

Development Discussion Papers

On Sustainable Development of an Agricultural Economy: The Case of Guyana

Chun-Yan Kuo and Gangadhar P. Shukla

Development Discussion Paper No. 765
June 2000

© Copyright 2000 Chun-Yan Kuo, Gangadhar P. Shukla,
and President and Fellows of Harvard College

Harvard Institute for
International Development

HARVARD UNIVERSITY



On Sustainable Development Of An Agricultural Economy: The Case of Guyana

Chun-Yan Kuo and Gangadhar P. Shukla

Abstract

The purpose of this paper is to develop the new market-oriented economic policies for sustainable development of underdeveloped countries, which have been poor and rely on external assistance for decades. The case applies to Guyana because of its chronic deficit and deteriorated facilities in the hydraulic system. As farmers receive poor services from these facilities, they are reluctant to pay for the drainage and irrigation services and a vicious cycle is created.

The benefit principle of taxation suggests that the beneficiaries should pay for the services wherever it is possible to identify the users and quantify the benefits accruing to them. The paper argues that a special levy of the consumption tax be imposed for maintenance of the sea defense and the public good component of the drainage and irrigation structures while user charges are contemplated for the private good component of the drainage and irrigation system. To be effective, the paper also emphasizes the importance of an appropriate agency to assess and collect drainage and irrigation dues. In that, the National Drainage and Irrigation Board and its regional offices should be given responsibility in the long run for collecting and assessing tariffs. However, in the interim period it would be practical to have the regional agencies continuing their operation and maintenance but arming it with legal powers for dealing with the delinquent farmers. For a greater participation of farmers in the management of irrigation water, the Water Users Associations may be encouraged to assume responsibility for the maintenance of the irrigation system at the local levels. The involvement of users will ensure both efficiency and economy in providing these services.

Keywords: drainage and irrigation, taxation, affordability, institutional arrangement, Guyana

JEL codes: H41, O13, Q15, H42

Chun-Yan Kuo is a Senior Fellow of the International Institute for Advanced Studies, Inc.

Gangadhar P. Shukla is a Research Associate, Deputy Director of the Harvard Institute for International Development (HIID) Public Finance Group, and Director of the Program on Tax Analysis and Revenue Forecasting at HIID.

On Sustainable Development of an Agricultural Economy: The Case of Guyana*

I. INTRODUCTION

Adequate and timely provision of drainage and irrigation is essential for development of paddy and sugar cane cultivation. This is especially acute for Guyana because of her two distinct rainy seasons and periods of drought-like conditions between the seasons. As irrigation water is a crucial resource for cultivation, a sustainable management of water becomes one of the most challenging tasks facing the agricultural sector.

Guyana's flood control and drainage and irrigation (D&I) facilities have deteriorated for years and the infrastructure management has been identified as one of the most complex institutional framework, characterized by a multiplicity of agencies, overlapping jurisdictions and a lack of coordination of activities.¹ As the facilities are inadequate, the services provided are of a poor quality. Since farmers are not getting adequate services, they are not paying for these services. As collections of D&I rates are poor, funds for operations and maintenance of the system become insufficient and a vicious circle develops.

Although international financial organizations have come to help for years, they would no longer continue their generosity without seeing some concrete steps being undertaken to resolve the problems. It is apparent that a mutual understanding of the issues between the government, farmers and international organizations is necessary and their willingness to resolve the problems is essential. The main purpose of this paper is to identify the potential issues and then explore alternative approaches by taking into consideration institutional arrangement.

*This study was completed as part of a project undertaken by the Harvard institute for International Development and financed by the Inter-American Development Bank for the Government of Guyana. The authors are grateful to R. Latchmansingh and G. Evelyn for their technical assistance in assessing the hydraulic facilities and conducting the survey of farm production costs used for this analysis. The authors would also like to thank R. Taliercio for his inputs, comments and suggestions.

Section II determines the magnitude of the problems in the hydraulic system facing Guyana. Section III explores the rationale to solving the problems in a sustainable manner. Section IV offers alternative cost recoveries for operation and maintenance of sea defenses and the public good component of the drainage and irrigation system. For the private good component of the drainage and irrigation system, it is dealt with in Section V. Section VI assesses alternative institutional framework and arrangement. Concluding remarks are made in the final section.

II. Issues Associated with the Hydraulic System

The hydraulic system in Guyana involves sea defenses and the D&I system and they are closely related. The institutional arrangement will also be addressed since it may have contributed to a deterioration of Guyana's D&I facilities and flood control infrastructure.

Sea Defenses

The coastal plain in Guyana lies between 1.5 to 3.5 feet below the sea level. The area is currently protected by six different types of sea defenses, of which earthen dams with sand reefs and concrete slope protection account for more than 90% of the coastline.² About 90% of the population live in the narrow coastal strip, which is considered to have the richest alluvial soils suitable for cultivation of paddy and sugar cane.

The Hydraulics Division of the Ministry of Works, Transport and Communications has been responsible for the execution of capital investments in Guyana while the Regional Development Councils (RDCs), the intermediate tier of the government administration, was responsible for the inspection, maintenance and monitoring of sea and river defenses. Inadequate financial resources and shortage of skilled personnel have made the Hydraulics Division incapable to discharge its mandate, many sections of the sea defenses have outlived their design life and are on the verge of collapse. Disrepair of the structures has meant regular

¹ See, for example, Morris D. Whitaker, "Agricultural Policy Reform in Guyana: The Floor Control, Irrigation and Drainage Subsector", report prepared for the Inter-American Development Bank, (June 1994).

² The coastline, which is about 267 miles long, is protected by sand reefs/earthen dams, rip rap structure (permanent), rip rap structure (emergency), earthen dams with concrete slope protection, timber sheet piles, and steel sheet piles.

breaches, damage to cultivable land and other property. Failure to adequately maintain the sea defense structures will increase the future cost and volume of rehabilitation required.

Guyana has suffered a long period of economic stagnation. Although its economy has recently improved, the size of the country's external debt and its debt service remain high and continue to limit the availability of resources for infrastructure rehabilitation. The sea defense system continues to deteriorate due to a lack of adequate and timely maintenance and rehabilitation.

Ever since Guyana became an independent nation, the expenditures associated with operation and maintenance of sea defenses have been financed in part by the national budget, but mostly by donor agencies. A number of consultants and international financial organizations have pointed out that this kind of approach to sea defenses financing is not sustainable in the long run unless Guyana demonstrates its making effort for cost recovery and a sustainable management of its infrastructure.³ On the World Bank's request, the government of Guyana undertook a study on cost recovery for sea defenses in 1993. The study concluded that the entire population of Guyana benefits from sea defense expenditures and, without them, the country would cease to exist as a country in its present form.⁴ It also suggested that the necessary funds for the management and maintenance of sea defense should be designated "Statutory Budget Expenditures," while capital rehabilitation works would continue to be funded through donor programs.

Rehabilitating the sea defenses structures over the next ten years would cost G\$19.3 billion (US\$138.14 million) in 1996 dollars.⁵ The annual maintenance cost was estimated at approximately G\$550 million.⁶

³ See, e.g., the World Bank, Guyana Public Sector Review, Volume II: Main Report and Annexes, Report No. 11753-GUA, (May 1993).

⁴ The Ministry of Agriculture, the Planning Division, Guyana, "A Cost Recovery Study for the Sea Defenses in Guyana", (November 1993).

⁵ This figure refers to a proposed program, prepared by the Sea Defenses Project Executive Unit, the government of Guyana, that needs to be undertaken over the 1996-2005 period.

Drainage and Irrigation

D&I works in Guyana are mainly categorized into “declared” and “undeclared” areas, though to a large extent, it is carried out in declared areas.⁷ When an area is declared the National Drainage and Irrigation Board (NDIB) is legally responsible for the provision of services, which includes drainage, irrigation and access roads. In undeclared areas, services may be provided but there is no legal obligation to do so.

Within the declared areas, there are “vested” and “non-vested” works. Vested works are the responsibility of the NDIB and the Hydraulics Division, while non-vested are the responsibilities of the Neighborhood Democratic Councils (NDCs), the lowest tier of regional government. Not all works in declared areas are vested and not all works in non-declared areas are not vested. For example, a vested main drain for a declared area may pass through a non-vested area en route to the sea.

The operation and management of the current D&I system is further complicated by the following factors. First, while most D&I areas fall within the jurisdiction of a single NDC, some fall within the jurisdiction of several NDCs and others have portions which fall outside of any NDC. Second, the non-vested works within the declared D&I areas for which the NDCs have responsibility is considerable; in some cases, it is the major portion of the works. Thus, reform of the system needs to be a well-coordinated effort between the central government, the NDIB, the RDCs, and the NDCs.

