

LAND USE ON GUAM

Prepared by: Paul Souder
Bureau of Planning

by

PAUL B. SOUDER

Director, Bureau of Planning

Government of Guam

This is the first of a series of articles relative to land use on Guam, an element of the Comprehensive Master Plan, mandated by Public Law 12-200. All ^{people} ~~citizens~~ of Guam should be aware of the various ^{attitudes, problems, reservations and} alternatives and compromises that enter into ^{land} ~~such~~ planning and ultimate decision making, ^{or policy you} and are invited to react in person or by mail to the proposals and philosophy expressed.

I - Attitudes and Problems ^{September 20, 1974}

^{Guamanians} ~~The Chamorro people~~ prior to World War II and up until Typhoon Karen, were closely attached to their ancestral holdings and didn't want to lose them. With relatively minor real estate taxes, land was held and accumulated by individuals to give to their children when they married, to build homes or to establish an estate.

This philosophy has changed. Today there is little reluctance to part with land if the price is right.

Before World War II, there was little objection to military and government land taking, because there was an adequate supply of this commodity to serve every ^{one's} ~~basic~~ needs. After World War II, when some 68% of the land in the territory was under military control in 1945, new feelings developed. There was little objection to such taking for the actual accomplishment of war goals. However, after passage of the Organic Act, and in the settlement of claims, there was considerable unhappiness on the part of the citizenry regarding such acquisition.

After the war, all of the fishing grounds from Apra Harbor to Tarague were under military control or polluted by sewage. Removal of these areas necessitated other employment for fisherman, ^{reducing the} ~~possibility for development of that industry,~~ ~~reduced this needed asset.~~ The military condemned the best farming lands, and although some of the lands have been returned to their owners, the land was made unusable by coral fill, pavement and complete removal of soil cover. ^{Much of the condemned land was}

~~Condensation included the better farming land, already developed~~ with plantations and orchards such as coconuts, avocados, tangerines, oranges, mangoes and breadfruit. Such plants usually take five to eight years to produce. ^{Most of the condemned} ~~The farms usually~~ had water cisterns. ^{If the new parcels made available were definitely} ~~land~~ ^{marginal} ~~made available for rehabilitation~~ had shallow soil, was rocky and ^{quality.}

the aforementioned plants,
wooded. If developed and planted with ~~coconuts, avocados, etc.~~, it *would have taken*
~~took~~ at least six years for the first harvest. Farms required water
cisterns for the catchment of rain water at a much higher cost than
originally. ~~The new parcels were definitely marginal lands.~~ Financing
was required to tide over a farmer during the time between planting
and first harvest from such cash crops.

In addition, was
~~The~~ confusion caused by the introduction of military roads,
trails and camp sites on an entirely different land pattern created *from*
after the military takings.
~~problems~~ where land was held by the military and where it was
returned to the owners.

Before the war
The people of Guam, by tradition, were part-time farmers. They
had a home, ~~and an additional~~ *a* vegetable *garden,* and a few chickens and hogs
to supplement their needs. They were reluctant, ~~prior to the war,~~
to work for the government or merchants. There were times when they
were put in prison or fined for disobeying the government in its efforts
to recruit stevedores to unload ships. They were clannish and some
of the problems of relocation were the outcome of this tradition.
Some of the people coming from certain segments of Agana would not
go to areas that the government designated for them; and some of them
even preferred residences in areas that were undeveloped and ~~sometimes~~
unhealthy.

Prior to the war, there were many leases executed for government
land for a twenty-five year period. Government officials inspecting
these leases and investigating lease applications ~~inferred~~ *implied* to the
applicants that such land would automatically be transferred to
their name upon the expiration of the lease contract. ~~This inference~~ *Although*
was not a part of the contract, ~~but~~ many lessees believed sincerely
that land would be theirs after twenty-five years.

The people of Guam by tradition usually registered properties in
the name of the head of the family notwithstanding the fact that such
properties were usually owned by six or seven adult members of such
a family. Consequently, when the property was condemned, the
registered owner was the recognized owner, leaving out other family

members whose names were not part of the registration. As a result, priorities for the rehabilitation of other members of the family were not covered.

Frequently, property owners whose land was condemned by the military made representation that these properties were unused, were lying idle, and should be returned.

With the advent of World War II in Guam, ^{the dispossession of} ~~dispossessing~~ people's ~~of their~~ property, the installation of a large military body, and the rapid growth of business activity changed the economy from land dependence to a dollar base. Property patterns and the holding capacities of the land-owners concurrently underwent change. Land received a dollar value and became important not as a means of sustenance, or as a status symbol, but as an item of barter.

Today there are approximately 1200 parcels of government land under the control of the ^Government of Guam. These range in size from 3.5 square meters to 1000 hectares. Most of the land area of these parcels is located in inaccessible areas with terrain difficult to develop. These assets must be reserved for conservation, watershed control, and reforestation.

Other parcels, not suitable for development by the ^Government of Guam, (usually remnants of land taken for highway development) are valuable only to adjacent property owners who wish to increase their holdings.

^{continuing and}
Guam's ^Amost urgent and pressing need is to determine the extent of government land by surveying both public and privately-owned unsurveyed parcels. Transfer of land should be declared illegal until a parcel is properly surveyed and recorded. Conflicting claims ~~could~~ be settled and the exact extent of public property ascertained ^{to} ~~should~~

to facilitate the proper development and land utilization of territorial real estate assets.

Lot Designations

In the continuing process of subdividing ~~large~~ parcels of land, whether public or private, a ^{intelligent and usable} numbering system is necessary. In the past, numbers were assigned to a particular area being developed. Following this, another section, not necessarily adjacent, would carry on in the same numerical order. A grid system indicates the general location of various parcels but has not been utilized to the extent of determining parcel numbers.

^a
~~The~~ difficult problem concerns property boundaries. Many of the legal descriptions include ^{as markers} coconut trees, ~~as markers or~~ rock piles, or an intermittent stream course. Some use only the names of adjacent property owners. Metes and bounds descriptions are becoming prevalent, especially in built up areas; however, there are discrepancies in the location of triangulation points. A problem exists in the use of a grid system which ~~only~~ identifies ^{only} approximately a property location, as the boundaries very seldom are coincident with the grid. In absence of the grid system, place names are used for the general location, but these have changed with every generation. Additional problems ^{have} ~~have~~ resulted from the loss of records during the Japanese occupation.

An orderly development of land is in the best interest of the public. This includes ^{Assigning various uses to which the land may be put,} ~~the uses of land~~ to insure that a supply is available for all needs, ^{and that each parcel is put to its best use,} ~~as well as placing the best use on each specific parcel.~~ Where several uses are considered equally suitable for a particular area, other aspects of total land use needs must be evaluated. Conversely, public improvements should have a choice of several sites in order to limit purchase costs or, if owned by the government, to enable a flexibility in the overall land use design.

~~ment.~~ The responsibility of the government to act in the best interests of the public transcends private desires to utilize land that may prove detrimental to adjacent landowners. Although there may exist development controls that determine uses of land, space relationship, and community design, a parcel of land is still not protected against becoming an undesirable blot on the landscape. The absence of utilities and proper access may create unsanitary conditions and illegal trespass on adjacent property. A deterioration of land exists where these facilities are lacking and the creation of ~~urban and rural blight~~ is inevitable.

~~Land Use~~

Land ownership, either public or private, is a privilege entailing many responsibilities. The misuse of land may subject an adjacent landowner to dangers of health and safety as well as depreciation of land value. Drainage, erosion, inadequate waste disposal, fire hazards, ~~poor sight distances of traffic~~ and obnoxious industries are examples of land misuse that ^{can} ~~would~~ adversely affect the safety and valuation of adjacent property.

The government has even a greater ownership responsibility in determining the use of public land than do private owners. In addition to limiting or eliminating the aforementioned examples of land misuse, the government must preserve and conserve land to satisfy many of the public needs of the people in the present and for the future. ~~The acquisition of vacant land in expanding areas insures~~

An increasingly important concept of public land responsibility is that of conservation and preservation of open land. Areas of steep slope or, in contrast, tidelands must be properly used to eliminate erosion. Some areas should be preserved in their natural state for the study of the inter-relationships of flora and fauna, while other areas can be developed for recreational purposes to include camping, boating, swimming and picnicking or just sight-seeing.

Government of Guam property can be divided into two categories-- 18.1% or 5,200 acres of an urban nature of which 1,600 acres are used for roads, 3,600 acres for conservation areas, and 1,000 acres for public use. The balance of the government of Guam land (81.9%) is of a non-urban category, comprising some 23,600 acres, containing approximately 1,935 acres 8.2% which are used, and 21,665 acres (73.7%) which are unused; the latter composed, for the most part, of mountain slopes.

Of private property, 4.4% or 2,700 acres include land for urban use, 2,000 acres of which are used for industrial purposes, and 200 acres for semi-public purposes. Private non-urban lands comprise some 58,500 acres (95.6%), 19% or 11,003 acres of which are used. The balance of 76½% of the private non-urban lands, comprising 47,367 acres, are not used.

One of the most distinctive and unfortunate characteristics of urban land use on Guam is the strip development, along major roads. The fragmented and haphazard placement of both residential and commercial developments reflects a past lack of zoning regulations, although the pattern of development (and the lack of it) in the Agana area is due largely to the problems of land fragmentation in that location. Areas of multiple-family dwelling units are located throughout the island, usually with little consideration for intelligent land use, or location. In nearly all areas with the exception of recent subdivisions ~~in Sinajana, Tamuning, and Dededo~~^{Upoua}, dwellings vary from simple, poorly constructed frame houses to those manufactured from concrete block of good design.

← Elsewhere on Guam, the pattern is one of concentration of single-family dwellings in fairly compact villages, usually centered around the church. Villages which suffered bombardment damage during the 1944 liberation of Guam or which experienced extensive typhoon damage in 1962 have a larger percentage of newer dwellings. ~~of villages with older housing.~~ Commercial services in the villages are usually limited to a few single-room, family-run retail stores which carry food items and some clothing and drugs. Needs for major clothing, appliances, drugs and other items are usually filled in Agana^{Dededo} or Tamuning retail specialty shops. Scattered commercial activity is located throughout the island.

II The Need for

A LAND USE POLICY

The first demand a growing population makes is on land. For subsistence living, a shelter is an unavoidable need; and a shelter needs space. Reasonable living conditions require basic services such as water supply, sewerage disposal, roads, shops, schools, offices, etc. These too make impressive demands on land. In urban areas, the provision of minimum services and amenities becomes imperative.

Population, though significant in itself, constitutes only one of the sources of competition for land. The process of economic development generates numerous other competing demands on real estate. Substantial reductions in birth and death rates, in average household sizes, significant increases in life expectancies, increased participation in the labor force, are the consequences of economic development.

As the productive base expands and productivity rises, additional employment is generated and income and consumption levels rise. The rise in standards of living creates more and new wants, and for their fulfilment, further enterprises and activities are undertaken. Implicit in this spiralling process is a substantial demand for land. All this necessitates rearrangement of land use. The relationship between economic development and land use policy calls for close coordination.

