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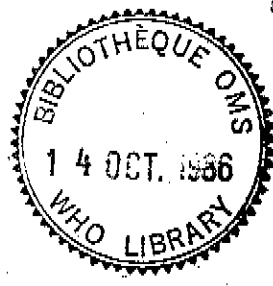
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**INSTITUTIONAL DEVELOPMENT  
IN COMMUNITY WATER SUPPLY AND SANITATION 1  
THEMES AND QUESTIONS**



**WORLD HEALTH ORGANIZATION  
GENEVA**

September 1986

This document has been prepared by the Community Water Supply and Sanitation Unit of WHO in Geneva (L. Laugeri, Editor). It contains a fictitious case study (The Republic of Terrania), and questions on the issues which it illustrates: some answers to these questions are proposed in document WHO/CWS/86.9 : "Institutional Development in Community Water Supply and Sanitation", WHO Geneva, 1986.

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ABBREVIATIONS

c/m <sup>3</sup>	Cents per cubic meter
CWS	Community Water Supply and Sanitation
EPU	Economic Planning Unit
GPD	Gross Domestic Product
IDWSD	International Drinking Water Supply and Sanitation Decade
IMF	International Monetary Fund
MOH	Ministry of Health
NAC	National Action Committee
NWA	National Water Agency
NWSB	National Water Supply and Sanitation Board
RR/UNDP	UNDP Resident Representative
TST	Technical Support Team
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Currency Equivalents

1 Terrania dollar (\$) : US\$ 1.05  
Fiscal year : 1 January to 31 December

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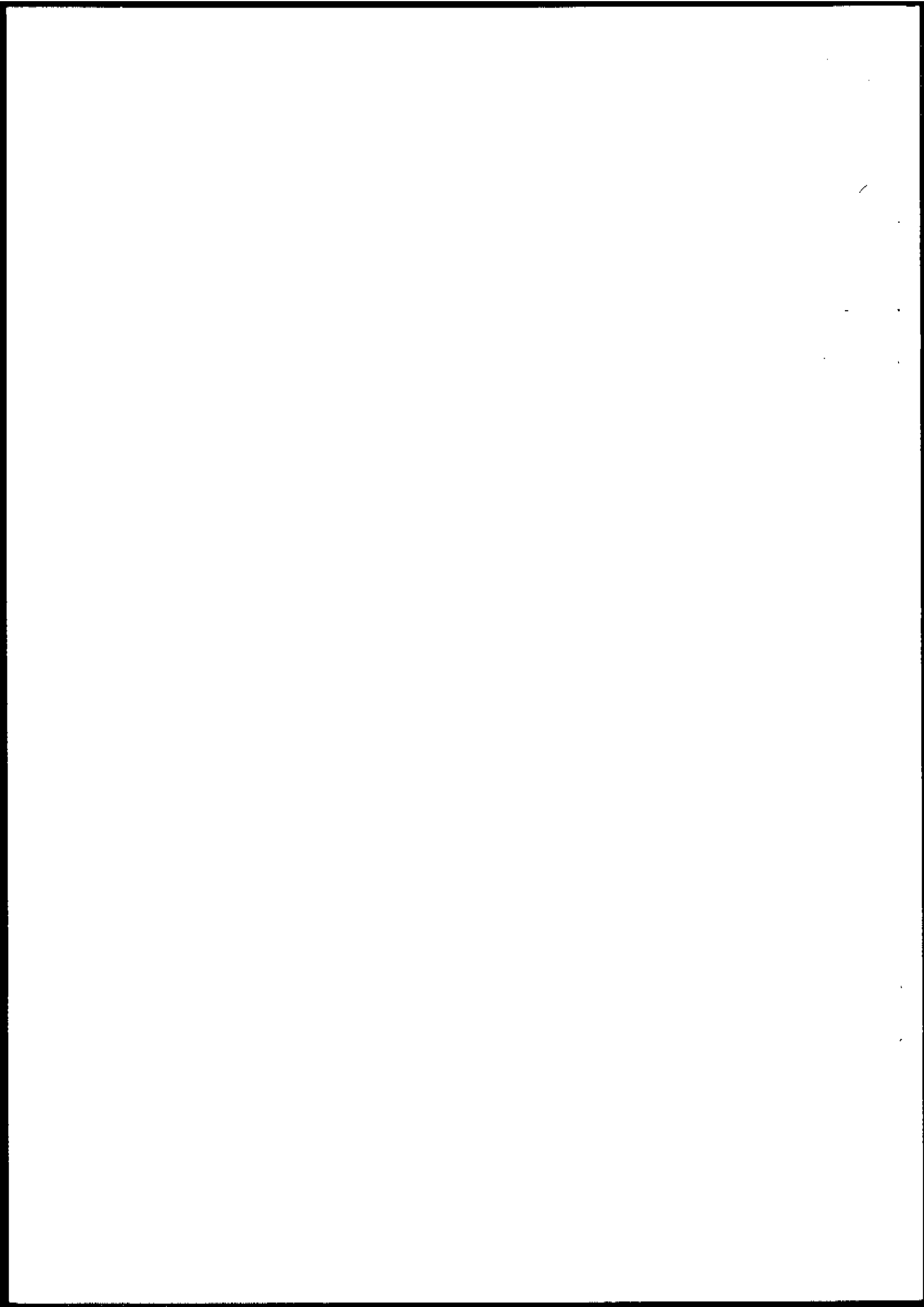
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## 0 INTRODUCTION

### Preamble

0.01 In 1980, the WHO/World Bank Cooperative Programme published a case study on the economic and financial aspects of programmes and projects in the drinking water supply and sanitation sector. The fictitious case of the Republic of Terrania was developed in order to illustrate some of the major issues which were likely to be encountered in the context of the International Drinking Water Supply and Sanitation Decade (IDWSSD - 1981-1990). The Terrania case study was widely distributed to countries as well as to multinational and bilateral technical and financial agencies, and was used as a background document (in English and French) in several seminars and workshops.

### Terrania

0.02 Terrania was presented as a medium-size low-income country of central Africa, with a predominantly rural population, a large capital city and a few small towns. There were large regional differences in population density, income, habitat and water resources. The overall economic situation was characterized by high inflation rates, strain on the balance of payments, difficulties in servicing foreign debt and a high level of unemployment.

