RESOURCE-CONSERVING URBANISM IN SOUTH ASIA VI: MEGALOPOLIS FORMATION FOR JAVA

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INTRODUCTION

This is the sixth of a series of studies undertaken with advanced students with the intention of evolving a new approach to urban planning. It recognizes the misfit between what is presently taught in American and European schools of planning and the scale of need already evident in the most densely populated parts of the world. It reports upon an additional experiment in teaching students the concepts that underlie the creation of very large communities that have a good chance of surviving foreseeable stresses. In Asia, even more than in Africa and South America, villages and towns are accumulating population far more rapidly than new resources and employment opportunities can be released. Pressure is on the cities to create productive positions for the surplus people. All simple calculations show that the resource-intensive approach to urbanization and industrialization employed up to the present misses by a large factor when applied to the parts of the world that are densely populated and still predominantly rural. What better strategies, based upon up-to-date technological and organizational knowledge, can be applied to the most desperate situations?

An exercise was designed around one of the most difficult instances that could be found in the world -- the urbanization of the tropical island of Java where rural population is the densest in the world and is reproducing at virtually unconstrained rates. The collective student-faculty effort was directed to a study of

alternative futures which enabled students to use methods of study-at-a-distance. The purpose was to focus on the actions that could be taken in Indonesia, not only to avert massive human tragedy but to allow people there to choose the improvements they want from a set of those that appear feasible. We hoped to find strategic means for intervening and affecting the future in desirable ways.

A final purpose was that such an overview of potentials should enable me to prepare an advanced set of hypotheses about those specific problems in Indonesia that are crucial for further social and economic development. Early in 1974 I hope to make a brief visit to that country; the formulation of a set of expectations and questions should save a great deal of time on the scene. The flaws that are incorporated in this analysis should be forgiven; it is the best we could do given the limits of library resources and ten fast-paced weeks.

A follow-up study based upon a survey of local situations and apparent capabilities should be in first draft about mid-1974. Then it will be possible to address such questions as the following: To what extent is the knowledge accumulated in the rest of the world actually applicable to Indonesia, and to Java in particular? In what ways is the Javanese population and culture atypical, so that what is learned there may not be readily transferable to other parts of the world (such as Bangla Desh, Iraq, or the countries in Equatorial Africa) that also are still in the first stages of industrialization? It should also be possible to appraise much better the course of the demographic transition and the closely connected urban transition in Java.

I. THE DISMAL FUTURES NOT WORTH EXPLORING

Careful planning should take into account the unexpected futures for a society as well as those which are anticipated outcomes. Therefore, some effort must be made to classify the full range of possible futures before concentrating effort upon a greatly reduced set of alternatives; we should know something about what we are excluding from our attention. This is a kind of "peripheral vision," except that it features foresight.

One way of obtaining a set of possible futures is to review current conditions and trends among societies thought to be ahead of the one in question. The World Bank provides in its Annual Report a compact list for analyzing the future of economic development. If a society, like Indonesia, has a per capita gross domestic product of $80 per capita per year for 1970, we look at the range of alternatives already experienced by societies in the $100-200 range and decide which of these resembles what is possible for Indonesia. Similarly, one may consider political futures -- the maintenance of public order and civil rights -- based upon such works as that of Cutright and his interpreters and upon the recent comparative analyses published by Dahl in his book Polyarchy. Socio-psychological and cultural futures are suggested in McClelland's work on the effects of the content of educational materials upon motivations regarding human bond formation (affiliation), potency (power over others), and achievement (personal

and collective accomplishment) that may be applicable to Indonesian society. McClelland's alternatives can be framed as polar types which may be compromised, or combined, so as to obtain mixes. (D. C. McClelland and D. F. Winter, Motivating Economic Achievement, N.Y.: Free Press, 1969.)

Thus the "rest of the world" is a source of concepts that might apply to Jakarta and its satellites and their directions for development. This is particularly true of those parts of the world which experienced conditions only a decade or two ago that are found in Jakarta now -- Seoul, Delhi, Bangkok, Karachi, Teheran, Lagos, Cairo, Manila, and Lima, but also Rangoon, Baghdad, and Algiers or Tashkent, Canton, and Chungking -- to choose about five different states of organization in contemporary metropolises. There are, of course, futures not yet explored by existing cities which must still lie within the bounds of technical and economic feasibility which will be explored more fully here. Actually the number of different alternatives now open to the Javanese is relatively small; they could gain a greater variety of options by means of an increased per capita income and a better educated labor force.

The names applied to the alternatives as experienced by such metropolises are intended to be descriptive; they are borrowed from contemporary seminars held on international subjects and are not precisely formulated:

1. Dynamic Westernization
2. Neo-colonialist Reactionism
3. Guarded Capitalism
4. Heroic Socialist Productionism
5. Cadre-managed Maoism
6. Resource-conserving Self-help

For Jakarta the first future needs extensive preparations which have not yet been made. The second would constitute a reversion to a past

and is therefore quite possible though it may not be particularly desirable. The third may be observed in Brazil, Spain, or the Philippines. The fourth is likely to be implemented only inside the Iron Curtain, which does not seem at all likely to skip over the China Sea and include Indonesia. The fifth recalls the nightmare of 1965-6 that Indonesians are doing their best to avoid. The sixth is the pathway I have been exploring over the past seven years, and is calculated to acquire increasing likelihood of occurrence.

Three futures, all of them "dooms" and adding up to perhaps half the likely outcomes, are not considered here because they cannot be influenced either by Indonesians or actors on the Indonesian scene. (1) Nuclear warfare, even in a preemptive war between Russia and China, would create radio-active fallout that might cause evacuation of Northern Hemisphere cities, though Jakarta, being at the Equator, would be almost the last to be affected; (2) A severe drought or volcanic eruption could cause a massive Malthusian catastrophe. Even if it occurred elsewhere in the world the skyrocketing price of imported grain would have a major impact upon Jakarta; (3) A major climatic change for the world as a whole is held to be a real possibility by the scientists investigating the periodicity of the Ice Ages. Java's transformation would be less than most parts of the world, but other adjustments would have a major impact upon the direction for further development.

The interesting alternatives -- those worth exploring because rational calculation, persuasion, and effort can produce a significant difference -- constitute less than half of the likelihood open for the future. If we add the chance of political breakdown to the chances for

global doom the odds are better than even that constructive effort would be wasted. Disaster-oriented fatalists have the betting odds in their favor. Nevertheless we persist in our search for the best that can happen to a metropolis that wishes to try.

II. SPATIAL REQUIREMENTS OF THE URBAN TRANSITION

Indonesia does not seem to have published any long range population projection, nor an outline plan for urbanization. If it had, even in conjunction with advisors from the United Nations, the projection could not be trusted. Local politicians and administrators, as well as overseas specialists, consistently underestimate probable-metropolitan growth. This generalization holds true even for routine estimates as in the regional transportation study of the Asia Development Bank (1972).

The first task we approached was to prepare an approximation of the demographic transition that might be feasible for Indonesia. It is based upon the comprehensive reports of experience in various parts of the developing world put out in Studies in Family Planning by the Population Council. A projection was constructed for Indonesia in light of the anticipated food-population crises over the next two generations. It foresees that the present 135 million people would grow to 400 million before the new equilibrium could be reached. Even that relatively optimistic figure courts disaster, because it corresponds to a world population of 12-13 billion as compared to 3.8 billion at present.

The Javanese share of the Indonesian long run peak is assumed to be about 250 million. The lower proportion than at present is brought about by higher rates of literacy and middle education, increasing proportion adopting birth control more rapidly than in outlying

areas. City life expedites acceptance of family planning, and Java is much more urban. Migration to other islands may become more economic due to land scarcity in Java, but will still be difficult to manage. Therefore, we have projected an extra population of unknown magnitude that participates in the life of Javanese cities but dwells on the surface of the seas adjacent. The fraction urbanized on Javanese land should make up about 95% of its population, while those living on the water could reach 20-30 millions, perhaps more, before levelling off.

All of these extrapolations are shown in Figure 1. They indicate that even this relatively optimistic projection for completing the transition skirts disaster. About 1990 a large scale program for the settlement of marine surfaces must be launched. Implicit in this forecast is the mobilization of some coastal desert which can be cultivated with the aid of desalinated water and a nuclear reactor (a nuplex). One such site may exist in northeastern Java, but others may have to be rented from Australia. Such developments can be designed so that crops can be planted that fit the shifting markets for foodstuffs within four months of the appearance of a shortage.

Within this framework one feasibility test can be made without expending very much extra effort in information gathering. The expansion of the present urban areas into the countryside can be plotted so that the high cost areas for settlement (major slopes and flood plain, primarily) are avoided. When the first extrapolation of natural growth of Jakarta was completed, in which each satellite center had been allowed to grow until it reached a population limit of three million inhabitants, the total Jakarta cluster reached 65 millions of people.