Land Values

Excessive and increasing land values in Guam pose a serious problem. The skyrocketing of land values unrelated to any perceivable economic factor is the result of speculation in land. In the absence of adequate investment opportunities in the productive sectors, finance capital-earned and unearned-finds real estate a lucrative business. Handsome returns ^{have been} are obtained

either through rentals, ~~which are high because of the severe shortages of all types of accommodation~~, or through capital gains on transfer. Also, ownership of land and property has a fascination for many people. It is a status symbol, a means of social security and a hedge against inflation in the face of rapidly declining purchasing power of money. Exorbitant land values are now proving to be serious obstacles to housing and economic development.

Land values are not uniformly high but vary, depending upon use and location. Nevertheless, maximum land values in Agana influence the structure of land values as a whole. The higher the values there, the higher they tend to be in other areas. Very high land values lead to maximum exploitation of land in the high value areas. Thus where a little thinning out is needed, overcrowding and traffic congestion increase further. The provision of adequate roads, community facilities and parking areas have become a casualty of high land values.

As the vast majority of citizens cannot afford to pay the prevailing market prices or the high rents in central areas where employment is concentrated, they move towards the fringes, increasing the demand for land there too. The polarization of land uses into an overpacked core and an ever-widening low density sprawl is caused and perpetuated by a free market in land.

It is evident that the structure of urban land values must be rationalized, otherwise high land values will thwart attempts at economic and community development.

Land use planning is by far the most important of all the land policy measures. Such planning should ensure that the utilization and conservation of land is economical, functionally efficient and aesthetically pleasing. It should balance the need to utilize land in the present and conserve it for the future. Many difficult situations now being confronted could have been minimized had development been preplanned.

Having noted ~~the need for~~ ~~some broad policy issues in~~ land use planning, attention should be given to overcrowded and congested areas. Redevelopment makes a heavy demand on financial and material resources, involves the displacement of people living therein, and disrupts their community life.

Although redevelopment recreates living accommodation for all displaced residents, their return is frequently barred by higher costs which most of them cannot afford. The result is that they prefer to settle down in other equally bad nearby areas, worsening the situation.

An alternative to redevelopment and that which we are following in urban renewal programs on Guam lies in rehabilitation schemes which make areas more habitable than they were. This may involve the elimination of noxious and hazardous uses of land, improvement of environmental hygiene, and the provision of basic services, community facilities, playgrounds and open spaces. Conservation measures in areas not yet damaged by ~~slum~~ ~~and~~ blight are no less important. In the urban renewal process, redevelopment must await its turn after conservation and rehabilitation.

Land Readjustment

Another alternative lies in the "land readjustment scheme". In congested areas where individual plots are small and irregular in shape, all the plots ^{can be} ~~are~~ pooled together to form one large area. ~~This is done~~ compulsorily. After assembling the land and deducting from it the land needed for common use such as roads, playgrounds, etc., the balance is given back to the owners in proportion to their respective original share.

Density Distribution

Extremely high and relatively low densities co-exist in Guam. A rational land planning policy must take this factor into account. While there is a case for reducing densities where they are unreasonably high, an equally strong case exists for densification of areas where these are low. A more even distribution of densities would obviate the premature extension of the urban areas and lead to compact development, making available utility services more economically, reducing vehicular traffic and giving easy access to place of work, shopping areas and recreational centers.

Urban Sprawl is characterized by unwarranted encroachment on agricultural lands; ribbon development along highways which chokes traffic, and premature spot development which is mostly substandard because essential services do not exist and cannot be made available by the government for financial reasons.

A solution to this problem would provide for "zones" of priority urban development and "deferred development zones". In the former, the government would have legal powers including

those of preemption and eminent domain and certain financial aid. Where development in a priority zone has progressed sufficiently, permission to build outside the zone could be refused for groups of less than a suggested 100 dwellings.

The control of indiscriminate conversion of agricultural lands and the strict enforcement of zoning regulations, subdivision laws, the housing code, building by-laws, and licensing are some measures which check urban sprawl.

A periphery control act might be used to check haphazard development in the community peripheries. An area within ~~three~~ ^{Several} miles on all sides of community boundaries could be declared "controlled areas" where development is guided and sanctioned on the basis of a periphery land use plan. No change in the present use of land would be permitted within 300 feet along roads and in the potential area of development.

~~Public Control Over Land~~

In dealing with public control over land, ~~the leading question is:~~ are there any special reasons which justify land being treated differently from other commodities and being subjected to greater social control? Land is relatively scarce and is an in-expansible commodity. Its use affects the community closely and its improper use much more adversely than is the case with most other commodities. Unlike most assets, its value appreciates rather than depreciates with time. This appreciation is largely an outcome of the improvements made to the environment by the public authorities at public expense or the result of social forces and progress. The individual owner's personal contribution to the augmentation of his land value is insignificant. A number of public controls and restrictions, unavoidable in the social interest, have the effect of redistributing land values. Some lands suffer and others gain. For example, an undeveloped area which a master plan marks for commercial or residential use gains overnight in value whereas one shown for parks or roads slumps. The correction of such ^a situation calls for government intervention. ₁

The general historical trend everywhere has ~~also~~ been one of increasing public control over the rights of private ownership, and the use of land through the government's police, revenue and expropriation powers.

The use of any one or more of these powers depends on various objective and subjective factors. An important objective consideration is the seriousness of the situation to be tackled. In the sphere of land policy and planning, all the three forms of power are being exercised in varying proportions even in countries which adhere to the principle of liberal democracy and free market economy.

The need to ensure the effective enforcement of existing building by-laws and subdivision regulations is essential because a building permit and the sanction of subdivision are important instruments of planning regulation and control. The by-laws and subdivision regulations must be consistent with the provisions of plans or zoning regulations where they simultaneously exist. The technical feasibility of introducing an element of use-zoning in building by-laws, at least in the case of major uses, is a good interim measure.

Zoning regulations should not be so complicated or rigid that they are difficult to administer or that they hamper rather than guide the process of development.

Various forms of governmental licensing are found in Guam. ~~The licenses relate to trades, professions, businesses and industries.~~ The licenseable objects are important from the locational or land-use-planning point of view. However, licenses are frequently not effectively enforced and many unauthorized units come up ^{haphazardly}. ~~Rationalizing and broadening the system of licensing may help extend regulation.~~ Better coordination between various licensing authorities and linking up of licensing with land-use policies may help prevent some damage arising out of wrong locations.

III GOALS

Determine the Land Use Policy

Public Law 12-200 mandated the design of a comprehensive master plan for Guam, Public Law 12-108 and 12-210, the Seashore Protection Act; Public Law 12-226, the Chamorro Land Trust Commission Act; and Public Law 12-225, the Agricultural Preserve Act; all supplement and directly relate to the planning process delineated in Public Law 12-200. All of these statutes come to grips with land use on Guam, a sacred concept that privately owned land is a commodity, and superimpose on it a new concept that privately owned land is also a public resource.

We are aware that the old concept of no control can produce ripple effects so vast that they dwarf and often obviate the benefits new construction or use might have conferred. Guam must revise and enforce regulations governing the use of private land, land to be treated not only as a commodity to be bought and sold, but also as a natural resource to be protected. It's out future.

Land use is everything people do--houses and airports, hospitals and cemeteries, drive-in theaters, hamburger stands and hotels. It's an infinitely interacting system, and when you press one of its buttons you never know how many bells you'll ring or when. You build a shopping complex in Dededo, and a year later you find you've flushed a thousand new toilets in Harmon.

Land use planning is no more and no less than an attempt to inject some logic into the pattern of where bells will ring and toilets flush.

To accomplish Land Use Planning, specific goals must be formulated, goals agreed to by the people of Guam, to determine our direction, ~~and to determine our direction~~. A comprehensive land policy including-integrated measures ranging from physical and legal controls to fiscal devices is the only effective answer.

~~Land Use Policy~~

The broad interrelated social objectives of land policies are to:

- (1) Achieve an optimum social use of land;
- (2) Ensure availability of land in adequate quantity,

at the right time and for reasonable prices to both public authorities and individuals;

(3) Encourage cooperative community effort and bona fide individual builders in the field of land development, housing and construction;

(4) Prevent concentration of land ownership by a few persons and safeguard especially the interests of the ~~poor~~ and underprivileged sections of the island community;

The implications of these objectives include the undertaking of:

(a) Comprehensive planning;

(b) ~~set~~ Measures to curb land speculation;

(c) ~~set~~ Positive programs of land reservation, price preference in land allotment, and financial aid in housing for the benefit of the vulnerable sections of the community such as low-income families.

The following general interrelated objectives should form the basis for land policies:

(1) Achieving a social optimum in the use of land and planned development of the physical environment to facilitate rapid economic growth and to promote a healthier and better life for the community;

(2) Eliminating conditions of scarcity of land, particularly developed or serviced land, to facilitate quick execution of housing and other public and private work;

(3) Creating conditions in which the ~~poorer~~ and underprivileged classes of the island community get a fair deal

in the matter of housing and enjoyment of the common physical environment;

(4) Curbing undue rises in land values and preventing land speculation;

(5) Utilizing the gains of socially generated surpluses in real estate values for the common good.

Land Use Goals *Specific goals relating to land use might include:*

Develop long- and short-range plans that identify basic land uses, classify island lands for their most beneficial use, and set performance standards for the development of those uses;

Survey all Government of Guam lands and establish clear title to them;

Cease the transfer, sale, and lease of public lands until such processes undergo public scrutiny and are devoid of political influence;

Enforce existing building codes, standards, erosion-control regulations, ~~and~~ environmental laws, *By the private builder as well as government.*

Begin discussions with the military on civilian needs for locating industrial activities on land near the Commercial Port.

Preserve agricultural lands with high potential for successful agricultural uses and

Prohibit arbitrary rezoning of ~~agricultural~~ ^{such} land except in areas where there is a logical need to extend an existing community or increase its population density;

Encourage production of agricultural crops that can replace imports and make the state more self-sufficient as regards to food produce; and increase export of tropical crops;

Encourage development of irrigation projects where such projects will promote fuller use of lands zoned for agricultural uses;

Prepare for new communications media. Educational television, radio and other forms of communication will require increased construction. Careful control as to location and type of construction should be exercised so as not to mar Island scenery and charm. This type of construction should be located away from areas where it would have a detrimental effect on our economy;

Set up a program to increase the volume of water available in areas of scarce supply and coordinate this with land use. Impose priority for installations in areas now under intensive use and plan for future expansion, giving careful consideration to irrigation problems and future demand;

Discourage construction of any kind along major fault lines and in likely new areas of volcanic activity;

Improve and enlarge the communications channels that enlighten the public about the above issues;

Classify separate lands that are highly susceptible to serious flooding within the Conservation District boundaries. These should be slated for possible acquisition by the territory or for possible diversion to uses that would not present a serious danger to citizens.

Achieve continuous and strict enforcement of sign regulations on highways and roads;

Enact a law requiring the removal of junked autos from the fronts of lots or tracts of land facing roadsides and on streets. This law should be enforced with adequate penalties;

Provide in the Civic Centers throughout the territory an environment for expressing the best in Island life. It is here that a heightened sense of community can be fostered among all members of society;

Maintain and restore historical sites, artifacts and buildings through adequate research;

Avoid homogeneity in settlement, both urban and rural, and encourage variety of visual experience;

Develop high standards for design and maintenance of all public areas and stimulate application of these standards in the private sphere;

Examine questions of the scale and density of settlement and associated ~~Public Works~~ *infrastructure* in order to maximize economies for Guam and the user;

Examine planned expenditures for public facilities for their comparative ability to stimulate desirable private investment;

Encourage completion of partially developed areas already supplied with sewers, water, schools, streets and other public services before making public investments in new urban developments.