0.03 Although all major decisions were taken at central level, the administration was regionalized. The government gave high priority to rural development, which was fostered by several major projects, under the leadership of the Ministries of Community Development, Agriculture and Public Health.

0.04 Community water supply and sanitation (CWS) was under the responsibility of a National Water Agency (NWA), except for the capital city, Hauterre, which had its own Water Supply Authority under its Municipal Council; NWA was also in charge of urban sewerage outside the capital city. The Ministry of Health (MOH) was responsible for national sanitation and water quality surveillance. The Ministries of Agriculture and Community Development had constructed CWS facilities in support of their own projects, where NWA could not provide these services. There was little intersectoral coordination except at the highest central policy level.

0.05 Although CWS had previously received about 3.5% of total public sector investment, 20% only of the rural population had access to protected water systems. By contrast, the urban areas had 70% coverage in water supply, and 40% of the population had access to public sewers, the rest being served by septic tanks or pit latrines. More details of the CWS situation of the Republic of Terrania in 1979 are given in Annex I.

### The National Decade Plan

0.06 In December 1978, the Terranian government approved the creation of a National Action Committee (NAC) for the IDWSSD, and confirmed its serious intent to reach the goals of the Decade. Recognizing the weakness of the rural subsector, the government reformulated its rural water supply programme, and proposed three districts, one in each region, for consideration for funding by a major international agency. It was specified that the Three Districts project should be prepared so that it could be replicated throughout Terrania, the implication being that another six such projects would be required to achieve national coverage. All of these rural water supply projects, together with their sanitation correlates, were incorporated in a National Decade Plan, which also included the priority needs of the urban subsector. Investment requirements and policy options are shown in Annex II.

0.07 It was found that total coverage could be achieved within the Decade, subject to the adoption of an adequate hardware/software mix: CWS "hardware" providers needed the support of such "software" agencies as the Ministry of Public Health, the Ministry of Agriculture and other structures at central, regional and local level.

0.08 At the beginning of 1979, NWA started preparing the Three Districts project. Data were assembled on water resources, supply and demand; the cost of a first project component to serve one district (Kalive) was estimated, and a preliminary construction programme/budget was prepared.

#### Institutional and financial issues (in 1979)

0.09 The Hon. B.J. Barudé, M.P., then Minister of Finance, expressed his concern at an early stage that a large part of the financial burden of the national programme would fall on government. In a letter dated 18 January 1979 to Mr H.J. Awango, then Chairman of NWA, the Minister indicated that while the Treasury might be able to support the Three Districts project, he was not prepared to accept it if it committed him to an acceptance of future replications throughout Terrania. He therefore requested that a detailed study be undertaken to demonstrate the financial feasibility of the project and the programme, its full economic justification, and its impact on NWA's financial situation. A copy of the Minister's letter to Mr Awango is shown in Annex III.

0.10 While the Economic Planning Unit (EPU) of Terrania had reluctantly accepted the demonstration of the economic justification of the project, it was shown that its financial feasibility raised even more difficult problems; for NWA to break even on its operations, a sizeable water tariff increase was required. In a letter dated 20 March 1979 to the Chairman of NWA, the Minister of Finance made two major comments as follows:

- (i) "NWA's present situation does not seem to be adequately reflected in the financial statements which we have received;
- (ii) The optimum solution ... is institutional, and consists of merging the resources and consumer markets of NWA with those of the Hauterre Water Authority".

This important letter (without enclosures) is attached as Annex IV.

0.11 In support of statements (i) and (ii) above, some revised estimates were prepared by the Ministry of Finance, in an attempt to reflect more accurately the operational and financial situation of NWA, to project the development of the Hauterre Water Authority, and to envisage the possible outcome (in terms of expenses, sales and tariff) of a consolidation of NWA and the Hauterre Water Authority. The relevant financial tables are shown in Annex V.

0.12 The consequences of these findings were disastrous for Mr Awango, who was unable to prove that he had not deliberately falsified the accounts of NWA and had to resign from his position in November 1979. The sector as a whole was affected, including the Hon. B.J. Barudé, M.P., whose fundamental errors were however not discovered until years later.

#### Objective and contents of the case study

0.13 The objective of this new version of the Terrania case study is to investigate, in the context of workshops, seminars or other activities, some of the major institutional issues which have affected the development of the CWS sector in many countries during the first half of the Decade.

In the fictitious case of Terrania, sector development was severely hampered by constraints which could already be identified in 1980, and which led to major difficulties in the following years. The first two sections of the present document describe this evolution which is also fully documented in Annexes. The third section contains summaries of the six major identified issues, together with series of questions on each one of them. Answers to these questions are proposed in document WHO/CWS/86.9 : "Institutional Development in Community Water Supply and Sanitation", which should be used as a companion document of the present study.

1. SECTOR DEVELOPMENT IN 1980

The National Water Supply and Sanitation Board (NWSB)

1.01 The merging of NWA and the Hauterre Water Authority became effective on 1 January 1980. The new agency took the form of a National Water Supply and Sanitation Board (NWSB) which enjoyed a large degree of managerial and financial autonomy, and was responsible for the entire CWS sector in rural and urban areas, including planning, construction or rehabilitation, and operation and maintenance of all existing and new facilities.

1.02 The financial statements of NWSB for its fiscal year 1980 (starting 1 January) are shown in Tables 0, 1, 2 and 3 of Annex VI. The opening balance sheet (Table 0) is the consolidation of the financial situation of NWA and the Hauterre Water Authority at 31 December 1979. At that date, the Hauterre Water Authority had a substantial surplus which compensated for NWA's accumulated deficits amounting to \$ 4.5 million. This transfer was of course reflected in the allocation of shares and control responsibilities within NWSB. The interests of the Municipality of Hauterre were also preserved by the incorporation of \$ 17 million from the Rural Water Development Fund, which lost its "rural" qualification to become part of the equity of NWSB.

First year of operation (1980)

1.03 The statistical and financial estimates and projections (Annex V) prepared by the Ministry of Finance proved correct for 1980, and at the end of that year the financial statements of NWSB reflected the consolidated projections of NWA and Hauterre Water Authority. The NWSB's statement of income and expenditures for 1980 (Table 1 of Annex VI) indicated that the Board just broke even on its operation. It also reflected the relatively high financial performance of the Hauterre Water Authority, as compared to that of NWA.