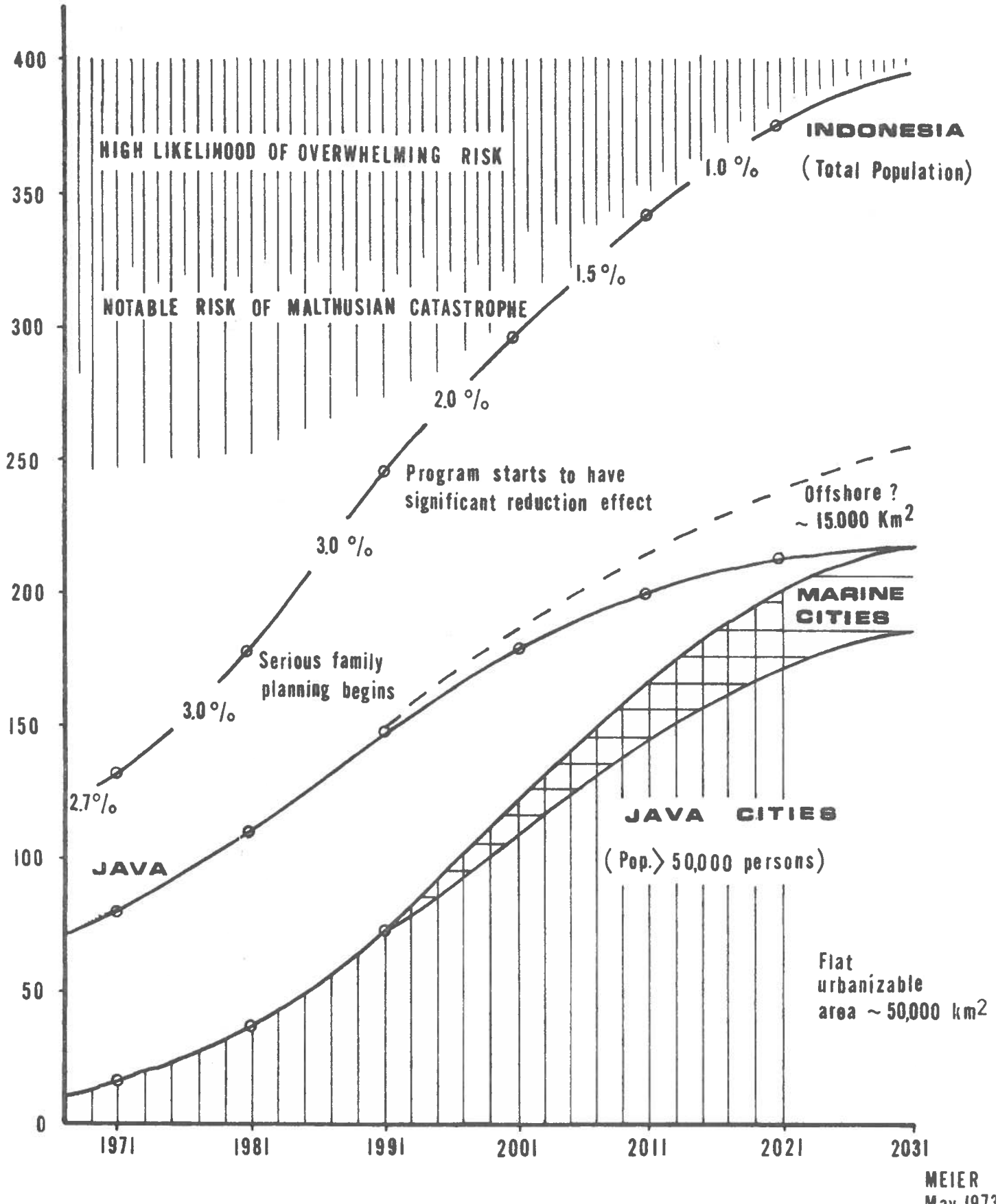


Fig. 1 PROJECTED GROWTH OF INDONESIAN POPULATION FOR THE NEXT TWO GENERATIONS (Optimistic future)

(These are the implications of locating a satellite city at the edge of commuting distance and watching it as the expansion causes increased concentration of people in the corridor in between it and the original urban center.) Such a constellation of urban settlement seemed likely to run out of fresh water in a moderately dry year. Therefore the exercise was repeated using a smaller population size; centers were distributed so as to optimize access and provide greatest security of water supply in a drought year. In Figure 2 the extra population requiring urban land (at a density of 20,000 persons per square mile average, or 80 persons per hectare) was distributed decade by decade from the urban projection in Figure 1 to standard communities that reached a million and a half apiece. Squares were used to represent these locational selections in order to emphasize the crudity of the analyses. The actual residential areas will depend upon the placement of rail, road, and ferry networks, as well as the costs of reclaiming marginal land.

It appears that much of the overspill onto the sea can be anchored in the Seribu Islands that range up to 50 km. north of Jakarta. They are surrounded by shallow seas. The preferred solution seems to be apartments on barges (a "kampong on the water") or individual houseboats clustered around a buoy equipped with electricity and telephone services. The density of such tracts is expected to be quite high -- about 100,000 persons per square mile, 400 per hectare, or about forty dwelling units per acre. An equally large settlement is likely to form east of Surabaya in the bay called Selat Madura. A third may be expected between Java and Bali in the Selat Bali. The thirty million or so that are designated to move out to the sea would need only about 900 square kilometers of surface.

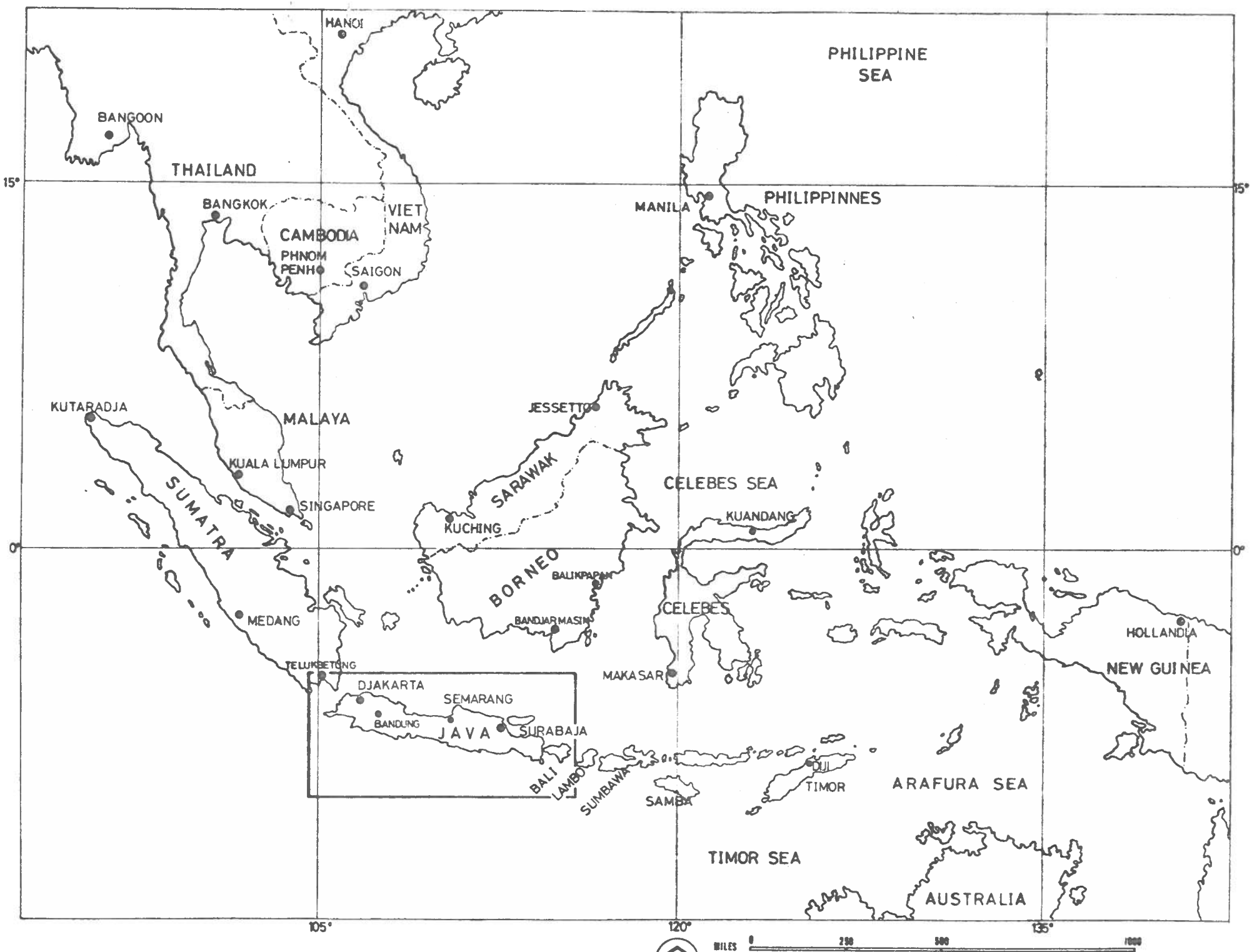


Fig. 2a INDONESIA

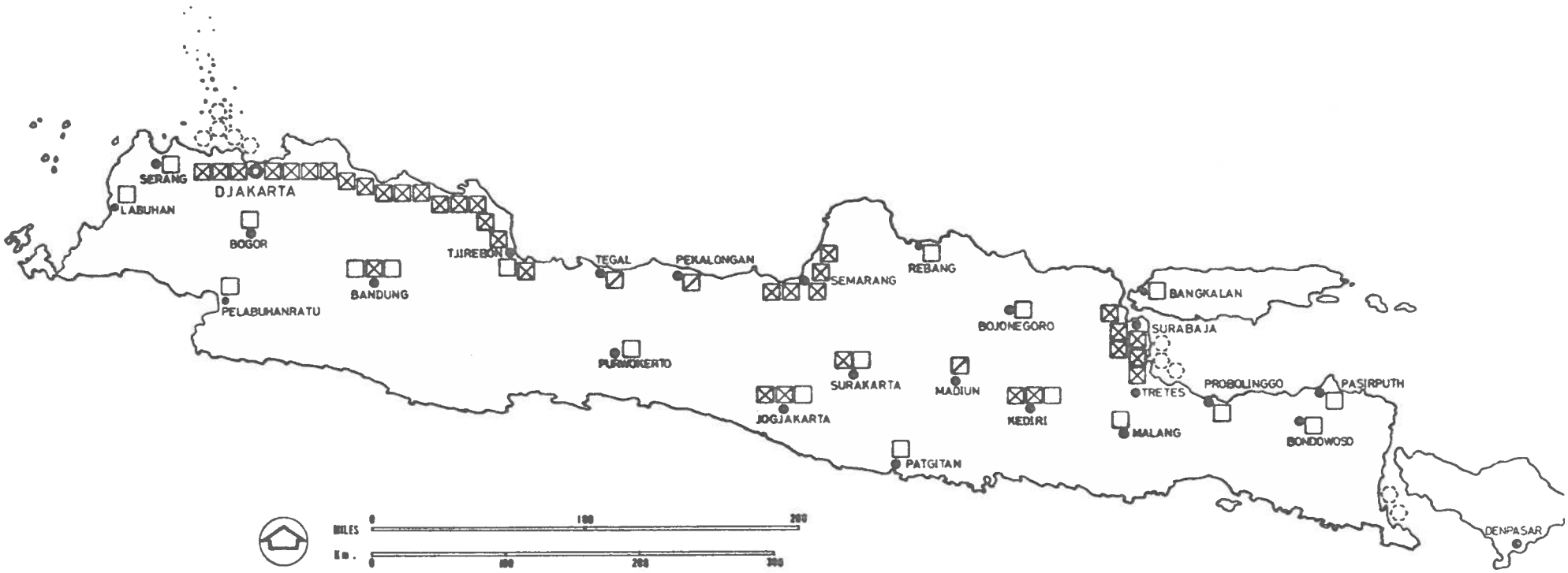


Fig. 2b GROWTH OF THE MEGALOPOLIS ON JAVA BY METROPOLITAN UNITS OF THREE MILLIONS OR MAJOR COMPONENTS, INCLUDING PROSPECTIVE AQUATIC URBANIZATION.