Irrigation water is generally obtained from water conservancies. A conservancy dam has headgates, which release water to the agricultural areas. Some conservancies have special flood control structures allowing for the release of wastewater directly into the sea. The D&I infrastructure in Guyana caters to approximately 592,545 acres of agricultural land, of which about 20% are under sugar cane cultivation and managed by Guyana Sugar Corporation

⁶ The latest maintenance cost was estimated at G\$510 million for 1995 by the Sea Defenses Project Executive Unit. See a memorandum prepared for the World Bank, “Maintenance Programme for Sea Defenses”, (November 1993). The G\$550 million is estimated by taking into account inflation from 1995 to 1996.

(GUYSUCO). An equal amount is under rice cultivation and the remaining area is devoted to cattle grazing and non-traditional crops such as root and tuber crops, fruits and vegetables.

The D&I system consists of an extensive network of drainage and irrigation canals, structures and access roads.⁸ The main irrigation canals flows into the secondary irrigation canals where flows are controlled by headgates. Farmers obtain water from the secondary irrigation canals by way of gravity flow through wooden gates. There are minor drains associated with the secondary canals and this empty directly into the sea through sluices or into facade drains that empty into the sea. Irrigation canals within sugar estates have no slope and no structures and are used to transport harvested sugarcane. There is also a network of access roads that runs through the farms along this D&I system.

The water delivery system is the same across all regions in the country. There are schedules providing information about the period during which the head regulators on the secondary canals will be opened so those farmers can access water as required. Just as in the case of sea defenses, the D&I infrastructure is also generally in a state of disrepair.⁹ The farmers do not get an adequate supply of irrigation water for the spring paddy crops sown in the month of December. The collection of the D&I rates has been poor for the following reasons.¹⁰ First, the low quality of services results in dissatisfaction among the farmers. Second, failure to enforce the provisions of law allows the delinquent farmers to go unpunished. Third, limited collection capacity (e.g., a lack of staff) on the part of the institutions is responsible for the D&I operations. Fourth, poor record keeping and information flows makes it difficult to assess the amount actually collected by the responsible institutions. As a consequently, a kind of a vicious cycle has been set in motion where

⁷ There are thirty-seven declared D&I areas under the D&I Board Act, Chapter 64.03.

⁸ The total length of the irrigation canals in Guyana is 272 miles of main canals and 687 miles of the secondary canals. Similarly, the main drainage infrastructure is about 315 miles in length while the secondary drainage system is about 927 miles in length. There is also a network of access roads that runs through the farms along this D&I system and is about 687 miles in length.

⁹ RDCs and NDCs spend large percentages of what they collect on D&I, but they collect very little and their expenditures are inadequate in absolute terms. Agrodev Canada Inc., "Guyana Agricultural Support Services Programme (ASSP)", GY-0011, final report prepared for the Ministry of Agriculture, Government of Guyana, (February 1996), P. 1-56.

¹⁰ The highest collection rate, slightly higher than 40%, has been in the MMA in Region 5.

resources cannot be raised because of poor services from these facilities and services cannot be improved because of lack of funds.

Land Tenure System

In order to address the issues of maintenance of the D&I system, the basics of the land tenure situation in Guyana should be understood. When Guyana became independent, the government received the territory's land divided into state lands (to be administered and leased by the government) and government lands (which may be owned absolutely and without conditions). The Department of Lands and Surveys (DLS) administers government and state leasehold lands. The functions of the DLS include cadastral surveying, land record management and rent collections. Since the DLS suffers from several administrative shortcomings, including a lack of funding, the integrity of the lands records system has been seriously compromised.

The legal leasing rates are currently about G\$7.5 to G\$12 per acre for lands with infrastructure and G\$2 per acre for lands without infrastructure. Lands are leased at this low rate to lessees based on the idea of making land cheap for development. As such, the rental rates are given in the legal code and can only be modified by parliament. The rates have neither been adjusted for inflation nor currency depreciation in the past. Land is commonly subleased to other farmers on the parallel market, with or without the approval of the government. The current average sub-lease price was quoted about G\$4,000 per acre per annum.¹¹ Land with good D&I works would receive a higher price and the prices move with the rice price. The cabinet has recently approved new rental rates for lessees in declared areas: the maximum rate will be G\$2,950 per acre and the minimum G\$100 per acre. Land rents in the undeclared areas will be about G\$1,500 per acre. These rates will only pertain to rice and sugar cane lands.

¹¹ This is obtained from a project undertaken in 1997 by the Ministry of Agriculture, the Guyana Land Administration Support Programms (GLASP). The project deals with the possibility of instituting a freehold tenure system and market-based rents.

Currently land rents are paid to the NDCs and the money is then transferred to the Consolidated Fund. In some cases, DLS has regional offices, which report to the RDCs and also help collect the land rents. It is estimated that only about 15% of lessees actually pay their rents.

In some cases the lessees do not have a legal lease, yet they are subleasing the land to others. Many lessees have to wait for years before the government renews their leases. Lease contracts have an average duration of 20 to 25 years and are not automatically renewable. Administratively, the system is very slow and it becomes difficult for farmers to lease lands from the government. In addition, the legal lessee pays all the land rents, D&I rates, and property taxes. He may pass these costs on to the sub-lessee. In terms of penalties, the DLS has the authority to cancel leases if rents are not paid, but it never exercises this power.

D&I Institutional Arrangement

The D&I expenditures are currently incurred by the RDCs on vested works in declared D&I areas, the NDCs on non-vested works in declared and undeclared areas. These expenditures are financed by an arrangement in which multiple levels of government collect and transfer rates among themselves. For example, the NDIB is legally empowered to assess and levy D&I rate in the declared areas. In practice, the NDIB neither collects nor receives any D&I rates, and it does not finance any operation and maintenance works.¹²

At present, tariffs in both declared and undeclared areas are levied, billed and collected by the NDCs as part of the assessment of the property tax, called “Rates and Taxes”. If there are no NDCs in an undeclared area, the RDCs can collect the tariffs. The only exception is Region 5 where the MMA is in charge of D&I activities.

¹² The current administrative arrangements are due to historical circumstances. In the late 1980s, there were five regional D&I boards in Guyana. At that time the regional boards had enlisted the NDCs to help collect their D&I rates for the declared areas. The NDCs were also collecting D&I rates for residential drainage in the undeclared areas, as well as collecting the property tax for health, education, etc. It seemed reasonable that the NDCs help the NDIB. In 1992, the NDIB organized itself, eliminating the regional branches. After this centralization, however, the NDIB did not develop its own capacity to collect the D&I rate, leaving collections to the NDCs or

In computing the D&I rates, the NDCs establish a budget estimate of the expenditures associated with the provision of all the services for which it has a responsibility. Included in the budgets are the costs associated with operation and maintenance of vested works in declared D&I areas which is the responsibility of the RDCs, the costs associated with operation and maintenance of non-vested works in declared D&I areas which is the responsibility of the NDCs, the costs associated with the operation of conservancies which is the responsibility of the Conservancy Boards, and the costs associated with the provision of the numerous services for which the NDC has responsibility, such as potable water, education and health. The NDC then establishes the ratio of its estimated budget to the assessed value of property within the NDC to determine the rate of tax to be applied. Having said that, the D&I rates are indeed calculated in an arbitrary manner. In certain areas, the rates varied significantly from year to year.

Collections of revenues were extremely low across regions, ranging from 20% to 40%. The information is in some cases not readily available because of the lack of organization that prevails within the regional accounting systems.¹³ The low collection rate implies an almost complete reliance on subvention from the national budget.

The collections for the “vested” land are supposed to finance the operation and maintenance of those works in the D&I areas. As such, NDCs must remit some percentage of the revenues collected to the RDC for the operation of vested works. The responsibility for the operation and maintenance of non-vested works rests with the NDC both in declared and undeclared D&I areas.¹⁴ The payment of D&I rates is further complicated by the fact that the central government owns a large percentage of the land. In a declared area, the government is required to pay the D&I rate. Those leasing government lands, on the other hand, pay an

the RDCs where there are no NDCs. The rates are set every few years and are based on budget needs and land valuations, which have not changed for many years.

¹³ For example, Region 3 could not supply information on either the budget or the collected revenues for 1994; Region 4 could supply budget information for 1994 but no information on budgeted nor collected revenues for 1995; Region 6 could not provide any type of information for 1994 or 1995.

¹⁴ There are lands that are under the control of GUYSUCO, which assumes responsibility for the operation and maintenance of its own system. There are also lands with D&I facilities which are entirely operated and maintained by large farmers.

annual land rental fee to the government. The central government also makes a subvention of about 10% of the annual operation and maintenance budget for D&I to the RDCs. The central government does not account separately for its rates and the subvention. The RDCs are therefore not sure of the amount of the actual subvention. Furthermore, the RDC does not keep these D&I fund in a separate account and thus there is a lack of accountability on the central government and the RDCs.