1.04 Despite the high production/sales ratio of the Hauterre system, one third of all water produced by NWSB was unaccounted for. The systems previously operated and maintained by NWA were thoroughly investigated, since in their case nearly 40% of all water produced was unaccounted for. High rates of leakage were reported in nearly all medium size towns, which had problems with galvanized steel pipes and damage to the networks as a result of direct installation of illegal connections by unskilled householders.

1.05 In rural areas, due to lack of master meters, the installed capacity of the pumps was in most cases used as a proxy for water production; although the distribution meters were usually in a good state of repair, faulty meters were reported in a large number of cases where distribution was by public standposts. While production was generally over-estimated, consumption figures were probably too low.

Tariffs

1.06 The consolidated projections prepared by the Ministry of Finance showed that a break-even situation could be maintained until end-1981 with tariffs (at constant 1979 prices) of 12 to 15 cents per cubic meter ( $c/m^3$ ) for public standposts (fully subsidized by government), and 30  $c/m^3$  for private connections, and until end 1984 with the same tariffs not exceeding 15 and 32  $c/m^3$  respectively.

1.07 At the time when NWSB was created, a new tariff legislation was passed on the basis of these projections. It enabled the Board to charge tariffs of 15  $c/m^3$  to government for all consumption by public standposts in all of Terrania, and to charge all the consumers who had the benefit of a private connection a flat rate of 30  $c/m^3$ . Since these tariffs were expressed in constant 1979 prices, NWA was also authorized to adjust them automatically each year by the current inflation rate. In its initial year of operation (1980), NWA therefore charged 18  $c/m^3$  for public standposts consumption, and 36  $c/m^3$  for all consumption by house connections.

### Accounts

1.08 At the beginning of 1980, the former Chief Accountant of the Hauterre Water Authority was promoted to the rank of Chief Financial Officer of NWSB. He had not been a personal friend of Mr Awango in the past, and his concern was to show that any deterioration in NWSB's financial situation was the result of weaknesses in the former NWA, while the Hauterre component of NWSB was performing satisfactorily.

1.09 As a result, separate accounts were kept for NWA and Hauterre Water Authority respectively, although these no longer existed as legal entities. The new Chief Financial Officer of NWSB kept these accounts for his own use: they are shown in all tables of Annex VI, in which the only official financial statements are in the NWSB column.

### Preventive maintenance

1.10 As it had become urgent to reduce the high level of unaccounted-for water, the first year of activity of NWSB was marked by the launching of a preventive maintenance campaign, at a cost of \$ 1.5 million per year. It was foreseen that this work would be subcontracted during the first three years, and subsequently taken over by NWSB.

1.11 In 1980, the major thrust of the programme was directed to the systems previously operated by NWA. It met with serious difficulties, particularly due to the fact that the state of repair of the facilities was generally unknown, and therefore some essential spare parts were in high demand and short supply during most of the year. As a result, there was no significant increase in output or decrease in expenditures during 1980; it was also noted that in terms of volumes produced and sold, NWSB as a whole was not significantly affected by weaknesses in its NWA component during that year.

1.12 There were however from the start difficulties in the NWA operation, and signs of strength on the Hauterre side; the capital city also had the benefit of a large market for new house connections. Personnel, fuel and overhead costs, as well as yearly allowances for depreciation, were much higher per dollar of sales for the systems formerly operated by NWA. Maintenance was under a special account because it had mostly been subcontracted in the past; years of neglect had to be compensated for, and it was anticipated that annual expenditures on this item would continue to grow, the more so as important works would soon be needed in Hauterre, in order to keep its unaccounted for water at its remarkably low level of 25%.

### Investment

1.13 Annex VII, Table I, provides details on the Three Districts Project. While there were significant investment expenditures, projected at the level of \$ 7 million per year, associated with this project, there was practically no expected increase in sales until 1982. All sector loans made by government had been allocated to rural supplies, leaving nothing for the development of Hauterre. Meanwhile, as shown in Table III of Annex VI, Hauterre had to finance its own investment in order to cope with growth in demand and replacement needs: as a result, NWSB as a whole started its operation on a rather weak financial basis.

1.14 In the past, the Hauterre Water Authority had maintained a level of internal cash generation which was high enough to cover normal system development needs corresponding to increases in demand. In 1980, this surplus was partly offset by deficits in the systems previously operated by NWA. At the same time, total investment expenditures were growing considerably, as well as total debt-service. Working capital needs were also increasing, and NWSB had to start negotiating terms of payment with its suppliers, as well as reorganizing procurement in order to keep inventories at a reasonable level in the future.

1.15 The Decade was officially launched on 2 November 1980. In its overall development plan, Terrania had allocated funds to IDWSSD programmes as from 1 January 1980, thereby planning in fact an eleven-year Decade.

### Public investment and sector development in 1980

1.16 In February 1981, the Economic Planning Unit (EPU) of Terrania undertook a review of investment made and progress achieved in the CWS sector during 1980. This review was based on comparisons between actual investment in the various subsectors and the investment required for the attainment of IDWSSD objectives, as indicated in Terrania's national Decade Plan (Annex II).

1.17 In a short note to the Hon. B.J. Barudé, Minister of Finance, the EPU summarized its own conclusions from the statements which had been produced by the various sector agencies. The target of spending 6% of all national development funds in the sector had been achieved; total public investment in 1980 was \$ 350 million, of which \$ 21 million was allocated to CWS. Contributions to NWSB equity from the Water Development Fund amounted to \$ 3 million, to be added to the proceedings from the first part of the government long-term loan for the Three Districts Project, amounting to \$ 18.3 million.

1.18 For the rural water supply subsector alone, NWSB had therefore been allocated more than 6% of total public investment. Besides, as a result of the high performance of the Hauterre system, which was not yet affected by financial problems, the NWSB had been in a position to self-finance \$ 9.5 million worth of investment for the extension and rehabilitation of the Hauterre system. For the entire water supply subsector, both urban and rural, the EPU noted with satisfaction that the progress made in 1980, if maintained until 1990, would be sufficient to achieve the goals of the national Decade Plan in those areas which should be supplied by NWSB.

