have been a more perceptive prophet.

Within a very few years, the monetary flow out of the agro-sector was dwarfed by the surge of money from and within the industrial sector. Many foreign countries established manufacturing branches in Taiwan, and this constituted the second phase of industrialization. The third phase was the establishment of free export-import zones at Geelung and Kaohsiung. A steel mill was now in order and indeed one was built in Kaohsiung.

During these 30 years, Taiwan became an industrial country. The number of persons employed in farming, forestry, and fisheries increased only slightly from 1,792,000 to 2,204,000, an increase of about 23 percent, while total employment increased more than 165 percent, from 2,936,000 to 7,795,000. Service employment increased 125 percent and industrial employment increased more than fivefold. Urban employment grew from about 1,150,000 to 5,600,000.

Statistics comparing the Republic of China in 1952 and 1980 are enlightening. The population of the Island more than doubled, from 8,128,000 to 17,805,000 in 1980 (119 percent). The increase came from refugees, plus a high indigenous growth in the early years. The rate had slowed markedly to about 2 percent in 1980 as the standard of living improved.

In 1952 most of the working population was employed in agriculture, about 1,800,000, about 61 percent of the total work force of 2,936,000; in 1980 2,204,000 persons were employed in agriculture, about 28 percent of the total work force of 7,795,000.

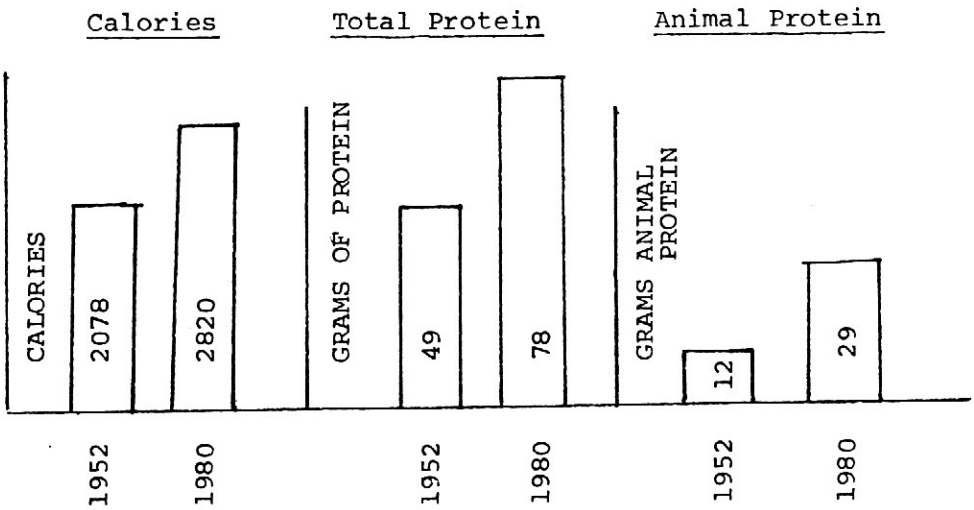
Real product stated in constant 1976 dollars, was NT 89,864 million in 1952 and NT 1,003,599 in 1980. The 1952 income represented about NT 10,222 per capita, equal to about US $280, and rose to NT 50,095 in 1980, equal to more than US $1,380.

Diet improved at the same time from a daily calorie intake of 2,078 calories in 1952 to 2,820 in 1980. Japan's rate in 1980 was 2,847. Daily protein intake increased from 49 grams total in 1952 to 78 in 1980. The increase in daily calories was about 35 percent and in total protein about 59 percent (Table III).