Given that the NDIB is legally responsible for the collection of D&I rates, yet does not have the administrative capacity to do so, it enlists the assistance of the RDCs and the NDCs. The RDCs, while not having any legal responsibility to collect the rates, are responsible for financing the operation and maintenance of D&I work. As such, they are interested in collecting the rates.¹⁵ The NDC, on the other hand, collects the rates and must remit some percentage of these collections to the RDC, because the latter provides the financing for the former to do operation and maintenance. Moreover, the activities of NDCs are monitored by the RDC, there is some incentive for the NDC to collect rates on behalf of the RDC.¹⁶ In sum, the legal structure in Guyana is not consonant with actual administrative practice.

III. Theoretical Framework and Considerations

The rehabilitation costs for sea defense and the D&I system for the next ten years are enormous, as much as the annual taxes revenue collections in the nation.¹⁷ Given the current fiscal and economic situation in the country, having the rehabilitation costs financed through the existing tax system may not be realistic and unsustainable, at least in the short term. To minimize additional capital expenditure requirements in the future, however, adequate maintenance of the facilities is necessary.

¹⁵ In some regions the RDCs have “contracted out” collections to the NDCs, which do not have any legal responsibility to collect D&I rates for the vested works. Subsequently, the RDC tried to cut the commission, to which the NDC’ response was that it would no longer collect for the RDC.

¹⁶ The RDC provides financing during the year on an on-going basis and collections are supposed to be paid at the beginning of the year, but in practice people are allowed to pay whenever they want. The penalties in interest charges are negligible and these are seldom enforced.

¹⁷ The rehabilitation costs for sea defenses are approximately G\$19.3 billion and for D&I system the costs are more than G\$2.5 billion. The total tax revenues are G\$27.7 billion.

As pointed out earlier, the World Bank and other international organizations called for a need for the government of Guyana to introduce a system of cost recovery to assist in the maintenance of sea defenses. On balance, the government of Guyana is better to secure external financing to restore the facilities of the entire hydraulic system while taking a full responsibility for operation and maintenance of the structures. This is based on the assertion that rehabilitation of the structure must be completed before the system is to function efficiently. Put it differently, without restoring the facilities the routine maintenance alone will not prevent the sea defense structure from deterioration nor improve significantly the efficiency of the D&I system. With these considerations, the following framework is developed.

The sea defenses and D&I systems in Guyana are closely related and interacted. The nature of their services is somewhat distinct. Sea defenses, by its very nature, will fall in the category of “public goods.” The areas that are situated inland (approximately 10% of population) may appear to have only the problem of flooding from watershed discharge but not the problem of flooding from the sea. Given the dependence of the inland upon the coast, Guyana would have ceased to exist in the present form if floods from sea were not prevented. Hence, recovery of the costs associated with sea defenses operation and maintenance should be the responsibility of the entire population, not just the 90% that occupy the coast. As a public good, it is not feasible to charge a user fee from the beneficiaries of the sea defense system.

The D&I services have elements of both private and public goods. Since water used for irrigation is clearly a private good, the direct beneficiaries should pay its full cost. Thus the costs of operation and maintenance of the primary or main irrigation canals and the secondary irrigation canals should be borne by the farmers whose lands lie in the area serviced by that particular system. The access roads are linked to the farms and the primary or the secondary canals catering to them. The services provided by them are, therefore, generally

assumed to be private goods.¹⁸ The cost recovery for these items should be based on the amount of water consumed for purposes of irrigation.

The conservancies do not serve the purpose of irrigation alone. They are also part of the flood control system. This should fall in the category of public goods and the expenses incurred on their operation and maintenance should, therefore, be a charge on the population in general rather than on specific farmers.

The drainage system consists of the main, the secondary and the tertiary drains. The primary drainage canals are part of the flood control system and they protect not only the farms but also the property of other residents in the region. They should be treated as a public good. However, the secondary and the tertiary drains should be considered a private good since the secondary drain links the farmland to the main drain while the tertiary drain is part of the farm system.

In terms of cost recovery, the assumption is that the irrigation system from the main and secondary canals principally benefits the agricultural sector, and thus should be collected from the landowners in the form of a user charge. On the other hand, the main system consisting of flood control services provided by conservancies and flood drainage channels should be a separate charge on the general population whose property is protected from floods caused by watershed discharge. This arrangement will ensure that the farmers do not pay for services rendered to the urban population and vice versa.

The separation of the total D&I maintenance costs into the private and public goods is important to this framework. In this study, the costs include operation and maintenance costs on main irrigation, secondary irrigation, farm access road, and administrative overhead. The tertiary system costs are excluded because the farmers have always been bearing the expenses associated with the operation and maintenance of these works as part of farm system.

¹⁸ There are some exceptions where the costs associated with access roads are considered as the public goods. Details can be found in the Technical Report prepared by the Caribbean Engineering and Management Consultants Limited (CEMCO).

Following the benefit principle, the D&I tariffs are to be assessed for each D&I area because of the differences in system designs and the differing density of structures. However, the tariffs may have to be kept uniform at the regional level at this stage for the sake of simplicity and political acceptability. In the long run, though, the tariffs should be set according to the costs in each area to ensure greater fairness, going into this level of complexity is not practical at the present time.

The administrative arrangements are also important in that the D&I charges should be collected from the users of these facilities -- private owners (free hold) and legal lessees -- because they are the real beneficiaries.¹⁹ In cases in which the land is illegally sub-leased, the legal lessee should still pay the D&I rates, since there will be no record of the sub-lessee.

For each of the total 37 D&I declared areas, we have estimated the operating and maintenance costs on the basis of the examination of official records, interviews with officials, and assessments of various facilities made during field visits in each region.²⁰ The annual estimates of operation and maintenance costs are based on the assumption that the rehabilitation of the D&I structures has been completed.²¹ In the interim, the government will have to continue with the current arrangement until the system is actually rehabilitated.

With the principle and assumptions indicated above, the cost estimates have been separated into the component of the expenses associated with the private good and the component associated with the public good. These are summarized in Table 1.²² The total annual operation and maintenance costs associated with the public good component of the

¹⁹ In cases in which the land is not leased by the government, then the government as the owner and user should pay the rates, as do the legal lessees.

²⁰ We only have information on the declared areas. As such, the D&I rates calculated in the report are for cultivated lands in declared areas only. Lands in undeclared areas do not receive the same services as those in the declared areas, and so cannot be charged the same rates.

²¹ The rehabilitation work must be done before realistic D&I rates can be charged because cost recovery will only work if the rates are pegged to the quality of the system (studies from other countries support this argument). Simply put, nobody will pay the rates if the rehabilitation is not done.

²² The costs presented in Table 1 are 6.5% higher than the original estimates provided by CEMCO in the technical report since the latter did not include the administrative costs.

flood control and other D&I works is estimated at approximately G\$288 million in 1996 prices and for the private good component, it is G\$314 million.

IV. Taxes Earmarked for the Public Goods

As explained earlier, sea defenses and the floor control portion of the D&I facilities are both considered as public goods. The operation and maintenance costs are estimated to amount to G\$838 million for 1996 on the assumption that the rehabilitation work is already completed. As a public good, the expense should be financed through some form of a general tax under the current system. The taxes being considered include property tax, trade tax, income tax and consumption tax. Each of these instruments is discussed in turn.

Property Tax

Guyana has had the property tax system in place for a long time. There are two kinds of property tax: the net property tax, administered by the Department of Inland Revenue; and “Rates and Taxes,” administered by the Neighborhood Democratic Councils (NDCs).

The former is levied on net property, which is determined by the amount of the total property owned by any person at the end of the year in excess of the total value of all debts owed by him at that time.²³ Property refers to all property movable and immovable, rights of any kind, and any money or investment. Thus, property should include land, house, motor car, furniture, jewelry, shares and securities, and deposits in financial institutions. The value of properties is adjusted upward by the cost of any improvements and additions since their acquisitions and adjusted downward for wear, tear and annual allowances. Debts refer to mortgage, overdraft, and other borrowings. The tax is currently imposed on the net worth based on the valuation of property assessed in 1991. In addition, there are multiple tax rates applied differently for individuals and companies.²⁴ Taxpayers find the calculation of this tax very cumbersome. Auditing this tax adequately by the government officers would not be easy either. Given the limited administrative capacity in Guyana, the compliance of this tax

²³ See, e.g., Inland Revenue Department, Guide to Property Tax.