1.19 The situation was quite different in the sanitation subsector, where hardly any progress was made. In urban sewerage, NWSB's role was limited by the national Decade Plan to system extension and maintenance in the capital city, and operation and maintenance of systems previously operated by NWA in secondary centres. The intention was to keep the development of urban sewerage within the limits of what the country and the people could afford, and to provide service to a large part of the urban population with septic tanks and pit latrines, which could be financed in full or in part by the homeowners themselves.

1.20 After the EPU had informed the Minister of Finance that it could not trace any sign of activity in urban or rural sanitation in the financial statements of NWSB for 1980, the Hon. B.J. Barudé requested details from the Chief Financial Officer, whom he knew kept separate accounts for his own use. The Chief Financial Officer was able to demonstrate that some maintenance work had continued to be done by NWSB for the Hauterre sewerage system; the simple tasks of maintenance of storm water drains and removal of solid waste had continued to be carried out by the municipal employees. There had not been any intervention from NWSB in the systems previously operated by NWA in the secondary centres.

1.21 NWSB was not receiving any income from its sewerage operation, the expenditures of which were merged with those of water supply, so that it was impossible to calculate the exact cost of sewerage to NWSB. This however was suspected to be high, particularly in view of the large number of former municipal employees who had been recruited as former NWA's specialized sewerage workers, and who had to be retained on the staff, despite their obvious lack of qualifications and the low level of NWSB activities in the sewerage subsector.

### Issues in technology selection (Section 3, Issue VI)

1.22 In urban poor and rural areas, the installation of sanitation facilities, based on low-cost appropriate technology, could not start as planned. The implementation of the national Decade Plan, as formulated in Annex II, required an extensive use of software approaches. In urban water supply and sanitation for instance, changes in design criteria had to be promoted and accepted, by NWSB as well as beneficiaries of the service. Although the newly appointed Chairman of the Board was fully convinced of the necessity to reduce unit costs and increase coverage, there was some resistance within NWSB itself.

1.23 The high level staff of NWSB was generally reluctant to change. The Commercial Manager, who had been responsible for the rapid increase in recent years of the number of connections to the public water and sewerage systems of Hauterre, was opposed to the proposed increase of the ratio of public standposts to private connections. Several engineers of the technical department were strongly in favour of a continuation of a policy which had consisted in simultaneous extension to new housing developments of water and conventional sewerage through house connections.

1.24 There was general doubt about the acceptability of pit latrines in the suburbs of Hauterre or even in secondary centres; as to septic tanks, they were usually poorly designed and built, their exact number was not known, and it did not seem feasible to organize a campaign to promote the construction of new sanitation installations at homeowners' expense.

1.25 While government had accepted in 1979 substantial reductions in planned service standards for rural areas, the April 1980 elections demonstrated that political continuity could only be achieved at the expense of major improvements in rural areas. Consultation between national agencies and community organizations, particularly the new Village Development Councils, was reinforced, and became compulsory in any major project.

1.26 It soon became obvious that there would be a strong resistance from community leaders to the adoption of low-cost technology in rural water supply. As shown in Table II of Annex I, there were a large number of technology choices available for source development throughout Terrania: however in some cases the most costly, e.g., deep wells, were the most attractive, and communities were opposed to the introduction of what appeared to be second-best solutions. The same applied to proposals to increase distances walked to water sources.

#### Search for an optimum hardware-software mix (Section 3, Issues III, IV and V)

1.27 The most important issue was related to the lack of information, sensitization and education of the beneficiaries. In fact, the Ministry of Health was entirely convinced of its role in this respect, but was never provided with adequate resources to fulfil its mandate. In a new note to the Minister of Finance, the EPU indicated that in the future the trend should be to reinforce the recurrent budgets of such software providers as the Ministries of Health or Education, as their action was regarded as indispensable to the success of a reduced hardware programme.

1.28 The Hon. B.J. Barudé replied that this would be terribly unpopular in government. There had already been a trend in several agencies to increase the number of their employees, often at the expense of qualifications. Besides, government officials as well as community leaders were much more in favour of spending funds for commissioning new works, rather than increasing the yearly budget of health educators, sociologists, and other categories of professionals who did not directly "give water to people".

1.29 The EPU turned to the Ministry of Health for support. To demonstrate the feasibility of the Decade programme, it had been assumed that maximum advantage would be taken of self-help, particularly in rural water supply and sanitation, and also for urban poor areas. This required a significant increase in the Ministry's budget for health education. There was also an assumption that coverage would increase with the expansion of health centres, and that operation and maintenance could be carried out by village-level workers. This called for rather drastic revisions of past policies, and for this purpose the EPU organized a meeting of the National Action Committee in March 1981.

1.30 After the initial enthusiasm of 1978 and 1979, the NAC had not been very active, and it only met once in 1980. However, under the leadership of EPU, several meetings took place in 1981, which had as their main objective the design and implementation of an appropriate hardware/software mix.

1.31 Other structural arrangements had been made for the Decade. A Technical Support Team (TST) had been created to coordinate the interests of the various international and bilateral agencies active in the sector. At the end of 1980, the TST had only met twice; attendance at these meetings was limited to the acting WHO Country Representative in Terrania, a UNICEF Project Manager, a Programme Division Officer of the UNDP, and a representative of the Agency for Technical Cooperation of the Federal Republic of Germany.

1.32 The Resident Representative of the UNDP had been designated as focal point for the Decade. However the UNDP funds were overcommitted, the share of the sector in the country programme was less than 5%, and there were other priorities, to which the RR/UNDP had to devote most of her time. Besides, there was not much demand for RR/UNDP intervention from the NAC, the TST, or other agencies active in CWS.

2. MID-DECADE REVIEW: ASPECTS OF THE 1981/85 CRISISMinutes of the annual General Meeting of the NAC - 5 March 1981

2.01 The meeting was opened by the Chairman of the EPU, who had convened it at an earlier date than in previous years, in view of the current difficulties of the Decade programme. Those present were the General Manager and the Chief Financial Officer of NWSB, the EPU Technical Officer in charge of infrastructure, a representative of the Special Committee on Public Utilities Tariffs of the Ministry of Finance, the Chief Engineer of Hauterre Municipality, the Director of the Engineering Division of the Ministry of Health, accompanied by a young professional (sanitary engineer), a sociologist from the Ministry of Community Development, and the Project Manager of the pilot reforestation programme which the Ministry of Agriculture was executing in Wangwea Division (Annex I, para. 26).