Require designation of public land in new subdivisions for open space, recreation, schools, and community facilities;

Strictly regulate development in airport noise corridors;

Prohibit establishment and continued use of scattered quarries; reclaim existing sites;

Establish conservation areas and protect them from encroaching development;

Require in-depth assessment of the impacts of highway projects, new sewage collection systems, and the relocation of government buildings;

- a. Encouraging centralization of employment and shopping areas;
- b. Imposing higher gasoline taxes and parking fees, and using the income to support mass transit;
- c. Discouraging the paving of large areas for parking lots; and
- d. Discouraging construction of new highways.

Create and maintain conditions favorable to the balanced and sustained socio-economic growth of the territory;

Establish realistic base for property tax evaluation; analyze land-use conflicts; assign priorities for redevelopment and rehabilitation for future development;

Increase the capacity of the territory to anticipate emergent problems. Improve facilities and methods of data collection and storage. Improve distribution of information about new developments to those who can best make use of it;

Preserve and enhance the beauty of Guam by protection from overbuilding, and by stimulating construction, planting and use of color to reflect the "Guamanian style" of naturalness and informality.

A statement of goals and objectives should clarify the role that Guam is anticipated to play in the land use planning process, define the kinds of problems in which Guam is expected to transcend purely local concerns; and describe the mechanisms and intergovernmental relationships required for an effective, joint approach to these issues. The ways in which a program can strengthen efforts to cope with significant development issues should be identified. This is essential to counter an inaccurate and emotional portrayal of land use programs as a takeover

The rapid emergence and increasing visibility of problems associated with land use and development have resulted in a growing appreciation of our relationship to and dependence on our total environment. Numerous conflicts and problems in locating and constructing essential facilities, housing and business on Guam, have brought about a searching examination by the public and of our government of long-cherished beliefs about growth and about the rights and responsibilities of those who own land. Previously, land was treated as a commodity--to be bought, ~~characterized~~ and sold through the real estate market. Land that was not flat and dry was in the way. Where land was cheap, wetlands and hills were left alone; where land was expensive, it was made buildable by flattening, draining or filling ~~it~~.

Experience however, has taught us that land is a complicated resource and the real estate market cannot handle all allocation considerations. Increasingly, the people of Guam are asking what growth will add to the quality of their lives. They are questioning the way relatively unconstrained, piecemeal development is changing Guam, and are rebelling against the traditional processes of government which, they believe, ^{has} have inadequately guided development in the past.

If this new mood is to prevail, land can no longer be seen as an economic commodity to be consumed as quickly as possible; but as a resource to be used sparingly. Further, the importance of the differing characteristics of land in determining how land should be used must be recognized. This new attitude toward land and the redefinition of interest in land regulation have raised anew the taking issue and prompted interest in growth policy.

The proposition that land is a basic natural resource and that the public has interests in the ways in which this resource is conserved and utilized, challenges a long-established philosophy on Guam.

The Fifth Amendment to the Constitution of the United States protects a fundamental right with these words: "nor shall private property be taken for public use, without just compensation." This brief phrase spells trouble when it is applied to regulation of the use of private land in the interest of both the owner and the general public.

When is property "taken" by regulation--when the owner is restricted in any way, or limited severely, or when the land is completely removed from his control?

What is "public use"--enjoyment, or absence of nuisance, or physical occupation?

What is "just compensation"--does the securing of advantages to Guam as a whole and, therefore, to each individual and property owner, provide compensation which is just for some limitations on the use of land, or does any loss in value resulting from such limitations require monetary compensation?

The taking issue involves a balancing of individual and social rights and obligations.

In a large number of areas with differing political, social and economic systems but still having a private market in land, it is felt that public authorities should enter the land market to make community planning successful, to overcome the failings of the private land market and to make an impact on speculation and land values. This proposition is based on an appreciation of the fact that increases in urban land values and of speculative transactions are not the cause of misallocation of land and its shortage but the consequences of it.

The suggestion that public authorities play an active role in the land market is neither novel nor radical. Controversy may however be aroused when it comes to considering one or the other of the two common methods of doing so, namely (1) public authorities purchasing land in the open market, like any private party, or (2) public authorities invoking the powers of expropriation. There are, of course, arguments for and against both.

~~Land Purchases by Public Authorities~~

The purchase of land through negotiations in the open market does not have to depend upon the territory's coercive power. It does not trouble or dissatisfy anyone. Transfer of title can be accomplished more quickly and amicably than in expropriation proceedings and no rehabilitation problems need be faced. ~~Land purchased sufficiently in advance may quite often become available for cheap prices and lesser investment may suffice for more quantity of land.~~ Where expropriation proceedings are difficult to invoke or are lengthy or costly, purchase through negotiation may be a more desirable course. Above all, it respects the right of private property and individual freedom and is therefore more in keeping with democratic principles.

The points against it are: it is operationally more difficult than expropriation especially where land holdings are small or where there are numerous divergent interests on land. Some landowners may not be amenable and a compact sizable area may not therefore be available at one time. Expropriation, on the other hand, will pass unified control over the entire area on to the public authorities without any encumbrances. ~~Pur-~~

Land ownership sentiment is deeply embedded in the structure of social values and rooted in economic life. Holdings are highly fragmented and generally very small. Land records are not always available and clear titles are difficult to determine. In the absence of alternative employment opportunities, the small piece of land is quite often the only means of livelihood of some of the owners, particularly in rural areas. Reluctance to part with land under such circumstances is thus encountered. The

The acquisition of land through expropriation has its problems. The common major issues revolve around its procedure, principles of determining compensation, administrative machinery to handle land transactions and questions concerning their financing.

The central issue in expropriation is the principle of determining the amount of compensation or indemnity. The market value of land on the "material date"--the most common basis of compensation--results in very heavy amounts of compensation payments which strain the finances of the government and severely limit the scale of their developmental effort.

Current market values are not what the hypothetical willing buyers would give to willing sellers but are highly inflated because they contain past unearned increments of which a substantial proportion was socially generated and a large element of "potential development value" which is an exaggerated speculative price. Payment of such a price in the event of expropriation will have no impact on the private land market and even expropriation will fail to serve one of the principal objectives of land policy, namely, to counteract unreasonable price increases and speculative dealings in land.

If the three components of market value, i.e. the real worth of the land on the basis of its existing use, the unearned increment and the potential development value, are analyzed, the latter two would far outweigh the former. Would it be fair to ask the territory to bear the liability of a compensation which is over loaded with surpluses and potential values unrelated to relevant economic factors?

However, the land owner may argue that his investment in real estate is one of the investment alternatives which were open to him when he made his investment decision. Why should he be penalized when others who have made other types of investment reap the benefits of unearned increases as well as of speculation? He can argue that the extent of his loss or the cost of his rehabilitation resulting from dispossession of his property justifies his claim to market value.

The basic point is one of balancing the individual's rights and liberties against those of society. The solution should be fairly equitable and workable, for no solution can be perfect.

~~Acquisition of Development Rights~~

A device short of full expropriation is the acquisition of development rights. It implies that owners are stopped from developing their lands, making any structures or permanent improvements over or under it or changing the existing use. This amounts to freezing the land at its existing use, which could be continued but not changed without permission. The merits of this measure lie in achieving public control over land with minimized compensation liability, its ability to guide future development according to land-use plans or policies and to capture all future increments in land values for the government.

The acquisition of development rights raises many questions. If, for instance, a master plan has determined a land use, the land is virtually frozen for that and compatible uses. The question of paying compensation does not arise unless the planning restriction so injuriously affects the property as to render it useless. If a plan proposed a use other than the existing one for land in any area, the proposed use has a right to be applied. Occasionally developments according to the proposed use may have to be encouraged by incentives rather than be penalized by a development charge. If the plan does not permit any particular use, the question of sanctioning that use with or without a development charge, does not arise.

One novel idea pertains to the right of pre-emption. It is being practiced increasingly. It has gr^{at} potential not only as an instrument to gain public ownership over private land but also as an anti-speculation and anti-tax evasion measure. There is a widespread practice of officially registering sales of property at values much lower than the prices actually paid or accepted. This is done to evade income, capital gains, property and other taxes. Power to exercise the public right or pre-emption at the self-declared values of properties at the time of registering their transfers is an effective deterrent against these evils.

Taxation, as an important instrument of social policy, can be wielded in such a manner that it encourages the desired, discourages the undesired, and prevents the wrong land transactions and uses. Suggestions in this regard ^{might include} ~~can be many, e.g.~~ an annual tax on unearned increases in land values, deterrent taxation of vacant sites, taxes on capital gains and transfers, conversion taxes on change from a less to a more profitable use of land, separation of site and development for purpose of land taxation, tax exemptions and differential or discriminating rates and reform of government property taxation.

Many individual tax measures can be considered for this purpose but it is essential that every tax chosen should fit into the overall tax system of the territory and should also be within the capacity of the financial administration which has to apply it. In spite of its limitations, taxation, combined with police and expropriation powers, should be used to the full in the overall strategy of ~~an urban~~ land policy.

The purposes, goals, and policies for a land use program must reflect the specific conditions in Guam and be related to a conception of the Government of Guam as the trustee of natural resources which must be managed so that they can be both used now by the citizens of Guam and protected for the enjoyment of future citizens. This custodial role requires that the Government of Guam consider environmental quality and economic development in more specific dimensions, perhaps including:

- (a) Protecting valuable natural resources and areas which are exploitable;
- (b) Relating the use of land to its natural and man-made characteristics;
- (c) Reserving appropriate areas for economic development adequate to support the population;
- (d) Relating the intensity of use of land to the type and level of public facilities and services available;
- (e) Recognizing the areawide impacts of many development decisions;
- (f) Achieving an appropriate balance of urban development, agricultural production, and other uses and non-uses of land; and
- (g) Meeting major social needs which have significant land use relationships such as housing for all residents and supporting public institutions.

The Government of Guam must also consider its responsibilities as a trustee of resources in light of the fact that decisions concerning the use of these resources are being made by the private sector and all levels of government as a continuous process usually without a framework by which the government can provide guidance, or even a consistent direction.

LAND USE ON GUAM

V THE CRITICAL AREAS of

In the design of a comprehensive land use plan, critical areas need special analysis, not as a no-growth concept, but rather a tool to direct growth to the most appropriate locations. Natural characteristics of land must be considered as much as its economic and social value.

The concept of planning for and regulating areas of critical concern has emerged as a major element of the land use program. It emphasizes problems and needs which are clearly visible and well established in the minds of both the general public and government.

While the term "areas of critical concern" can be applied to a wide variety of physical, economic, and social conditions, the central and common characteristic is the existence of a problem which requires attention.

The critical areas concept provides a means of demonstrating that the significance of some areas or facilities clearly extends beyond the boundaries of the property in which they happen to be located.

These areas can be shown to require management at the island level in order to extend the decision-making process to all those who are really concerned or affected. Defining, inventorying, designating, and regulating critical areas place new demands on government. An effective critical areas program will call upon technical, political, legal, financial and organizational capabilities which are frequently overburdened.