Very obviously people in Taiwan were enjoying a "better" life in 1980 than their elders did in 1952. They ate more of more nutritious food, had far more creature comforts and lived considerably longer. They enjoyed excellent medical care, good insurance programs and the equivalent of American social security. More youngsters went to school, and stayed in school longer. Education beyond primary school was not for the

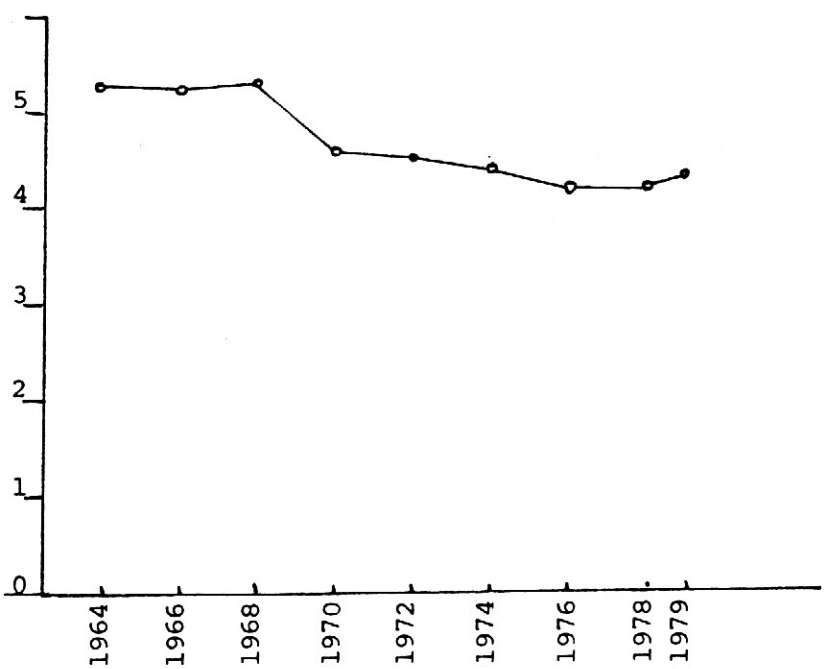
TABLE III

CHANGES IN DIET 1952 - 1980
Daily Intake



RATIO TOP QUINTILE (1/5) TO BOTTOM QUINTILE (1/5)

OF POPULATION



peasantry in 1952; now the free farmers sent sons and daughters through middle school, some through high school and not a few through college.

As mentioned before, population more than doubled as conditions improved, through immigration and indigenous growth. Population was 481 per square kilometer, one of the most dense of any country. The Netherlands had a density of 380 and Japan of 311. The situation is more striking when it is considered that about two thirds of Taiwan is mountainous, and 95 percent or more of the population lives in the eastern and western coastal plains. (Table IV)

In 1952, 876,000 hectares of land were cultivated. By 1980, this figure had increased to 907,000 hectares. The peak was in 1977, when 922,000 hectares were cultivated. The increase between the 1952 and 1980 figures equalled 31,000 hectares or about 4 percent of the 1952 area. (Table V) The increase was brought about by some tidal land reclamation, but chiefly by the cultivation of slope land. While properly handled slope land can contribute significantly to the national food supply, it cannot compare with the agricultural productivity of the alluvial plains.

The total area of paddy land dropped a bit between 1952 and 1980, from 533,000 hectares to 509,000. Paddy land reached a peak in 1969 at 537,000 hectares. Fortuitously, considerable single crop paddy was converted to double crop, by provision of better irrigation and drainage facilities. Double crop paddy increased by 35,000 hectares. Upland farms increased by 56,000 ha. (Tables VI and VII)

Industrial expansion underlay the second phase of the Republic's remarkable prosperity, land reform and agricultural prosperity having

