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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT  
INTERNATIONAL DEVELOPMENT ASSOCIATION

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A REVIEW OF  
THE LOWER MEKONG BASIN DEVELOPMENT  
PROBLEMS AND POLICIES

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Special Projects Department

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PROBLEMS AND POLICIES

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## A REVIEW OF THE LOWER MEKONG BASIN DEVELOPMENT - PROBLEMS AND POLICIES

### I. INTRODUCTION

1.01 In response to a request from U Thant and the Mekong Committee<sup>1/</sup> for closer World Bank involvement in forthcoming stages of the Mekong Basin development effort, Mr. McNamara suggested that a first step should be a review by the Bank of the work already carried out by the Mekong Committee. This review has now been completed and a report prepared on development of land and water resources of the Basin.<sup>2/</sup> A consultants' report dealing at greater length with requirements for development of human resources and supporting services has already been published.<sup>3/</sup> Throughout the review close liaison has been maintained with the Mekong Committee, the Asian Development Bank, the UNDP, FAO and other UN agencies. The present paper summarizes key conclusions of the Bank's review and discusses the institutional framework for development of the Basin in the phase ahead, including possible World Bank <sup>4/</sup> involvement.

1.02 Due to disturbed conditions in the region, much less field work proved possible than would have been desirable. Reliance had to be placed primarily on readily available information, desk studies and data. Such sources, though mostly of good quality, have in important respects been less than adequate. Moreover, present conditions in the area generally militate against detailed planning beyond the short term by agencies of the riparian countries. The scope of the review and conclusions has been correspondingly limited.

1.03 Among general observations, recognition of the achievement of the riparian governments' Mekong Committee and the twenty-five donor governments and agencies that have supported it since its formation in 1957 merits prior place. The Mekong Basin is better documented on a wide variety of aspects than any comparable basin at a similar stage of development; a major part of the credit is attributable to the Committee, its Advisory Board and Secretariat. The Committee has also played a leading role in launching a number of tributary projects. Above all, it has been able to function and act as a focal point for international assistance throughout a period of great disturbances in the region. In the process it has created a "Mekong spirit" of cooperation which can be of fundamental value not only for the Mekong Basin area, but for the region as a whole.

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<sup>1/</sup> For brevity, "Mekong Basin" or "Basin" denotes the Lower Mekong Basin from the Laos/Burma frontier downstream. "Mekong Committee" denotes the Committee for the Coordination of Investigations of the Lower Mekong Basin; "Advisory Board" and "Mekong Secretariat", its Advisory Board and Secretariat.

<sup>2/</sup> "Review of Land and Water Resource Development in the Lower Mekong Basin", IBRD, January 1972.

<sup>3/</sup> "Agricultural Development in the Mekong Basin." A Staff Study, Resources for the Future Inc., Johns Hopkins Press, 1971.

<sup>4/</sup> References to "World Bank" or "Bank" should be understood to refer to the World Bank Group.

1.04 In particular, the Indicative Basin Plan -- the first comprehensive study of the Mekong's potential for power generation, irrigation and flood control -- is to be regarded as a document of major importance. Its indicative analysis and comparison of a wide array of possible Mekong River and tributary developments have led to the identification of a number of projects which clearly merit priority for further planning and investigation. Also, an important by-product of the preparation of the Indicative Basin Plan has been the stimulus it provided for project investigation and the collection and analysis of basic data. The long-range planning efforts so far conducted have served to focus attention on some of the main issues to be faced in the near term as well as the longer term and, with proper balance and focus, could continue to provide a background for more specific preinvestment studies. Also, the collective efforts in data acquisition and project investigations have provided valuable experience in the regional cooperation which will be needed to make integrated Basin development a reality. There are certainly formidable problems to be overcome before international development of the Basin's major water resources could become a reality -- in fact, nowhere are these problems more clearly perceived than in the Mekong Committee and Secretariat -- but this should not be allowed to detract from the value of the Indicative Basin Plan as a demonstration of alternative ways in which the Mekong could be developed for the mutual benefit of the four riparian countries.

1.05 In large part, the detailed suggestions arising from the Bank's review emphasize changes in direction already evident in Basin development activities. Their central theme appears nonetheless important. This theme, in the broadest terms, concerns the need to develop an overall strategy based on the potential of the various distinctive parts of the Basin, the practical constraints to development, and the relation of development of the Mekong's land and water resources to programs of national development of the riparian countries.

1.06 With the benefit of hindsight and information which has evolved from the Mekong Committee's activities, it would seem that attention has been focussed too narrowly on irrigation and hydropower developments from mainstem projects. In particular, the capacity to implement, and measures to accelerate the speed of effective utilization of irrigation facilities, appear to have received too little consideration. Socio-economic factors impeding adaptation of traditional practices to more modern farming methods and administrative difficulties constitute no less effective constraints than physical limitations and require equal attention.

1.07 The changes of emphasis suggested to increase the coherence and relevance of Mekong development activities are closely inter-related. In summary, attention should be focussed on specific projects and programs addressed to the more readily observable potentials and constraints; to continued planning and project formulation of the more promising of the mainstem projects; and to the filling in of critical gaps in basic data. Such a program would include various types of projects that can be quickly implemented, particularly in relation to

partially completed irrigation schemes, to development of rainfed agriculture, to supporting services and to improvements in infrastructure which are complementary to feasible changes in farm operation and management. Of immediate interest to the riparian governments, such projects should not only maintain momentum in the near- to medium-term, but also provide experience of critical importance in developing an appropriate general approach to Basin development and in evaluating the major projects contemplated. Longer term investment programs should be conceived in terms of progressive refinements in a step-by-step approach based on the growing experience and prevailing national priorities; to maintain flexibility as well as realism, more attention should be given to practical implementation constraints. The need for basic decisions on the major mainstem projects does not yet appear imminent; but the time required to gather needed experience for their adequate evaluation gives further emphasis to the urgency of preparing and executing smaller projects. Immediate attention to improvement of evaluation techniques appears necessary, including greater comparability of the methodologies used in various studies and more attention to social and marketing aspects. More generally, a stronger identification of the riparian authorities with the Mekong Committee's role now seems indicated so as to integrate the "Mekong effort" with the programming of priorities of the riparian countries.

1.08 Land and water are the chief physical assets of the Basin countries and their development clearly will play a major role in overall economic development. However, resource development alone cannot be relied upon solely as a means for improving the material well-being of the predominantly rural population of the Basin. Complementary efforts in rural development will also be needed such as an expanded network of farm to market roads, improvement and expansion of health services with emphasis upon the dissemination of family planning information, and the provision of educational services which are relevant to the needs of farming communities. To support agricultural development and to diversify the economic structure of the Basin it would also appear desirable to introduce a measure of industrial development into some of the major sub-basins. Promising opportunities are agricultural processing and the establishment of manufacturing and light industries to supply consumer goods for some of the sizeable regional markets within the Basin.

1.09 Most of the detailed recommendations have been discussed with the Mekong Committee and its Secretariat over the last two years. Many of the proposals are, indeed, already under active consideration by the Committee and by national agencies. Cooperation with the Committee and its Secretariat has been further extended by the joint effort in close association also with the Asian Development Bank and FAO, to prepare a series of pioneer projects. The large measure of agreement which has been found to exist bodes well for Basin development.

## II. DEVELOPMENT PERSPECTIVES

2.01 The Khmer Republic, Laos, Northeast Thailand and the Vietnamese delta, which together comprise the Lower Mekong Basin, have a combined population of about 30 million in an area slightly larger than France.<sup>1/</sup> Some 90% of this population is rural and the Basin's economy as a whole is almost completely dependent on agriculture. Rice-growing predominates to an exceptional degree over all other activities, with rice lands accounting for as much as 85% of the 10 million hectares of cultivated land. Controlled irrigation and double cropping are minimal.