If the selection of critical areas is sufficiently broad to encompass the full range of concern in land use and development, the critical areas approach can provide methods for both broadening and narrowing the resources planning and management process.

Both of these seemingly divergent objectives must be part of an effective effort. First, we can use this approach to build new procedures into the planning process and to expand the basis for making decisions on when and how to use land. This is a major re-orientation of long-established practice.

Critical Areas On Guam

Agricultural Land;

Airports, approach zones, noise impact areas, and surrounding areas ;

Areas above a stated altitude;

Areas subject to frequent weather disasters;

Coastlines, coastal areas, and tidewater;

Coral extraction sites including inactive or mined areas;

Communication facilities, transmission lines, and rights-of-way;

Ecological communities, particularly those indicating characteristics of a physiographic province or biological phenomena or illustrating the process of succession and restoration, and rare or valuable ecosystems;

Educational or research areas;

Flood hazard areas;

Highway interchanges, particularly at the intersection of a limited access route with one which gives access to abutting properties;

Historic sites, buildings with a particular architectural style or quality, and archeological sites;

Housing for low-or moderate-income groups or others who encounter problems in obtaining adequate shelter;

Mass transit terminals or systems;

Natural areas which are unique or significant due to landform, vegetation, hydrologic features, flora, fauna, geologic formations, botanic interest or zoological species or communities, whether terrestrial, or aquatic;

Port facilities, deepwater anchorages, harbors, and channels.

Powerplant sites and locations for other forms of energy production;

Prime sites for economic development and job creation;

Public facilities which support urban development such as water supply and sewerage systems and public schools;

Recreation areas;

Restricted population zones, such as in an area of limited water supply;

Rights-of-way and other means of access to the shoreline;

Rock outcrops and areas of very shallow soil cover;

Scenic areas and vistas;

Seismic or volcanic activity areas;

Slopes which are too steep or otherwise unstable to support development or resist erosion;

Soils which are unstable for construction or occupancy or unsuitable for on-site sewage disposal;

Solid waste disposal areas;

Storm protection facilities and natural features;

Urban fringe areas, subject to rapid growth and development;

Water supply sources: surface reservoirs, aquifers, and recharge areas;

Wetlands - fresh and salt water, poorly drained areas, and areas of predominately sheet flow drainage.

Wildlife habitat;

Historically, land use planning and control has been largely concerned with land as an economic and cultural phenomenon. The prevailing view of land was that of economic, two-dimensional space. There was little concern for the features and processes of the natural environment which serve to differentiate one parcel of land from another. The plans and regulations were (and are) primarily based on its economic and social utility and were concerned with accommodating man-made structures and uses.

This limited approach to land use planning is no longer satisfactory. The natural characteristics of the land will have to be considered as much as its economic and social value. A new kind of land use planning is needed which goes beyond the task of allocating space for economic activities.

Second, the critical areas approach makes it possible to limit interest and action to matters which have impact which extend beyond the jurisdiction of one owner.

Designation of areas of critical concern through a land use program is not simply a method of identifying areas where no growth should occur. The purpose of designation is to call attention to the importance of the area designated. In many cases, it is possible to permit development which is regulated so as to be "compatible with the basic environmental or renewable resources values or safety problems of the land in question." While it is true that "uncontrolled or incompatible development (would) result in significant damage to the environment, life or property, of the long-term public interest," it is equally true that some acceptable way to develop or use many such areas can be found; others must remain virtually unused or unoccupied if their values are to be preserved.

A key question in the critical areas approach is the relationship of government regulation of such areas to the adoption of an overall land use or development plan for the territory. While a logical sequence of actions would seem to progress from preparation and adoption of a general plan covering the entire territory to regulation of land use or development in any part of that area, this process usually requires an extended time period, often of several years. Many problems will occur in the interim and, if no action is taken, the chance to protect the area and to require that it be developed in accordance with its significant characteristics will be lost.

Finally, procedures must be devised which prevent the critical areas approach from becoming spot zoning at the government level. This requires a substantial understanding of the entire land resource and the demands placed upon it so that designation and regulation of critical areas will emphasize standards and information rather than intuition and political pressure. Achieving this kind of understanding without turning the planning process into a massive data collecting operation which becomes a substitute for decision-making requires that a clear distinction be made between a comprehensive perspective and complete and detailed information.

Future articles in this series will focus on specific critical areas, areas which will encompass a portion of the future land use plan for Guam.

Guam's freshwater resources consist of an underground lens system in the northern plateau and, in the southern part of the island, surface waters that run off as rivers. The lens system in the northern plateau is a dynamic phenomenon: its volume at any given time depends on the amount of rain-derived recharge flowing into it from above, the amount of water flowing seaward along the margins, and the amount removed by pumping for drinking water. The lens essentially floats in delicate equilibrium on top of the seawater which permeates the porous limestone structure and it is separated from undiluted seawater by a mixing zone, or interface, of brackish water. Extreme fluctuations, or even destruction of part or all of the lens, could be caused by excessive or improper removal of water through pumping.

If the lens is to be preserved as a permanent drinking-water source, it must receive enough recharge water during the rainy season to sustain pumping activities throughout the dry season. This requires that conservation areas be designated above the lens to serve as permanent recharge areas. The conservation areas should consist of zones where no development is allowed and these zones should then be surrounded by areas of low-density habitation (no more than 4 dwellings per acre).

Specific conservation areas have been recommended by consultants to the Public Utility Agency of Guam, but conservation zones have never been set aside by the Government of Guam. Instead, development has encroached upon the areas that were recommended as conservation zones. The effect on the underlying water lens is not yet understood. ~~In any case, it is clear that~~ quick action is needed to preserve what is left of the areas so that a permanent source of drinking water is assured. Some of the rivers in the southern part of the island are developable, primarily for irrigation water.

Water quality in the northern basal lens is generally adequate at the present time, ~~(Fig. 1-19) which release nitrate into the ground.~~ The development of mass agriculture on the northern plateau would have a definite negative impact on water quality there because agriculture would involve use of fertilizers and pesticides. The major water-quality problem in southern rivers is contamination by human and animal wastes.

The most important areas recommended for water conservation zones in northern Guam are rapidly being developed for housing tracts and businesses. Agricultural development has also been proposed. The northern water lens may be facing serious threats of

pollution and damage through lack of protection of recharge areas. If serious damage does occur, which seems a distinct possibility, then the cost of providing fresh water will go up dramatically because of the necessity of much more expensive treatment for rendering water useable and the necessity of developing new water sources either by damming certain southern rivers or desalinating seawater. The last alternative is particularly expensive at the present time and will probably remain so for the foreseeable future. It seems much more sensible to protect our existing resources than to think of developing new ones.

~~Many of the recommendations made under the Land Resources section above apply to the protection of freshwater resources as well.~~ Land use will determine the fate of the northern water lens system in the near future and the eventual fate of the southern river watersheds. Efforts should begin immediately to preserve and protect government lands in northern Guam from intensive development and to acquire private lands for similar protection. This is ~~an~~ urgent recommendation. The Government of Guam also needs to acquire lands in critical southern watersheds.

It has been estimated that an average of nearly a billion gallons of rain falls on Guam each day. Part of this water evaporates and another part is taken out of the soil and incorporated into plant tissue or is returned to the atmosphere as transpiration. Depending upon the geology of an area, a fraction of rainwater may percolate downward to a groundwater aquifer, or lens. Another fraction may run into ravines and join flows that are fed by seeps and springs on a journey to the sea.

In northern Guam, an average of 400 million gallons of rainfall reaches the surface of the limestone plateau each day. Fifty percent of this amount begins its vertical journey to the groundwater reservoir below. The rest is lost to the atmosphere through evaporation and transpiration, or is incorporated into plant tissue. There is no surface runoff to the sea nor are there any perennial streams in the northern plateau because of the excellent percolation properties of the rock.

The groundwater reservoir beneath the northern plateau essentially floats in delicate equilibrium on top of seawater, which permeates the porous limestone structure (Fig. 1-19). A "lens," as a groundwater reservoir is called, is a dynamic phenomenon. Its dimensions depend on the amount of recharge flowing into it from above, the amount flowing seaward along its margins, and, of great importance, the amount being removed by pumping for drinking-water purposes. The freshwater lens is separated from the undiluted saltwater (35 parts per thousand) by a mixing zone, or interface, the thickness of which is a function of vertical displacement caused by tidal fluctuations (which become less important with increasing distance from the coast) and fluctuations caused by excessive or improper removal of water by pumping activities.

The above is a description of an ideal unconfined basal lens. ~~We must now consider certain geologic complications and their effects.~~ First, The lens under the northern plateau of Guam is not completely unconfined. Basement volcanic structures intersect the lens in two areas--along the interface between the northern plateau and the central block, and adjacent to the Mt. Santa Rosa block (Fig. 1-27). Second, Various other geologic complications produce local alterations in recharge characteristics with the non-uniform lens distribution.

Other major limestone formations along the eastern coast and on top of the southern cuestas have percolation and permeability properties that are similar to the basal lens system of the northern plateau (Fig. 1-37). There are no surface flows. Rain falling on these structures sinks to the impermeable volcanic basement. The water then pools and flows out through the perimeter. This mechanism makes up the major sources of water for the Fena Reservoir.

The groundwater below the limestone cap along the southeast coast was previously thought to be of limited amount and too mixed with seawater to be developable. However, this source has now been tapped for irrigation purposes and is being considered for development of a drinking-water supply. There may be a high potential for contamination of this groundwater resource because of the high permeability of the rock and its fractured, dissected nature. Extreme care must be taken to protect the groundwaters against sewage and other pollutant discharge. Care must also be taken, especially during times of drought, to manage the lens so that excessive pump-out doesn't occur. A large number of small wells pumping continuously is better than a few large wells, which set up damaging fluctuations in level and thus allow saltwater to enter the aquifer (Fig. 11).

Southern freshwater resources include "perched" (trapped) groundwaters, surface flow, and the groundwater systems of the southern limestone regions. Groundwaters related to volcanics are limited in quantity and localized. ~~Stearns (5) noted that the lava flows of southern Guam have been secondarily mineralized, resulting in quartz filling up the spaces in the rock. Thus these rocks do not transmit large volumes of water. Also, many rock layers that are capable of transmitting artesian water have been broken up and offset, resulting in very limited artesian spring flow (a flow caused by underground water pressure).~~ On the western side of the southern ridge, vertical dikes create local prisms of water that discharge into upland ravines. These perched water systems, however, are small and limited in quantity. Their flow drops off markedly during periods of drought. The Geus River, which is used as a drinking-water source for Merizo, is fed by such a system. During the drought of 1973, the flow was insufficient to supply the village.

The heavily weathered surface volcanic rock on the eastern side of the southern mountains is capable of holding much water. However, because the soil is impermeable, rainwater does not sink through it. A large proportion of the rainfall runs off into adjacent ravines or channels. The remainder, which is stored in a high water table, is released slowly through seepage or is released at points where the water table intersects the surface, such as depressions or ravines (6). Other seepage is added to the flow from waters flowing around the cracks and fault planes of impermeable rock as the stream grows on its journey to the sea. These seeps, as well as small springs, establish the base flow in southern rivers. The average runoff to the sea from the streams of Guam amounts to about 250 million gallons of water per day (7).