TABLE IV

DENSITY, POPULATION, AREA, GROWTH OF CERTAIN COUNTRIES*

	Population (000,000) Mid 1979	Area (000) In km^2	Density per km^2	Growth Rate 1960-70	Growth Rate 1970-79
AFRICA					
Libya	2.9	1,760	2	3.8	4.1
Angola	6.9	1,247	6	1.5	2.3
Sudan	17.9	2,506	7	2.2	2.6
Zambia	5.6	753	7	2.8	3.0
Zaire	27.5	2,345	12	2.0	2.7
Liberia	1.8	111	16	3.1	3.3
Zimbabwe	7.1	391	18	3.9	3.3
South Africa	28.5	1,221	23	2.6	2.7
Ethiopia	30.9	1,222	25	2.4	2.1
Kenya	15.3	583	26	3.2	3.4
Nigeria	82.6	924	89	2.5	2.5
Egypt	38.9	363	107	2.2	2.0
TOTAL	265.9	13,426	20 (Average)	2.7	2.8 (mean)
ASIA - Far East					
Burma	32.9	677	49	2.2	2.2
Indonesia	142.9	1,919	74	2.0	2.3
Thailand	45.5	514	89	2.9	2.4
Pakistan	79.7	804	99	2.8	3.1
China (Mainland)	964.5	9,597	101	1.9	1.9
Philippines	46.7	300	157	3.0	2.6
India	659.2	3,288	200	2.3	2.1
Japan	115.7	372	311	1.0	1.1
China (Taiwan)**	17.3	36	481	2.0	
Bangladesh	88.9	144	617	2.4	3.0
TOTAL	2193.3	17,651	124 (Average)	2.3	2.3 (mean)
ASIA - Mid East					
Saudi Arabia	8.6	2,150	4	3.4	4.5
Kuwait	1.3	18	72	9.8	6.0
Iran	37.0	1,648	22	2.7	2.9
Iraq	12.6	435	29	3.1	3.3
Syrian Arab. Rep.	8.6	185	46	3.2	3.6
Israel	3.8	21	181	3.4	2.7
TOTAL	71.9	4,457	16 (Average)	4.3	3.8 (mean)
AUSTRALIA	14.3	7,687	2	2.0	1.5
New Zealand	3.2	269	12	1.7	1.5
TOTAL	17.5	7,956	2 (Average)	1.9	1.5 (mean)
U.S.S.R.	264.1	22,402	12	1.3	0.9

* From: World Development Report (The World Bank, August 1981)