That allocation of surface area would leave rural population at about half the present levels, although it is expected to produce about three times as much food. Once the production from mariculture on the shoreline is added, such increases seem achievable. The yield in calories per unit area may have to double, but recent experience shows that such improvements are feasible over the long run. The design of the new urbanism, whether land bound or afloat, allows the city to produce most of its own perishable foods, depending upon the countryside for rice, sugar, palm oil, and starches obtained from root crops. Breadgrains, maize, and peanuts (groundnuts) would be largely imported, as is already happening in most years, and so would not require Indonesian land.

III. A THEORY OF FUTURE URBAN GROWTH

No complete theory can be presented here. Some of the early argument was presented in my books, A Communications Theory of Urban Growth (1962) and Developmental Planning (1965), and a more comprehensive current synthesis will be found in a forthcoming book, The Design of Resource-Conserving Cities. These efforts have emphasized arguments that combine principles of political economy and socio-cultural systems.

The function of the city and its institutions is to expedite public transactions of all kinds. We have learned from experience that inequitable and exploitive transactions can be reduced through law, so cities have rules and regulations with police to maintain them, which make it possible to trust strangers in routine matters. Many transactions carried out in public places are associated with the market, but about an equal number do not have a significant money value, though they are found to be rewarding by the persons engaged in them. A good city is one that provides places and occasions for the full range of public transactions. Both parties to a voluntarily undertaken transaction expect to gain from the exchange -- the hope is for a win-win outcome. If it does not turn out that way for one of the persons involved, that particular transaction is less likely to be repeated. Therefore, those transactions are maintained which produce enough surplus value to offer incentives to people to engage in them. The city may be regarded as a gigantic machine or artifact that promotes rewarding interaction and inhibits unrewarding types. The task of

the urban administrator and the city planner is to make this apparatus work better -- fewer errors and accidents, more transactions, and more equal division of the benefits. If they succeed, the city will become more attractive than rural areas and immigrants are to be expected. Growth in performance is followed by growth in participants.

People who support each other repeatedly form a friendship or some kind of a partnership. Larger transactions are possible when people combine into partnerships, teams, or firms. These must distribute enough of the benefits from the transactions to maintain the cooperation of members. A simple organization like this remains viable as long as (1) it possesses a name or some identity of its own by which the group acts as a group, (2) it has an address so that it can be contacted by others, (3) it specializes in a particular kind of transaction and is able to focus attention and effort in ways that reduce costs of participation, enhance the quality of outcomes, and diminish the frequency of failures. Organizations created by individuals have the same aims as those of the city (the "macro community"), but on a narrower front; they represent a form of local self-help.

One way for a metropolitan agency to amplify the effects of its efforts is to maximize the number of viable organizations that are spontaneously formed by members of the city's population. These organizations will set up win-win transactions; they will dissolve if they fail. However, a "survival of the fittest" approach wastes much organizing effort and investment in specialized equipment. The metropolitan agency should be able to improve the performance of the city if it studies the difficulties an organization has in coming into being, the "infant mortality," and the sources of disability or premature

dissolution. It can cultivate the environment the way a forester does with trees. One might measure the accomplishments of such an agency by counting increases in the number of viable organizations. The amount of resources used for promotion, stimulation, and mortality reduction, and other assistance for collective self-help can be compared against the quantity of organizations created. More advanced measures quickly come to mind -- such as the degree to which people are left out of programs (the proportion unemployed, the "social isolates," levels of racial and ethnic discrimination, etc.). If an agency or organization has only one reason for its existence, such as making a profit or teaching a skill, the single measure of performance will cause it to look for short-cuts and economies that restrict freedom to transact in other avenues of public life. External diseconomies, especially pollution of the environment, are brought about by such single-mindedness. Thus we need a balanced set of indicators for determining the success of an agency in stimulating the self-organization of activities in a metropolitan region.

One of the first agencies to be created for such purposes was a complex combination of governmental departments and public corporations in Puerto Rico during the 1950s. Over the course of two decades it pulled the island from Asiatic levels of poverty up to leadership in Latin America. It was called FOMENTO, and Kenneth Boulding labeled the Puerto Rican approach the "Fomentarian Revolution." Legally it was the duty of the Fomento to promote commerce and industry, but it quickly discovered that in an underdeveloped, urbanizing environment it had to promote cooperatives, clubs, associations, bureaus, and many other non-profit organizations in order to render viable some of the most

promising firms. From the brief news dispatches available in the United States this year it appears that Indonesia has created a similar entity called P. T. BAHANA, with the Impressive capitalization of 10 billion rupiahs and the legal right to buy up to 25% of the stock in promising enterprises and to sponsor the extension of credit where it is most needed. We shall assume here that the new Indonesian public corporation will carry out this promotional function for the whole country but that its principal activities for a while will be in East Java. In effect its task will be to make the cities perform better in producing a wide range of goods and services needed in the society.

A quick review of the present conditions and anticipated difficulties suggests that the national government, the metropolitan government of Jakarta, and P. T. BAHANA, together face very serious problems. Those we identify from a distance that stand out very starkly from a long list are:

1. The availability of water for the urban population after a sustained drought. Lack of water first stops productive activity; if continued it kills animals and people.

2. Dependable food supplies at prices that do not create wholesale starvation. Already Jakarta has outgrown the capacity of its immediate region to supply sufficient food in a normal season, and the gap is becoming greater yearly. World scarcities will have as severe effect upon the metropolitan diet as a local drought.

3. Transport and communications systems capacity needed to overcome intolerable congestion, overloads, and an incapacity to serve foreseeable requirements of the future. Jakarta is strikingly underserved

as compared to other metropolises its size in and around Asia. The basic service networks have not yet been laid down, except for the street system. Lack of an ability to meet and communicate with people promptly will greatly hinder all kinds of development.

4. The maintenance of public order in the face of many frustrations on the part of a loosely integrated urban population. The evolution of law and the implementation of the intents of the law breaks down rather frequently in cities at the stage that Jakarta is in now. However, Mexico City and a number of others have managed to maintain a continuous series of legitimate governments through this dangerous period so there is some hope that no sharp break in governmental authority will occur.

There are some assets Indonesia has at the present time that were not really available before. One of these is the enhanced world price for oil, tin, and wood. Another is the over-employment situation in Japan (shortage of workers) which has already brought about full employment in Hong Kong, Singapore, Taipei, and Kaohsiung, and close to that condition in Seoul and Pusan. About 1.5 million jobs at Japanese levels of productivity (three to five times that of workers in Jakarta) seem to be ready to open up, since markets have already been found. Also, the levels of violent disagreement between Indonesians and their Government seem to have dropped, so that the cost of internal conflict appears to be falling quite rapidly. These factors suggest that organized economic activity can be accelerated greatly -- if disaster can be prevented.

IV. TACTICS FOR APPROACHING CURRENT PROBLEMS

Once the fundamental issues of food, water, population, space, transport, environment, and public order were identified, special studies were initiated on each of them. The methods for solving such problems in various parts of the world were sifted and proposals were made for approaching what were believed to be the conditions in Jakarta or in nearby Java. Information obtained in this manner is always imperfect, but it provides some indication of what action is feasible. Some of the most cogent ideas had to do with issues that at present are not often considered important, but it can be seen from experience in other places in the world that a huge amount of regret will be expressed if action is not taken in the 1970s to preserve the best possible expressions of the background and evolution of the Indonesian culture. As noted earlier these topics will be outlined independently.

New Food Production

The rapidly rising population, and its increasing separation from the soil, creates a demand for food that expresses itself through the marketplace. The government needs to have a strong and steady hand in food allocation, distribution, and pricing.

The nuplex -- a nuclear-powered agro-industrial complex -- in its economic dimensions would produce enough food to meet the rations for 5-8 millions of urban people if they will eat wheat, maize, safflower seed oil, potatoes, etc. These are the crops that utilize

irrigation water efficiently, as judged from world market prices for output or calories of food value. It would also produce large quantities of electrical power for electrometallurgy, electrochemicals, urban region grids, and pumping of water. The economics are only favorable if users can be found for the energy producible by a nuclear reactor over at least eleven months of the year.

The best location for a nuplex might be along the northeast coast of Java (although many questions about soil fertility and hydrology remain unanswered as yet). The coastal area of the immediately adjacent island of Madura might also be suitable, but the need for about 100,000 hectares of flat, poorly used land that feeds out through a specially designed port city may be too large for Java and Madura to handle. The next best solution seems to be the rental of a small portion of the Australian coast in the neighborhood of iron and bauxite mines which could be developed in collaboration with the Australians.

Mariculture is an approach to solving the overfishing problem in the seas surrounding Java. Bardach and Ryther have recently published a volume (Aquaculture, Wiley, 1972) describing practical procedures for cultivating marine fish of many kinds, which is aimed particularly at Javanese conditions. Some of the experience was accumulated from Indonesia itself. Yields of 1000 kg. of dry weight protein per hectare of sea water and upward are obtained.

Intensive gardening that fits together with self-help housing and urban settlement, using recycled water when necessary, appears to be eminently practical in Java since the agricultural techniques are well known there. Thus rice cultivation at the growing edge of the metropolis may be displaced by multiple crops of vegetables with a

doubling or so of the amount of edible calories produced per unit area. This allows a third or more of the land to be used for houses, shops, small factories, and roads. The newest parts of the metropolis would then be producing perishable foods close to the markets. Since all the basic knowledge already exists, there remains primarily the problem of land acquisition and reallocation followed by organization of viable urban villages along roads and future rail lines.

Algae culture is now under way in Japan and Taiwan with advanced research going on at the Asia Institute of Technology in Bangkok (Michael McGarry). Although a struggling industry until 1972, the recent three-fold rise in the price of the principal competitor, soy beans, generated keen interest in this novel technique. The June, 1973, embargo on American soy beans will give algae culture top priority for years to come. Recycling the organic constituents of sewage yields algae and reclaimed water. The algae may be introduced into standard fish farming, the water applied to intensive gardening.

Appropriate food producing technologies can be found for coping with a three-fold increase in population, including its concentration in a megalopolis along the coast line, but a higher level of organization is required to fit the various pieces together. The system must work adequately during droughts and bad weather, while producing a surplus for storage and export during normal times. This safety factor must be regained.