As a stream descends to lower elevations, losses as well as gains in flow may occur, depending on the characteristics of the underlying stream bed. On April 4, 1968, ~~Austin, Smith and Associates (7) measured the flow of the Ugam River immediately above Talofof Falls as 9 million gallons per day. During the same period, the U.S. Geological Survey gauging station approximately one mile downstream from Talofof Falls measured a flow of 5.2 million gallons per day.~~ After the water flows over the falls, a significant fraction of the total sinks vertically or moves laterally through the porous alluvial soils ~~(deposits from erosion occurring elsewhere)~~ of the lower valley floor. A similar situation is common to many of Guam's rivers. If the daily discharge upstream exceeds the loss resulting from vertical or horizontal flow through rock or soil of high permeability, the downstream flow will be greater than zero. If the daily discharge upstream is exceeded by flow loss downstream, there will be no visible flow at the mouth of the river.

The sources of Guam's largest rivers are in the steep upland ravines near the crests of the central and southern ridgelines. The four largest rivers have cut the gently sloping expanse of heavily weathered volcanic rock layers through which they flow. The drainage basins of these large rivers range from 4.5 square miles (Inarajan River) to more than 16 square miles (Talofof River).

During the period from 1952 through 1965, the Ugam River discharge averaged 19.5 million gallons per day. The lowest flow for this river, which occurred in July 1965, was 0.7 million gallons per day. The maximum recorded flow during the period was nearly 4,000 million gallons per day on December 4, 1963 (8). The Ugam watershed measures 6.6 square miles. The runoff from the limestone formations making up the upper Talofof Basin, including the Fena Valley, averaged 33 million gallons per day from 1952 through 1961. The highest recorded flow for this period was 5,500 million gallons per day on October 15, 1953. The lowest flow was 0.34 million gallons per day in June 1959 (8).

Records indicate that the Pago River watershed, an area of 6.17 square miles, averaged 16.5 million gallons per day from 1952 through 1965. The highest recorded flow was 6,100 million gallons on August 2, 1962, during a severe flood. However, no flow at all was observed on several days during June 1959 (8).

~~According to Ward, et al. (3),~~ The geology of the drainage basins of the Pago and Ylig rivers is such that the ground absorbs less rainfall and has less storage capacity than the Ugam River, which is of similar size. Therefore, the low flow of the Ylig and Pago rivers may drop to zero or near-zero during droughts, causing water losses to the areas serviced by the Ylig Water Treatment Plant. Adequate knowledge of the flow characteristics of a river system is essential in development of water resources.

In trying to preserve the water quality of the Territory we are faced with a dilemma in developing the northern plateau. On one hand, the terrain and the geology seem ideal for massive development. On the other hand, the northern-plateau groundwater system is the primary source of drinking water for the civilian community; the demand for greater use of this resource is growing yearly as the population increases and the economy expands.

Since World War II, many families have moved from other island locations to build permanent homes in Dededo, Yigo, Barrigada, and Mangilao municipalities. These areas have been identified as important locations for development of wells. The only means of human waste disposal are latrines or cesspools. The installation of septic-tank leaching-field systems in conjunction with new building construction has been a requirement of the Department of Public Health and Social Services since 1969. Installation of such systems now comes under the aegis of Guam Environmental Protection Agency. The treatment efficiency of an individual sewage treatment process of this kind is a 50 percent reduction of waste. A high potential for contamination of groundwaters exists if the number of these systems in a given area is such that inorganic substances (e.g. nitrates) build up concentrations in the water lens.

In addition to the growth related to families building homes in the above-mentioned municipalities, the Government of Guam also began leasing tracts of public lands as subdivisions. The earliest ones did not provide for sewage collection. Also, local and off-island developers began building tract developments and apartment complexes.

In 1970, ~~in order to fulfill the requirements of federal water pollution control laws~~, the Government of Guam and the military drew up a plan for islandwide sewage collection and treatment facilities. The plan recognized the massive development occurring in northern areas. Previous sewage planners ~~(10)~~ had used population projections that proved to be inadequate: in 1970 the populations of Yigo, Dededo, and Mangilao had already exceeded the 1980 projections for those villages ~~(11)~~. Several subdivisions were built in answer to the needs of a rapidly growing population. However, the unplanned growth occurred before sewage treatment facilities were available. This resulted in the construction of package (pre-fabricated) aeration treatment plants with ground discharge.

Another factor in sewage planning difficulties is illustrated by the Tumon Bay predicament. Sewage facilities were originally planned for R-1 zoning (single family dwelling). By the time the facilities were planned, approved, and funded, land use in Tumon Bay had changed to include the construction of hotels. At present, there are nine major hotels and a variety of large apartment buildings, luxury condominiums, and shopping complexes. Sewage generated by hotels is handled by timed pumpout from holding tanks. However, the potential for sewage overflow into the watershed of Tumon Bay is a distinct possibility.

~~Under the present plan, a~~ sewage treatment plant to serve the northern sewage district is to be constructed by 1978. The interceptors (sewer lines) and collection facilities are to be completed by the same year. ~~The Integrated Wastewater Plan (17) estimated that the flow in the main sewer line in upper Tamuning that carries the flow from the northern district should reach capacity by that time. However, in a letter from the Director of Public Works to the Navy OICC Project Manager for the Northern Sewage System and Treatment Plant, dated February 28, 1974, the Director stated:~~

- The existing Dededo to Agana trunk sewer is so seriously overloaded that surcharging is already occurring in many sections of the sewer. Overflows of raw sewage can be expected in the near future as the hotels in the Tumon Bay area reach full capacity.

~~At present, agencies are debating options that, at one extreme, would involve discharge of raw sewage into an outfall at Hilaan Point prior to completion of the Northern District Treatment Plant (a clear violation of the 1972 Federal Water Pollution Control Act), and which would prevent massive overflows in the Harmon Sink area, and, at the other extreme, an option that would declare a moratorium on further developments in the Northern District pending completion of the Northern District Sewage Treatment Plant. Present flow of sewage through the Agana Outfall averages eight to ten million gallons per day (PUMP Pumping Station daily sheet), compared with about 1.7 million gallons per day in 1971.~~

Because of intensive land use and development in the northern part of Guam, the ~~Schedule of Compliance, established in the 1968 Guam Water Quality Standards (18),~~ placed priority on constructing sewage facilities on the northern plateau to ensure protection of the drinking-water source. The southern villages were to be provided with facilities later. However, the southern villages have problems unique to geography. Except for Talofofo, which lies on a plateau, the southern villages are packed along narrow stretches of coastal bench. There is little room to build new homes to meet the demands of the growing population. There is even less room to build septic-tank leaching-field systems. Indeed, the effluent, or overflow, from such a system is not readily absorbed into the ground. More and more people are moving to floodplain areas or near marshes because of a scarcity of inexpensive land. Rising waters during times of heavy rain cause the existing cesspools and latrines to overflow. These conditions have led to long-recognized health problems, including parasitic infestation and hepatitis. It is important to build sewer collection systems for the southern villages. However, there are those who say that building such systems without proper controls would open up new areas for large-scale development in the southern end, as has occurred in the North, with resulting negative impact on other utilities and services and on life styles.

It is imperative that we move to protect the quality of the freshwater lens of the North. We must also ensure that adequate recharge takes place so that the dynamics of the lens is not altered to the extent that a reduction of total volume occurs. Land clearing, massive removal of vegetation, paving, and building houses all affect recharge characteristics.

What limits are placed on the lens in terms of water available for domestic use? As described previously, nearly 200 million gallons of water per day sinks into the earth and eventually reaches the groundwater source in the northern plateau. Only a portion of this total is developable as drinking water. How much is recoverable? Estimates range from as low as 12 million gallons per day to as high as 100 million gallons per day. ~~Minck (19, 20) estimates that, on the basis of the latest information, a realistic figure may range from 35 to 50 million gallons per day, given proper management and wise hydrologic decisions.~~

How much water is presently being removed from the northern aquifer? ~~DWC~~ now produces

Government

an average of 11 to 12 million gallons per day. The Air Force removes an average of 3 to 4 million gallons per day. This gives a figure of 14 to 16 million gallons per day, or approximately half the minimum amount of groundwater available as drinking water ~~as estimated by Mink (1970)~~

In order to preserve the quantity and maximize the quality of recharge entering the limestone aquifer, adequate infiltration capacity must be maintained. Changes made in ground cover vegetation or other changes to the natural system alter the equilibrium status of the freshwater lens. If recharge area is reduced while demand is constantly increasing, overpumping, or "mining," may occur, resulting in saltwater intrusion and long-term damage to the aquifer (Fig. 11). In order to prevent this, conservation practices must be instituted in the form of either reserving tracts of land in their natural state or, where changes have been made, by channeling runoff into natural or man-made depressions. ~~Mink, in (21), has proposed that the Government of Guam reserve as much natural area as feasible in northern Guam to assure a continuous replenishment of the basal lens with rainwater. Each area would consist of a conservation zone surrounded by a low-density use zone. The conservation zones would total 7,850 acres, or 12 to 13 percent of the area of northern plateau. The low-density zones would equal 11,400 acres, accounting for 18 percent of the land area. If the total recommended conservation zones cannot be established, those areas outside the actual assignment should be restricted to low-density use. In addition, Mink recommended that the immediate vicinity of all wells should be placed in a conservation zone to prevent accidental contamination.~~

The recommendation to establish the conservation zones in the north has not been implemented. On the contrary, a number of planned unit developments have been approved or are pending in the ~~heart of Area 2 and the low-density zone of Area 1 (Figs. 21, 22).~~

The proposal to create buffer zones around individual wells also has not been implemented. The high cost of land and the hesitancy of the government to obtain easements on private lands has resulted in the placing of wells on parcels of government land on school grounds, near public buildings, or near highways. Although the proposal to establish conservation areas in the North has not been implemented, large developments such as Barrigada Heights, Liguán Terrace, and Latte Heights have built large ponding basins into which storm water flows. This practice, primarily implemented to control flooding problems, also provides for recharge to groundwaters. However, the storm runoff from yards and streets may contain materials such as pesticides and fertilizers, oil and grease, and an assortment of heavy metals that could have toxic effects or otherwise render the water source unusable for drinking water. In addition, the discharge of large volumes of runoff through a ponding basin rather than diffusing water over a large area may alter lens dynamics in the immediate zone beneath the development. ~~(Additional information regarding storm runoff may be found in Chapt. 5 of this section.)~~

Low beam required

In order to evaluate the effect of discharge of storm runoff from a large development on the quality of groundwaters, ~~the Guam Environmental Protection Agency, Public Utility Agency of Guam and the U. S. Geological Survey have required Hyundai America Corporation to establish two monitoring wells in the vicinity of the ponding basins serving the Barrigada Heights subdivision. Specifically, the monitoring wells will be used to:~~ *if and when constructed, will be used to*

... determine whether disposal of storm-runoff water in ponding basins will adversely affect freshwater lens quality; that is, whether or not the overlying limestone can filter out storm run-off contaminants before they reach the lens. ~~(22)~~

A secondary purpose for establishing the monitoring well is to study the thickness of the freshwater lens and the transition zone between salt and freshwater as it relates to the presence of a major subdivision within an important infiltration zone.