EPU (Section 3, Issue III)

2.02 The main item on the agenda was intersectoral cooperation in the pursuit of Decade goals. In her opening address, the Chairman of the EPU expressed her regrets that the National Action Committee had not met more often in recent months, and that appropriate legislation had not yet been passed to provide the Committee with the legal status, authority, responsibility and resources which it needed to perform promotion and coordination tasks effectively. She explained that after one year of operation of the newly created NWSB, there had been a reinforcement of the tendency of this agency to work in isolation and exclusively in the CWS sector, without seeking support from other interested Ministries or agencies, while these in turn had not expressed much interest in CWS development, which they apparently thought was of the sole competence of NWSB.

MOH (Section 3, Issues III and IV)

2.03 The divisional Director of MOH argued that there had been from the beginning a misunderstanding of what intersectoral cooperation meant. It was not enough to write in a national Decade Plan (which had been prepared by the NAC) that the action of CWS hardware providers should be supported by health education, promotion of community participation, and other software programmes. These programmes required new financial and manpower resources which had not been allocated to the Ministry of Health, nor to his knowledge to any other agency interested in CWS development.

2.04 The Director also expressed his concern that Decade achievements were estimated in purely quantitative terms. In the recently published NWSB annual report for 1980, progress was measured in numbers of water points created, additional mileage of pipes, and number of installations commissioned during the year. There was not a word on improvement or deterioration of the quality of the water, continuity and reliability of the service, and its impact on the health of the beneficiaries.

2.05 The sanitary engineer of MOH mentioned an on-going project in another African country, where it had been demonstrated that even ground water supplies could contain dangerous pathogens, with proportions of unsafe supplies reaching 65% in the case of traditional shallow wells; levels as high as 11% were even found in some areas in the case of deep boreholes equipped with hand-pumps.

2.06 He pointed to the fact that while a modern well-equipped water point serving an agglomeration of 500 people would cost from \$ 7,000 to 25,000, according to the technology choice available (Annex I, Tables II and IV), the cost of a water quality test did not exceed \$ 20. This required however that the Ministry of Health be provided with resources, consisting essentially of qualified and well-equipped quality surveillance teams.

2.07 The sanitary engineer also deplored the way in which the issue of dispersed and nomadic populations was dealt with. At the end of 1980, the rural community comprised nearly nine million people, including 4.5 million living in fifteen hundred comparatively large well-organized agglomerations with village councils, 3.5 million (one third of the total population of Terrania) living in dispersed hamlets and farms, and one million nomads (Annex I, Table I).

2.08 In sparsely populated zones such as the Pumani Plateau or the Northern region, NWSB had continued the former NWA programme of gradual extension of coverage in the areas of jurisdiction of its district centres. This had led to costly errors. Within the Kalive component of the Three Districts Project for instance, a large number of small supplies were provided by NWSB to small hamlets on the Pumani Plateau of the Kalive Division (Annex I, Map II). By contrast, nothing had been done to improve the water supply of some ten villages in the neighbourhood of Sokoko, where cholera had struck again in the second half of 1980.

2.09 The sanitary engineer reported that MOH had prepared an epidemiological map of water-related diseases in Terrania, and was keeping it up-to-date. His opinion was that such a map should be more useful in planning than the territorial expansion scheme of NWSB. As to service to dispersed populations, he thought that the policy of NWSB should be reexamined.

2.10 A recent mission of MOH staff, consisting of a sanitarian and a nurse, had visited some sixty hamlets and farms on the Pumani Plateau. They were struck by the fact that most of these populations were not using the new CWS installations that NWSB had provided in the area in 1980. The "beneficiaries" argument was that they had been living on their farms for many decades, using their own traditional water supplies; they were unaware of any relationship between water pollution and disease; although NWSB had installed water points not too far from the farms, women and children preferred to use their own shallow wells in their own courtyards. Besides, there was no evidence that "protected" water points provided water of any better quality than traditional supplies.

2.11 The sanitary engineer's opinion was that it was certainly not the purpose of the present Decade to radically change CWS installations in areas of dispersed habitat, where the risks of epidemics were too low to warrant major costly efforts such as required for instance in urban poor areas. He thought that a true Decade approach should consist of relying on existing private installations, and on a direct intervention of the PHC structures of MOH and of the community.

2.12 The surveillance and improvement of the quality of existing supplies would in this context become more important than the provision of new installations. These would be constructed by NWSB by exception and on request from individuals and communities, based on evidence of health risks, and they would not be imposed on the rural dwellers; construction would occur upon advice from the Health Inspector, and the community worker, after local solutions had been tried and had failed.

2.13 The difficulty, however, was common to most Decade and Health for All approaches: it had always been more difficult to increase recurrent budgets than to adopt new investment proposals. What MOH needed was the extension of its PHC programme, which covered less than half of the rural population (Annex I, para. 7). Qualified staff from health centres and rural dispensaries were seen as the only support available to community workers. As to NWSB, it seemed impossible to deconcentrate it to a level which would allow it to interface effectively with communities.

#### Community Development (Section 3, Issues IV and V)

2.14 The representative of the Ministry of Community Development stated that the major issue in all software programmes had been related to insufficient human resources development rather than lack of financial resources. Currently, the main effort of the Ministry consisted in the development of visible career paths for staff engaged in the provision of software. He believed that health education to villagers, or promotion of community development, or creation of structures and mechanisms to organize community work more effectively should be regarded as professional tasks requiring high level competence and motivation: rewards should therefore be at the level of qualifications needed.

2.15 The main obstacle to this type of human resources development scheme (which had succeeded in several instances, for example in the agricultural sector) had been the absence in CWS of permanent structures of software providers in the field. Qualified staff would accept to leave Hauterre to participate in the construction and first phase of operation of a project; they would work actively as members of Project Units, in cooperation with the community. Some workers would be trained at local level to ensure that the community would later on be self-sufficient in operation and maintenance of CWS installations.