Water Supply

A review of rainfall patterns with an emphasis upon regularity or dependability clearly indicated that urbanization in West Java would be more secure from drought than in East Java. However the seasonality

and variability of the rainfall requires water storage, and the largest prospective projects for building upland reservoirs were proposed for Central Java. The data available to us in our Water Resources Library were insufficient to work out even the most crude water accounts. Very soon the planners on Java must consider conditions during the driest year in ten or twenty, and make calculations of water supply for each month of the year. The rates of evaporation and transpiration at those temperatures would determine the bulk of the water loss and the need for drawing upon reservoirs for extra water can then be estimated. Thereafter a review can be made of the topography of the hills and mountains to determine greatest reservoir capacity at lowest cost.

It seems not unlikely that field studies on potential reservoir sites will rule many of them out. Either the siltation rate will be too great or the rocks too permeable to hold water securely. This means that other approaches to reservoir construction will need to be reviewed. One of these is to be found in Hong Kong's Plover Cove facility, where the sea was pushed back and fresh water collected behind a retaining wall. This procedure allows a city to use a much higher proportion of the normal runoff.

Perhaps the best analog to Java over the long run, and the most advanced example of what may need to be done, is that of Israel. There most of the water, including effluent for recycling, is injected into the soil. The fresh water flowing downhill underground pushes back the salt water at the sandy edge of the land and can be tapped from wells. During droughts this underground reservoir will shrink, causing some wells to become salty. These techniques require a thorough understanding of hydrology as well as some control over the demand for

water for irrigation in order to minimize losses during a severe drought. It does not pay to plant citrus trees, for example, in an area where the wells may become salty once every decade or two, but with broad beans or California potatoes there should be scarcely any loss. The Israelis have also initiated a cloud-seeding program by which they believe that they can get the clouds to drop their rain in more convenient places, thus adding to the underground reservoir at crucial times.

It may well become more economical to sell pure water in containers, leaving the regular water supply for washing, industrial uses, and gardening. Sewage could be collected by carts and trucks as well as sewers, processed in oxidation ponds where organic constituents are predominantly converted into algae and the water returned to the general supply. A good deal of time and trouble was spent exploring the possible implications of such a system for Jakarta and its possible extentions. The organization of sanitation districts with their own integrated collection system, canal or ditch networks, and reuse procedures (a modification of what has been working for a decade on the island of Formosa, particularly around Taipei) seems to fit future conditions best. This is quite different from the way American and European cities operate.

We have not considered the problems of drainage and flooding to the same degree as water shortage. Canal building and dredging are well understood on the Island though funds required to carry out the necessary work for preserving the use of lower levels of the cities are scarce. Plans must be undertaken for total watersheds, yet the work itself must be broken down so that most of it can be undertaken voluntarily in neighborhoods and communities and the effort would benefit them directly.

One feature of the drainage problem is stream pollution. Increases in population would make the situation even worse than it is. Programs for cleaning out the canals in the older parts of Jakarta, followed by ponding of the runoff containing organic wastes in special areas of the delta now relatively unused, would yield feed for fish. Better drainage should enhance the value of in-town property enough to justify further investments in its preservation. Based upon a review of the changing content of the newspapers over the past year we anticipate increased attention to environmental problems in Jakarta, mostly due to tourism and international exchanges. The gravest problems will no doubt occur where unsuitable sites are occupied by squatters; there only the most intensive community development measures can cope with the waste disposal and drainage system construction that would lead to a reduction in pollution. It is difficult to organize self-help programs that benefit the rest of the community much more than they do one's own group and downstream sewage is the "other person's" problem.

Population Control

It was known that the World Bank made a special grant to Indonesia to expedite birth control and thus reduce the demand for the increasingly scarce capacity for growth in the supply of food and water, but nothing could be discovered regarding a program for action. It is evident, however, that a large share of the necessary infra-structure of clinics and distribution points for contraceptives is lacking, so at present no large scale program of publicity and recruitment can be successful. This is the period for investing in basic facilities and learning how to provide reliable service.

One program that was considered was recruiting the dukuns that provide traditional health services to the less educated population. Providing them with all the basic techniques, materials, and essential information in short training periods could enhance the importance of their role in the more traditional elements of the culture and would therefore be acceptable to them. Some delicate negotiations between leaders of traditional medicine and representatives of modern medicine must precede such educational arrangements. The most advanced varieties of intra-uterine contraceptive devices, as well as pills and early abortion techniques, would appear to fit well into both kinds of medicine with very little conflict apparent to the users.

A basically agrarian culture like that residing on Java is founded on principles of high fertility. The best chance a poor family has for improving its prospects in life is to produce many sons -- the surplus from their work can be hoarded as jewelry or invested in the purchase of land. The need for social security provides additional incentive. In the city such justifications are reduced, so that as families urbanize they soon see the need to restrict family size. Quality in children, in terms of health and education, becomes more important than quantity. Therefore initially about ten per cent, later somewhat more, of the most ambitious component of the poor immigrants to the city will avail itself of family planning services if they are convenient. Often consultation occurs after four or more children have already arrived. In the white collar classes, where the educational level reaches that of secondary school and perhaps some university, the acceptance rate may quickly reach fifty per cent, beginning after the arrival of the second or third child. Thus the net effect, as

measured in the numbers of births prevented, represents only a barely noticeable fraction of total fertility. Much more motivation and public education is needed.

One approach is to draw upon puppet shows and dramatic presentations by schools. The traditional media have ways of presenting alternatives so that they can be understood and discussed. Before large scale acceptance spreads, however, a motivational shift is required; the strong motives in family planning are not of the traditional affiliation set of indicators, which are associated with a preference for large families and extended social networks, but achievement. Radio, and later television, are effective to some degree, in transferring a number of meaningful images about consumption styles, attitudes toward life, opportunities for work and improvement, and organization to the women even more than men. These messages may substitute in part for education up to the level of literacy in that they open a window upon modern urban life. Women notice much more quickly than others that modern life implies low fertility as well as low morbidity and mortality. Children raised in the city will pick up cues presented through both traditional and modern communications media very quickly, so that the second generation should be more than 50% committed to family planning. If that should be the case, then the natural growth rate should drop below 2% per year, later even lower. (Equilibrium seems to be achieved when 70-80% of the couples are planning the size and spacing of their families and the desired size approximates two to three children on the average.) These long range effects must occur if investment in public education is to pay off and the population is prevented from expanding to unsupportable levels.

The young in the city are aided by the increased range of social and political life available to their mothers, particularly if the mothers are encouraged through community development efforts to organize so as to help each other. Increasingly, in Jakarta more than elsewhere due to its cosmopolitan atmosphere, women will organize with the intention of influencing governmental policy. Collective self-help seems to produce the greatest changes in attitude; women have been left out of social policy making in traditional Muslim societies but it is expected that they will participate very actively in the forthcoming modern Muslim society. One sees the first stages of this transition already in effect among the professional classes; henceforth effective social and political organization of women will work itself through the commercial and white collar classes, perhaps creating mass support on a few selected issues. This must happen in the next decade if it is to have the needed effect upon population growth.

Living Space

Western standards for living space, as evolved in England, Holland, and Scandinavia, were based upon a need to deconcentrate people in the household, provide ventilation, and create an opportunity for cleanliness. With this change tuberculosis and other contagious diseases, along with dysentery-related infections that are carried by bad water and flies, could be brought under partial control. Nowadays, however, the use of elementary public health measures is reducing the incidence of these diseases without the drastic reduction in urban density. It was thought for a long time that crowding would cause mental disturbance and an incapacity to cope with crises (largely based upon inferences from experiments with small mammals living in

"apartments," where they were allowed to build up excessive populations), but this has now been quite firmly disproved for Southeast Asian cultures (Mitchell, American Sociological Review, 1972). There appears to be no change in mental strain or welfare as a function of living space down to about 2.0 square meters of floor space per capita. Thus the "compressibility" of a human being in a climate like that of Jakarta reaches a limit around the dimensions of 1 x 2 x 2.5 meters (5.0 m^3), but with increases in income most people, though not all, will rent or build more space up to about 15 m^3 per capita, after which only a minor fraction will want more.

Since these generalizations hold over many cultures, currently and historically, it has been assumed that they will apply to Indonesia while it retains a sizable population living in poverty. If Indonesia becomes an affluent society in the twenty first century it would very likely find it necessary to reconstruct its cities from the foundations upward, and reallocate space appropriately. What is relevant is that people should have enough urban space at hand to allow the population to live at a minimum adequate standard of living (Meier, Science and Economic Development, M.I.T., 1966).

From these per capita standards one can compute a range of house dimensions. From the sizes of adequate houses, one arrives at plots of land which range from 50-100 m^2 to be dedicated to single family homesteads, which are strongly preferred in Indonesia, as elsewhere. For circulation space with limited use of automobiles, we add about 17%; for commerce, schools and public facilities add 10-15% more. The space to be allocated to gardens depends more on the availability of water than any ratio of land to people. In West

Java, the new urban area could be more than 50% garden and thereby produce virtually all of the locally consumed perishable foods.

Self-help housing needs to be organized by and for communities where people know each other. The maximum size might be of the order of 10,000 persons. Sometimes two or three independent communities may share the same land, but they would meet at different, non-conflicting hours and share the public areas and facilities. At the densities assumed in the projections in Figures 1 and 2, however, this is not necessary.

In this study we had less information about living requirements than we had for previous investigations of comparable areas in India (Working Papers #154 and #186). Aside from the cultural differences, variables such as income, level of activity, degree of social organization, rainfall, temperature range, building materials, and level of capitalization were about the same. Therefore any designs that occurred to us as likely to be suitable had already been suggested for India. They were proposed and analyzed in preceding working papers in this series (Meier, IV, 1971; V, 1972). An illustration of one slightly differentiated version of self-help housing is presented in Figure 3. It is highly suited to the use of panels of wood substitute, particularly a foam sandwich in order to expedite quick construction.

Similarly, the overspill onto the sea in Indonesia led to solutions that are not different from those likely to be pioneered elsewhere. There are no special economies to be obtained by means of new approaches to the allocation of urban space.