Another potential source for contamination of the lens is related to the use of dry wells to control storm runoff. ~~In 1973, six dry wells were placed throughout the village~~

revealed
~~Feltz, et al. (23) have studied potential contamination to groundwaters at Andersen Air Force Base, 15 in Barrigada, dry wells are used rather than surface means to control storm runoff. Over 90 dry wells were in use at the time of the study (1970). Pollution sources were identified as cleaning waste arising from a jet engine repair facility (alkaline base detergents, petroleum distillate, carbon remover, trichloroethylene), an Air Force housing area (pesticides, including aldrin, dieldrin, DDD, DDE, DDT, 2, 4, 5-T, and 2, 4-D), and a trench used to dispose of sanitary wastes.~~

How much water will be needed in the future? Most recent population estimates indicate that by 1982, the civilian community will number 139,000 persons. Water requirements would be 26.6 million gallons per day; 19.5 MGD would be the domestic demand, and 7.1 MGD the agricultural demand. Domestic demand is based on an average per capita usage of 110 gallons per day.

~~It is clear that the~~ Experts do not agree on the exact developable limit of our northern basal lens system. It is ~~also~~ clear that our civilian population is growing faster than past predictions have indicated. The military population may increase with the apparent plans for military buildup in the western Pacific islands. There is a distinct possibility that the development now occurring on the northern plateau may reach such a level that the capacity of the water lens will be reduced. In addition, over 5,000 acres, or 20 percent of the fertile land in southern Guam, can be considered available for agricultural development if adequate irrigation potential is developed (24). Therefore, there is strong justification for development of dams and reservoirs on several of the more suitable southern rivers as freshwater sources (Fig. 22).

In 1950, Fena Reservoir was constructed by the Na
h a storage capacity of 2,000 million gallons per day (25), became
water for the island. At present, the reservoir supplies 10 mil

The most recent existing studies propose establishing dams, reservoirs, and strict watershed control on six southern rivers, including the Ugan River (6 million gallons per day for domestic and irrigation use), the Talofofo River (7.5 million gallons per day for domestic and irrigation use), the Inarajan River (3.6 MGD for irrigation), and the Umatac / La Sa Fua River (1.8 MGD for domestic and irrigation use). Agaña Springs Redevelopment is suggested (1.5 MGD for domestic use). To date, no action has been accomplished on any of the proposals.

Because of growing government interest in expanding the agricultural base of the Territory, a study was carried out to assess the feasibility of providing water for irrigation (24). For northern Guam, the feasibility study recommended using surplus well water for irrigation purposes for the present. ~~The study cited John Mink as stating that the yield of the basal lens is 25 MGD.~~ Since there is presently an average daily demand for domestic water of nearly 13 MGD, a surplus of 12 MGD is available for irrigation use. As demand for domestic water supply increases, the feasibility study recommends using the 12 MGD discharge from the Northern District Sewage Treatment Plant. The initial daily flow of 5.5 million gallons would be sufficient to irrigate 750 acres of land.

There are several important obstacles to development of agriculture in northern Guam. First, there is little knowledge available of the impact of pesticide and fertilizer use on groundwater quality. Since the basal lens will be the basic source of domestic water, at least for the near future, any activity that could possibly contaminate the lens must be severely restricted. Second, although recycling of our water resources is an important goal in itself, sufficient study will have to be undertaken to determine the extent of treatment necessary to preserve the quality of the basal lens.

The Department of Agriculture estimates that a total of 800 acres of land in southern Guam is used for full-time or part-time agricultural pursuits. Three hundred acres are privately owned and the remainder is government land. None of the land is intensively farmed (24). Analysis of soil conditions indicates that the five southern municipalities of Yona, Talofofo, Inarajan, Merizo, and Umatac have the potential for agricultural use on river bottoms, coastal uplands, or argillaceous limestone, and inland plateaus where the terrain is suitable. An estimated 5,000 acres of arable land is available for agricultural development, according to the study (see Chapt. 3). The

Bigg

Acanthaceae

Fittonia (Fittonia verschaffeltii) is a low plant with dull green leaves, notched at the base, often yellowish with red veins. It grows to six inches tall, and has a trailing or dwarf habit. It grows well in deep shade. Propagate by cuttings.

From tropical Peru, it has been called F. rubronervum, F. rubrovenosum, Eranthemum rubronervum, Eranthemum rebrovenosum, Gymnostachyum verschaffeltii.



ECONOMIC RECOVERY AND REDEVELOPMENT PLANNING

June 1976

I. Introduction

The objective of this economic recovery and redevelopment plan in addition to return business to normal operations is to utilize the opportunity provided by Typhoon Pamela to:

1. free the shoreline of the Philippine Sea for public scenic and recreational use;
2. encourage the development of Agana as a concentrated commercial and financial center; and
3. encourage the development of Harmon Field as an industrial and commercial center.

By-and-large, the businesses located on seashore property in Guam in no way utilize the water frontage. Such location of non-ocean oriented business is a misuse of the seashore. It would be desirable to have Marine Drive from near Camp Watkins Road in Tamuning through Piti evolve into a seashore boulevard. The destruction wrought by Typhoon Pamela to businesses along the sea side of Marine Drive makes the present a propitious time for the relocation of these businesses and establishing the land they occupy for public scenic and recreational use.

Because of destruction and in some cases the availability of low interest loans to business for relocation, now is a propitious time to encourage the movement of business required for Agana to become a commercial and financial center and Harmon Field become more of a commercial and industrial center. The social costs or resource required for the transition is less than

at other times.

Scenic and recreational use of this shoreline will provide enjoyment to the Guam resident and, as such, contributes to Guam's desirability as a tourist destination. Such use for this seashore complements existing plans for a war memorial park in the area between Adelup and Asan Point and a possible convention center.

There are numerous reasons concentrated commercial, industrial, and financial centers are desirable. For example, it is more convenient to be able to do related shopping--whether it be for goods, industrial, and commercial services, or financial services--at a single place. The success of shopping centers with a multiplicity and variety of stores and other businesses as well as the success of department stores are testimony for this convenience. As a related matter, concentrated centers increase the feasibility of small specialty shop, increasing competition in the economy and benefiting the small entrepreneur.

Concentrated commercial, industrial, and financial centers reduce the cost of providing infrastructure such as water, sewage, electricity, and telephone and reduce the time and cost for repair subsequent to a storm. The concentration of the work places resulting from the development of concentrated industrial, financial, and commercial centers allows for increased use of car pools and increases the likelihood that public transportation becomes feasible.

Concentration of the commercial, financial, and industrial centers increases the options and opportunities for Guam residents by reducing the industrial and commercial blight in other parts of the island by allowing for water conservation and agricultural use of other land. It provides the option of less development-oriented life style in the parts of the islands away from these centers.

II. Developing the Policy Instruments

Later in this paper, means for reaching the objectives are recommended. The instruments given, however, are not exhaustive and the formulation and description of others is less than complete. The competence for development and the responsibility for implementing the policies (and refining the objectives when necessary) lie in various departments and agencies. These departments are not identical to those on the Economic Development Committee. Therefore, when land use rationalization is being discussed, the directors of the following departments should be asked to attend the Economic Development Committee:

1. Guam Housing and Urban Renewal Authority,
2. Public Works,
3. Parks and Recreation, and
4. Guam Environmental Protection Agency.

The Army Corps of Engineers liaison officer should be included from time to time because of the Corps' concern with coastal land use and flood plains.

The Guam Housing and Urban Renewal Authority belongs when land rationalization is discussed since this agency is responsible for handling the relocation of businesses and families. Part of the justification of a centralized business district is the feasibility of public transportation. Public Works is responsible for transportation planning. Parks and Recreation will need to administer the seashore as a result of this proposal. The Guam Environmental Protection Agency must at times be consulted because of possible environmental impacts of the actions.

III. Suggested Policy Implements

Certain means to meet the objectives presented are not exhaustive nor mutually exclusive. They are given as an indication of tools which can be

further refined and used. A large number of implements should be used and as much as possible positive incentives for relocation be used.

The various laws which prevent a severely damaged business to rebuild near the seashore should be enforced. These include the standard building permit and Seashore Protection Act clearances. The membership of the Economic Development Committee augmented for discussion of land use rationalization needs to determine what these laws are and what their effects are. Any added legislation or administrative decisions needed to enforce the laws should be found.

The Small Business Administration (SBA) will lend to businesses at very good terms for replacement of losses due to the disaster--6 5/8 percent interest rate with no collateral if collateral is unavailable and repayment period perhaps as long as thirty years. The cost of complying with "city-wide building construction codes" and costs of relocation when required by local ordinance even if the ordinance are enacted subsequent to the disaster normally is included in expenses eligible for these loans.* This program lessens the adverse impact on business, if any, of relocation required by the Government of Guam.

The Government of Guam should make every effort, even entering a suit as a plaintiff if necessary, to insure, when possible, that cost of relocation when required by local law be considered as part of the damage costs covered by typhoon damage assistance and insurance. This matter should be discussed with the different insurance adjusters.

The property tax law should be amended to encourage consolidation of fractional lots. The existence of very small parcels of land in Agana are

*Fact Sheet No. 14, Small Business Administration, Washington, D.C. 20416 and conversation with Small Business Administration disaster loan officials.

a discouraging factor in the development of Agana as a financial and commercial center. The proposal is a combination of a tax on small lots and tax abatement on the merged lots.

A tax in the amount sufficient to encourage the merger of fractional lots can be imposed on any commercial zoned parcel of land with an area under 1,000 square meters or with average width under ten meters (eg. see attachment). The average width is defined as the area divided by the longest distance between any two borders of the parcel. A parcel of land should refer to any piece of land under the same single or multiple ownership or leaseholder, provided the leasehold expires five or more years subsequent to the tax year. That is, if several adjacent lots are united by sales to a common owner or by leases to a common lessee, the whole or the parts are treated as a single parcel for the purpose of this tax. As a tax incentive for merging fractional lots, all property tax on a parcel of land should be abated for five years if it results from merging any parcel meeting the criterion for the small parcel tax into a large parcel to which the small parcel tax is not applicable. This merger must take place within the shortest possible time period.

The Government of Guam must find funds to purchase fractional lots in Agana and to bring condemnation proceedings against those lands where the title is uncertain. The following sources of funds for this purpose should be considered:

1. Federal Housing and Urban Renewal Authority emergency dispersement based on previous intentions for urban renewal in Agana.
2. Special federal appropriation justified by federal action being the cause for fractional lots.
3. Disaster funds.

The land acquired in Agana should be available for financial and commercial

institution either on a dollar for dollar trade for sea front property or for sale at market value.

In some manner the provision by the government of automobile and parking combined with relaxation of parking provisions in the building codes should be used in Agana as an inducement because this will provide longer term instruments to concentrate Agana further than is feasible under the current commitment to the automobile and to further influence transportation choices.

Currently, a developer of a large building is required to provide a specified number of parking spaces. Suppose in Agana, the government provided public parking spaces instead. This would be an incentive to build in Agana. It would also provide the government with a tool for future planning. For example, controls on parking places could be used to encourage car pooling or parking space could be eliminated as part of a rapid transit plan.

As a final possibility, property tax abatement for commercial and construction in Agana could be used to encourage relocation of businesses from the seashore to Agana.