2.16 In fact, complete self-sufficiency was never achieved, and after the Project Unit had been dissolved, the community was in permanent need of support at first referral level. Agencies at this level could not develop, essentially because staff who had been involved in project work had regarded this as a temporary activity; after their return to Hauterre, they would generally argue that other staff with the same qualifications should be sent out to the field. In the end, the outposting of staff was regarded as a discriminatory measure, and field work was becoming a penalty.

2.17 The policy of the Ministry was to encourage the development of agencies to bridge the gap between the communities and the deconcentrated offices of central government. This could only be done in the context of very large projects, e.g., integrated agricultural development schemes, essentially because their size justified the creation of permanent structures, ample enough to accommodate the career development needs of qualified individuals.

2.18 Where CWS development was not integrated with that of other sectors, which was mostly the case, the only solution to attain a critical mass depended on the degree to which projects would be replicable, so that temporary Project Units could gradually expand, establish linkages with other sectors, and in the end be replaced by permanent structures.

#### Rural Development (Section 3, Issue III)

2.19 The Project Manager of the Pilot Reafforestation Programme of Wangwea Division explained how his Project Unit, which initially was small, was being expanded and linked with other sectors. The objective of the reafforestation programme was to contribute to the new development of a large area on the slopes of the Pumani Plateau, immediately to the West of the border between Kalive and Wangwea Divisions (Annex I, Map II). This area had once been the site of tobacco plantations, which were subsequently abandoned for economic reasons.

2.20 A large number of small hamlets and farms remained on the slopes bordering the Uruku river, in what had once been called the "Green Valley" of Terrania. Unfortunately, during the period of economic prosperity, deforestation had been intense; the wood was cut in the Uruku valley and transported to Lale where it was processed.

2.21 After some twenty years of neglect, government realized how essential it was for the Ministry of Agriculture to organize corrective measures in the Valley. As a result of intense soil erosion, it could be predicted that the rich slopes of the Pumani Plateau to the North and South of the Uruku river would soon be deserted. Migration had already started, not towards Lale, where industry and trade were declining, but rather towards the growing centres of Wailka and Sokoko, near the Western banks of Lake Kandi.

2.22 As the Project Manager remarked, only a central agency could initiate a project which would involve several sectors, and not less than three administrative divisions, those of Kalive, Lale and Wangwea. The programme, which was assisted by a major international bank, had as its main objective to increase the agricultural production of the Kalive district as a whole, rather than raise the level of economic activity of one Division or the other.

2.23 While the afforestation programme would by itself have been too small to justify permanent maintenance structures, it was associated with other programmes in the central region of the Kalive district (Annex I, para. 26 and Map II). Cooperation was organized with the Ministry of Community Development, which had started a large labour-intensive road construction project throughout the district, and was willing to undertake major rehabilitation works in the Uruku valley area, where labour was abundant.

2.24 Also for that reason, the Artisan Development Agency had started several rural workshops in the same area, to help improve the maintenance of local machinery and equipment. Further up the Pumani Plateau, a large mission of the Charitable Group was developing an irrigation zone: 18 villages were involved in this project, which had also attracted the attention of responsible staff of the schistosomiasis and malaria programmes of MOH.

2.25 The Ministry of Agriculture, which was planning the development of a large cooperative distribution centre in the Valley, had some doubt about the growth potential of the local market. The town of Lale had been growing fast during the preceding Decade: it consisted of a trading centre (Lale Town) and a large rural village. The population of the trading centre had stabilized with the economic slowdown; the village-type area of Lale, where some of the rural migration had been diverted, did not offer any more employment opportunity, and therefore had ceased to grow. On the whole, the central area of Kalive district had become a zone of economic and social recession.

2.26 The Project Manager recalled the important roles which the Ministries of Community Development and Agriculture and the EPU had played in organizing intersectoral cooperation. Instead of five different Project Units serving the interests of various sectors in the area, each one for a short period of time, a Rural Service Centre had been created, at the initiative of a Users' Association, to serve all sectors on a permanent basis; the Project Manager however recognized that this would not have been feasible if Lale Town had not developed so rapidly, and support at first referral level had to be sought from Wangwea or Waika, more than 100 km away.

2.27 The two areas of activity which had not led themselves well to intersectoral cooperation were Public Health and CWS. The Project Manager went as far as to state that these two sectors, although they were closely related, had been totally incapable of cooperating with each other, and no one was competent or able to coordinate their activities.

#### NWSB (Section 3, Issues I, II and III)

2.28 The General Manager of NWSB mentioned several reasons which accounted for the isolated CWS development denounced by the representative of the Ministry of Agriculture. One of these reasons was purely administrative. While construction was entirely managed from Hauterre, operation and maintenance were the functions of district agencies and divisional offices of NWSB. The development of the Kalive project for instance, had been planned in Hauterre, and a project team had been constituted at district level in Kalive. It operated from a small village on Kalive Bay, where all stores, vehicles and heavy equipment were located.

2.29 By contrast, the operation and maintenance of CWS facilities located in the "Green Valley" were shared between the Nwangi office (Kalive Division) and the Wangwea office (Wangwea Division). The Lale office, although it was close to the Green Valley, belonged to another administrative Division.

2.30 The General Manager of NWSB gave some major reasons why CWS structures did not adapt well to multisectoral project approaches. NWSB did not have a rural sanitation component, and therefore had to rely on MOH rather than cooperate with it. The sanitation correlates of NWSB water supply projects were not at all studied by MOH; this Ministry could not even deal with water quality surveillance, which NWSB had to carry out itself.

2.31 The General Manager regarded the Green Valley development project as evidence of the fact that NWSB could not achieve the Decade objectives alone. The decentralization of NWSB had been strictly limited to deconcentration to field offices at lower levels. As hardware providers, CWS agencies did not have the same deconcentration potential as such software agencies as the Ministries of Public Health, Education or Community Development.

2.32 The organization chart of NWSB was limited to four levels: Hauterre, which had the most competent staff and very complete equipment, the regional capitals, the districts and the divisions. At this last level, there were generally few resources, particularly in terms of manpower, and the main effort was to staff the CWS mobile rural maintenance teams.