The gravest problems are found in the organizational process, and the legitimation of modern approaches regarding land and the

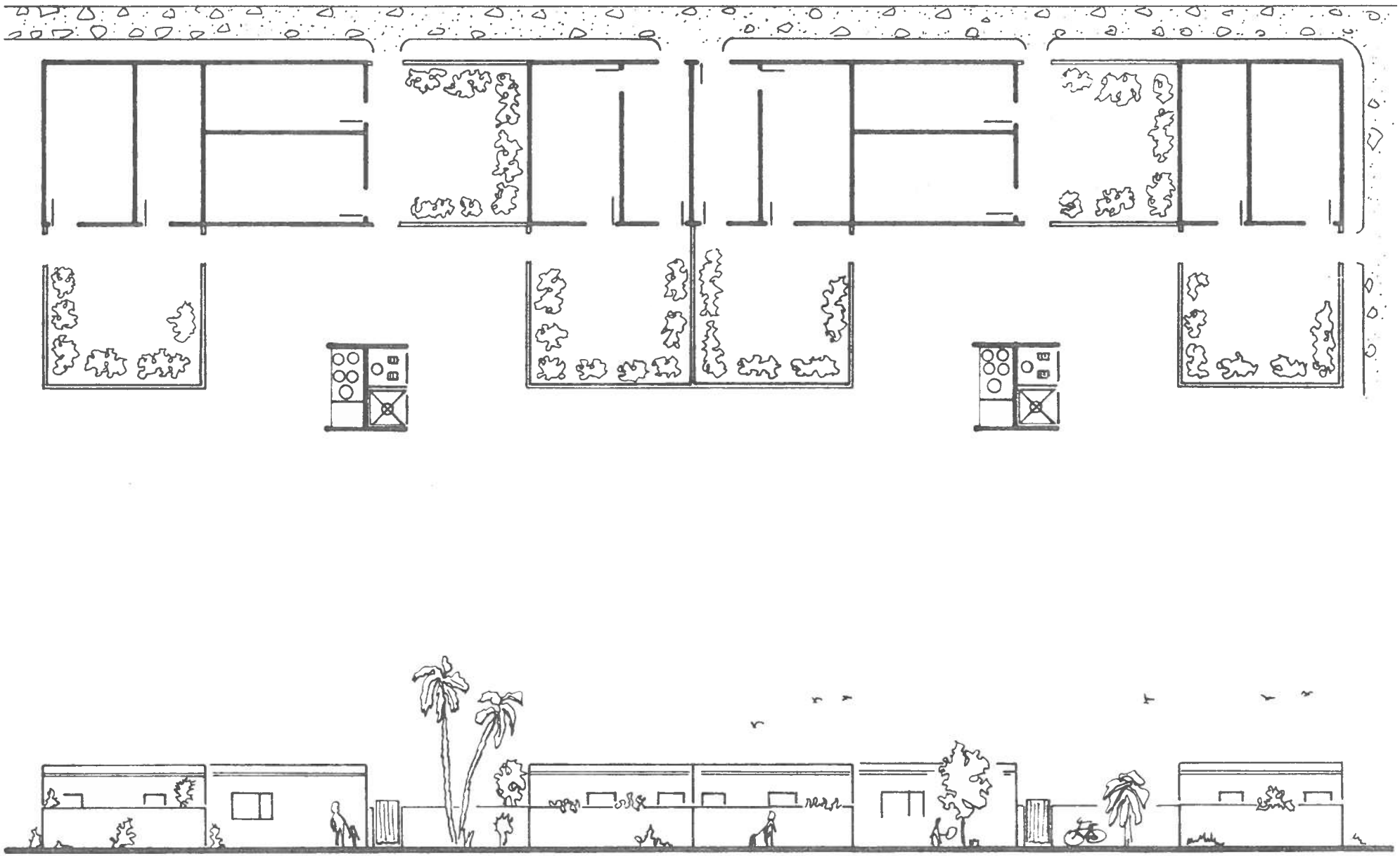


Fig. 3 SELF-HELP HOUSING BACKED BY GARDENS. MATERIALS OF CONSTRUCTION : FOAM PANELS ON CONCRETE SLAB

HOMESTEADS AVERAGE 60 m^2

ownership of physical property. For example, the sequence of creating an urban village based upon self-help freely contributed appears to require the following steps:

1. Surveyed plots of buildable land, compactly laid out;
2. Clear titles that are readily transferred at one's own initiative;
3. Long-term credit (e.g. ten years) at bank rates of interest;
4. Materials for traditional temporary building, if fire resistant;
5. Materials for traditional permanent building;
6. Cheap substitutes for both (cement, plastic foam, film, filament, metal sheet);
7. Exhibitions and training in use of substitutes;
8. Short-term credit for materials (one to five years);
9. Access to places of employment by bus, bicycle, or rail (less than one hour);
10. Availability of water throughout the year at competitive charges;
11. Access to part-time work and second job opportunities;
12. Presence of a trust advocate to fight battles with bureaucracy.

Economical Transport

The fact that automotive vehicles are less common in Indonesia than elsewhere in Southeast Asia, and are underrepresented in Jakarta as compared to other capital cities, can become an asset. The investment rate in paved roads, bridges, and related facilities has also been much lower, so there is less to write off as a loss when improved technology is put to work.

The mode of traffic most worthy of reinforcement was that of bicycles and other mobile equipment using the same rights of way.

Velocities of 4-30 km./hr., with a mean in the neighborhood of 10-15 km./hr., can be expedited with a network of lightly paved roads. However a parallel network needed to be created on the water to service housebarges and the marine platforms yet to be designed. In West Java, this network of bikepaths may need to be aided by a number of temporary shelters in case of too much rain or sun, but at the moment we do not know how to defend such areas against hawkers and the desperate people who must sleep in the streets.

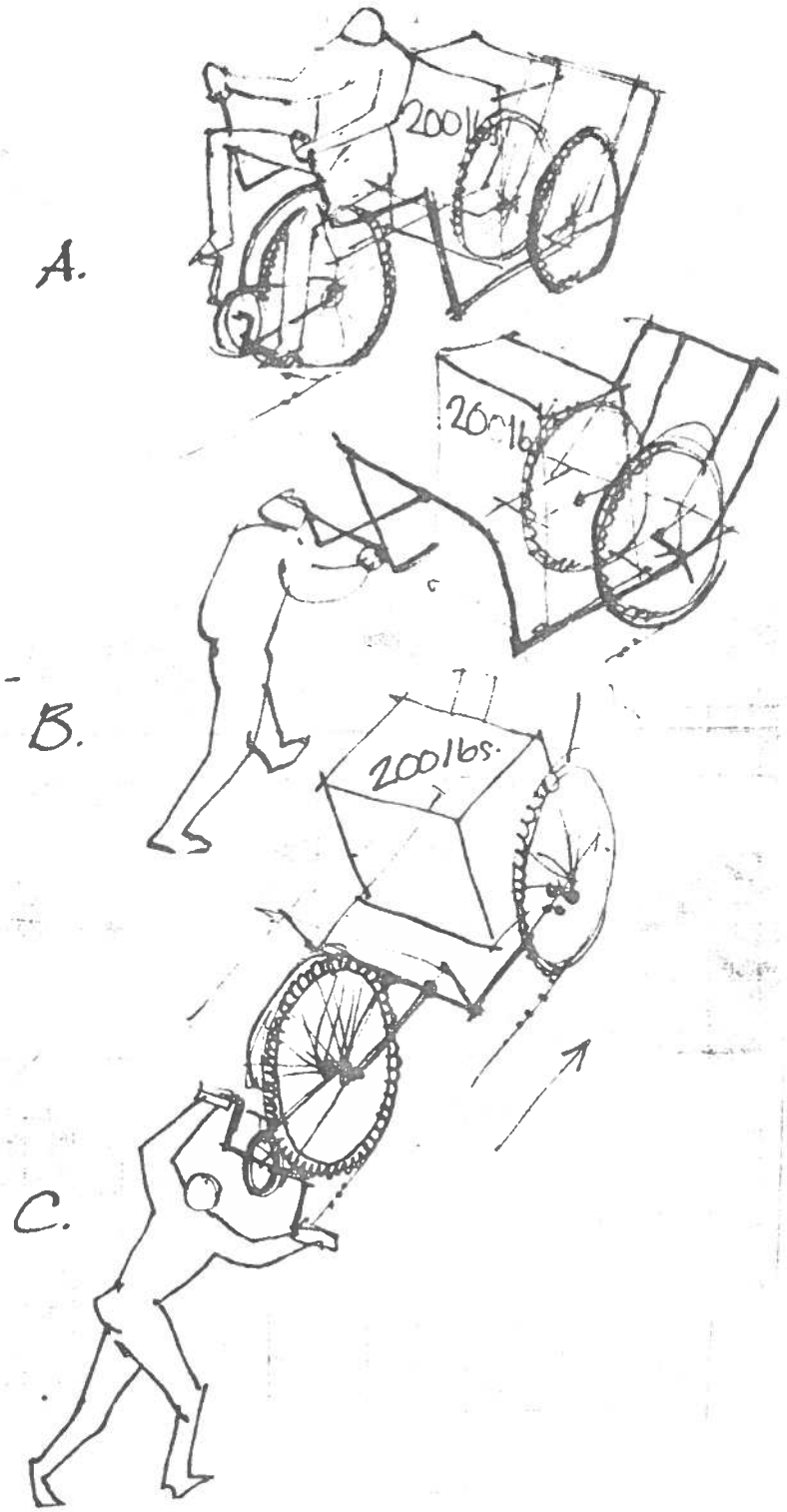
We found a number of proposals for the improved design of carts (Figure 4) but recognize as well that the local optimum, possessing convenience, efficiency, and multi-purpose capability, might result in quite a different kind of frame. Many semi-developed countries have found that the scooter-engine powered cart, carrying up to a half ton or four passengers, is a highly economical interim solution.

The different modes of movement that need to be integrated in Jakarta are also the maximum number for the whole society. The total system should include:

1. Pedestrian movements, some with pack frame or carrying loads on the head. Maximum economic distance is about three kilometers. Requires drained sidewalks and sun shade, preferably as large leafy trees.

2. Bicycles with carts, pedicabs, low-powered scooters, and similar vehicles may serve trips up to ten kilometers in length, preferably on their own paved routes, and carry loads up to 0.5 tons (includes betjaks and helitjaks).

3. Automotive vehicles would emphasize jitney service, combined with radio-dispatched dial-a-ride in high income areas. Shared with light vans, motorcycles, taxi cabs, and private cars, the jitney



This system for the use (or re-use) of bicycle parts could be adapted to those sectors of Djakarta where man powered vehicles would predominate. A readily demountable and re-assembly vehicle such as this would be very valuable to a co-op or an individual owner to say the least.

The re-use of bike parts is recommended, but in most underdeveloped countries, bikes are usually cannibalised to supply replacements for operating bikes and it seems likely that the variable assembly bikes would have to be made up from scratch and sold.

Disadvantages of the vehicle include:
The probable relative clumsiness of the various adaptations of the bike pieces -- it is doubtful that the variations would all perform equally in traffic, for instance, thus presenting some of the same problems of multi-modal or man-powered/motor powered mixes.

Joinery details and part design would have to become rather sophisticated to handle the wide variety of loads. Such parts might be difficult to produce in Indonesia initially.