²⁴ The property tax rates are progressive, depending upon the value of net property. For individuals, the property tax rates range from ½%, ¾%, 1% to 1 ½%. For companies, they are ½% and ¾%.

appeared very low. If this tax were to be the preferred option, the tax rate would have to be more than tripled in order to collect additional taxes to recoup the sea defenses and D&I maintenance expenditures.²⁵ Moreover, the tax rate has to be duly indexed to inflation unless the valuation of property can be assessed periodically to reflect the market value.

The second kind of the property tax is the property-based tax, sometimes referred to as “Rates and Taxes.”²⁶ There are differential tax rates applied on different categories of residential, commercial and industrial properties. It is currently administered by NDCs, which uses these taxes to finance D&I operation and maintenance as well as health and education services. This tax has some inherent advantages as well as some serious problems. The advantages include its ability to pay principle in the sense that the rich pay more while the poor pay less.

The problems associated with this tax are serious, at least for now. First, assessment would be difficult, as it requires the maintenance of an updated property cadastre. Second, the valuation of property is a difficult task, unless there is an active market for different types of properties. A well functioning system of registration of property sales is also a pre-requisite for this tax. These pre-requisites are not yet fulfilled in the case of Guyana. Third, collection may be facilitated when there is a direct linkage between the payment of tax and the benefits derived by the taxpayers. The ideal situation is the agency that should preferably be done by the local government where the property is located. Fourth, the property taxes are currently collected to provide a variety of services including potable water and education. If sea defenses and D&I facilities were one of the many services supported by the property tax revenues, this would add another dimension of confusion to the rationale of using this option.

With the kinds of problems associated with the current central and local property taxes, a modified option can be to replace the current central property tax, levied on the net worth of an individual or a company, by a new central property tax imposed on land and other

²⁵ The actual collections in 1995 amounted to G\$410 million. Several prominent businessmen had pointed to the research team that they didn’t even know the existence of this property tax.

immovable property. The tax, based on the market valuation of the property, should be applied nationally and administered by the Department of Inland Revenue so that no level of regional government will have any responsibility. To seriously consider this option, the government would first have to establish a taskforce to assess property values nationwide. The valuation problem and administrative costs of this option may be too large at the present time as compared to other options, at least in the short-term.

Trade Taxes

Guyana has both an export tax and customs duties. The export tax, which is only applied to rice and sugar, has the advantage of covering the agricultural sector well. However, the export tax may ultimately have to be phased out as it is linked to the preferential treatment accorded to the Guyanese exporters in the European rice markets which may not continue beyond year 2000.

An increase in import duties in the form of a sea defense or floor control levy has the impact of increasing the prices of both consumer and capital goods. The import duty on consumer goods is more or less a general kind of tax because of the wide consumption of imported goods in the country. The import duty on capital goods would increase the costs of domestically produced goods. The advantage is that with an expanding economy, imports are expected to increase and this should provide a stable source of revenues.²⁷

The problem with this alternative is that it will be a somewhat retrograde step. For example, the government of Guyana was committed to the new Common External Tariff

²⁶ See, e.g., the Ministry of Agriculture, the Planning Division, "A Cost Recovery Study for the Sea Defenses in Guyana", (November 1993).

²⁷ The merchandise imports were G\$34,275 million in 1991, G\$44,065 million in 1992, G\$61,351 million in 1993 and G\$62,723 million in 1994. This shows an average annual growth rate of 23.34% in nominal dollars (approximately 14.03% in real terms) over the period 1991-94. Exports, on the other hand, have exhibited a growth rate of 26.97% per annum in the same period. See Bureau of Statistics, Guyana Statistical Bulletin, (March 1995).

arrangement within the overall CARICOM agreement. As a result, many import duty rates have to be decreased substantially.²⁸

By its very nature, this tax is easy to administer. It may be acceptable from equity considerations, as the rich are likely to consume more of imported goods than the poor are. If import duties were to be used as a preferred option, a sea defense levy would increase all the current import duty rates by 19.0%.²⁹ However, the scheduled reduction of tariff rates from the overall CARICOM agreement plus the global trade liberalization will offset the real increase in dutiable imports, thereby reducing the collections of import duties in the future. As a consequence, the new import duty rates earmarked for sea defenses and flood control have to be adjusted upwards periodically running against the overall trade liberalization.

Income Tax

This option is to impose a surcharge specified over and above the general income tax on both personal and corporate incomes and to earmark it for sea defenses and D&I maintenance costs. At present, the corporate income tax is levied on profits at 35% for manufacturing companies and 45% for non-manufacturing companies. The personal income tax applies to income in excess of G\$180,000 at 33 1/3%. The self-employed are taxed on their net income at 33 1/3%. Withholding tax is imposed on interest income at 15%.

The performance of personal and corporate income taxes has been reasonably satisfactory in recent years.³⁰ If this tax were to be a preferred option, the rates of all income

²⁸ As of January 1, 1994, the government of Guyana had already started to implement a scheme of tariff reduction. Import duties were reduced in phases through the end of 1997. The rates applied to intermediate inputs were reduced from 30% to 15% by the end of this period. Similarly, primary inputs and capital goods had rates reduced from 30% to 10%. On other items, tariffs had reduced to the level of 5%.

²⁹ The calculation of this rate is based on two factors: the 1995 import duty figures -- G\$3,402.2 million -- and the 30% annual growth rate of dutiable imports in 1996. The 30% figure is the annual growth rate in nominal dollars over the past three years. With this assumption, a 19.0% increase on the current import duty rates would yield slightly more than G\$838 million. Therefore, a current tariff rate of 20% would have to be moved to 23.80%. See Bank of Guyana, Research Department, *Statistical Bulletin*, (December 1995).

³⁰ For example, revenues from general taxes in 1994 were G\$22.2 billion, which rose to G\$27.7 billion in 1995. This amounts to an increase of 8.0% in real terms. The revenues from personal and corporate income taxes increased from G\$7.99 billion in year 1994 to G\$10.71 billion in 1995, showing a real growth rate of 16.1% in 1995. This figure was calculated first from the nominal growth rate of 24.8% and then deflated by consumer

taxes, including personal and business, earmarked for sea defenses would have to be proportionally increased by almost 6.4% in order to garner revenues to the order of G\$838 million.³¹ This is based on the same growth rate of income tax revenues as in the past three years.

Although the recent performance of personal and corporate income tax revenues has been encouraging, one needs to bear in mind that the tax base is quite narrow and evasion of taxes is rife. Second, the share of the total income taxes collected from corporations is about 60%, which is much higher than those prevailing in developed countries. An increase in corporate income tax rates may hinder investment and economic growth.

Consumption Tax

The consumption tax in Guyana is imposed on domestic manufacturers' sales prices or duty-paid value of imported goods. It was introduced in 1969 and has been amended several times since 1992. The system is moving towards a pure consumption tax as machinery, equipment and materials used in manufacturing, forestry, mining, agriculture and construction are exempt as of March 1, 1995. The tax is now less regressive since it has been extended to include services such as hotel and telecommunications effective March 1, 1995.

The consumption tax currently accounts for approximately 35 percent of the tax revenues and it has the broadest tax base in the country. This tax has problems of multiple rates and specific exemptions. It is, nevertheless, considered as one of the important sources of the government revenues and is expected to remain so in the future. Collections from this tax have risen from G\$7.7 billion in 1994 to G\$ 9.7 billion in 1995, an increase of 9.1% in real terms. Although this growth rate is lower than that of income taxes over the same period, the overall performance of the consumption tax was better over the past three years.

price index of 15.5%. See Bank of Guyana, Research Department, Guyana Statistical Bulletin, (December 1995); Bank of Guyana, Research Department, Statistical Bulletin, (special quest, August 1996).

³¹ The annual growth rate of the total personal and corporate income tax revenues over the past three years was about 22.9% in nominal dollars. Assuming that the same growth rate occurs in 1996, a 4.2% increase of the current income tax rates would bring G\$550 million in 1996. For example, the current personal income tax rate of 33 1/3% would have to be moved to 34.7%. See also the table in Appendix A.