2.33 The CWS component of a Green Valley Project would have been under the administrative responsibility of the Wangwea NWSB office, which was too distant to fulfill this function. The Lale office, which was only 20 km away, was in a better position to provide the services required. In Lale however, NWSB had a resident staff of only four persons, responsible for

the water supply of the town; as to the mobile team, comprising a plumber, a driver and two unskilled workers, it was responsible for maintenance of facilities serving some 36,000 rural dwellers, living in 52 villages (some more than 80 km away from Lale) and more than 500 hamlets and dispersed farms.

2.34 The Chief Financial Officer of NWSB mentioned that this dispersion of population, which was common throughout Terrania, had been the main reason for the declining performance of the CWS sector in 1980. For each dollar spent on investment, operation or maintenance, there had been fewer persons served, less water sold, and as a result less net income than in, for instance, the case of the former Hauterre Water Authority.

2.35 The Chief Financial Officer thought that the financial situation of NWSB was likely to deteriorate further during the following years. As the expansion programme was mainly oriented towards rural areas, the quantities of water produced would continue to increase, but unaccounted-for water would remain high; water sales, and therefore income from customers and government would grow slower than expenditures.

2.36 Even in Hauterre, growth was affected by a considerable backlog in the supply of connections, due to lack of essential parts which had to be imported. The irregularity and unreliability of foreign supplies were affecting the sector as a whole; in rural areas, despite the small size of individual facilities, the cumulated amount of work in progress was nearly equal to the yearly investment expenditures; this was likely to last for some time, in view of serious import restrictions recently imposed by government.

2.37 The General Manager of NWSB was concerned that the request for tariff adjustment which he had routinely made in January 1981 had been rejected by the Ministry of Finance. In his opinion, the income projections prepared by this Ministry had been on the high side; the Chief Financial Officer of NWSB had made his own projections, which indicated that in 1981 the Board would probably have a net deficit of some \$ 4 million; its cash situation would be worse than in 1980, and some additional contribution would be required from government, possibly through the Water Development Fund, which had in the past contributed to the expansion of NWA. The situation would deteriorate further after 1981, if tariff adjustments were not authorized during that year.

#### Hauterre Municipality (Section 3, Issue II)

2.38 The Chief Engineer of Hauterre Municipality had seen with some concern that in recent years, as a result of repeated interventions of international development agencies, public utilities' tariffs had increased considerably in most sectors. In order to maintain the financial autonomy of NWSB, the large consumers of Hauterre would soon have to pay a high price for their water supplies. Tentative estimates by NWSB indicated that the price of water to industry would reach \$ 1 per cubic meter before the end of the Decade. On the other hand, NWSB charged a low subsidized tariff to government for the consumption through standposts of a rapidly increasing low-income group.

2.39 The Chief Engineer had had several discussions with private entrepreneurs. These were not so much concerned by the high cost of water than by the fact that in recent years all public utilities prices, as well as local taxes, had gone up simultaneously. Contrary to most project planners, they did not compare the cost of water to their overall income, but rather to their profit margin, which they saw rapidly diminishing.

2.40 The Chief Engineer, who knew Hauterre well, did not believe that a few large consumers could subsidize the rapidly expanding population of the suburbs. In his view, the subsidization by Hauterre of the entire CWS sector throughout Terrania was even less feasible. In Hauterre itself, he had seen that water at the standposts was misused and wasted, essentially because there was no form of direct cost recovery from the beneficiaries.

Ministry of Finance (Section 3, Issue II)

2.41 The representative of the Special Committee on Public Utilities Tariffs thought differently. In his view, water should be accounted-for as it was, i.e., including a provision for inflation which should be reflected in assets values and depreciation allowances, in order to provide a meaningful rate of return. Any surplus should be fed into a revolving fund for service improvements in secondary urban centres, which in turn would provide surplus funds to increase coverage in rural areas.

2.42 The concept of revolving fund seemed to apply well to the CWS sector, as financial autonomy could easily be achieved in urban areas, while service to rural areas would always have to be subsidized. The Special Committee had already examined the impact of water rates on the large consumers of Hauterre. There had not been any case of an industry decreasing consumption because of the recent tariff increases. It could therefore be assumed that for each individual case the price elasticity of water was negligible.

Conclusions

2.43 In the general discussion which followed, it was stated that what was true for one private agency did not necessarily apply to a community as a whole, the income of which tended to stabilize while population continued to grow. The EPU Technical Officer thought that tariffs should remain as they were, i.e. close to the real cost of water to the economy. The General Manager of NWSB thought that the transfer of any hypothetical surplus from the capital city to secondary centres and from there to rural areas would not be feasible, and that the whole idea would lead to the creation of another useless institution to manage the proceeds of such a Fund.

2.44 The sociologist from the Ministry of Community Development agreed with the Chief Engineer of Hauterre Municipality that all beneficiaries of the service should contribute to the recovery of its cost; he went further by suggesting that the former NWA practice of providing routine operation and maintenance services to villages would lead to the gradual deterioration of the financial situation of NWSB.

2.45 He suggested instead that more authority and responsibility should be devolved upon the communities; more investment should be directed towards manpower development at community level, in order to achieve self sufficiency in operation and maintenance of CWS facilities; central agencies should be deconcentrated to a level close enough to the community to provide support as required.

2.46 In concluding the meeting, the Chairman of the EPU summarized her own impressions: the most serious and urgent issue was the financial deterioration of NWSB; as a first step, she proposed that a request be made for an immediate allocation of \$ 5 million from the Water Development Fund. She urged the General Manager of NWSB to take the necessary steps with its foreign suppliers to complete all works already undertaken and to commission the new installations, which would result in sizeable increases in NWSB income. She also asked the Special Committee on Public Utilities Tariffs to re-examine the case of NWSB and authorize it to adjust its tariffs in step with inflation, as provided by law.

2.47 The EPU officer then produced a tentative estimate of investment made and progress achieved in the CWS sector in 1980. This estimate is shown in the 1980 column of Annex VII, Table I: this Table was kept up-to-date until end-1985, when the Mid-Decade Review took place (para. 2.50).