IV. Conclusions

Needless to say, before the policy instruments suggested above can be implemented, overall land use plan as well as a detailed mechanism to implement the recommended policy are needed. The recommended steps to follow by policy makers are as follows:

1. Work out an immediate recovery plan independently of long-range development plan except any assistance in direct conflict with development plan. Therefore, assistance should be limited to:
 - a) temporary repair of plant and equipment; b) inventory restoration;
 - and c) other assistance of temporary nature such as assistance

with manpower problems, etc.

2. Long-range land use planning and detailed work plans should be mapped out to consolidate with the emergency recovery plans--particularly in relocating establishments.
3. An Economic Recovery Council as required by FDAA be formed immediately to plan and coordinate all pertinent activities of the related departments and agencies. The number of committees in this common endeavor should be minimized for greater efficiency in terms of time and energy expended.

PHYSICAL ENVIRONMENT PLAN PROPOSAL

Introduction

Physical planning is concerned with the changes that man makes on the face of the earth, the habitat, which includes the immediate underground, water, and air space adjacent to the surface. Its primary goal is to conserve, develop, and utilize the physical resources in a manner that will provide a harmony of activity conducive to a predetermined lifestyle and that will enhance the economic well-being of the individual and the community. To accomplish this goal, habitat uses are analyzed according to their degree of interrelated compatibility. Throughout this process emphasis is placed upon the preservation and enhancement of the environment and its ability to renew itself.

Few features of the community have more direct bearing upon the general welfare of its inhabitants than its physical setting. Most residents may not be aware of the degree to which poor planning or the failure to plan may have affected their economy of time, their economic success, or their sense of well-being. Whenever a water source is degraded, a building is constructed or a subdivision is developed, the physical setting is altered and should be a matter of concern to the residents. The lack of personal participation by the residents in the important decisions that affect the individual leads to a one-way communication of the public media, diluting a working philosophy for creating the future human environment. It is the responsibility of the Planning agency to collect information from all sources and to take the lead in providing the data which will make the physical plan a reflection of the total community thought.

Guam is unique in several aspects of American planning organization. As a single political unit, the territory is responsible only to itself, not requiring approval of minor governmental units or influenced by an adjacent metropolitan area. Grassroots action has been accomplished by local and regional groups and from civic organizations. Another aspect of uniqueness is Guam's attempted leap into modern lifestyles during a few years of applied technology in contrast to the mainland's growth over several hundred years. No longer isolated, we must expect and prepare for greater future changes as we direct our efforts to create an environment of

fresh air, clean water, natural beauty, access to opportunity, privacy, and freedom for self-development.

The physical planning staff has been in existence less than one year, but combined experience exceeds twenty years, of which more than half has been on Guam. The staff is essentially local with only two out of ten on contract. The project manager has directed two master plan projects, was principally involved in two others, and is registered in Pennsylvania as a Planner-in-Charge for Federal planning programs. A second echelon planner is currently being sought and a proposal is being made for a private consultant to objectively review progress and suggest approaches and direction.

The proposed study is scheduled for completion on March 1, 1974. Associated material at the data collection and projection stages requires assistance of various agencies. With expertise currently available within government agencies, there should be no problem in maintaining the proposed schedule. The extent of review by officials and the public at large will be a determining factor. Benefits of an in-house program are usually considered to be continuous activity at a reduced cost. In addition, the staff, being essentially composed of local residents, has a personal interest in preparing a high quality plan. Of equal importance is the continuing program of advanced planning and implementation that a well oriented staff can provide.

OBJECTIVES

While total direction in creating the cultural environment includes the non-physical aspects of social and economic development, the scope of the physical plan of the environment is the habitat. Subsurface areas are important as sources of raw materials and marine activity. Both urban and rural development are concerned with the characteristics of the soil and bedrock lying beneath the surface. The habitat includes man-made elements that may begin under the surface, cover portions of the surface and extend into the atmosphere as architectural masterpieces or blight. Marine life and physical characteristics of marine environments are also very much part of the habitat and are included in this proposed physical environment study. Community design is an essential element to meet the specific objectives and community goals of the area. An implementing element is concerned with incremental development and governmental policy.

Rational planning is a composite of many elements---experience, history, technology, opinion, research, comparison---but must begin with direction. Recognizing this, the American Institute of Architects in 1970 commissioned a study to determine the direction that development should take up to and beyond the turn of the century. Recommendations of this study include:

1. Broaden the appreciation and understanding of the significance of the physical environment in the activities of society,
2. Stimulate support for more research and development that deepens understanding of the cultural environment,
3. Insist that all income levels participate in the physical design and creation of the home and community,
4. Call attention to the need for population control consistent with human dignity,
5. Declaim the "first things first" attitude that relegated charm, beauty and serendipity to limbo when it comes to creating the future environment,
6. Actively support policies that encourage maximum economic growth consistent with controlled inflection and a human utilization of the environment,

7. Seek to develop full utilization of available technology making possible cross relationships and satisfaction of concerned professions, and
8. Encourage change and modification in current government and private organizations concerning the environment.

While national direction of development is important to give perspective to local objectives, greater detail is essential to enhance the unique attributes of Guam while efficiently accommodating the rapidly growing population segments. As the final plan is a guideline or framework for the future physical development of the territory, so are objectives the guidelines for the development of the plan. In both cases, amendments and revisions are anticipated as information is analyzed and conditions change. The following expresses the scope and justification leading to the proposed objective:

1. The need to know development limitations is most critical in an island environment. Certain provisions must be made to protect unrenowable resources as well as to insure that renewable resources will be enhanced. The occurrence of limitations critically inhibit development patterns.

Objective: *To determine the extent that our natural resources limit urban and rural development.*

2. The uniqueness of Guam combines the openness and friendliness of its people with similar attributes of its physical environment. A growing population and new technology mandates that change will take place so that we can never recapture "old" Guam. However, the charm and traditions of Guam cannot be allowed to be lost forever.

Objective: *To plan for the preservation of the natural charm and character of Guam within the framework of a growing population and modern technology.*

3. As we look into the future we can anticipate population levels of one-quarter million, one-half million and beyond. The land may be adequate, but limitations are placed by other natural resources

and should be further placed by man's need for a balanced and pleasing environment. Development and infrastructure costs do not justify the sprawl pattern of growth occurring on Guam. Urban areas of moderate density must be established to provide an economy of scale in providing the urban services demanded by the residents. Rural development and agricultural activities must occupy appropriate areas and areas having a critical balance of nature must be protected and enhanced. Certain areas of recreational and visitor value should not be subjected to the ravages of uncontrolled development.

Objective: *To establish generalized areas of use within an urban, rural, agriculture, conservation, and resort context.*

4. Unplanned or poorly planned development is responsible for many of our inconveniences from traffic congestion and inadequate parking to incompatible users of land and inappropriate locations. Density control and open space development have been almost non-existent. Economic waste and speculation are prominent.

Objective: *To provide a development pattern that enhances the comfort, convenience and economic welfare of the individual.*

5. The capability of the land determines much of its potential value. Open space conservation, and agriculture are essential elements for a balanced community and the well-being of its residents, but such uses may tend to reduce the maximum economic return of any one site. Tax abatement should occur in those areas of low return and vacant areas having a high potential return should be taxed accordingly to encourage optimum use and infrastructure development.

Objective: *To prepare a basis for taxation that tends to equalize the divergent qualities of location.*

6. The past record of land transfers and massive takings has shown inequities to individuals and the public at large. The foundation of the American nation repudiates governmental actions not in the benefit of the majority of the people under the protection of the

government. Vast unused areas under government control must be evaluated for legitimate anticipated uses and relocation of inappropriate uses must occur.

Objective: To reappraise the total land tenure of the territory and provide guidelines for relocation of inefficient or inappropriate major uses.

7. Leap-frogging of infrastructure and transportation development has shown to be uneconomical. Such construction is not based on incremental usage and only encourages minor immediate development with no provisions for normal expansion. Locating major or central facilities is extremely difficult without a program of development.

Objective: To provide for the efficient development and extension of the infrastructure and transportation facilities.

8. Our daily, weekly or annual activities should be able to be conducted in a pleasant environment free from the debilitating affects of pollution and with the enhancement of the natural environment in all use and density areas.

Objective: To plan for a high quality environment essentially free from pollution and with adequate and well-kept open space throughout our varying activities.

9. Many aspects of modern technology were introduced to Guam after large areas had been developed. These early communities many times are characterized by small lots, narrow streets, inadequate services and a general lack of neighborhood amenities. The growing population requires new development but we cannot ignore the existing residents' rights to the pleasant life.

Objective: To indicate areas of substandard development and suggest solutions to rectify such conditions.

10. However valuable a plan may be, its worth can only be measured in the ability of the community to implement such plan. In a rapidly developing community, traditional regulations are not adequate and usually relate to the past rather than the future. Imaginative

legislation is vital, breaking new ground, if need be, to assure a tailor-made implementation program.

Objective: *To recommend creative legislation regulating our use of land for the protection of our future generations.*

A Physical plan developed within the framework of these objectives will require considerable coordination and cooperation of many agencies. Data collection and projection is especially important to provide the basis for continual analysis of alternative solutions and patterns consistent with community goals and governmental policies.

General

Procedures to prepare a plan for the physical development of Guam are similar in nature to most planning projects. Objectives are established and data collected to determine existing conditions and trends. Problem areas are identified and goals established to provide a framework in which to analyze alternative courses of action. Selection of best alternative initiates the detailed plan preparation. Development patterns will be established for various levels of population based upon community standards and efficient expansion of urban services.

Phase I: Data Collection (April-September)

- a) Preparation of base maps at specific scales to provide a continuity of data analysis and presentation.
- b) Research characteristics of individual lots through tax records, registration, deeds, mortgages, property maps and field reconnaissance to determine land utilization, structural conditions, property value, land tenure and urban services.
- c) Investigate physical features and resources of the land and reef areas of Guam to inventory the natural potential and limitations of the territory of Guam, and the characteristics of flora and fauna, both land and water oriented.
- d) Research supply and distribution facilities of the infrastructure and transportation network to provide basic data of design capability and use.
- e) Assemble records and statistics of population, schools, health centers, economic indicators, development and capital programs to provide basic information of the community's function and service.
- f) Compile comparative maps, charts, tables and other graphics from raw data into forms readily usable for subsequent phases of plan preparation.
- g) Compile land use regulations and other legislation affecting the physical development of Guam including changes in such law during the past decade; other communities will be researched.

- h) Collect public expressions of attitudes concerning the future development through news media, proposed legislation and meetings.

Phase II: Trends and Projections (August-November)

- a) Indicate locational, service, and land requirements through projection of population of population characteristics including distribution.
- b) Provide insight into community design variables and support for anticipated population by economic projections of labor force, occupations, income, tax revenue, and structural conditions.
- c) Illustrate the changing character of the many villages and neighborhoods by trends in land utilization.
- d) Devise a time framework for programs and a service load at various population levels through development projections.

Phase III: Appraisal and Analysis (October-November)

- a) Determine basic development problems and associated community issues through a critical analysis of data and projections.
- b) Analyze causes of deficient activity patterns and trends that must be redirected.
- c) Appraise land and resource characteristics to determine limitations on growth and areas of environmental protection.
- d) Analyze quality of development to indicate areas that are inadequate to serve the future generations.
- e) Appraise development regulations as to affect in a rapidly growing community and the results of existing regulations.