** Not listed in World Development Report

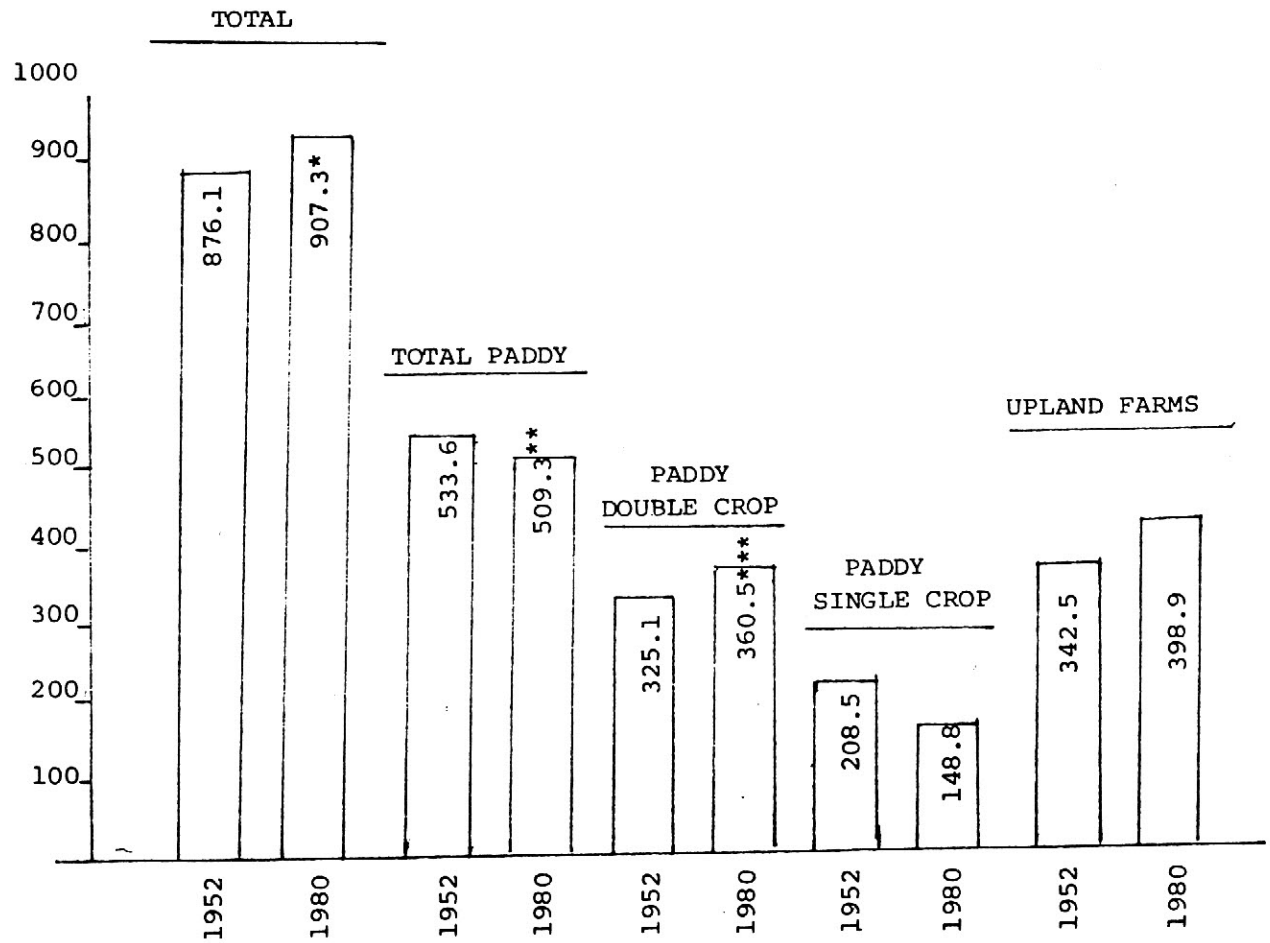
TABLE IV (Continued)
DENSITY, POPULATION, AREA, GROWTH OF CERTAIN COUNTRIES

	Population (000,000) Mid 1979	Area (000) In km^2	Density per km^2	Growth Rate 1960-70	1970-79
EUROPE					
Sweden	8.3	450	18	0.7	0.3
Turkey	44.2	781	57	2.5	2.5
France	53.4	547	98	1.0	0.6
Poland	35.4	313	113	1.0	0.9
Italy	56.8	301	187	0.6	0.6
United Kingdom	55.9	245	228	0.5	0.2
German Federal Republic	61.2	249	246	0.9	0.1
Netherlands	14.0	41	341	1.3	0.8
TOTAL	329.2	2,927	112 (Average)	1.1	0.8 (mean
AMERICA - North					
Canada	23.7	9,976	2	1.8	1.1
USA	223.6	9,363	24	1.3	1.0
Mexico	65.5	762	35	3.2	2.9
TOTAL	312.8	20,101	16 (Average)	2.1	1.7 (mean)
AMERICA - Greater Antilles					
Cuba	9.8	115	85	2.0	1.4
Dominican Republic	5.3	49	108	2.9	2.9
Haiti	4.9	28	175	1.5	1.7
Jamaica	2.2	11	200	1.4	1.6
TOTAL	22.2	203	109 (Average)	2.0	1.9 (mean)
AMERICA - Central					
Nicaragua	2.6	130	20	2.9	3.3
Panama	1.8	77	23	2.9	2.3
Honduras	3.6	112	32	3.1	3.3
Costa Rica	2.2	51	43	3.4	2.5
Guatemala	6.8	109	62	2.8	2.9
El Salvador	4.4	21	210	2.9	2.9
TOTAL	21.4	500	43 (Average)	3.0	2.9 (mean)
AMERICA - South					
Bolivia	5.4	1,099	5	2.3	2.5
Paraguay	3.0	407	7	2.6	2.9
Argentina	27.3	2,767	10	1.4	1.6
Peru	17.1	1,286	13	2.8	2.7
Chili	10.9	757	14	2.1	1.7
Brazil	116.5	8,512	14	2.9	2.2
Uruguay	2.9	176	16	1.1	0.3
Venezuela	14.5	912	16	3.4	3.3
Colombia	26.1	1,139	23	3.0	2.3
Ecuador	8.1	284	29	3.1	3.3
TOTAL	231.8	17,339	13 (Average)	2.5	2.3 (mean)
TOTAL - 62 countries	3730.1	106,956	35 (Average)		