2.02 Population pressure is not yet severe and extension of the cultivated area has enabled the population increase to be accommodated. Although some improvements are noted for the last two or three years, rice yields have been generally stagnant at relatively low levels -- ranging from less than 1 ton of paddy per hectare in parts of Northeast Thailand and Laos to 2.5 tons of paddy per hectare in some delta provinces. These yields have nevertheless permitted self-sufficiency in rice in Northeast Thailand, a substantial though dwindling surplus for export in the Khmer Republic, and a surplus in the Vietnam delta which, with the recent improvement, is just sufficient to meet the rice deficit of other areas of the country. Only in Laos, and probably attributable in large measure to direct and indirect effects of prolonged hostilities, is there a rice deficit, of the order of 10-15% of consumption.

2.03 Prospects for the future indicate serious problems. Population growth has risen to over 2 $\frac{1}{2}$ % per annum and may be approaching 3%. By contrast, currently available data indicate further availability of land suitable for rice at no more than about 20% of the existing rice area in Northeast Thailand and 10% in the Khmer Republic and Vietnamese delta -- and such land is generally of appreciably lower quality than existing rice land. Diversification into other crops than rice is expanding and these crops constitute major exports for Northeast Thailand and the Khmer Republic. However, a major part of such diversification is taking place on upland soils which require high standards of soil and water management to sustain present levels of production. Largely because of poor soil structure of presently uncultivated areas, the prospect for increased production using traditional techniques is quite limited.

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<sup>1/</sup> Some relatively small, sparsely populated areas of Laos and the Khmer Republic lying outside the Basin are excluded; the Chiang Rai province of Northern Thailand and the larger but less populated Central Highland provinces of Vietnam lying within the Basin are included.

2.04 Apart from land and water, the Basin has on present knowledge few natural resources. Forests, fisheries and perhaps some minerals can contribute to the development of the Basin, as can the development of food processing industries and other urban activities. The towns of the Basin are however few and small; only Phnom Penh exceeds 200,000 population. In these conditions, it is evident that for some time to come development in a meaningful sense for the great majority of the population must be centered on improvements in agricultural productivity. The Bank's review has accordingly concentrated primarily on the agricultural sector and related hydropower development. The following paragraphs summarize some of the key findings.

#### A. Agriculture

2.05 The information available on soils leads to the conclusion, critical for development planning, that the major part of present rice lands is not suited to other higher value crops. Exceptions occur in respect of narrow belts of alluvial soils along the banks of the river system above the delta and in some larger areas in the delta -- if water availability in the dry season can be improved. Much more limited exceptions should be found in parts of the command areas of projected irrigation schemes based on reservoir storage.

2.06 A second finding of basic importance is that, because of both low returns and high costs, the prospects for viable year-round irrigation schemes based on storage dams are poor. The low returns derive from the character of the command areas of projected irrigation schemes, which are predominantly rice lands generally unsuited on account of soil types and poor drainage for other crops, and from the low unit value of rice. Even an increase of four tons of paddy per hectare -- far above levels yet attained in the region -- would yield only about \$200 per hectare in gross income. The incremental benefit attributable to irrigation would be significantly smaller.

2.07 Recently constructed irrigation works and feasibility studies for new projects in the area indicate that irrigation costs generally exceed the limits for viable projects based on such returns. For the two banks of the river above the delta, irrigable land and favorable water resources generally do not coincide. Nearly 90% of the runoff of the Basin above the delta is concentrated on the eastern side of the Mekong where the monsoon strikes the Annam range. Here the topography is mountainous, areas suitable for irrigation few and the population sparse. On the west bank, rainfall is considerably lower and the tributaries carry very little water once the wet season ends. Costs of adequate storage dams on these tributaries are correspondingly high and power potential -- and hence the costs that can be allocated to power -- very limited. Moreover, in the larger potential irrigation areas of the west bank, the undulating nature of the terrain and existing parcelization would necessitate substantial expenditure on levelling and consolidation. So far as the mainstem irrigation potential is concerned, two of the proposed multi-purpose projects would provide large volumes

of storage for direct gravity irrigation. However, if the cost of such irrigation development -- excluding the cost of the storage dam -- approaches the order of \$1,700 per hectare as indicated in recent studies of Pa Mong project, the economic feasibility of these developments must be considered doubtful, and until experience with on-going irrigation projects provides more favorable benefit and cost data, it would seem prudent to place a fairly low economic value on the potential for direct irrigation from mainstem projects.

2.08 In the case of tributary projects where dams and main canals have already been constructed, the incremental costs of building field distribution systems could be justified by potential benefits. A major constraint is implementation capacity, but a phased development of perhaps 250,000 hectares over the next two or three decades can be envisaged. In selected areas the well drained alluvial soils forming the natural levees of the Mekong are suitable for diversified year-round cropping under pump irrigation. In the Vietnam Delta the extensive network of navigation and drainage canals form a source of water which is already being exploited by low-lift pumps. The potential is good for further development of low-lift pumping, but the impact of such development on saline water intrusion requires early attention. In the upper reaches of the delta the canals contain fresh water throughout the year, but in the lower Delta saline water enters the canals during the dry season. The minimum dry season flow entering the Delta is very large compared to likely irrigation needs, but any depletion of the flow by irrigation diversions would tend to worsen the salinity intrusion problem. Therefore, upstream storage on the mainstem to provide low-flow augmentation will become an important factor in Delta development.

2.09 The limitations on extension of the rice area and on viable irrigation from storage dams make it the more important that attention be focussed on other ways of increasing agricultural production. It is also evident that both an increase in rice yields and diversification into other crops need to be considered. An increase in rice yields appears necessary to feed the growing population of the Basin and, in the case of the delta, the rest of Vietnam. In many areas of the Basin where subsistence rice farming predominates, an improvement in rice yields also appears as a prerequisite for diversification into higher value crops. Without greater assurance of adequate supplies of rice in poor as well as good seasons, farmers are understandably unwilling to venture into other types of farming. In the longer run, self-sufficiency in rice needs to be accompanied by increased diversification into other crops -- whether by dry season crops on such rice land as is suitable, by non-rice farming of upland soils or by subsidiary crops and animal husbandry on individual farms -- if the agricultural economy of the Basin is to escape the limitations imposed by the low unit value of rice.

2.10 Review of existing information on the potential of the Basin for increasing rice yields and for crops other than rice indicates that a very large measure of conjecture still exists. Lack of practical experience even more than the insufficient soil and hydrological information makes overall assessment particularly hazardous. There are some

encouraging signs. High-yielding varieties of rice appear to have had considerable success in some parts of the delta over the last three or four years under conditions of less strict water control than usually considered necessary. Where water availability has been adequate, alluvial soils in the rice areas of the delta and along the banks of the river system above the delta have grown a variety of dry season crops successfully.

2.11 The greatest uncertainty, however, concerns the large areas of upland soils above the delta. A study of land capability maps indicates that as much as 3 million hectares in Northeast Thailand may be suitable for dry foot crops only a fraction of which is at present cultivated in any year. A similar situation prevails in the Khmer Republic. Export crops of maize have been successfully grown for years around Korat in Northeast Thailand and in the Khmer Republic, but comparable soils and hydrology elsewhere, at least in Northeast Thailand, appear scarce; the same is true for areas suited for rubber in the Khmer Republic. In more recent years, kenaf and cassava crops have expanded to become important exports from Northeast Thailand. They are grown by shifting cultivation, under which about 70% of land is fallow in any year, on the predominant podzolic soils of low inherent fertility of this area. Here, the twin dangers of a reduction of fertility and soil erosion as a result of over-cropping are already becoming apparent and are likely to increase under the influence of rising population pressure.

2.12 In brief, there are a number of encouraging indications for further diversification in areas of alluvial rice lands for dry season crops if water can be provided, and for rainfed upland soils if proper soil and water management can be introduced. To these should be added some small areas of better soils such as the Bolovens plateau and the Battambang area at the western end of the Great Lake in the Khmer Republic which have higher intrinsic, but so far largely untested, potential.