Phase IV: Community Goals (November-December)

- a) Determine development standards conducive to a sense of well-being for the permanent residents of Guam.
- b) Define community goals that support the objectives of the Plan.
- c) Establish goals that eradicate or alleviate the basic problems of Guam's development.
- d) Promote policies of priorities to attack deficiencies in the quality of life and to create a firm foundation of development direction.

Phase V: Alternatives (December-January)

- a) Investigate alternative methods to accomplish community goals and policies.
- b) Determine cost-benefits of alternatives considering minimum service constraints.

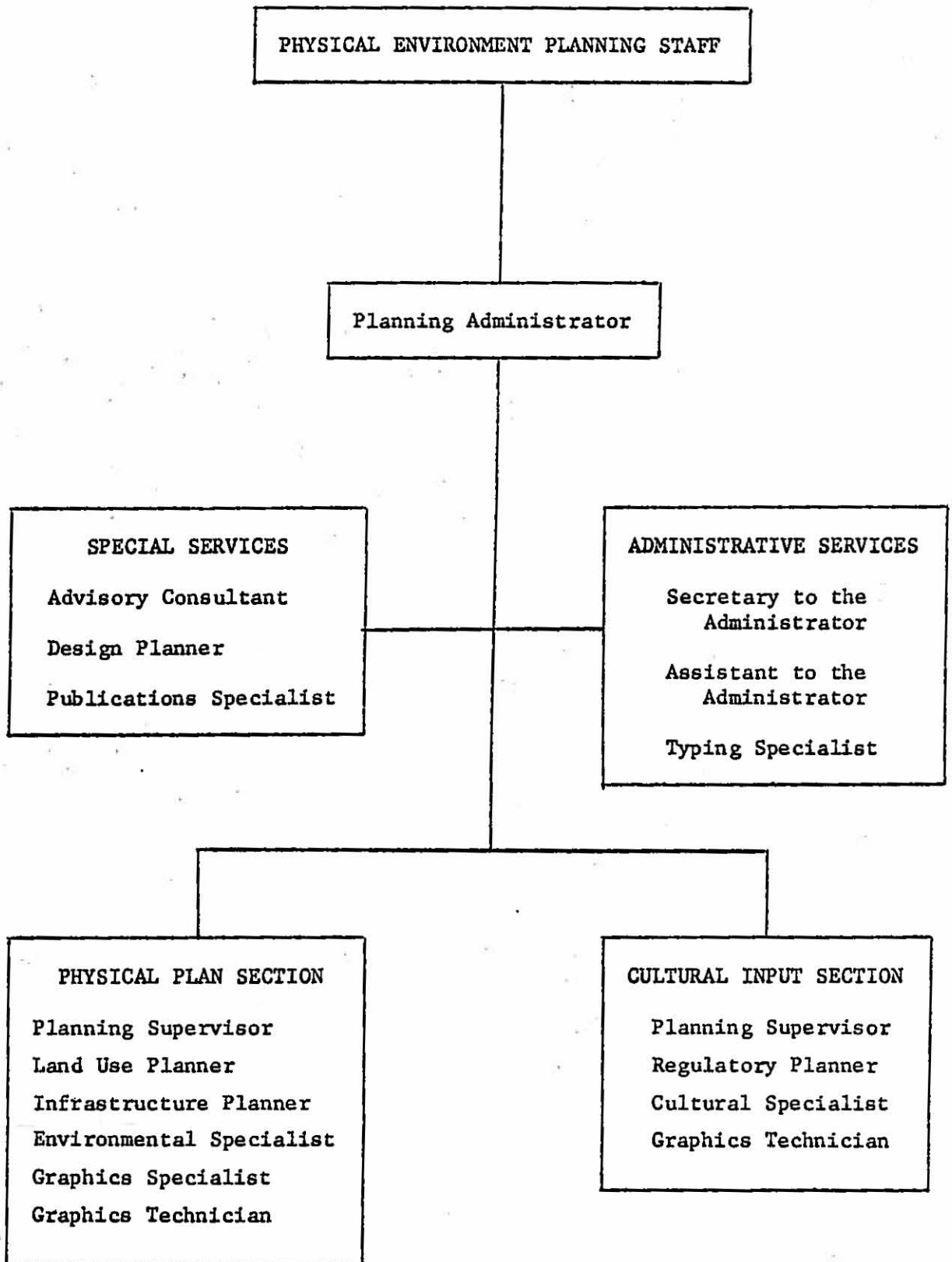
Phase VI: Plan Preparation (February-June)

- a) Prepare preliminary Plan for the physical development of Guam (February-March).
- b) Provide official review of preliminary Plan (March-April).
- c) Prepare finished graphics for the final Plan (February-June).
- d) Present information program and conduct public review of Plan (April-May).
- e) Prepare imaginative development regulations and legislation designed to implement the Plan (February-June).
- f) Prepare final Plan (June).

WORK-PROGRAM SCHEDULE

PHASES	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Data Collection	/														/
Trends & Projections	.	.	.	.	/										/
Appraisal & Analysis	.	.	.	.	.	.	/								/
Goals & Policies	.	.	.	.	.	.	.	/	/	.	.	.	.	.	.
Alternative Approaches	.	.	.	.	.	.	.	.	/	/	.	.	.	.	.
Plan Preparation															
Graphics	.	.	.	.	.	.	.	.	.	/					/
Regulatory	.	.	.	.	.	.	.	.	.	/					/
Preliminary Draft	.	.	.	.	.	.	.	.	.	.	/		.	.	.
Official Review	.	.	.	.	.	.	.	.	.	.	.	/		.	.
Public Review	.	.	.	.	.	.	.	.	.	.	.	.	/		.
Final Plan	.	.	.	.	.	.	.	.	.	.	.	.	.	.	/

ORGANIZATION CHART



General

The Physical Environment Planning staff has three functions: physical plan preparation, plan implementation, and interrelated activities with other agencies and individuals. The Plan proposal, due to its magnitude, will involve the entire staff but not necessarily on a full time basis. Responsibilities of each staff member is indicated hereafter estimating a percent of time expended to plan preparation.

Administration

1. Planning Administrator 75%

Chief professional officer of the Physical Environment Planning staff is responsible to the Director of Planning for staff performance and provides maximum liaison and consultation, if necessary, to agencies involved in planning and development.

2. Secretary to the Administrator 50%

Office management and communications coordinator with provision of typing support.

3. Assistant to the Administrator 25%

Assist in data collection phase of Plan but is primarily engaged in internal affairs of a data bank and budget preparation. In-service training (JET) program scheduled for academic year, with part-time at office, in preparation for implementation phase of Plan for the following year.

4. Typing Specialist 100%

Typing support for plan preparation and assist in document reproduction and data bank.

5. Publications Specialist 75%

Map and document reproduction and communications with agencies.

6. Design Planner 50%

Review of development projects with special emphasis of design and Plan conformance; analysis standards and goals elements of Plan preparation receive major emphasis.

7. Advisory Consultant 100%

Off-island specialist in land use and regulations to give objectivity on a visiting schedule and document review at home office.

Physical Plan Section

1. Planning Supervisor 100%

Direct responsibility of Plan preparation and schedule maintenance; prepares critical studies and preliminary draft; under general supervision of Chief Planner.

2. Land Use Planner 100%

Use of land and buildings specialist, assists data collection organization but emphasis on analysis, goals, alternatives and Plan preparation.

3. Infrastructure Planner 75%

Infrastructure and transportation elements of the Plan provide activity to passive condition; liaison with appropriate agencies.

4. Land Use Specialist 100%

Continual data collection and compilation of land and building use, valuation, tenure and condition.

5. Environmental Specialist 100%

Physiography, flora, fauna of land and water areas with emphasis of resource development and capability; continual effort toward environmental quality.

6. Graphics Specialist 100%

Maps, charts and other graphical representation of the Plan primarily prepared by this position.

7. Graphics Technician 100%

Preparation of base maps and assisting in graphics.

Cultural Input Section

1. Planning Supervisor 50%

Liaison with social economic agencies engaged in planning and development activity and with regulatory devices to implement the Physical Plan. Provide analysis, goals and perspective in Plan preparation.

2. Regulatory Planner 100%

Review, research and preliminary preparation of legislation or rules and regulations pertaining to physical development.

3. Cultural Specialist 75%

Data collection, compilation and preliminary trends and projection of data related to people's activities: statistical support.

4. Graphics Technician 100%

Representation of cultural data on charts, graphs and maps.

COST FORECAST

Divisional Requirements

PERSONNEL	<u>Plan Preparation</u>	<u>Divisional Function</u>	<u>Total</u>
Planning Administrator	12,870	4,290	17,160
Planning Supervisor	15,210	- 0 -	15,210
Planning Supervisor	7,605	7,605	15,210
Design Planner	5,980	5,980	11,960
Land Use Planner	11,960	- 0 -	11,960
Infrastructure Planner	8,970	2,990	11,960
Regulatory Planner	11,960	- 0 -	11,960
Land Use Specialist	9,360	- 0 -	9,360
Environmental Specialist	9,360	- 0 -	9,360
Cultural Specialist	7,020	2,340	9,360
Publication Specialist	7,078	2,360	9,438
Graphics Specialist	7,588	- 0 -	7,588
Graphics Technician	6,512	- 0 -	6,512
Graphics Technician	6,512	- 0 -	6,512
Secretary to the Administrator	3,638	3,638	7,276
Assistant to the Administrator	1,972	5,918	7,890
Typing Specialist	<u>6,328</u>	<u>- 0 -</u>	<u>6,328</u>
	139,923	35,121	175,044
BENEFITS	14,338	3,584	17,922
TRAVEL			
Recruitment	12,000	- 0 -	12,000
Official	<u>3,000</u>	<u>- 0 -</u>	<u>3,000</u>
	15,000	- 0 -	15,000
CONTRACTURAL			
Advisory Consultant	25,000	- 0 -	25,000
Rental & Utilities	12,600	- 0 -	12,600
Reproduction	<u>6,320</u>	<u>1,580</u>	<u>7,900</u>
	43,920	1,580	45,500
SUPPLIES	4,400	1,100	5,500
EQUIPMENT	<u>2,000</u>	<u>500</u>	<u>2,500</u>
TOTAL	218,581	41,885	260,466

PROTOTYPE PLAN OUTLINE
PHYSICAL ENVIRONMENT PLAN

Introduction

- concept
- study chrono
- objectives
- time frame
- credits

Summary

- problem areas
- goals
- development program

Background

- history
- culture
- natural features

Population Characteristics

- trends
- projections
- distribution

Economic Base

- occupations
- industry
- income
- tax revenue
- projections

Land Use and Transportation

- patterns
- trends
- highways
- international transportation

Public Facilities

- schools
- public safety
- health
- libraries
- administration
- recreation
- infrastructure

Problem Areas and Issues

- cultural
- economic
- environmental
- political

Community Goals

- character and extent of development
- environmental protection
- socio-economic considerations
- development standards
- priority policies

Future Land Use

- land use districts
- ultimate patterns
- five and ten year patterns
- 50% and 75% ultimate patterns

Implementation

- land use regulations
- environmental protection
- historic and cultural preservation
- urban and rural renewal
- budget and capital programs
- tax and economic controls
- official map

Action Program

- legislation
- development priorities
- governmental structure
- workable program
- community participation

Appendices

- maps
- graphics
- statistics

Bibliography