TABLE V

CULTIVATED LAND (1,000 HECTARES)

1952 - 1980

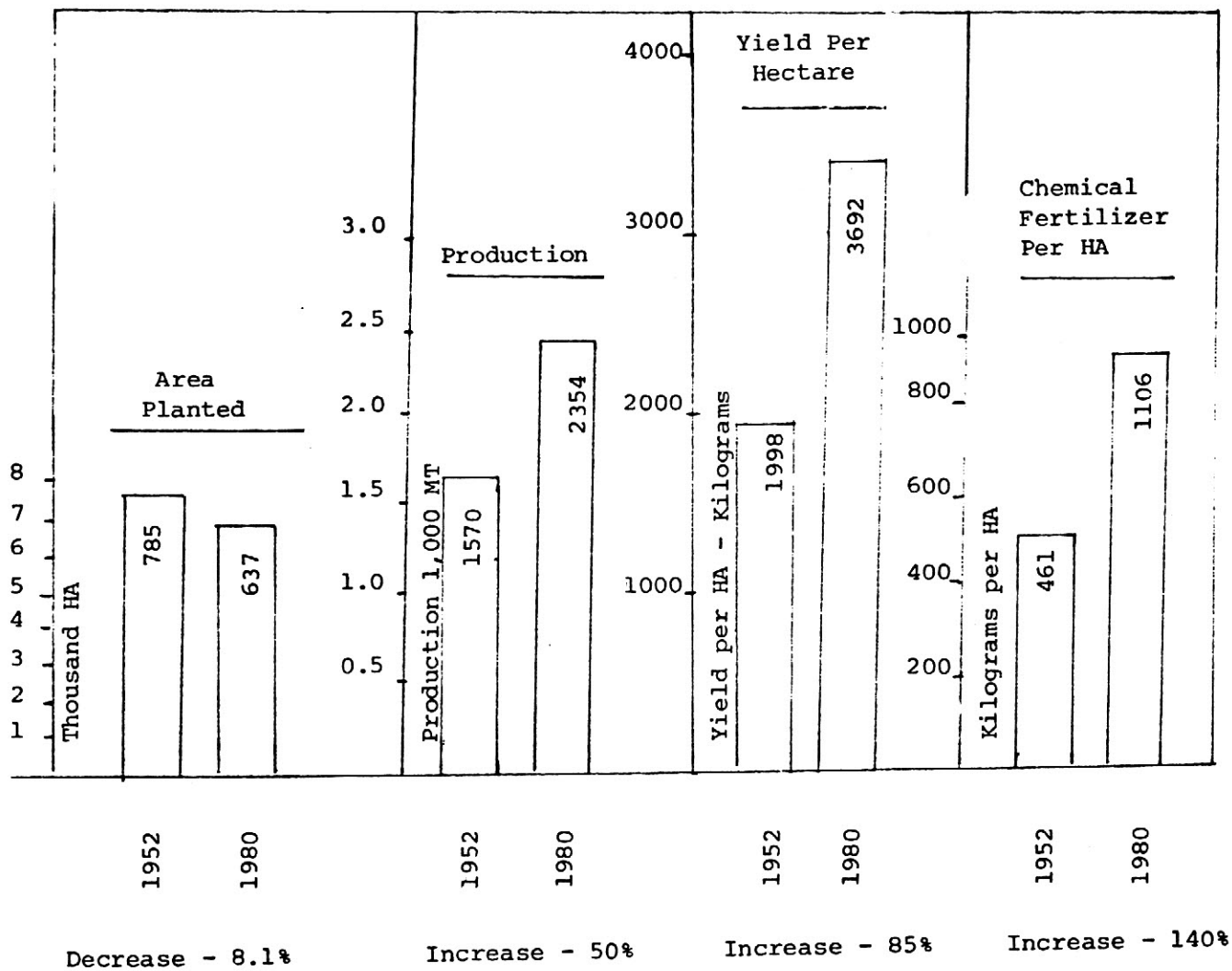


* Peaked in 1977 at 922.8
** Peaked in 1969 at 537.6
*** Peaked in 1977 at 369.0

TABLE VI

R I C E

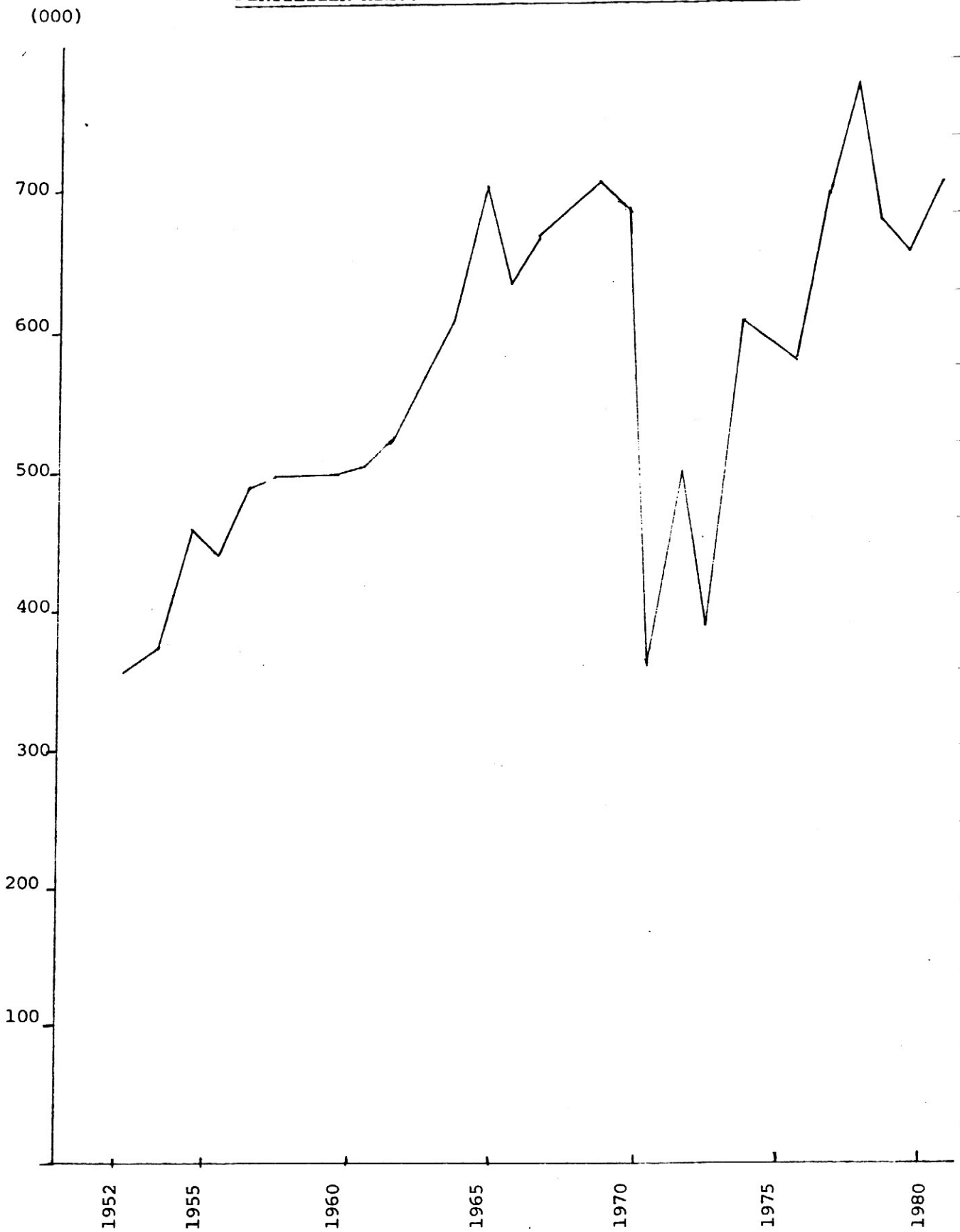
1952 - 1980



(Taiwan Statistical Data Book 1981)

TABLE VII

FERTILIZER ALLOCATED TO RICE CROP ALLOCATED IN MT



underlain the first phase. But industrial expansion threatened the relatively small area of choice farmland. The main roads and the railroads were all located in the coastal plains. The advantage of flat land, good roads, and rail service, plus plenty of water for industrial processing led industry to expand along the west coastal roads near the major cities. The result was the conversion of a significant amount of choice land from agriculture to urban types of use, and the diversion of water from paddy irrigation to factories and mills.

During the Japanese period, the island was a heavy exporter of food, mostly rice and sugar to Japan. It was clearly self-sufficient in food at the time of retrocession. By 1980, it was still self-sufficient, but by a very much narrower margin. Meanwhile, the area planted to rice declined, but the yield per hectare increased spectacularly by nearly 70 percent; in other words, Taiwan was growing more rice on less land.