2.13 It is against this background that the Bank's review has considered the possibilities for raising agricultural productivity apart from conventional storage irrigation. The first finding is that much greater attention should be paid to lower cost ways of providing improved water control. Above the delta, variations in the timing of the monsoon and the frequent occurrence of dry spells during the growing season present serious hazards resulting in wide variations in rice production from year to year. Some modest run of the river schemes for supplying additional water at the crucial early growing stage could well prove viable. Based on very limited information, the area which could be so serviced is, however, likely to be quite small. More important could be expansion in use of low-lift pumps along rivers and the existing network of canals in the delta. The rate of expansion in the use of pumps in the delta indicates considerable possibilities and should permit some diversification into higher value dry season crops on stretches of alluvial soils. Improved drainage and better control of flood runoff can provide additional possibilities in some other areas.

Groundwater availability does not, on existing evidence, appear encouraging, but more needs to be learnt. In the lower delta, a high priority must be rehabilitation and reconstruction of canal and other structures controlling salinity intrusion. Further possibilities appear to exist for extending this system which will allow greater use of low-lift pumps. Finally, less costly methods of delivering water from the storage dams of multi-purpose projects such as Pa Mong may prove feasible, including diversion into existing tributary river systems, to supplement water availability in dry spells of the wet season as well as in the dry season. Though not a short-term possibility, the extent of the area that could physically be serviced from such storage is so large, perhaps over 1½ million hectares in the case of Pa Mong, that such possibilities deserve careful study.

2.14 No less important, and indeed to a large extent complementary, is the improvement of seeds. The apparent success of high-yielding varieties of rice in some part of the delta over the last three or four years has already been referred to. No evidence was found of any careful monitoring of this experience, including levels of fertilizer and other inputs, with a view to determining the limits of more general applicability. Yet such an assessment would appear of the highest priority. It is, however, not only in the new high-yielding varieties that a potential exists. Selection, upgrading and large-scale production of traditional varieties to substitute for seed rice kept over from the previous crop may well have even larger potential. The speed of adoption of high-yielding variety rice in the delta -- from a negligible area to over 300,000 ha in three years -- portends well for the readiness of farmers to change when success is demonstrable.

2.15 A third direction of great importance to which more attention is needed is the promotion of rainfed crops, including trial of new crops in different areas on a sufficiently extensive scale for results to have applicability for normal farming conditions. As already noted, the proportion of rice lands likely to be irrigated is small and for the longer term diversification into higher value crops appears indispensable for a significant raising of living standards. That the process will be long, given the time inevitably needed to introduce new types of farming and supporting services, makes it the more urgent for action to be initiated quickly. In this connection the use of crop rotations for proper management of upland soils deserves particular attention.

2.16 Supporting activities in such fields as transport, storage, credit and education appear vital to the success of other measures. Conditions in these respects vary considerably over the Basin. Over large parts of the Basin, however, the rural transport system is inadequate to provide farmers with quick and economical access either to inputs or to markets for their produce. More generally, growth in agricultural production is constrained by inadequacies in storage and processing. Shortage of people with mechanical, technical, or managerial skills, makes remedying this situation particularly difficult and points to the need for a thorough analysis of the constraints, and

action in several interrelated fields. The report by Resources for the Future recommends immediate attention to providing vocational education relevant to the experience of rural children, expansion of storage and processing facilities, and the designing of credit systems to provide short-term credit on reasonable terms to farmers for investment in fertilizer and for capital goods for farm improvement.

2.17 To sum up the prospects in the absence of greater experience of changing the predominantly traditional rice-farming pattern of agriculture in the area is obviously difficult. However, so far as the next five years or so are concerned, it would appear that, taking account of the possibilities for a greater degree of cropping in relation to cultivated area as population expands and existing development policies, the rice balance should be maintained. For Northeast Thailand and Laos this would imply self-sufficiency, for the Khmer Republic some margin for export once the dislocations due to hostilities are ended, and for the Vietnam delta a sufficient transfer to other provinces to enable the country as a whole to maintain self-sufficiency. Some further diversification into other crops is foreseeable but, with the possible exception of the Vietnam delta, not on a very significant scale.

2.18 Beyond the next five years or so the outlook becomes much more problematic. There is, however, reason for optimism that income can be raised for a large part of the population if action focussed in the directions outlined above is pursued energetically on a broad front. The potential for rice is indicated by the fact that rice paddy yields in Central and Northern Thailand are roughly twice those in areas of the Khmer Republic comparable in terms of soils and water regime, yields in Korea around 50% above those of comparable areas in the Vietnam delta. While export markets for rice may be limited by the "green revolution" in previously importing countries, the domestic market should expand steadily both as a result of population growth and the potential for cattle, pig and poultry raising. The rapidity of growth of secondary crops in various areas both of alluvial and upland soils when incentives have been favorable likewise provide grounds for optimism in regard to diversification and here the prospect for export markets appears generally more favorable than for rice. The costs involved in developing these potentials, moreover, appear less demanding than the effort of organization and administrative reform involved. Without such an effort, on the other hand, a decline in living standards for a considerable part of the Basin population may well result from the population pressure. In the longer term, the mainstem projects which the Mekong Committee has under consideration, and to which attention is now turned, could provide a further impetus. But this prospect should in no way detract from the urgency of stepping up measures for a more general improvement in agricultural productivity both under irrigated and rainfed conditions.

## B. Electric Power and Multi-Purpose Projects

2.19 A considerable part of the activities of the Mekong Committee has been devoted to the examination of the large hydroelectric power potential of the Mekong and its tributaries. The power requirements of the Basin itself appear likely to remain small in relation to this hydro potential which could exceed 25,000 MW. Major benefits from Mekong power seem, therefore, likely to accrue to population outside the Basin and primarily in the main load centers of Bangkok and Saigon situated at more than 600 km from the main dam sites identified. However, in the case of Laos and the Khmer Republic, power exports could contribute directly to the Basin's development by augmenting scarce foreign exchange receipts and development resources, while some part of any power economies achieved in Thailand and Vietnam would presumably redound to their Basin territories.

2.20 Of particular relevance to Basin development planning is the conclusion that none of the mainstem projects would, on the basis of existing information provide power at a significantly lower cost than alternative conventional or nuclear fuel plants. Partly for this reason, partly because technological advances of the last two decades as related to neighbouring countries such as Japan have reduced the importance of moderately low cost energy among the factors relevant to location of electricity-intensive industry, and partly due to the sparse raw material resources, Mekong power appears unlikely to prove a major determinant in the siting of industries such as bauxite refining within the Mekong Basin. The value of enclave processing type industries not based on local materials for the economy of the Basin would, if experience elsewhere in the world is a guide, be likely to be marginal in any case.

2.21 Given that the economic advantage for power of the mainstem projects will probably not prove large, additional considerations are likely to play heavily in decisions on their building and timing. These considerations include on the one hand the extent to which national power systems are willing to rely on remote sources of energy, large in relation to the total system, particularly when situated outside national territory. On the other hand, and of particular relevance to the development of the Basin for its inhabitants, lie considerations of additional benefits which may be obtained from the multipurpose nature of some of these projects.

2.22 The Indicative Basin Plan proposed the construction of six major projects in the following sequence: Sambor (1981), Nam Theun (1981), Pa Mong (1983), Stung Treng (1992), Ban Koum (1997), and High Luang Prabang (1999). Except for Nam Theun, a project on a Mekong tributary in Laos, the projects are all on the mainstem of the Mekong. The plan was conceived in accordance with the principle that power requirements of the four riparian countries for the period 1980-2000 would be met by exploiting the hydroelectric potential of the Mekong Basin.