Fig. 4. VARIABLE ASSEMBLY BICYCLE, CART, ETC.

(bemo or oplet) could reach every square kilometer of urban settlement, running predominantly on roads given a light top dressing of asphalt.

4. Buses and trucks would be limited to arterials and industrial areas. Coordinated flows of buses in four lanes can supply the peak period capacity provided by a subway, and accomplish it at one fifth the cost. Their flexibility in meeting changing demand is obviously far superior. Range is 50 km. for regular service.

5. Rail mass transit would be introduced on existing rail rights of way quite early, and later it could be built underground or overhead to draw a heavy linear flow away from the surface movements. Given the newest systems for traffic control they appear to become useful after the total metropolitan population exceeds ten million.

6. Small boats for fishing, copra movement, and passenger movement will become more variable in design and more fully motorized. Eventually they would become the private substitute for bicycle or scooter maintained by houseboat dwellers. Range: 5 km.

7. Ferries and launches can provide a transit system that, with the aid of canals running through reclaimed land, could serve high density urban populations and connect island and suburban ports with little interference from rail crossings. It would combine with LASH and SEABEE to cover all islands.

8. VSTOL air bus connections with satellite cities would put Surabaya only a little over an hour away from Jakarta, and cities on other islands will be influenced even more strongly. This service is feasible only after first class ferry accomodations are adequate and have generated sufficient traffic.

9. International airlines will focus on perhaps five airports including Jakarta and Bali.

10. Megalopolitan "fast trains" may have either the New Tokaido Line specifications or the still newer magnetic field suspension with linear induction motors that the Japanese hope to have working by the end of the decade. Java may be ready for this mode in the 1990s.

V. A GAMING SIMULATION OF JAKARTA'S FUTURE

The FOMENTO model of gaming simulation previously developed for understanding the futures of Bombay and Saigon was fitted to the problems faced by Jakarta. The required preparatory work began with the conversion of key projects, as envisaged by students, into proposals for stimulating viable organizations ("ORGs"). These emphasized the social and cultural features as much as the technological and economic. The more routine proposals were proposed by the faculty in such a way that a relatively balanced set of opportunities existed with which decision makers could work. Each proposal "cost" a certain amount, would generate a certain number of jobs, and was assigned a probability for survival (.1-1.0). Many of the ORG proposals required approval or funding by more than one team. (The sample in the appendix required two.)

The number of students and volunteers on hand determined in part the number of decision units incorporated in the simulation. They were nineteen altogether, but two were called out of town. This allowed us to assign at least four members to each of four teams. Besides P.T. BAHANA, which was already introduced in Part III, there was a group representing the national government (chaired by an Indonesian law instructor acting as President) that was labeled NAT GOVT. Another was the Jakarta Metropolitan Government, a provincial type government, abbreviated JAKARTA METRO. The last represented all

the overseas interests in Indonesia, both predominantly Business-oriented International Non-Governmental Organizations (BINGO) and International Governmental Organizations such as the World Bank, UNESCO, and others (IGO). Fortunately, almost all students could be assigned to the teams they preferred. Once in teams they prepared more "ORG" proposals that represented development projects that could be sponsored by their group.

The faculty made a projection of political, economic, social and cultural trends assimilated from the ANTARA News Agency reports and produced a Newsflash for 1975, which was set as the launching time for the next Five Year Plan (APPENDIX I). This indicated some possible areas of strength and weakness to the team.

Players were given an abbreviated "constitution" and Five Year Plan budget for the first half of the period (APPENDIX II). The implications were discussed but, as will be seen, were only superficially understood. Although they might have been able to pass an examination on the interpretation of the Bases for Team Action, they were still unable to formulate a coordinated plan for action. In connection with the discussion of "areas of concern" for the respective teams, the table labeled "Prospective Events Affecting the Future of Cities in Java" (APPENDIX III) was introduced and the possible impact of such events was analyzed. Teams were told that the public would respond if injustice was done or welfare was severely unbalanced. A set of headlines would be introduced as a consequence which might very well influence further decision making. A target set of headlines

from ANTARA was prepared describing the atmosphere created by "dynamic urbanism" (DYNURB) illustrated in APPENDIX IV. That was what could be expected if the teams reached their goal of political, economic, and social development of the metropolis.

Play began at 9 A.M. on Friday at a time when almost all students were operating under a high stress level because it was the last day of the term. Each team had previously selected a chairman, but that did not seem to be of much significance because cooperation and coordination were more important than authority. The chairman was given a distinctive colored felt tip pen for signatures regarding agreements and approvals. Each team was handed the packet of "ORG" sheets which fell under their aegis, although the approval of others was often also required. A typical ORG sheet for this game is provided as APPENDIX V. The stacks (which included enough options to spend more than all their available resources, except for the multi-nationals) were accompanied by a reminder sheet (APPENDIX V) which stated succinctly what the "rest-of-the-world" expected the various teams to optimize. (As will be seen by the description of play, the sheet was read but not comprehended or used -- except in retrospect.) By 9:15 the "events" of the outside world, designed to add another element of reality, were chosen from the set in APPENDIX III (Nos. 3 and 7 were designated as "happening" according to a table of random numbers) and some gossipy comment upon the significance of their occurrence, of the kind appearing in newspapers, was aired. Then each team addressed itself to putting together a preferred package of ORGs. Bargaining began tentatively about 9:40 and it accelerated until about 11:15 when,

after a number of warnings, the cycle ended. For twenty minutes then the ORGs were tested by a table of random numbers for viability. The failures were returned to the teams for new attempts, if they wished, but the capital invested in them had been wasted. Cycle One was completed.

The results were tabulated on the blackboard (Table 1) while participants had sandwiches and cold drinks (the heat was close to an all time record for Berkeley in early June, obligingly creating Indonesian weather conditions). The results were almost catastrophic compared to the potential. Only about a quarter of the financial resources available to the society were used, and great unemployment was being experienced by the labor force normally employed in light manufacturing and construction. The national government appeared to have been paying excessive attention to community development and the building of bureaucratic capability and, while doing these things, showed an insufficient interest in production. In addition the metropolitan team seemed to have been paralyzed; it made a minor contribution to the little development that occurred.

Cycle Two began around 12:15 P.M. with the selection of extra outside events from APPENDIX III (Nos. 1 and 4 "occurred"). Teams began to build up a supply of proposals, some to rectify the imbalances created during the first cycle and others to enhance the growth rate. Bargaining was nearly complete at deadline time. This time employment in stimulated activities (even in the real world it is always a small share of the whole) was 40% larger and capital

invested was up a little more than 50%. P.T. BAHANA fulfilled its function very well. However, there was a great deal of frustration with the central government. In the beginning it had not set any priorities for focussing its attention and as a result became a bottleneck in decision making.

The frustrations of the other teams had built up rapidly. The metropolitan group began to feel that Jakarta would be better off as an independent city state, similar to Singapore. It was supported in this thinking by the multi-nationals who promised to funnel huge sums into the metropolitan area if it could make independent decisions. But how does a region secede? After much fumbling it was agreed that a way was needed to persuade a member of the national government to join the conspiracy. A variety of attempts were made before some interest was generated. At that time, about 1:30 P.M., time was called, the "budget period" closed and the Five Year Plan revisions completed. The viability of the proposals was again tested against random numbers, with the results already indicated. Cycle Two was completed at 2 P.M. and it was decided then to halt. A discussion was held over sandwiches and wine, where the preceding outline of events began to emerge. Players and game directors were exhausted, because the action had been continuous and intense.

Many more parallels with the real world were noted than can be included here. The chief value of a gaming simulation is to raise these interesting fragments of interaction for discussion and analysis and to discover whether they are plausible. Of course, many plausible sequences were acted out in a political context that could not be

SOCIAL INDICATORS OF DEVELOPMENT

	Cycle 1	Cycle 2
Kinds of Organizations		
Firms	15	98
Community	28	5
Co-operatives	13	32
Agencies	75	62
Associations	12	13
Clubs	3	8
Other	2	2
Sectors Represented (nos. of orgs.)		
Food	13	32
Light Manufacturing	2	90
Heavy Manufacturing	5	16
Socio-cultural	28	29
Construction	3	13
Utility	6	23
Housing	7	5
Commerce	5	10
Transport	12	7
Communications	7	1
Education	4	11
Other	63	6
Responsible for Financing (nos. of orgs.)		
BINGO-IGO	69	105
NAT GOVT	102	67
JAKARTA MET	11	63
P.T. BAHANA	49	108
Capital Investment	505.6 mil.	772.6 mil.
Jobs Created	73,310	116,054

imagined before we started, yet only a tiny fraction of the possible total were elicited in the ninety man-hours spent in gamed interaction.

The principal deficiency, noted by a student of political science (with a special emphasis upon Asia), in a thoughtful review of the simulation from the point of view of a member of P.T. BAHANA, was the lack of realistic response from "the people." The impact upon the people was gauged purely from employment effects and drawn from unbalanced delivery of public and private services. In other words, it was only plausibly argued whereas it could have been acted out. Actually, much too little is known even in Indonesia to construct a gaming simulation of Jakarta metropolitan politics, but the gap revealed by this insight is important. What are the metropolitan politics of Jakarta and their interaction with the national government and the military which resides in its center and holds the reins of power? What factions must be taken into account?

Perhaps more important than any other outcome from the gaming simulation was the ability to voice causally related objections to a publication like that which appeared while the class had been attending lectures (Indonesia: The Inevitable Miracle, a study by the Crocker Bank, Edward Ellis Smith, Assistant Vice President, International Division, San Francisco, April 1973). Normally students are suspicious of this kind of glorious optimism and pick upon details for criticism, or else revert to ideology -- right, left, or center. With this simulation experience they see more clearly a number of events and policies that can frustrate the "miracle" held in view by means of poetic prose and statistical tables. They can also assess the risks somewhat more clearly.

VI. FOLLOWUP STUDIES OF HIGHEST PRIORITY

It was evident from the beginning of this exercise in long range planning for Indonesia that producing enough food to meet the prospective population growth was the critical point. Even with the most advanced food technology we were able to find the need could be met with confidence only if population leveled off at about three times the present level. That means that henceforth rate of adoption of family planning must be equal to the most rapid yet seen in the world. At the momentum of the progress of the present program, as reported to the most interested parties outside of Indonesia, gives no evidence of such success.