The population has continued to grow at about a 2.0 percent rate, down from the 1952 rate, but still fairly high. Japan's rate by way of comparison was about 1.1 percent in 1980. The combination of all these figures leads to the first conclusion: <u>The Republic of China MUST conserve its capacity to produce food</u>. This would be true even if there were no international threat. With continued ominous mutterings from the mainland government, and the generally unstable world situation, the Republic of China has very little choice. It cannot rely on foreign purchases of essential food which may be cut off at any moment.

Furthermore, and this is vitally important to the urban planner, it cannot assume, because rice production per hectare increased by 70 percent in the past 30 years, it will continue to increase at anything

like the same rate. The application of additional increments of chemical fertilizers is well past the point of diminishing returns. In other words, the application of US $1.00 worth more fertilizer will produce much less than US $1.00 more value of crop. No one can predict that further giant steps will not be made in plant genetics, fertilizer, pesticides, and herbicides; but neither can anyone predict that they will happen, and if so, when and to what extent. Lacking such foreknowledge, a conservative policy is clearly indicated about the conversion of farmland to urban uses.

Preserving farmland, from a planning standpoint, is a very large order. Land for urban use in most of the world commands prices about 10 to 15 times the price of excellent farmland, and often the ratio in individual cases is much higher. The landowner, be he a farmer or a speculator, wants to make all the money he can as quickly as he can, and he can be relied upon to howl to the rooftops at any interference with his "right to sell to the highest bidder." The developer or industrialist, who wants good flat land for some quick project, has the same desires; that is, the most profit in the least time; and he also can be relied on to raise a mighty howl at any interference with his "right to buy." Combined, the voices of the would-be seller and the would-be buyer make a deafening din which a government cannot easily ignore, but given the great importance of an adequate food supply, it behooves Taiwan and all countries in the world to preserve its resources, especially farmland, and to educate its people about the urgent need to do so.