2.23 All of the mainstem projects would derive their primary benefits from power generation, but two of the projects -- Pa Mong and Stung Treng -- because of their large reservoirs, would have other attributes in terms of Basin development. Pa Mong would open up possibilities for irrigation in both Northeast Thailand and Laos and considerably reduce flooding in the upper and middle reaches of the Mekong. Stung Treng would offer possibilities for irrigation in the Khmer Republic, and eliminate flooding of large areas in the Delta which are now subject to inundation every year. Also the projects would substantially increase dry-season flows in the Mekong Delta. In fact, either of the projects alone would provide dry-season flows in excess of any foreseeable requirements for Delta irrigation and salinity control.

2.24 In their review of mainstem development, the Bank and its consultants concentrated on three of the six projects -- Pa Mong, Stung Treng and Sambor. The first two obviously merit attention because they are the only projects with sufficient storage to even out the wide seasonal variations in river flows. Also, they are not only the largest projects but also the only true multipurpose projects. Pa Mong has been studied in considerably more detail than any other project on the mainstem. Work on Stung Treng has been confined to mapping and geophysical investigations, and a desk study by the Mekong Secretariat. Further desk studies of the project were made by the Bank's consultants. The Sambor Project was selected for review because it has been the subject of a feasibility grade study and it was assigned priority in the Indicative Basin Plan. The Tonle Sap Barrage, which had been investigated under the auspices of the Mekong Committee, was also reviewed. This is a scheme for a barrage across the Tonle Sap designed to utilize the Great Lake in the Khmer Republic as a storage reservoir.

2.25 Revised and updated estimates of Pa Mong, prepared by the Bank's consultants, indicate a mid-1970 cost of US\$1,133 million for the dam and high tension transmission lines for integration into the Thai power system. As presently planned, the project would have an installed capacity of 4,800 MW and generate about 27,000 GWh annually. Although the energy from Pa Mong could be absorbed progressively into the Thai power system, it would account for about 60% of Thailand's total power demand in the early 1990's<sup>1/</sup> -- the earliest date when all of the Pa Mong

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<sup>1/</sup> Forecasts of power "needs" for periods of several decades are difficult in any country. They are the more so when rates of growth are very high from a small base, heavily dependent on assumptions of rates of overall economic growth and on backlogs due to hostilities; and also on decisions on the priority of electricity as against, say, education in conditions of strained overall development resources. In accepting estimates that appear reasonable, it is recognized that they will need to be frequently reviewed. The broad conclusions presented here may be affected somewhat as regards timing, but are unlikely to be so in other respects.

units could be installed. Thailand, therefore, has to make an important policy decision on whether it would be willing to depend for a large percentage of its national power from a single source located about 600 km away from the main load center of Bangkok. Since the project lies on the border between Thailand and Laos, prior agreement between the two countries would be necessary on the legal financial, construction and operational aspects of the project.

2.26 As a means of assessing the relative economic merit of alternative modes of power development and to provide a comparison between mainstem projects, the Bank's consultants used the "equalizing discount rate" (EDR). This is the discount rate which equalizes the present value of costs - capital costs and operating costs - of alternative power systems developments designed to meet identical load growth. Non-power benefits of mainstem projects were considered as cost off-sets in these analyses. The EDR for Pa Mong is about 10% for power benefits alone, 9% with fuel costs for the thermal plants at 30 cents per million BTU and 10.1% at 40 cents. If commissioned in the latter part of the eighties, permitting faster installation of the power units, the EDR would be increased by about 1%. Average annual foreign exchange savings of the order of \$70 million would also be significant. The costs of year-round gravity irrigation from the Pa Mong storage on present estimates appear too great to warrant any significant attribution of net benefits in the overall evaluation. Flood control benefits in the delta would also be of marginal significance due to the fact that the major part of the Basin runoff occurs below Pa Mong. Some important flood control benefits would, however, accrue along the upper reaches of the river and are estimated on the basis of present designs to add 0.7% to the EDR, or somewhat lower if a part is preempted by prior dyke protection of the Vientiane area. Pa Mong would also, if the first major project built, contribute significantly to the augmentation of dry-season flow in the delta and thereby substantially reduce salinity problems. Until more is known on the delta water regime and agricultural potential, it is difficult to assess the benefits that Pa Mong -- or other major projects -- could provide in this regard. A rough and possible conservative estimate indicates a 1.5% addition to the EDR.

2.27 Although Pa Mong project has been the subject of detailed technical studies, one major uncertainty remains; this is the resettlement of the reservoir population which presently numbers about 280,000 and would have grown to 450,000 by the mid-1980's. Lands suitable for resettling the reservoir population have not so far been located in either Laos or Thailand. An adequate resettlement program for the population, which by the time of project completion will be several times larger than that relocated under such projects as Aswan, Kariba, Volta or Mangla, would be much more costly than figures used in the project cost estimates. Thus, the economic benefits of the project would also have to be weighed against the economic costs and the social and political risks of such a massive relocation and compensation program. Map studies indicate that reduction of the dam elevation by 20 m combined with modifications of associated structures could reduce the population affected by more than two-thirds. The Bank, therefore, recommends that

serious consideration be given to an alternative project formulation with a lower reservoir level, in order to reduce the resettlement problem to more manageable proportions. Until such alternatives have been considered, an adequate resettlement program has been formulated and costed, the agricultural benefits have been studied in greater detail and information on the project's ecological impact has been assessed, an adequate evaluation of Pa Mong project is hardly possible.

2.28 Investigations of Stung Treng are much less advanced. The project differs from Pa Mong in certain essential features. The main part of the power produced would be apportioned to Vietnam as well as Thai load centers. The reservoir, lying below the confluence of the Mekong and the main east bank tributaries, would provide major flood control for the delta as well as augment dry season flow and thus permit a change in the upper delta from floating rice to varieties of perhaps 50% higher yield. Consultants estimate indirect benefits from reduction of delta flooding of the order of \$30 million annually -- against \$6 million for Pa Mong. Population displaced would be less, though still of the order of 250,000 by 1985, and land appears to be more readily available for relocation.

2.29 Estimates based on desk studies indicate that Stung Treng would cost some 50% more than Pa Mong while energy generation would be about 30% higher. Although, therefore, the equalizing discount rate based on power alone can be expected to fall below that of Pa Mong -- 8% to 9% on the rough estimates -- its rating on total net benefits may prove comparable. Foreign exchange savings would be somewhat higher than for Pa Mong.

2.30 Stung Treng, lying completely outside the territory of either of the main power consumers, poses in even more acute form than Pa Mong the problem of site location in relation to national boundaries. Moreover, whereas Thailand has negligible hydropower potential to develop apart from Mekong mainstem possibilities, Vietnam has perhaps 2,500 MW of potential, outside the Basin and on Basin tributaries, sufficiently attractive to warrant technical studies. On the other hand, Stung Treng is the only mainstem project which could provide Vietnam with a substantial measure of flood protection for the delta. It would appear that a careful weighing of these factors by the riparian countries concerned and a determination of policy is required before very extensive and expensive feasibility grade investigations of Stung Treng would be justified.

2.31 The Sambor project was studied by the Overseas Technical Cooperation Agency (OTCA) of Japan. Desk studies were also made by the Bank's consultants. As formulated by OTCA, Sambor is essentially a power project -- the active storage in the reservoir available for augmentation of dry-season flow in the delta is quite small. The Bank's review has indicated that a revision in the project's mode of operation to increase active storage and to maximize the project's multipurpose benefits merits further study. The aim of such a revision would be to formulate a viable hydro-power project which would also make a significant contribution to dry-season water needs in the delta.