The use of this tax to recover the operation and maintenance costs of sea defenses and flood control is an attractive proposition. If this tax were used, assuming the same growth rate of consumption tax revenues as in the past three years, the current consumption tax rates earmarked for the maintenance of sea defenses and D&I facilities would need to be raised by 6.7%. This option would have marginal administrative and compliance costs as the government can simply adjust each of the consumption tax rates upward by 6.7%. Moreover, the revenues collected from this option would be stable as consumption generally goes up over time and the collections will keep up with the sea defense and D&I maintenance costs.³²

Overall Assessment

Four alternative tax options have been examined. First, a central property tax based on the current market value of immovable property may be an attractive option from a theoretical perspective. However, having the government to set up a commission or taskforce to assess the property of each individual and company across the nation is a major undertaking and may take years to materialize. Second, the option of trade taxes appears inconsistent with the CARICOM agreement and the world trend of trade liberalization. Third, the income tax option may be equitable because higher income groups should be paying the bulk of charges. However, the personal and corporate income taxes currently have a narrow tax base and high tax rates. There is also an abundance of exemptions and remissions that make the tax system complex and ultimately reduce the revenue collections. A lack of integrated income tax system also results in double taxation, adversely affecting investment and economic growth. Finally, the consumption tax appears to be the best candidate. It would increase the existing consumption tax rates by approximately 6.7% earmarked for sea defenses and D&I expenditures. Since March 1995, this tax has been extended to certain services and is considered to have the broadest tax base in Guyana. It can provide a relatively stable source of revenues to finance sea defenses as compared to other options. Also, both capital goods and materials for production are exempt from this tax and therefore it does not hinder

³² If this option were accepted, tax policy analysts would have to re-assess the proposed rate if the consumption tax base changes. For example, exempting more items from the current consumption tax will reduce the base and

economic growth. This option would be simple to comply, as the special charge will simply piggyback on the existing consumption tax.

As the sea defenses and D&I facilities are so vital to the survival of the nation, the operation and maintenance costs should be classified as “statutory expenditures”. To ensure that additional resources are made available to the government, this special levy should be imposed on top of the existing consumption tax rates and collected by Inland Revenue Department.

V. Charges for the Private Goods

At present, the D&I rate collections tend to be better where the RDC assumes a more active role in the management of the system and where some autonomous body is responsible for tariff setting and revenue collection.³³ This phenomenon is quite consistent with the general principle to be followed toward a sustainable development in Guyana. In this section, we first estimate the D&I rate to be charged to farmers and then examine the extent to which farmers are able to afford the rates for the services they receive.

Tariff Rates

The total costs associated with the private good component of the D&I system was estimated at G\$314 million per annum for the nation as a whole. To derive the tariff rate per acre on a regional basis, one can divide the total private cost by the acreage units of the declared cultivated area for each region. The reason of taking the cultivated area alone is because only those who are farming are benefiting from the use of the irrigation system. The results are presented in Table 3.

The unit cost represents the benefit received by farmers per acre and, therefore, should be the amount charged to all farmers for water consumed for purposes of irrigation. This implies that farmers who grow crops other than rice should pay the same D&I rate, otherwise

thus necessitate a higher tax rate to produce the same amount of revenues and vice versa. The above recommended rate, 6.7% was based on the 1996 tax system.

³³ For example, the 1995 collection ratios were comparatively high at 24.5% in Region 2 and 40.8% in Region 5.

resources would have not been properly utilized. Table 3 shows the variation in the estimates of costs among the regions, ranging from G\$921 per acre in Region 4 to G\$3,222 per acre in Region 6. The reason for a unique and substantially higher operation and maintenance cost in Region 6 is that it lacks a conservancy and, as a result, additional costs on the purchase of diesel fuel and engine required for pumping water from the Canje River into primary canals have to be incurred.

At present, a number of different taxes and duties are paid in the agricultural sector. Farmers pay a small amount of land rents to DLS, some D&I rates to NDC, and some consumption tax on agricultural inputs. Thus, the government collects a meager amount of revenues from the farming sector while its obligation for operation and maintenance of sea defenses and D&I system entail large sums of money. This situation would change for the better if farmers are expected to pay a substantial amount of land rents and D&I rates, which would definitely improve the financial situation of the government.

Financial Viability of Rice Farming

To examine the extent to which farmers in Guyana can afford to pay the rate per acre for the private good component of the D&I services, we need additional information about the cost of paddy production and the price of paddy farmers can expect to receive.

We mainly survey the production costs of small farmers since they account for the majority of farmers in Guyana. A telephone interview is also conducted with a few large farmers. In fact, the principal difference in production cost between large and small farmers is whether or not they own machinery and equipment. Small farmers tend to rent machinery and equipment while large farmers own machinery and equipment.

Small farmers interviewed are all located in Regions 2 and 5 and all of them have farm sizes of approximately 20 acres. We also discuss the issue with the representatives of the International Fund for Agriculture Development project in Region 3, the Research Scientist at Burma in Region 5, and representatives of the National Agricultural Research Institute. From

the survey, we believe that the production costs presented here are fairly representative for small farmers in the respective regions. In fact, the cost of paddy production per acre for small farmers does not differ significantly from region to region. This is due to the fact that the cost of labor and other major inputs such as seed paddy, urea, TSP, fastac and monocrotophos are virtually all the same across regions.

Machinery and equipment rental is the main business input but rental rates tend to be uniform across a given region. However, these costs are the highest in Region 5 and the lowest in Region 2. Thus, it is reasonable to assume that the cost of production in the other regions fall somewhere between the floor provided by the Region 2 costs and the ceiling provided by the Region 5 costs. Table 4 shows that, based on the 1996 Autumn crop, the total farm level cost per acre of rice paddy turns out to be G\$30,994 in Region 2 and G\$29,092 in Region 5 with the assumptions that farmers did not pay D&I rates and only pay G\$12 of annual land rents. Given the average observed yields of 30 and 24 bags per acre in Regions 2 and 5, the cost of production on a per bag basis works out to G\$1,033 and G\$1,212 for regions 2 and 5, respectively, which represents a 17% difference in terms of unit cost of rice paddy production between these two regions.

In addition to production yield, the rate of return on farming rice also depends upon the price of paddy, which will not be determined until the price of rice is finally settled in terms of signed export contracts. The price of paddy is, in turn, determined by the types of grade of paddy produced. With the information received from the Guyana Rice Development Board (GRDB), we derived the weighted average price of paddy actually sold in 1996 by farmers in each region: G\$1,535 per bag (140 lbs.) in Region 2 and G\$1,497 per bag in Region 5.³⁴ The results indicate that small farmers in Region 2 are likely to earn gross profits of G\$502 per bag and a rate of return on investment at 48.6% from the 1996 Autumn crop.³⁵ Table 5 also

³⁴ Regions 2 and 3 produce 80% of paddy rice in Grade A, 10% each in Grades B and C. Regions 4 and 5 produce 40% each in Grades A and B and 10% each in Grades C and D. The actual price of paddy sold in 1996 is G\$1,550 for Grade A, G\$1,500 for Grade B, G\$1,450 for Grade C, and G\$1,325 for Grade D.

³⁵ The rates of return discussed in this section are calculated on yearly basis and thus the figures are only indicative. Furthermore, many farmers may have not received payment within six weeks by millers after handing the paddy over to the miller. This will also affect the rate of return to farmers.

presents the results if farmers have to pay different rates of levy for the use of irrigation water and annual land rents. For example, if farmers in Region 2 were to pay annual D&I rates of G\$1,088 per acre and annual land rents of G\$2,000 per acre, their rate of return would be reduced from 48.6% to 41.2%.

Farmers in Region 5 are expected to earn a lower rate of return because of their lower yield of 24 bags instead of 30 bags per acre. Nevertheless, they still earn a very high rate of return of 23.5%. Their rate of return would decline to 16.6% if farmers were to pay annual D&I rates of G\$1,212 as suggested in the previous section as well as annual land rents of G\$2,000. Of course, farmers who are currently paying annual D&I rates of G\$3,500 would be better off given that the proposed levy is much lower than the actual levy in this region.

The production costs of rice paddy are not significantly different between the autumn and the spring crops. However, the annual rate of return on farming will be influenced by different paddy yields between the two crops as well as paddy price. The yields between the autumn and spring crops in 1996 are not significantly different. However, for the spring crop in 1997, the paddy price for grade A was about G\$1,350 per bag which is substantially lower than the price in autumn 1996. As a result, Table 6 shows that, other factors being equal, the rates of return would have dropped by more than half in Region 2 depending on annual D&I rates and land rents. For Region 5, the rates of return would become negative if the proposed D&I rates and annual land rents were charged. The situation would become even worse if the price of paddy for grade A were reduced to G\$1,000 per bag. Farmers in both Regions 2 and 5 would have negative returns.

Large farmers, instead of renting, own tractors and combine harvesters. With economies of scale, Table 7 shows that their paddy production cost is about G\$958 per acre, which is lower than that of smaller farmers by 7 percent. As a consequence, the rate of return to larger farmers will be greater than small farmers. As such, they should be certainly able to pay the proposed D&I rate.

All this seems to suggest that at either the 1996 autumn or 1997 Spring price of rice, farmers are getting a positive return with the proposed payment of D&I tariffs. This price may be relatively low and it is likely that it will return to its historical levels.³⁶ In addition, improvements in the D&I infrastructure will likely increase productivity, thus making rice farming more profitable. Finally, it may also be pointed out that large farmers have an advantage over small farmers due to economies of scale.