Failure could bring about a catastrophe up to a dimension ten times the scale of the Irish Potato Famine of the 1840s -- the last well recorded event of this kind not associated with war or revolution. Study of the history of that event and of the minor famines that followed demonstrates that the major outcome is accelerated urbanization because refugees are more likely to survive where relief supplies can be distributed. If, in desperation, they migrate, they are most likely to be found in port cities of other islands or other countries. Our "solution" is also one of accelerated urbanization, but much less traumatic. There seems to be no alternative -- if a future exists at all, it is urban.

How might the city itself bring about the required reduction in fertility? The biggest single chance lies in the rate of

modernization of the role of women, one feature of which is reduced family size. Other aspects include accelerated education, increased factory and commercial employment, independence of movement in public transport and in public places, participation in public affairs, etc. What parts of the mass media are dedicated to communication to women? What new organizations are being created that mobilize their efforts? What features of traditional society put up the greatest resistance to a reshaping of the female role? What are the social indicators of progress in this direction which would allow us to compare Jakarta with Bandung, Bogor, and Surabaya? The most promising are those that relate to substitutes for the child-bearing role and apply to productive activities of young women from the ages of fifteen to twenty two.

Another approach to the issue begins in the present contraceptive supply centers. What sources of information lead users to believe help is possible and tell them where to get contraceptive materials? That kind of information will be available as part of the lore of the clinics and pharmacies, if nothing else. But what images and programs on radio, television, or other mass media appeal to users? What conceptual blocks prevent abortion among those that need the operation for reasons of health and family welfare? Is it possible to dramatize the positive values of abortion and sterilization, given cultural norms?

Can one construct a feedback loop? Propaganda can go out arguing the benefits of abortion, for example, if the price of rice futures is greater than the cash price; if rice futures are much higher

then a proportionately larger effort is made. The advantage of making such a connection is that it bypasses the argument for having children as investments toward security in old age (i.e., if the family is on short rations the new child is less likely to survive anyway) and puts emphasis upon the control of one's own destiny, including number of progeny. Children can be postponed until times are propitiate for investments to be made in them. It is likely that this social economic model of family dynamics is more operative among the Chinese than the Indonesians, but can one find similar feedback systems in the alternative models? In what ways are they future-oriented? The most important component of the population to be alert to is the stratum that is joining the bureaucratic institutions at the bottom of the hierarchy, because they set examples for the ambitious poor who make up the mass of a metropolis. Since there will be politicians and social workers who try to understand shifting motivations, current information should be available.

Organization Initiation

Another crucial function of cities is that of stimulating new forms of human organization. Who besides the Chinese are the social entrepreneurs? Will they be marginal people from other places -- Bandung, Atjeh, Bali, Medan? What are the kinds of organizations that do not have telephones, and how do they communicate? Is the person at the focus of communications the founder or his successor, or an adjutant-disciple? Is there any part of the military that goes into business for itself upon retirement?

Perhaps a systematic way of approaching this subject would not be to draw parallels with other societies (which is the way the subject was introduced here) but to start from the real world and discover the origins of the agencies and enterprises encountered. Who took the initiative in forming them? How did he learn techniques of organization -- from a mentor or from the family? What appeared to be the opportunity or urgency at the time of origin? Every society contains excellent multi-lingual informants on such subjects, although fact will usually be mixed with gossip and will therefore often need to be corroborated independently.

One can ask many related questions. How do the Japanese find counterparts in Java? The Americans? The Chinese? The South Asians?

Inside the country itself, how do new agencies or offices of Government get formed. Is PERTAMINA, the powerful public oil monopoly, different from the rest of Government, Jakarta different from provincial, etc.?

What are the real opportunities for entrepreneurship at present? What kinds of social groups might produce organizing competence? What obstacles can be identified? Is it the extension of credit, the lack of a dependable transport system, a mistrust of those outside the family relationship, or something else much more specific to Indonesia? The concept of opportunity should be compared with Malaysia, Korea, and Thailand, where somewhat higher levels of organization have been achieved, and where the degree of organization constitutes a "next step up" for Jakarta.

The Interface with the Multinationals

Increasingly the multi-national organizations are developing styles of their own in dealing with the newer nations. The national origins of Chevron, Shell, Mobil, Nestle, Unilever, IBM, Sony, and Ford are becoming attenuated. They are no longer controlled by the foreign policies of the countries of origin, just as the WHO and the World Bank are becoming relatively independent of the United Nations group.

What are the formulas for cooperation across a cultural and legal boundary? Is it to be like the USSR, where indigenous competence and self-assurance must be built up before nationals are willing to deal with outsiders because they only want to do so as equals? Or will it be more like Thailand where complementarity allows an outsider to acquire a virtual monopoly for an indefinite term so the Thai can have the capability on hand.

What form do feelings of inferiority and inadequacy take in bargaining? At some point they are crystallized into an accusation of "neoimperialism," but for each country the sensitive factors that combine to form the stereotype at the interface are quite different. Prevention of exploitation by neo-imperialists is one of the functions of law. This information is likely to be collected by legal and other advocates of a "go-it-alone" policy of exclusion of foreign contacts, thereby eliminating all the difficult situations.

Much of the advanced organizing behavior transmitted from the West -- the culture we understand by far the best -- will flow through computing centers. Are they decentralized, as in Karachi or Hong Kong,

or brought together into multi-purpose service centers? How does the most sophisticated programming get done? Who are the sponsors? One gains insight into the formation of complex organizations by taking this approach to assembling information.

All this leads up to the key question: How does one set up "win-win" types of games within the Indonesian culture, where too often in the past its people have been engaged in conflicts with an "I lose but you lose more" kind of outcome? The viable organization at the face-to-face level of interaction is the best indicator of success.

Table 1

SOCIAL INDICATORS OF DEVELOPMENT

CYCLE 1/CYCLE 2 IN PARENTHESES

Kinds of Orgs

FIRMS - 15 (98)
COMMUN. - 28 (5)
CO-OPS. - 13 (32)
AGENCIES - 75 (62)
ASSNS - 12 (13)
CLUBS - 3 (8)
OTHER - 2 (2)

Water

30.4 mil gal/day

Electricity

5.5 mil kwh/yr

Sectors Represented

FOOD - 13 (32)
LGT MFG - 2 (90)
HVY MFG - 5 (16)
SOC-CULT - 28 (29)
CONSTR. - 3 (13)
UTILITY - 6 (23)
HOUSING - 7 (5)
COMMERCE - 5 (10)
TRANSPORT - 12 (7)
COMMUN. - 7 (1)
EDUCATION - 4 (11)
OTHER - 63 (6)

Responsible for financing (in nos. of orgs.)

BINGO-IGO - 69 (105)
NAT GOVT - 102 (67)
JAKARTA-MET - 11 (63)
P.T. BAHANA - 49 (108)

CAPITAL INVESTMENT

505.6 mil (772.6 mil)

JOBS CREATED

73,310 (116,054)

APPENDIX I

Selections from ANTARA - 1975

GENERALS ANNOUNCE PLAN TO USE MILITARY IN DEVELOPMENT ROLE

General Suharto and the General Staff today put forward an outline of the comprehensive plan to reinforce the new Government in its program of economic development. Major contributions will be made in advanced engineering for the public sector, technical education at all levels, model forming of public lands for its own food supply with surplus going to the Ministry of Health, adding to telecommunications capacity around Jakarta and to the border stations of Indonesia, pioneering new air and water ferry services, etc. They acknowledge having consulted at length with officers from Korea and Brazil, two of the states now undergoing accelerated growth.

JAPAN RAILWAYS TO ASSIST BUILDUP OF JAKARTA-SURABAYA LINK

Arrangement has been made between Asian Development Bank and the Japan National Railways to use the latter's technical staff to develop a four track electrified railine along the north coast of Java with spurs inland. Japanese foresee that the demand could develop up to the levels reached by their Tokyo-Osaka links -- the Old and New Tokaido lines. This rail service could provide a spine for industrialization and urban settlement over the next several decades. Indonesian Army Corps of Engineers will work on the traffic control system development.

JAVA WATER RESOURCE CONSERVATION PROGRAM LAUNCHED

The National Planning Council recognizes that water is the crucial resource on Java. At the village level a series of Small Watershed Conservation Authorities will be created to use local labor to build minor reservoirs. A varying price for metered water based upon scarcity will be charged in Jakarta, Surabaya, and Semarang. All new electric power plants will use their waste heat to produce distilled water. Fresh water lagoons will be created at several points along the shore line to catch much of the water that runs off the lower land after a heavy rain. If water becomes truly scarce it will be imported from Sumatra and Sulawesi in big plastic bags, and brought to the harbors by sea-going tugs. Oil tankers could also be used, but are more expensive.

"POLLUTING INDUSTRIES" AGREEMENT REACHED

Agitation in Japan caused the government to require firms to locate new steel, chemicals, paper, and non-ferrous metals industries in isolated areas or to arrange for overseas manufacture in order to fulfill contracts. Indonesia agrees to accept Japanese industries in special free port zones. Two million Indonesian manufacturing and construction jobs may be created over the next decade. Workers would live in self-help settlements and commute daily by bus. Japanese will provide credits for infrastructure. Indonesia clearly reserves the right to halt these industries if intolerable harm is done to the environment.

CHAMBER OF COMMERCE PROTESTS "SELLOUT" TO JAPANESE

Independent businessmen, joined by invitation by the spokesman for Chinese firms in Indonesia, have submitted a strongly worded protest to the Government regarding the long term agreement with Japan. They claim that the Japanese are being given an unfair advantage by being able to sell cheaply in Indonesia a variety of commodities and goods that were only partly produced by Indonesians. Business spokesmen hinted that they would accept a slower rate of development if it were "all Indonesian."

APPENDIX II

Outline of Bases for Team Action

(available to all players)

NATIONAL GOVERNMENT

	Areas of Concern On the basis of constitution and precedent.	Special Constituencies Groups needing help and organized well enough to demand it.	Criteria for Selecting ORGs Procedures for optimization and inbuilt goals.
1.	Distribution of benefits to the respective islands in a fair fashion	1. Workers in resource development industries	1. Maximize "value added" as a measure of returns to individual and society, i.e., economic development
2.	Stabilize the political system by equitable distribution of benefits to the social classes.	2. Military servicemen and families, retirees.	2. Promote exports
3.	Reducing population growth and redistributing population	3. Tribal people and landless rural population.	3. Produce tax revenue for national government
4.	Functions: Natural Resource Development Transport and Communication Higher Education International Trade Public Order (Police) High Culture	4. White collar governmental personnel.	4. Import substitution 5. Establish as few new precedents as possible (because bureaucracy is unwilling to take responsibility)

Capital Resources for Urban Java:

$1,000 millions first cycle
500 millions more, if matched with BINGO-IGO
100 millions more, if matched with JAKARTA-METRO

Key Powers of National Government

1. Has universal veto on projects, but must give a reason for doing so.
2. Can dismiss the JAKARTA-METRO government for a cycle and take over its remaining funds.
3. Initiates projects in education, heavy manufacturing, with multi-national corporations, airport-related, railroad-related activities.