2.32 The Tonle Sap project in the Khmer Republic was designed primarily to augment the flood control effects of the Great Lake which acts as a huge natural storage reservoir for the rising Mekong flow during the monsoon period. By erecting gates across the connecting channel, flood storage capacity could be reserved for peak flow periods and the waters released at a later period. The project cost is modest relative to Stung Treng or Pa Mong -- of the order of \$140 million. Unfortunately, studies of the potential flood control effects have proved disappointing. Further difficulties arise from constraints on operation to reduce interference with the important though declining Great Lake fish catch. An alternative design which would involve a lower structure and control only the outflow from the lake merits consideration. As well as augmenting the dry-season flow in the delta, the project might also help to improve fish production. The former function would duplicate the major mainstem projects; but if the fish potential proves large and/or the project is commissioned sufficiently in advance of Pa Mong or Stung Treng, the project at lower level may prove viable.

2.33 Long-range planning for the Mekong Delta has also received attention. Two conceptual plans have been prepared; one by Development and Resources Corporation (D&R) in cooperation with a planning group of the Vietnam Government, and one outlined in the Indicative Basin Plan. The two proposals have much in common but differ in scope and timing.

2.34 The D&R proposed a massive investment in water control works in the Vietnamese Delta over an area of 1.6 million ha. The physical works envisaged comprise a system of levees extending on both sides of the Mekong and Bassac stopping short of the Khmer border. These levees would be primarily for flood control down to Can Tho and would continue thereafter for the purpose of salinity control. Within the protected area existing canals would be used and, where necessary, extended to provide a complete system of irrigation and drainage channels, with a series of pumps and control structure to regulate the flow of water. The estimated capital cost of the program was US\$1.25 billion. The program was phased in four stages over a period of 20 years from 1971-1990 with the major works substantially complete by 1986. Increased agricultural production would result from lateral expansion, reclamation, improved agricultural practices, flood control and irrigation. The major component of this increase, about three-quarters, is projected to result from dry-season irrigation.

2.35 Included as one of the major projects in the Indicative Basin Plan is a conceptual plan referred to as Delta Development. The major flood control and irrigation works are designed to include the Delta in the Khmer Republic as well as Vietnam. Development is phased in two stages timed to coincide with the implementation of the two major upstream storage projects, Pa Mong and Stung Treng. This stage would also include the completion of coastal embankments. The estimated expenditure during the plan period of 1980-2000 would be of the order of one billion US dollars. By making allowance for the effect of upstream storage projects, the scope of the works would be less than the D&R proposals.

2.36 Further elaboration of these plans will require a much more detailed knowledge of delta hydrology and agronomy than presently exists. Also, irrigation on the scale proposed would only be possible following construction of the Tonle Sap project or one of the major upstream storage projects. In the formulation of long-range plans, a clearer assessment of the potential for more productive agriculture in the absence of large investments in water control appears to be required. The investigations of delta hydrology and agriculture which are currently being undertaken under the auspices of the Mekong Committee with the help of the Netherlands Government, should, in conjunction with other recommendations made in the Bank's review, help to fill vital gaps in the information.

2.37 In summary, the Bank's review concludes that the justification and timing of mainstem project development must be viewed in the context of the increasing demand for power within the riparian countries, the feasibility of reservoir resettlement, the need for flood control in specific areas of the Basin and the advantages of improved irrigation along the river itself. However, development of an international river involves considerably more technical, legal, political and administrative problems than that of a national river. Moreover, it requires the full commitment and the active participation of all the countries which are affected, directly or indirectly, by such development, and in some cases, the chief beneficiary may not be the country in which the projects are located.

2.38 Power needs will obviously be an important determinant of the timing and sequence of mainstem developments. Although long-term projections must be treated with caution. Before 1990 the power demand of the riparian countries will have probably reached a sufficient level to absorb at least one hydroelectric scheme on the scale contemplated in the mainstem projects. This demand can, of course, be met by conventional oil-fired or nuclear installations but in view of the lack of indigenous fuels such a mode of development involves a permanent commitment by the riparian countries to using energy with a high foreign exchange cost. However, some of the major hydropower projects lie outside of the countries with the largest demands. Even countries in areas with a history of political stability have shown reluctance to depend on plants outside of their borders for a large part of their power capacity. Thus the creation of a regional power system will call for a high degree of cooperation and a mutual confidence between the countries concerned.

2.39 Irrigation demands as a determinant of mainstem development are subject to an even greater degree of uncertainty than power demands. There are three areas of the Basin in which mainstem development would provide opportunities for large-scale irrigation -- Northeast Thailand, the area north of the Great Lake in the Khmer Republic and the Mekong Delta. In Northeast Thailand, a first priority is to make effective use of water stored in existing storage reservoirs; only when this has been accomplished will there be a basis for judgments on the economics and timing of direct irrigation from Pa Mong. In the Khmer Republic, the areas which could be commanded from Stung Treng have yet to be studied in any detail. In the Vietnam Delta there is considerable scope for development of low-lift pump irrigation from existing canals. However, irrigation diversions during the dry season would tend to worsen the

salinity intrusion problem in the lower Delta. Thus, the need for a modest volume of upstream storage to increase dry-season flows in the Delta during a period of two to three months will become an important factor in mainstem development. A more detailed understanding than presently exists of the potential for agricultural development in the absence of irrigation will also be needed to assess future irrigation needs. Outside of the Vietnam Delta, there have been virtually no attempts to adopt new technologies in the production of rice, the Basin's principal agricultural product. Intensive efforts directed to accumulating experience in the development of the water resources of the tributary basins and the delta and in promoting the development of rain-fed agriculture appear, therefore, as an essential prerequisite to decisions on irrigation from mainstem projects.

2.40 Considerable emphasis has been placed to date on the need to overcome the problem of flooding. In addition to specific reaches upstream, particularly the area around Vientiane, about five million ha are subject to annual flooding in the area of the Delta and around the Great Lake. The pattern of agricultural cultivation has evolved around this natural phenomenon, and varieties of rice are adapted to the particular flood conditions that prevail; however, flooding does result in a depression of yields in some areas. Also, flood-dependent varieties possibly have less potential for yield increases than varieties cultivated under rainfed conditions. To some extent, however, the adverse effects of floods can be circumvented by using short maturation varieties of rice in conjunction with low-lift pumping which will enable a higher yielding crop to be harvested before the onset of the flood. Also, the introduction of sorghum as an "after-flood" crop in Vietnam has indicated the feasibility of more productive land use without large investments in flood control. Thus, the flood problem as far as agriculture is concerned may now assume a lower priority than it has previously been given.

2.41 In this context it is worth noting that Stung Treng is the only project capable of providing a high degree of flood control in the lower reaches of the river and in the Delta. While flood control is generally regarded as beneficial it will result in profound changes in the water regime. These changes could initially be damaging if they are introduced too abruptly and without careful advance planning. Agreements on the mode of operation of Stung Treng would be necessary to protect the interests of Vietnam and the Khmer Republic, the riparians who would be affected by the project.

2.42 The Bank's review has confirmed the findings of the Mekong Committee that multipurpose development of the Mekong River is technically feasible and in the long-term holds considerable promise for regional economic development. However, before such plans can be translated into firm decisions on the timing and sequence of major investments, numerous problems attendant to the assessment of project costs and benefits and to the joint development of an international river will have to be resolved.

C. National and Basin Approaches

2.43 Consideration of the development of the Mekong Basin is rendered more complex by the fact that territories of four countries are involved and that for two of them, Thailand and Vietnam, the territories within the Basin constitute only a part of their total national territory. Even if the Basin lay entirely within one country, problems of priority and allocation of resources, of local interests and of political balance would arise. The history of major river storage schemes bears ample testimony to the difficulty of securing an acceptable allocation of costs. Such difficulties are particularly evident when, as is often the case, the costs and disturbance of construction is concentrated upstream where the most advantageous sites for storage and power potential are found, while the major benefits lie downstream or in urban centers outside the Basin. Within a single country, adjustments in national financial assistance can help in finding a solution. Between two or more countries, the finding of an acceptable solution is inevitably more difficult, though it is possible that international financial assistance, where available, can play a catalyst role. It is nonetheless of even greater importance than in the case of a single country that the benefits as well as the costs of the proposed projects should be fully recognized by all concerned; without such a common basis, the possibilities of cooperative action must inevitably be reduced. Much light must be shed on the problems before enlightened self-interest can play its part.