VI. Alternative Institutional Arrangement

The choices of an appropriate implementing agency and a basis for imposing D&I rate are equally important for a successful policy adopted in an underdeveloped country.

Basis for Imposition of Tariff

The above D&I rates are estimated on per acre basis. There are three alternative bases to assess these rates: area of land, number of waterings, and volume of water consumed. Volume may be the most efficient basis as it encourages economy in water use. It is, however, difficult to employ in Guyana because of the heavy investment required in installing and maintaining a metering system. The next best alternative is the number of waterings as this also encourages economy in use of water. The government would need a survey staff to keep records of the number of waterings used by the farmers. This is an accepted practice in several countries where the irrigation system consists of canals. There is land revenue staff that conducts a plot to plot survey twice a year. The survey not only provides a record of mode and number of irrigation in a year, but it also collects a good deal of statistics related to agricultural production. Presently, Guyana does not have this kind of field staff and therefore this may turn out to be a costly proposition. We are thus left with the option, at least in the short-term, of using area as the basis for levying irrigation charges because of its simplicity and practicality. This is the method currently used in the country and would be easily acceptable to the farmers.

³⁶ During the past five years, the price of paddy has been in the range of G\$1,000 to G\$1,712 per 140 lbs

The area may be found with the help of the lease records maintained by the office of the DLS. It will, however, be necessary to keep the land records updated, incorporating all the transfers of land whether through sales or inheritance. The maintenance of a record of rights or an updated cadastre becomes crucial for operating this system.

Choice of Appropriate Agency

The issue of appropriate agency is more complex. The most suitable agency for assessment and collection of dues will be the one that provides the services and maintains the system. Under the new set up, the NDIB at the national level should be the agency for coordinating all the tasks. Its regional units are to be established in due course. It will take some time before the new system is fully in place and becomes effective.

We recommend that the NDIB should continue to use the RDCs and NDCs to collect D&I rate in the short run. The commission paid by the RDCs to the NDCs for collecting the rates needs to be rationalized. The range of 20% to 35% of D&I collections as commission is much too high, considering that most tax administrations in developing countries have administrative costs of less than 5% of revenues collected. The RDC should try to set a commission rate between 5% and 10%. The problem of the high commission being paid to the NDC highlights the need for an early strengthening of the NDIB. Once the NDIB is reorganized and has greater administrative capacity at the regional level, it will be able to collect the rates much more efficiently.³⁷

A reorganized NDIB will be able to improve collection rates, especially given support from other programs. Steps are underway with the Guyana Land Administration Support Programme to develop a cadastre of land and owners, but it is expected to take about five years. In addition, the NDIB must be given legal powers to impose higher interest penalties and develop better enforcement capabilities to increase compliance. One option is to grant the NDIB the concurrent power to cancel government leases, in conjunction with the DLS, which currently holds such power.

In terms of operation and maintenance, it may be more realistic in the long run to let the NDIB focus on developing the capability to bill and collect D&I rates, and use the private sector for performing operation and maintenance works. In the interim period, however, the optimal arrangement may be to assign the work of operation and maintenance in each region to the agency that is currently doing this work. One practical approach could be to treat the agency that is most effective in the region as the regional unit of the NDIB and bestow the necessary legal and administrative powers upon it to enable it to coordinate the entire work of operation and maintenance in the area. This regional agency will, of course, remain responsible to the NDIB.³⁸

To make this regional agency effective, one can provide the agency with the power of cancellation of the lease of the defaulting farmers. This will ensure better collection of the irrigation dues. It may not be feasible to bestow identical powers on all the regional agencies, but it is important to link regular payment of dues to continuation of the lease. In fact, several other steps may be taken before the ultimate cancellation of lease, such as sale of crops and other movable property. It will be necessary to make adequate legal provisions for this purpose.

The power of cancellation of lease is currently exercised locally by a representative of the DLS. It may also be placed at the disposal of the regional agency that is chosen to act as the regional unit of the NDIB. Another option could be to give the agency the power to recommend cancellation of lease to the DLS, which may then proceed against the defaulter. The problem is that the DLS has neither the staff nor the funds to perform its current responsibilities, let alone take up new ones.

³⁷ The NDIB will be able to earmark its funds for the operation and maintenance of D&I, whereas presently the D&I revenues are lost in the general pool of the property tax, Rates and Taxes.

³⁸ This is one of the recommendations of the Whitaker report on "Agricultural Policy Reform in Guyana: The Flood Control, Irrigation and Drainage Subsector", report prepared for the Inter-American Development Bank", (June 1994).

For a greater participation of farmers in the management of irrigation water in Guyana, the Water Users Associations are encouraged to assume the responsibility for maintenance of the irrigation system at the local levels. While this idea may be conceptually sound, the role of the Associations in the D&I system will have to be reassessed at a later date.

VII. Concluding Remarks

This paper has developed alternative approaches and institutional arrangement to address the fundamental problems associated with inadequate provision of irrigation water to farmers in Guyana. The sea defenses structure has been deteriorated for years and so does the drainage and irrigation facility. The maintenance of these facilities has also been inadequate and thus the country's infrastructure has continued to deteriorate. As a result, sufficient D&I rates cannot be raised because of poor irrigation and drainage services from these facilities and services cannot be improved because of lack of funds.

To prevent this situation from getting worse, international financial institutions have argued that prior to accessing further external funds, the people of Guyana have to pay for sea defense and D&I services rendered to them. However, the costs for rehabilitation of the hydraulic system are enormous. It may be impossible, at this stage, to ask the country to pay for rehabilitation and maintenance costs. It would be better to have the government of Guyana secure external financing to restore the sea defense and the D&I facilities. In the meantime, people and the government of Guyana should be responsible for operation and maintenance of these facilities so that the entire hydraulic system can operate in an efficient manner.

Estimates of the annual maintenance costs for sea defenses and the public good component of the D&I system would amount to G\$838 million in 1996 dollars. Given the fact that sea defenses are a public good and the D&I facilities are also sufficiently important so that the public good component of the maintenance costs can be classified as "statutory expenditures". These expenditures should be financed through the general tax system. We argue that the consumption tax should be the most suitable candidate because of its broad tax

base and economic efficiency as a result of the recent removal of the tax on capital and materials for production.

For the private good component of the maintenance cost in the D&I system, the services should be subjected to user charges. The tariff rates vary among regions, ranging from G\$921 per acre in Region 4 to G\$3,222 per acre in Region 6. To answer the question of affordability of the tariff by farmers, we have conducted a survey of farmers regarding their costs of rice production. With the 1996 autumn and 1997 spring prices of paddy, we find that farmers in Guyana should be able to pay the amount as suggested in this paper. There is no question that the rates of return to farming depend very much upon the world price of rice and the price of paddy. To be sustainable, a paddy farmer must contribute the full recovery of the costs associated with the operation, maintenance, and administration of the D&I systems.

We also recommend that the irrigation charges should be levied based on the area of land. As regards the most appropriate agency to collect D&I tariffs, it is best to have the assessment and collection of tariffs undertaken by the agency responsible for providing the services. This implies that neither the RDCs nor the NDCs should be responsible for these activities. In the long run, it should be the NDIB, through its regional offices, which are to be established in due course, that should have responsibility for these tasks.

The establishment of the regional NDIB offices, however, will take some time. In the interim period, a second best solution might be to assign the responsibility of D&I rate assessment and collection to the agency that is currently performing operation and maintenance in a particular area, and to treat that agency as a regional unit of the NDIB for this purpose. As such, that agency would have to be vested with the necessary legal and administrative powers to execute the tasks involved. For a greater participation of farmers in the management of irrigation water in Guyana, the Water Users Associations may be encouraged to assume the responsibility for maintenance of the irrigation system at the local levels. The NDIB, nevertheless, is still the agency for coordinating all tasks at the national level.