JAKARTA METROPOLITAN GOVERNMENT

Areas of Concern	Special Constituencies	Criteria for Selecting ORGs
1. Delivery of social services to residents	1. The technocrats, their families, and the modern business and professional class	1. Modernize and improve image of Jakarta
2. Public works	2. The lesser bureaucracy still operating in traditional fashion	2. Improve the quantity of taxes collected from property
3. Industrial promotion	3. Associations of workers	3. Make life more tolerable for the poor
4. Cultural development and center for fashions and styles	4. Collection of local leaders of squatter colonies	
5. Sanitation and environmental improvements based upon public cooperation		

Capital Resources for JAKARTA METRO

$30,000,000 (first cycle) from taxes, rents, and grants
$50,000,000 in bonds, matched with anyone, requires OK from BINGO-IGO

Key Powers of Metro Government

1. A majority can veto any proposal of P.T. BAHANA
2. Can be over-ruled by NATIONAL GOVERNMENT
3. Initiates proposals on transport, communications, construction, food, housing, utilities, socio-cultural activities, etc.

Business-oriented International Non-Governmental Organizations and International Governmental Organizations (BINGO-IGO)

Areas of Concern	Special Interest Groups	Chief Criteria
1. Availability of literate labor force for quality control	1. Workers in tourism services	1. Transferability of profits
2. Infra-structure conditions that will improve quality of labor	2. Engineers, architects, and other modern growth-oriented professionals	2. Low risk of failure
3. Transfer of potentially polluting industries	3. Associations of workers	3. Further opportunity for enterprise
4. Decent living conditions for overseas personnel		

Resources: up to $2,000,000,000 dollars per cycle
(no more than $200,000,000 in a given industrial complex)

Key Powers of the Multinationals

1. Propose projects in categories of manufacturing (all kinds), construction, communications, transport, commerce.

2. Includes overseas credit, so must approve use of METRO's bond issues.

3. Make grants or gifts without strings attached.

Regional Agency for Stimulating Business and Socio-Cultural Organizations

(P.T. BAHANA)

Areas of Concern	Special Constituencies	Chief Criteria
1. Wants to generate a wide range of balanced projects	1. Promoters of new organizations	1. Maximize social returns
2. Improved statistical and reporting systems	2. Immigrant unemployed workers	2. Develop external economies by evolving complexes

Resources: $50,000,000 first cycle
(requires three times as much from NAT-GOVT)
or BINGO-IGO

Key Powers

1. Encouraged to initiate ORGs in manufacturing, commerce, construction, housing, food, educational and cultural groups.

2. Concentrates on small to medium enterprises.

APPENDIX III

PROSPECTIVE EVENTS AFFECTING THE FUTURE OF CITIES IN JAVA

EVENT	BASIC LIKELIHOOD	SIGNIFICANCE
1. Discovery of Massive Off-Shore Oil Deposits. The Japanese syndicate drilling off the Sumatra coast announces the tapping of fields as large as the largest in Indonesia today. They are negotiating with Chevron for assistance in developing the field.	0.4 for the first cycle; 0.2 for succeeding cycles.	A huge search has been underway for some time in the hope that such a discovery would occur. Later borings are done at higher risk, because the most likely had been dry holes. Indonesia's credit improves.
2. Blight Attacks High Yield Rice. The Green Revolution is halted while blight resistant strains are developed. Blight spreads across island in a year due to insect carrier.	0.2 for each of the cycles.	This is a standard risk for new strains. Grain imports are raised to 3 million tons/year. Costs $600 million per cycle in foreign exchange.
3. Pill to Produce Only Sons Available. Family Planning Ministry makes 95% sex control possible. Must be used in conjunction with contraception. Possibilities are widely publicized by the Russians, because the final scientific discovery occurred there.	0.2 for first cycle; 0.4 thereafter.	The understanding of contraceptive technique spreads widely, birth rate takes a 20% drop. Land owners have more sons; ambitious landless peasants choose to have daughters. Lays foundation for a biochemical industry of $30,000,000 capital.
4. Extremists Assassinate Score of Leaders. Underground movement associated with Palestinian Arab fedayeen organizes a large scale plot. Several ministers and the vice-president killed, with aides and top bureaucrats.	0.3 for first cycle; 0.2 thereafter.	Senseless violence carried out by partially educated is a result of past injustices. Increases risk of failure in large projects for one cycle.

5. Sufi Mystic Attracts Huge Following. A charismatic teacher-preacher tends to attract people affected by social change. He advocates self-criticism, conscientious cooperation, achievement through attention to detail, dispensing with luxuries, and thus different from original Sufi movement.	0.1 for first cycle; 0.2 for second; 0.3 later.	This seems to be a novel source of change for a predominantly Muslim society. The change increases the likelihood of success in small enterprises, because the new group gravitates to organizing and managing positions.
6. Whole Mountain Blows Up. Australia is colliding with Southeast Asia. This time the mountain is in East Java: Huge amounts of dust are deposited over a period of months after initial explosion. Millions of refugees, and a million need new homes altogether.	0.1 for each cycle	The world will come to the rescue as in Bangla Desh. A new emphasis upon transmigration to other islands results. Top management assigned to it.
7. Second Cultural Revolution in China. A new socio-political convulsion is accompanied by large public trials and the disorganization of production. Chinese export markets are made available to competitors.	0.3 for each cycle	The shift in top leadership in China will be abrupt. Disagreements about doctrine and policy are certain. The internal crisis keeps China focussed only on USSR policy. Rest of world ignored.

APPENDIX IV

Selections from ANTARA

P.T. BAHANA REPORTS STRONG PROGRESS

Fifty-two major undertakings have been launched in the past year (each greater than a thousand members or a hundred full time employees) for West Java, as compared to 41 last year and 35 the year before that. Orgs. with postal addresses increased 17%; Orgs. in telephone directory by 21%.

METRO MOVEMENTS UP 10% IN YEAR

Spot surveys show that the number of trips made in Jakarta metropolitan area increased by 10% as against a population increase of 8%. The Metropolitan Transport Commission warns that hundreds of buses are needed to displace the congestion caused by bicycles and private cars. They are asking that the roads in the outer city be repaired, because they are causing the buses to wear out or break down too early in their life.

JAKARTA GOVERNOR PUSHES BIG CLEANUP

Governor Sadikim, the long time chief of greater Jakarta, has received strong backing from the Prime Minister for his program of eliminating encroachment upon public spaces by small shopkeepers, public markets, hawkers, and beggars. Owners are encouraged to paint their fronts in some sort of grand design for the block. Ali Hakim, Minister of Tourism, is highly enthusiastic.

MILLIONTH URBAN HOMESTEAD PRIVILEGE GRANTED

The Government's urban homestead loan program, devised for the establishment of urban villages, granted Amin Modjorostra and his household the small (60 mi) plot. Present arrangement is for the family to hold stock in the Arpira landholding cooperative to be paid for over a period of ten years. The stock averages the land value for the whole garden community and pays for land development costs with stock, thus controlling land speculation.

FIVE NEW CITIES TO BE STARTED

The National Planning Council announced that land has been designated for the start of five new cities between Jakarta and Surabaya, each to reach more than a million population. The outline plan already designates street and water supply grids. Special development corporations will be created.

WORKING SAMPLE

6 firms started

5 survive

F O M E N T O

DEVELOPMENT PLANNING SIMULATION GAME

"O R G" P R O P O S A L

What does it Organize (Activity)... ELECTRONICS COMPONENTS ...
(in capital letters)

What Is It? (check one) Firm ✓ Community ___ Co-op___ Agency___ Ass'n___ Club___ Other___

Sector (check one) Food___Light Manuf. ✓ Heavy Manuf.___Construction___ Utility___
Housing___ Transport___ Communic's___ Education___Soc. Cult.___ Commerce___ Other___

Location Central City___ Other Urban___ Urban Periphery ✓ Exurban___Port related___
Railroad related ✓ Airport related ✓

Source of Financing 1. BINGO - IGO 2. JAKARTA METRO 3. P.T.BAHANA
4. NAT. GOVT. 5. Other

Water:
Over 1,000,000 gals/day; est'd....
100,000 - 1,000,000 " (check)___
Under 100,000 " (check)___
None (check) ✓

Power:
If special needs, estimate vol.....

Manpower:
If special skills, specify .....

Capital Investment:
Over $1.0 mil. - estimate: .....
$0.50 m. - $1.0 m. (check) ✓
$0.25 m. - $0.50 m. (check) ___
$100,000 - $250,000 (check) ___
Under $100,000 (check) ___

6 different kinds of materials

silicon
germanium
gallium arsenide

chips
dopes
phosphors

Phasing: What must precede your ORG? (specify essential services, infrastructure, etc.)

electronics assembly

What may follow your ORG? (Specify any likely ORG or other spinoffs)

Justification: (Specify important benefits, such as national economic growth, benefit for special groups, export & foreign exchange, import substitution, social infrastructure building, etc; where you can, quantity)

Critical Features: (Specify any major costs and possible bottlenecks, such as foreign exchange needs, political, social or cultural constraints, etc.)

EVALUATION:
Survival Probability (Evaluator check):
0.1__ 0.2__ 0.3__ 0.4__ 0.5__ 0.6__ 0.7 ✓ 0.8__ 0.9__ 1.0__ not certain ___

Lag before output of surplus (years) ...1-2.....
Any other critical feature:.....

APPENDIX VI

As a member of a team you will be presented with a packet of "proposals to organize something." You must choose which ones are worth financing -- or sharing their finance.

The criteria of choice are typical of a developing country like Indonesia:

NAT GOVT	is judged by Total investment surviving and by the balance of investment by function.
JAKARTA METRO	desperately needs jobs and must worry about water supply and power supply.
P.T. BAHANA	is expected to maximize number of ORGs surviving and maintain a mixed economy.
BINGO-IGO	multinations maximize viable investment, minimize loss of capital.

Each person learns how to operate as he goes along. The rules are normal rules for professional behavior; they can be broken, but with consequences that are unknown to either victim or exploiter.

The president or executive-secretary of each team will indicate its share with a pen of designated color on the sheet, so we can quickly ascertain the agreement that was reached. A zero allocation to the project means approval, but the other party must provide the total capital.