2.44 The benefits of cooperation between the riparian countries in the development of the Mekong Basin have to date been discussed largely in terms of total estimated costs and benefits of the proposed mainstem projects in an integrated development of the river system and with reference to agreement on mainstem low-flow water use. These certainly constitute a most important aspect and the desirability of regarding the river and its tributaries as a total system from the beginning can be fully endorsed. Only in this way can benefits be maximized in relation to costs and the international difficulties often caused in other river systems by isolated, independent action be averted.

2.45 It is not infrequently suggested, on the other hand, that because the four national territories of the Basin are so dissimilar and because priorities for their development must be determined in the context of national planning involving non-Basin territories and their problems in the case of Thailand and Vietnam, the major emphasis should be on national approaches to development of the respective Basin territories. The four component territories differ substantially in physical conditions, in ethnic groups, in population density, in degree of integration into commerce, in transport facilities and in education levels to mention only a few of the important considerations for policy. It is indeed for this reason and because of the need for a national perspective in determining priorities, that the Bank's review stresses the desirability of considering separately the potential of each of the four component territories of the Basin.

2.46 The national and Basin-wide approaches are not, however, regarded as being in antithesis but as strongly complementary. Apart from the mainstem projects, which directly affect more than one riparian country, joint riparian efforts can be of great assistance to the sub-basin's development by economizing Basin studies and expertise, in communicating relevant experience, in preparation of agricultural projects and in organizing financing and technical assistance. In current conditions in the Basin, shortage of expertise and requirements for training appear at least as important as shortage of finance. The pioneer project program is illustrative. Fourteen pioneer project areas are being selected throughout the Basin to test, on a scale large enough to have wider practical application, various techniques for agricultural management and water control. They are being chosen and designed so that the experience gained will have relevance for other parts of the Basin irrespective of national boundaries. At the same time, a system of multilateral financing and riparian involvement has been created which facilitates the provision of international financial and technical assistance support.

2.47 Moreover, it is only by close interaction between the national and Basin approaches, that the experience in the development of sub-basins can contribute to the evaluation and design of the major projects. A close working relationship between the program makers at national and Basin level is, in addition, essential to widen the appreciation at national level of the benefits and limitations of the major projects proposed.

2.48 None of the mainstem projects with the possible exception of Tonle Sap, seems likely to be appropriate for completion for perhaps 15 years or more. Far from regarding this as a long period, it should be considered as uncomfortably short for the formulation of a detailed approach to the development of Mekong Basin and Mekong River. Time will also be required to gain the additional experience required for detailed project formulation and realistic assessment of agricultural benefits. Riparian agreement, detailed design, arrangements for finance and operation, and actual construction may require a dozen years or more for such major projects as Pa Mong or Stung Treng even when, as for Pa Mong, much of the data and site testing have already been accomplished to feasibility grade. Accordingly, although the need for basic decisions on the mainstem projects is not regarded as imminent -- and in any case appears impractical in present conditions -- the interaction and, where necessary, coordination of national and Basin approaches is not a matter of only future concern. It is rather of immediate urgency.

2.49 In the longer run, such activities could have more far-reaching effects. The economies of the four riparian countries are at present largely isolated from each other. Trade between them (excluding entrepot trade in the case of Laos) represents only a few percent of their total foreign trade; their exports, almost exclusively agricultural products, are competitive. Yet in the longer term, benefits may be derived from greater integration of their relatively small domestic markets. The Mekong effort could provide a basis for greater cooperation in other fields, perhaps extending to neighbouring countries.

2.50 In this context of the complementarity of the Basin and national approaches, some brief observations on national policies and priorities appear appropriate. None of the four riparian countries have long-term perspective type plans for development. In Thailand, however, a five-year development plan for 1972-1976 is being drafted including a five-year plan for development of Northeast Thailand. Here, at the invitation of the Thai Government, a Bank team has been able to review more closely the problems of overall development, relative priorities of water resource projects and relationships to national programs. Conditions in the other territories of the Basin have precluded similar studies. It is understandable that in Laos, the Khmer Republic and Vietnam immediate problems dominate to such an extent as to give long-term planning relatively low priority. While attention is in fact being given in all four countries to the adoption of broad policies towards future development, it is probably unrealistic to anticipate close attention by the four countries to detailed long-term planning on a Basin-wide basis at this time except as an adjunct to pressing shorter term programs.

2.51 There is an evident danger in these circumstances of planning at national and Basin levels getting so out of step as to render their integration difficult, with a resulting isolation of the Basin planning. It is the more important that the Basin-wide effort take into account the constraints under which the national development efforts must necessarily operate over the years immediately ahead. For the reasons indicated, it was not possible to undertake an assessment of general development priorities in each of the riparian countries in relation to the Basin territories. The following observations are therefore no more than indicative of types of consideration which may be of particular consequence for the next phase of the Basin development effort.

2.52 In its national setting, Northeast Thailand's 13 million population is almost as important a proportion as it is for the Basin -- it constitutes about 33% of the Thai total and about 45% of the Basin total. Even more than in the case of the Basin, however, the Northeast's proportion of total production is significantly lower. More revealing than the fact that income per head in Northeast Thailand is only about 25% of the Central region of Thailand which includes Bangkok, is the fact that it is only 40% of the Southern or 55% of the Northern region.

2.53 It could be argued that, because of its poor resource base and location, it is wasteful to give priority to the Northeast in allocation of national development resources. "Almost anything can be produced more easily in other parts of Thailand." Apart, however, from socio-political aspects which are of evident concern to the national government, there are strong economic considerations behind the Thai Government's continuing efforts for development of this region. The "opportunity cost" of resources in this region, human even more so than physical, is low. The studies carried out by the Bank team indicate in particular that self-sufficiency in foodstuffs should at least be maintainable with relatively limited expenditures given a concerted effort to reduce constraints in several complementary fields. In the

longer term both an expansion of export crops from diversified upland agriculture and greater industrialization appear feasible. More generally, although incomes are likely to remain lower than in other parts of Thailand in the foreseeable future, a development policy concentrated on fields where the comparative disadvantage of the Northeast is least, appears likely to produce acceptable returns in the national setting.

2.54 The investigations conducted by the Bank team indicate that a priority program of roughly \$300 million of expenditures for 1972-1976 comprising technical assistance and preparatory investigations as well as capital projects might provide a balanced approach when coupled with various administrative improvements. The program would include phased completion of irrigation projects where the main infrastructure already exists, upland crop and seed improvement, agricultural extension and credit, an extension of highways and feeder roads, rural electrification and health, vocational education, urban infrastructure and preliminary steps towards locating industries for processing local agricultural and other products and possibly certain light industries.

2.55 In Laos, the extended period of hostilities, the flow of refugees to the Vientiane area, and the distortions produced in the economy by various measures of support will make the formulation of a rational development policy of more than short-term nature particularly difficult for some time to come. An important part of the country's population of three million is by now concentrated in the Vientiane area which has developed a deficit in rice. Laos is the largest of the four Basin territories and transport between the few populated areas is difficult. In the short-term both improvement of rice productivity and some further diversification in the Vientiane area thus appear of high priority. Some reduction in the special advantages enjoyed by Thai exporters of foodstuffs to Laos resulting from present monetary and associated policies may be required to provide necessary incentives.

2.56 Exports of Laos cover only about 3% of imports. Commissioning of the Nam Ngum project will aid export earnings once obligations to Thailand incurred during construction are repaid. If the full potential of 135 MW is installed, net foreign exchange receipts could be of the order of \$3 million annually compared with \$2 million and \$68 million for current exports and imports. In the long-term a much larger potential for export of power exists both from tributary projects and Pa Mong if and when arrangements can be made for purchase by Thailand. An inventory of mineral resources would also deserve early attention.