Table 1
The Public versus Private Component of Operation and Maintenance Costs
(millions of G dollars)

Region	Declared D&I Area	Public Good Component	Private Good Component	Total Cost
2	Tapakuma Conservancy	0.65	7.79	8.44
	Johanna Cecilia/Annandale	5.08	5.72	10.80
	Tapakuma (General)	9.60	5.91	15.51
	Tapakuma (Special)	17.50	11.48	28.98
	Somerset and Berks/Cozier	7.64	4.32	11.96
	Maria's Lodge/Supenaam	8.88	8.32	17.20
	Total	49.31	43.54	92.88
3	Canals Polder	5.17	7.73	12.90
	North Klein/Pouyderoyen	1.07	1.50	2.57
	Vreed-en-Hoop/La Jalousie	2.50	5.22	7.72
	Potosi/Kamuni	4.15	1.14	5.29
	La Retraite	0.66	4.95	5.61
	Den Amstel/Fellowship	1.69	0.94	2.63
	Vergenoegen/Greenwich Park	2.94	3.74	4.55
	Kent Dam, Settlement	0.52	1.29	1.81
	Vergenoegen/Bonasika	3.59	4.00	7.59
	Total	22.29	30.51	52.80
4	Good Success/Craig	1.50	1.18	2.68
	Garden of Eden	1.26	1.74	2.99
	Plaisance	0.55	0.13	0.68
	B/V/Triumph	8.64	0.00	8.64
	Buxton/Friendship	10.10	1.71	11.81
	Golden Grove/Victoria	7.03	0.05	7.08
	Ann's Grove	2.97	0.00	2.97
	Mahaica	0.44	0.00	0.44
	Helena	2.41	0.00	2.41
	Cane Grove	13.06	5.23	18.29
	Total	47.95	10.04	57.99
5	Abary/Berbice	62.47	61.59	124.06
	Mahaicony/Abary	14.69	14.16	28.85
	Park/Abary	1.87	0.00	1.87
	Total	79.03	75.75	154.79
6	Block III	3.16	11.87	15.04
	Crabwood Creek	1.20	0.11	1.31
	Sisters	0.33	0.05	0.38
	Lots 1-25	0.66	0.19	0.85
	Fryish	0.70	0.02	0.72
	Gibraltar/Courtland	0.94	0.04	0.98
	Rosew Hall	6.54	1.20	7.74
	Whim/Bloomfield	1.87	1.30	3.17
	Lancaster/Manchester	1.98	1.50	3.45
	Ulverston/Salton	1.51	0.10	1.61
	Limlair/Kildonan	1.82	0.10	1.92
	Black Bush Polder	66.22	137.31	203.53
	Manarabisi Cattle Pasture	2.65	0.17	2.82
	Total	89.60	153.94	243.53
	Grand Total	288.21	313.78	601.99

Source: The Technical Report prepared by CEMCO (October 1996).

Table 2
Tax and Non-Tax Revenues of the Central Government
(millions of G dollars)

	1992	1993	1994	1995
Income Taxes				
Companies	4,347.3	4,539.3	4,503.2	6,123.3
Self-Employed	79.1	131.0	293.3	392.5
Personal	1,378.5	2,183.4	3,192.8	4,199.1
Others	62.6	211.8	73.0	124.7
Total	5,867.5	7,066.4	8,062.3	10,839.6
Property Taxes				
Property Taxes	97.8	242.0	348.6	410.5
Estate	12.1	15.9	17.2	17.3
Total	109.9	257.9	365.8	427.8
Taxes on Prod. & Cons.				
Excise Duty	146.0	168.4	53.7	15.2
Consumption Tax	4,469.6	6,147.6	7,746.8	9,703.2
Total	4,615.6	6,316.0	7,800.5	9,718.4
Taxes on International Trade				
Import Duty	1,620.1	2,689.3	2,847.5	2,402.2
Export Duty	152.8	152.2	180.9	140.2
Travel Tax	284.4	424.8	429.1	575.0
Total	2,057.3	3,266.3	3,457.5	4,117.4
Other Tax Revenues*	4,400.9	4,469.9	2,527.0	2,562.3
Total Tax Revenues	17,051.2	21,376.5	22,213.1	27,665.5
Non-Tax Revenues	718.5	1,035.5	1,596.0	1,468.6
Total Tax & Non-Tax Revenues	17,769.7	22,412.0	23,809.1	29,134.1

Sources: Bank of Guyana, Research Department, Statistical Bulletin, (Preliminary 1996).

Notes: *Other taxes: The purchase tax is currently applied to motor vehicles at 10% if vehicles are under 1,500cc, 30% under 2,000cc, 70% under 3,000cc, and 100% for 3,000cc+. Entertainment tax is levied on the price of a ticket for cinema and other shows. An environmental tax of G\$10 is levied on each unit of non-returnable containers of alcoholic and non-alcoholic beverages, effective March 1, 1995. A levy is also imposed on exported sugar and the tax rate can be negotiated between the government and GUYSUCO. License fees are applied to vehicles, televisions and transmitting stations.

Table 3
The Unit Private Good Component of Operation and Maintenance Costs
in the Drainage and Irrigation System
(G dollars)

Region	Total Costs (G\$m)	Cultivated Areas for			Total	Unit Cost (G\$/acre)
		Rice	Sugar	Others		
2	43.54	35,000	-	5,000	40,000	1,088.50
3	30.51	14,054	2,300	10,000	26,354	1,157.70
4	10.04	4,700	1,200	5,000	10,900	921.10
5	75.75	56,503	0	3,500	60,003	1,262.44
6	153.94	39,577	2,200	6,000	47,777	3,222.05
Aggregate	313.78	149,834	5,700	29,500	185,034	1,695.80

Sources: The cultivated areas were estimated based on interviews conducted by CEMCO. The Ministry of Agriculture provided guidelines in the way of percentage estimates. A more exact estimate will be made by GLASP using aerial surveys in a few years.

Table 4
Small Farmer Rice Paddy Production Cost in Regions 2 and 5 in 1996
(G\$ Per Acre)

Activity Category	Unit of Measure	No. of Units (per acre)		Unit Cost (\$G)		Total Cost (\$G)	
		Region 2	Region 5	Region 2	Region 5	Region 2	Region 5
Labor						4,625	4,565
Organize equipment	Days	0.40	0.40	1000	1000	400	400
Purchase/Prepare Seed	Days	0.10	0.10	1000	1000	100	100
Sow seed	Days	0.33	0.33	1500	1500	500	500
Purchase Chemical/Fertilizer	Days	0.10	0.10	1000	1000	100	100
Fertilizer Application	Days	0.25	0.25	1500	1500	375	375
Weeding & Cleaning	Days	0.75	0.75	1000	1000	750	750
Roughing	Days	0.50	0.50	1000	1000	500	500
Supervision ¹	Days	0.80	0.80	2000	2000	1,600	1,600
Harvesting ²	Bags	30.00	24.00	10	10	300	240
Inputs						12,930	11,753
Seed Paddy	Bags	1.00	1.00	3000	3000	3,000	3,000
Urea	Bags	1.00	1.00	2675	2675	2,675	2,675
TSP	Bags	1.00	1.00	2780	2780	2,780	2,780
Fastac ³	Applications	1.00	1.00	375	375	375	375
Monocrotophos ⁴	Applications	2.00	2.00	468.9	468.9	938	938
2-4D ⁵	Applications	N/A	1.00	N/A	445.63	N/A	446
Fugi 1 ⁵	Applications	1.00	0.00	1237.5	N/A	1,238	N/A
Empty bags (1 for 3 crops) ⁶	Bags	30.00	24.00	60	60	1,800	1,440
Twine ⁷	Lbs	30.00	24.00	4.17	4.17	125	100
Machinery/hired Services						9,700	9,480
Ploughing ⁸							
First Cut	Acre	1.00	1.00	1300	1500	1,300	1,500
Second Cut	Acre	1.00	1.00	1300	1400	1,300	1,400
Third Cut	Acre	1.00	1.00	1300	1300	1,300	1,300
Backblading	Acre	1.00	N/A	1050	N/A	1,050	N/A
Harrowing/Leveling	Acre	1.00	1.00	1000	1200	1,000	1,200
Harvesting	Bags	30.00	24.00	125	170	3,750	4,080
Transportation						2,020	1,680
Seed delivery to Farmer's H.	Bags	1.00	1.00	50	60	50	60
Seed from House to Field	Bags	1.00	1.00	50	60	50	60
Fertilizer Delivery to Farmer ⁷	Bags	1.00	1.00	60	60	60	60
Fertilizer from House to Field	Bags	1.00	1.00	60	60	60	60
Paddy from Field to Mill	Bags	30.00	24.00	60	60	1,800	1,440
Land ⁹						6	6
D&I Rates	Acre	0.50	0.50	0	0	0	0
Land Rent	Acre	0.50	0.50	12	12	6	6
Summation of all Costs						29,281	27,485
Interest Charges							
(60% Financing, 6mth, 19.5% pa)						1,713	1,608
Total Farm Costs (per acre)						30,994	29,092
Total Farm Costs (per bag)						1,033	1,212

Notes:

1. Supervision refers to visits to the field (at least 3 times per week) to observe crop progress and other development. Usually, the farmer himself undertakes these visits and he has to be a skilled person. The labor cost is G\$2,000 per day. For 1 visit per week and for 16 weeks (the crop is reaped within 110-112 days of sowing) dealing with a 20-acre plot, it takes 0.80 unit of labor per acre.
2. A rented harvester comes with an operator and one other individual. However, the farmer must provide labors to bag the paddy harvested. Two laborers are needed (because combine empties its tank into a reservoir and 2 workers bag and tie from the reservoir, which they empty before the combine returns). These two workers tend to do at least 300 bags per day. The cost is best measured on a bag rather than a day basis, and then related to acreage. That is, $G\$1,500 \times 2 / 300 = G\10.00 per bag.
3. Fastac is an insecticide used for early season weeds. It is sold at G\$3,300 per litre (i.e., G\$1,875 per pint) and is applied at a rate of 0.20 pints per acre.
4. Monocrotophos is seen in Guyana as the best chemical for treating Paddy Bags. It is sold at G\$1,654 per litre (or G\$937.8 per pint). It is administered at a rate of 0.5 pints per acre. Usually there are two applications.
5. 2-4D is sold at G\$3,565 per gallon and applied at a rate of 1 pint per acre in Region 5. In Region 2, Fugi 1 is used instead of 2-4D as a fungicide that is levied against blast. Its application is usually only required during the autumn crop. It is sold at G\$13,200 per gallon and applied at a rate of 0.75 pints per acre.
6. Empty bags are sold at G\$180 per bag.
7. Twine is sold at G\$250.00 per pound. One pound of twine does approximately 60 bags.
8. The general practice of those who rent land preparation machinery in Region 5 is to charge a block figure for the three cuts plus harrowing and leveling. These individuals start with G\$1,500 for the first cut, and deduct G\$100 for each subsequent cut.
9. Most farmers never pay D&I rate. However, more farmers pay D&I rate in the MMA/ADA scheme than elsewhere in the country. In this table, farmers are assumed to pay nothing on D&I rate. In the analysis of farmers' financial viability, we simulate the results if farmers would have paid some D&I rates. A similar analysis is undertaken and presented in the text if farmers would have paid much higher land rent.

Table 5
 The Rates of Return to Small Farmers for the 1996 Autumn Crop
 with Alternative Annual D&I Rates and Land Rents Charged

	Annual D&I Rates Charged	Annual Land Rents Charged					
		12	1,000	2,000	3,000	4,000	5,000
Gross Profits (G\$per acre)							
Region 2	0	501.9	484.4	466.8	449.1	431.5	413.9
	1,000	484.2	466.8	449.1	431.5	413.9	396.2
	1,088	482.7	465.2	447.6	430.0	412.3	394.7
	1,500	475.4	458.0	440.3	422.7	405.0	387.4
	2,000	466.6	449.1	431.5	413.9	396.2	378.6
Region 5	0	285.3	263.5	241.5	241.2	197.4	175.3
	1,000	263.3	241.5	219.4	219.4	175.3	153.3
	1,262	257.5	235.7	213.6	197.4	169.5	147.5
	2,000	241.2	219.4	197.4	175.3	153.3	131.2
	3,500	208.1	186.3	164.3	153.3	120.2	98.1
Rates of Return (%)							
Region 2	0	48.6	46.1	43.7	41.4	39.1	36.9
	1,000	46.1	43.7	41.4	39.1	36.9	34.8
	1,088	45.9	43.5	41.2	38.9	36.7	34.6
	1,500	44.9	42.5	40.2	38.0	35.8	33.8
	2,000	43.7	41.4	39.1	36.9	34.8	32.7
Region 5	0	23.5	21.4	19.2	17.2	15.2	13.3
	1,000	21.3	19.2	17.2	15.2	13.3	11.4
	1,262	20.8	18.7	16.6	14.7	12.8	10.9
	2,000	19.2	17.2	15.2	13.3	11.4	9.6
	3,500	16.1	14.2	12.3	10.5	8.7	7.0

Table 6
 Potential Rates of Return with Alternative D&I Rates
 and Land Rents Charged by Region
 (percentage)

Alternative D&I Rates And Land Rent Charged	<u>Region 2</u>		<u>Region 5</u>	
	1996	1997	1996	1997
Status Quo	48.6	23.2	23.5	2.5
Proposed D&I Rates And Land Rent at G\$12	46.0	21.1	20.9	0.3
Proposed D&I Rates And Land Rent at G\$1,000	43.6	19.3	18.8	(1.3)
Proposed D&I Rates And Land Rent at G\$2,000	41.3	17.4	16.7	(3.0)
Proposed D&I Rates And Land Rent at G\$4,000	36.8	15.7	12.9	(6.1)

Notes: Proposed D&I rates are G\$1,088 per acre in Region 2 and G\$1,262 in Region 5.

Column under 1996 assumes the paddy price is G\$1,535 for Region 2 and G\$1,497 for Region 5. Column under 1997 assumes the paddy price is G\$1,350.

Table 7
 Large Farmer Rice Paddy Production Cost in Region 2
 (G\$ Per Acre)

Activity Category	Total Cost	Share of Total Cost
Machinery/Hired Services	22,084	0.77
Ploughing		
Three Cuts & Backblading	4,800	
Aerial Sowing	5,595	
Aerial Fertilizing	7,344	
Aerial Spraying for Weeds	560	
Aerial Spraying for Pests	3,785	
Reaping & Transportation	3,915	0.14
Land Rent	1,500	0.05
Summation of all Costs	27,499	
Interest Charges	1,237	0.04
Total Farm Level Costs (per acre)	28,736	1.00
Production Yields (bags/acre)	30	
Total Farm Level Costs (per bag)	958	

REFERENCES

- Agrodev Canada Inc., “Guyana Agricultural Support Services Programme (ASSP)”, GY-0011, Final Report prepared for the Ministry of Agriculture, Government of Guyana, (February 1996).
- Angel, Amy, “Analysis of the Effects on Guyana’s Export Sector of Changes in International Markets”, report prepared for the Ministry of Finance, (February 1996).
- Bank of Guyana, Research Department, Statistical Bulletin, (December 1995).
- Bank of Guyana, Research Department, Statistical Bulletin, (Preliminary 1996).
- Bureau of Statistics, Guyana Statistical Bulletin, (March 1995).
- Camacho, R. F., “Policy and Environmental Aspects of Water Control Schemes”, report prepared for Republic of Guyana and Inter-American Development Bank, (June 1994).
- DHV Environment and Infrastructure, “Draft Report on the Appraisal of Lome IV Sea Defense Program Project No. 6, Guy. 16”, paper prepared for the Government of Guyana, (September 1992).
- Guyana Rice Millers and Exporters Development Association, Ltd, “Annual Report 1996”.
- Honourable Asgar Alley, Senior Minister of Finance, “1993 Budget - Reconstruction for Human Development”, (March 12, 1993).
- Honourable Asgar Alley, Senior Minister of Finance, “1995 Budget Speech”, (February 6, 1995).
- Honourable Bharrat Jagdeo, Senior Minister of Finance, “1996 Budget Speech - Unleashing Guyana’s Potential”, (January 19, 1996).
- Inland Revenue Department, Guide to Property Tax.
- Kennard, Charles P., “Sustainable Development: A Case Study of Guyana’s Rice Industry”, document prepared for G-77 Sector Review Meeting on Food and Agriculture, (January 15-19, 1996).
- Mohamed, N., “Maintenance Programme for Sea Defenses”, a memorandum prepared for the World Bank, (September 22, 1994).
- NEDECO, “Institutional Strengthening of Black Bush Amendment III, D&I Systems in Regions 3, 4 and 6”, (September 1987).

NEDECO, “Institutional Strengthening of Black Bush Amendment III, D&I Systems in Regions 3, 4 and 6: Manual for Operation, Maintenance and Supervision of Drainage and Irrigation Systems”, (March 1989).

Sanl, Compton, “Study to Determine the Demand for Inputs in the Rice Sub-Sector and to Assess the Ability of Farmers to Pay for these Inputs”. paper prepared for IDB Country Office Guyana, (July 1992).

The Government of Guyana, “Guyana Agricultural Sector Policy Loan (GY-0016), A Policy Directive to the D&I Board”, (November 1995).

The Ministry of Agriculture, “Annual Report of the Ministry of Agriculture 1993 with Review of the Agricultural Sector”.

The Ministry of Agriculture, the Planning Division, “A Cost Recovery Study for the Sea Defenses in Guyana”, (November 1993).

The World Bank, Guyana Public Sector Review, Volume II: Main Report and Annexes, Report No. 11753-GUA, (May 1993).

Whitaker, Morris D., “Agricultural Policy Reform in Guyana: The Floor Control, Irrigation and Drainage Subsector”, report prepared for the Inter-American Development Bank, (June 29, 1994).

Whitaker, Morris D. and Wynn R. Walker, “Irrigation Policy Reform in Guyana: An Interim Assessment”, paper prepared for the Inter-American Development Bank, for Internal IDB Use Only, (October 13, 1995).