2.57 In Vietnam, self-sufficiency in rice has now been restored and is likely to continue. A much wider base for exports and for substitution of imports exists though heavy investments will be required. Obviously restoration of war damage in many parts of the country will merit priority for several years. Moreover, the delta population is advantaged in many respects as compared with other parts of the country such as the small coastal deltas to the north where pressure of population, swollen by refugees, is in some cases already intense; and the

Vietnamese authorities are already embarked on several programs in the delta of the types recommended earlier. Although investigations to clarify such projects as Stung Treng or Tonle Sap clearly merit close attention in view of their important potential in the longer term, a high priority for allocation of national development resources to major projects in the delta such as the D&R proposals seems unlikely for some years unless particular favorable net benefits can be demonstrated.

2.58 The Khmer Republic will be faced with heavy expenditure on repair of war damage. Rice production, which normally accounts for over one-third of exports, is however much less dependent on structures such as canals and salinity controls than in the case of Vietnam and reconstruction requirements in the field are likely to be correspondingly less. On the other hand, the rubber estates which normally account for about a quarter of exports have been extensively damaged and their rehabilitation will presumably constitute a relatively high priority as will repair and improvement of the transport network -- of considerable importance to the improvement of agricultural productivity. The returns attainable from the incremental costs of the completion of the Prek Thnot project, due to the proximity of Phnom Penh as a market for rice and diversified crops, combine to suggest that speedy completion of the Prek Thnot project should also rank high in the priority list.

### III. A PRIORITY PROGRAM

3.01 The Bank's review confirms the priority of agriculture in Basin development and emphasizes the merit of regional cooperation in the development of the Basin's land and water resources. However, the review also concludes that most, if not all, of the promising opportunities for land and water development in the Lower Mekong Basin require substantial further preparation before they could be considered ready for implementation. Recognizing the urgent need for project preparation, the Bank's review has identified a "Priority Program" of pre-investment studies to promote investments in the period immediately ahead and to lead logically into a longer term basin development program.

3.02 The program includes studies and investigations with implications for the Basin as a whole, including the preparation of a Basin-wide program of pioneer agricultural projects which is already funded, selected pre-investment studies in each of the national components of the Basin, and the most urgent follow-up action in the preparation of multipurpose projects on the Mekong River. A preliminary estimate indicates a funding requirement of US\$12.0 million which might lead eventually to follow-up investments on the order of US\$250 million.

3.03 It is recommended that this program, many elements of which have already been adopted by the Committee, should be contained in the work program of the Committee. In addition to the pioneer project program which is expected to lead to roughly \$50 million of projects, the priority program places emphasis on investigations that could be speedily concluded and form the basis for further investment in field

distribution systems for existing reservoirs in Northeast Thailand and the Khmer Republic. Investigations of the potential in the Khmer Republic for improving the productivity of river-bank farms by crop diversification and of the Great Lake fisheries, and in Northeast Thailand of flood protection in the lower reaches of the Nam Mun are also included. In the Vietnam delta, emphasis is on evaluating the further potential for low-lift pumping and expanded use of high-yielding rice varieties, on carrying forward investigations in relating to three salinity control cum irrigation projects, and on hydrologic data collection required as a basis for more comprehensive planning of Delta development. In Laos, investigations required for extension of the Nam Ngum project and for determining the further potential of the Nam Ngum valley below the dam are included along with studies to enable final decisions to be taken on flood protection of the Vientiane Plain.

3.04 Investigations of Basin-wide significance include further studies of Pa Mong, particularly relating to reduction in dam elevation, studies of a basic redesign for the Tonle Sap project, a consolidation of the work so far carried out on Stung Treng, further studies of the Sambor project, and a continuation of the delta studies undertaken by the Netherlands team. Particular importance is attached to a Basin-wide program of research and field trials of techniques for improving agricultural productivity under rainfed conditions.

#### IV. INSTITUTIONAL ASPECTS

4.01 From the analysis outlined above, it follows that the degree of association between the national authorities of the riparian countries and the Mekong Secretariat will be of crucial importance for the next stages of the Mekong Basin development activities. The initial studies undertaken by the Committee could be carried out with limited involvement of national agencies. The time has now arrived when closer attention to this association appears necessary to ensure the most effective use of the resources available for development both short term and in the longer run, as also the relevancy of Basin planning in relation to national planning. The legal and administrative framework for implementation and management will also need increasing attention as investigations lead to projects.

4.02 The need to enlarge the scope of Basin development activities and for closer association between the Committee and national authorities has clearly been appreciated by the Committee, and its activities have in fact widened from a predominantly engineering approach centered on consideration of mainstem projects to a more general approach to development of water and land resources. Its Advisory Board of eminent engineers was enlarged in 1968 by the addition of three experts in the fields of agriculture, finance and economics. Of potentially great importance, an agriculture sub-committee, composed of directors from the respective ministries of agriculture of the riparian states, was created in 1971. Plans are also underway to increase the participation

of riparian nationals in the upper ranks of the Secretariat. Some parallel efforts by national agencies to facilitate integration with the work of the Committee are also evident.

4.03 These efforts are still continuing. Since the preparation of the draft Indicative Basin Plan, discussions between the Secretariat and national agencies appear to have increased significantly. Two major aspects nevertheless appear to deserve immediate emphasis. The first is the problem of determining the scope of Committee activities in relation to those of national authorities involved in Basin development. The second concerns the identification of the riparian governments with the Committee and its Secretariat.

4.04 To a large extent these two problems can be considered as opposite sides of the same coin. Insofar as the riparian governments thoroughly identify themselves with the Mekong Committee, the problem of defining the scope of the activities carried out under the aegis of the Committee and those of national agencies can be more expeditiously resolved. The danger of mutual lack of sufficient confidence, and hesitation in collaboration, which could reduce effectiveness and acceptance of the Committee's work, should also be much reduced. Closely related is the problem of keeping the capacities of Basin-wide and national agencies reasonably in step. It is essential that each of the partners should have the technical capability of evaluating the studies and recommendations produced. These considerations appear to point to the riparian governments deciding in considerably greater detail than in the past and in full discussion with agencies involved, the scope of the Basin-wide activities.

4.05 It would be presumptuous for the Bank to suggest explicit means by which the further evolution of the Mekong Committee can most effectively be accomplished. However, the explicit consideration of the problem suggested should, it would seem, take into account the paramount importance of continuing to maintain a high level of competency in the Mekong Secretariat, the considerable advantages which a continuing association with the UN can afford, and the need for flexibility to reflect the differing administrative organization of the four riparian countries.

4.06 Two related sets of difficulties in ensuring the maximum effectiveness of the contribution of the Mekong Committee and its Secretariat merit mention. The first concerns the number of separate activities in relation to the capacity of the Secretariat. The second concerns procedures for individual studies under bilateral aid which have often resulted in rather minimal Secretariat involvement in the definition of the detailed scope of the investigations, the conduct of the investigations, the monitoring of progress, or discussion of preliminary findings.

4.07 At the present time, the work program of the Mekong Committee includes nearly 50 main program heads, many containing several individual sub-programs, either ongoing or for which funds are sought. Secretariat professional staff numbers less than a hundred including expert

consultants and administrative officers. This situation indicates firstly that a clearer system of priorities based on the evolving Basin strategy will need to be worked out for the future to avoid dissipation of effort. While the Committee should certainly maintain an overview of the activities carried out for Basin development, that these activities should be competently carried out appears more important than under whose auspices they are performed provided that adequate liaison is maintained. Here again, the improvement of the association with national authorities is directly relevant. Secondly, considerable advantage should be gained by building up a section in the Secretariat specifically devoted to project preparation and evaluation. In the initial stages, such a unit could serve a most valuable function in the Secretariat's contribution to the conduct and evaluation of investigations. The donor countries could assist by modification of their procedures. A readiness to involve the Secretariat to a greater extent than in the past both in initial discussion of the terms of reference, and by providing for a continuing dialogue between their consultants and the Secretariat and for monitoring during course of investigations could contribute to the efficacy of the overall program.

4.08 In view of the size and variety of needs for assistance and because of the diversity of conditions respecting present and potential donors, considerable flexibility in arrangements for donor support appear indicated that will encompass bilateral and multilateral aid, and aid to the riparian nations as well as via the Mekong Committee. The Committee's auspices would, however, appear to have particular advantage where investigations or projects are of direct concern or applicability to more than one riparian country, where innovative techniques and/or relatively large components of foreign technical assistance are involved, where individual donors wish to associate themselves with others and where a project of a size requiring multi-national donor finance is concerned. Multilateral financing arrangements appear particularly appropriate within the Committee's program for basic Basin studies, for investigations and projects involving several donors and, more generally, for an amount sufficient to provide the Committee with sufficient flexibility to maintain an overall balance in its program of activities. The pioneer project program involving several donors and international agencies as well as the Committee, its Secretariat and national agencies represents an experiment in a limited multilateral approach which, with modifications appropriate to the circumstances, may provide a flexible system applicable on a wider scale in future operations of the Committee.

4.09 This paper does not attempt to predicate in detail the role of the World Bank Group in future Mekong activities. Its purpose is rather to provide a background against which discussions of such a role can be held. The considerations above, however, do lead to some general observations. The first is that a large measure of aid, financial and technical assistance, will be required for the Mekong development effort both at the national and regional levels. The provision of assistance by the World Bank Group should be viewed in this context and might naturally contain an element at both levels. It also appears that the Bank Group can best serve the interests of Mekong Basin development by

maintaining its normal approach to appraisal of projects and programs. This could be of particular importance in respect of any service the Bank Group may be able to provide in mobilizing donor support -- and in which close association with other aid-giving agencies, including particularly the Asian Development Bank, appears as a prerequisite.

4.10 It is recognized, on the other hand, that to provide supporting services adequately requires a close liaison with the Mekong Committee and its Secretariat. Bank Group involvement in the pioneer project program and other parts of the priority program outlined above and summarized in the Annex might provide one means of furthering this liaison. Assistance in the building up of a project evaluation unit in the Secretariat might provide another. A Bank Office has already been set up in Bangkok for liaison with the Secretariat and could be strengthened for this purpose. At the Committee's invitation, the Bank has sent observers to meetings of the Mekong Committee and its Advisory Board as well as to meetings on particular subjects. This practice should clearly continue. The pioneer projects program provides for ad hoc meetings of the Secretariat, UNDP, ADB, FAO and World Bank to formulate the program and discuss its progress and findings. Similar arrangements for other programs of the Committee could be considered. The World Bank has acted as administrator of the Nam Ngum project, the largest project implemented under Committee auspices. Similar arrangements for other projects could be considered. The Bank Group has not provided finance, as opposed to technical assistance, for any of the Mekong Committee's projects. However, the priority program outlined in Section III above could open up the possibility of Bank Group financial participation in the near future. Also, in relation to larger projects, the Bank could certainly help the Committee in the organization of multilateral financing arrangements.

4.11 Activities undertaken by the Bank for the riparian governments can also directly complement support for the Committee's activities. The review of Northeast Thailand development referred to earlier has, for example, led to recommendations for a program covering several inter-related fields in which the Bank might participate both in the initial stages of preparation and in the financing of resulting projects. Training courses for the personnel of national agencies, particularly in the field of project evaluation, at the Economic Development Institute of the Bank and/or in the area, offer further possibilities.

## V. CONCLUDING OBSERVATIONS

5.01 The Mekong Committee's Indicative Basin Plan represents an important first step toward the preparation of a comprehensive plan for Basin development. A major contribution has been made towards the identification of constraints and potentials. Future planning should, however, rely more heavily on practical experience gained in the constituent territories of the Basin and should be continuously refined as development proceeds and new information becomes available. More specifically, the Bank's review indicates the need to concentrate on specific projects and

programs addressed to the more readily observable potentials and constraints; to continue planning and project formulation of promising projects of immediate interest to riparian countries; and to fill in critical gaps in basic data on the Basin's land and water resources for the longer term development. Greater experience with irrigation, crop diversification and supporting activities is required before definite conclusions about the merit, priority and timing of mainstem projects for agricultural development can be reached.

5.02 U Thant referred in his letter to a "new phase" in which "decisions should be made, so far as possible in the context of a careful review of investment priorities for the Basin as a whole and for the general development programs of the riparian states." It is hoped that the Bank's review will be of assistance in determining the priorities in the new phase.

LOWER MEKONG BASIN

PRIORITY PROGRAM

Description	Estimated Cost of Pre-Investment Studies (\$ million)	Estimated Cost of Likely Follow-up Investment (\$ million)	Description	Estimated Cost of Pre-Investment Studies (\$ million)	Estimated Cost of Likely Follow-up Investment (\$ million)
<u>A. BASINWIDE STUDIES</u>			<u>C. NORTHEAST THAILAND</u>		
1. Pioneer Project Program	1/	50.0	1. Irrigation from Existing Reservoirs		
2. Pa Mong Project			(a) Stage I (40,000 ha)	0.20	
(a) Study of Low Pa Mong	0.50		(b) Stage II	0.40	
(b) Review & Formulation of Ecological Studies	0.05		2. Nam Mun Flood Protection	0.20	
(c) Ecological Studies	0.50		3. Nam Chi Development	0.20	
3. Tonle Sap Project	0.20		4. Rainfed Crop Improvement	0.20	
4. Sambor Project	0.20		<b>Sub-Total</b>	<u>1.20</u>	<u>45.0</u>
5. Stung Treng Project Desk Study	0.10 <sup>2/</sup>		<u>D. KHMER REPUBLIC</u>		
6. Delta Study (follow-up)	0.60		1. Prek Thnot Project - Phase II	1.00	
7. Central Data Bank	0.30		2. Battambang Project	0.40	
8. Rainfed Crop Improvement Research and Field Experiments	3.00		3. Stung Chinit Project	0.10	
9. Improvement of Agricultural Data Base	0.40		4. Riverbank Farms	0.20	
<b>Sub-Total</b>	<u>5.85</u>	<u>50.0</u>	5. Fisheries Studies	0.30	
<u>B. LAOS</u>			<b>Sub-Total</b>	<u>2.00</u>	<u>50.0<sup>4/</sup></u>
1. Nam Ngum Project (Re: Spillway Gates and Phase II)	0.05		<u>E. VIETNAM DELTA</u>		
2. Flood Protection for Vientiane Plain	0.10		1. Project Planning	1.00	
3. Reconnaissance Studies for Nam Ngum Valley	0.20		2. Review of Low-lift Pump Development	0.40	
4. Resource Surveys	0.30		3. Review of High Yielding Variety Program	0.10	
<b>Sub-Total</b>	<u>0.65</u>	<u>25.0<sup>3/</sup></u>	4. Hydrologic Data Collection	0.50	
			5. Inventory of water Control Infrastructure	0.30	
			<b>Sub-Total</b>	<u>2.30</u>	<u>80.0<sup>5/</sup></u>
			<b>T O T A L</b>	<u>12.00</u>	<u>250.0</u>

1/ Estimated cost of US\$ 2.0 million already funded.

2/ Site investigations and feasibility study estimated at US\$ 12 million should be deferred pending review of desk studies by riparian Governments.

3/ To cover the cost of the following possible investments: Nam Ngum Power Plant Phase II; Nam Ngum Spillway Gates; and Flood and Bank Protection Works for Vientiane.

4/ To cover the cost of the following possible investments: two major tributary projects; and one program of minor irrigation works.

5/ To cover the cost of the following possible investments: one major salinity control and irrigation project including rehabilitation of existing sea defenses; one flood protection, irrigation and drainage project including rehabilitation of existing water control works; and one program for low-lift pump development.