2.48 Notwithstanding improvements or deterioration in the quality and reliability of the service, it was noted that progress in coverage had been much slower than anticipated in water supply (except for conventional systems constructed by NWSB), and virtually nil in sanitation. It was becoming very urgent to adhere strictly to the principles which had prevailed throughout the preparation of the national Decade Plan: increased deconcentration of NWSB, devolution to local authorities of all operation and maintenance responsibilities, intersectoral action in support of community development, and promotion of software approaches wherever they could supplement the provision of hardware, or compensate for its absence.

Minutes of the annual general meeting of the NAC - 18 November 1985

2.49 The meeting was opened by the recently-appointed Chairman of the Economic Planning Unit. In his opening address, he reminded those present of a similar consultation which all of them had attended on 5 March 1981. Some of the major issues facing the Decade had been identified during that 1981 session: these issues, which are related to the administrative constraints to decentralization, the difficulties encountered in transfers of resources, the need for improvements in intersectoral cooperation, community involvement and human resources development, and to the institutional implications of technology selections, are summarized in Issues Papers I through VI of Section 3.

2.50 Besides the Issues Papers, the background documentation for the meeting included the EPU's revised estimates of increase in coverage (Annex VII, Table II) and NWSB's financial statements for the 1980-1985 period (Annex VIII, Tables I, II and III). The deplorable financial situation of NWSB, and the failure of the Decade programme to achieve its targets, had led the Hon. B.J. Barudé, former Minister of Finance, to retire from the political scene in September 1985. The Chairman of EPU, however, thought that steps could be taken to at least achieve some of the Decade objectives while restoring the financial situation of NWSB.

### 3. ISSUES AND QUESTIONS

#### 3.01 ISSUE I : DECENTRALIZATION: ADMINISTRATIVE ASPECTS

##### Definitions (based on Webster's Dictionary)

Decentralization: "The dispersion or distribution of functions and powers from a central authority to regional and local authorities".

Deconcentration : "Decentralization".

Devolution : "The surrender of powers to local authorities by a central government".

##### Interpretation

- Devolution occurs when authority and responsibilities are given by a central institution to another organization (e.g., a Village Council).
- Deconcentration occurs when a central agency entrusts parts of its authority and responsibilities to its own field offices at lower levels.
- Decentralization can occur in the form of either devolution or deconcentration, or both.
- For decentralization to be successful, both deconcentration and devolution are required:
  - . deconcentration is necessary to provide effective support to communities;
  - . devolution is a prerequisite to community involvement.

Probably the main challenges of the Decade are to foster community-based development, and to bring central government's support as close as possible to the town, village or hamlet, where decisions should be made and implemented. This requires effective decentralization, including both deconcentration of the CWS agencies and devolution of powers and responsibilities to communities.

##### Issue

Frequent misunderstandings of the process result in a trend towards deconcentration without appropriate devolution of authority and responsibilities to the communities. Conversely, many governments and international agencies tend to focus their efforts in institutional development on the sole promotion of community involvement (through devolution): due to cost and logistic constraints, CWS agencies are often unable to deconcentrate their structures to a level allowing the community to have easy access to those services which it cannot by itself provide.

##### Questions

1. Would deconcentration be easier if the entire CWS sector was managed by one national agency, rather than fragmented as it often is (between urban and rural areas, between municipalities, between Ministries, etc)?
2. Although the limits of decentralization are country-specific, can some generalization be drawn from types of population distribution (dispersed/ nomadic, agglomerated, nucleated, etc) and administrative organization (regions, provinces, districts, etc)?

3. Do physical conditions (relief, catchment areas, forests, deserts, etc) play an important role in the need for decentralization and its success?
4. Can integration of CWS with other elements of PHC serve as support to the decentralization process for the sector, since software providers are more decentralized than water utilities?
5. Is decentralization feasible and useful if it results in the central agency overlapping with strong regional institutions concerned to maintain their prerogatives in the CWS sector?
6. Is deconcentration in CWS feasible if other sectors are not deconcentrated to the same level?
7. Can CWS structures responsible for construction and initial operation of replicable projects (Project Units) expand to a level where permanent structures become economically justified and constitute an adequate referral level for the communities? Could local contractors perform both construction and operation and maintenance functions? Can national private enterprises develop a rural CWS support system?
8. Can agencies of other sectors (Agriculture, Education, Public Health, etc) and NGOs be useful in an effort to bridge the gap between the most deconcentrated CWS agencies and the communities?
9. Should intersectoral coordination be organized by the central agencies, or simply result from the need to respond to communities' requests for support? Which coordinated tasks are primarily central functions, which are functions at community level?
10. In order to provide the most rational and economical institutional framework, should devolution be restricted to some functions (e.g., system planning, operation and maintenance, etc), while others (e.g., procurement, loan negotiations etc) are retained at central level?
11. Of the functions which are to be retained by CWS agencies, which ones can be appropriately deconcentrated? By which mechanisms?
12. Of the functions which are subject to devolution to communities, which ones (e.g., maintenance/urgent repairs) require immediate access to strong first referral structures?
13. At which level should deconcentration end? To which functions should devolution be limited? What type of support is required from decentralized software providers? At which level? In which functions?

3.02 ISSUE II: DECENTRALIZATION: TRANSFER OF RESOURCES

Costs (in the broad sense, corresponding to the mobilization of both human and financial resources) tend to increase sharply beyond the boundaries of manageable decentralized structures.

Issue

CWS agencies as well as communities have few resources for new undertakings; their funds and their personnel are usually overcommitted. The possibilities of generating a surplus in towns for transfer to the urban poor and rural subsectors are limited. The motivation for such a transfer is often non-existent: qualified personnel working in towns are reluctant to leave their positions; CWS managers are equally reluctant to allocate funds to service extensions in urban poor and rural areas, because of considerable risks, low expected returns, and sometimes ignorance of CWS development conditions, particularly in villages. For political, financial and social reasons, there is a permanent need to maintain and improve service in large towns. Many of these are in need of major rehabilitation and extension during the present Decade, while IDWSSD efforts are intended to focus on the underserved rural and urban poor populations.

Questions

1. Should not financial autonomy be achieved at least in the urban subsector before decentralization can be effective in extending coverage of rural needs? Alternatively, should specific allocations of funds be made for rural and urban poor programmes?
2. If some surplus can be generated in towns for transfer to the urban poor and rural subsectors, can the amounts transferred exceed the cost of decentralized structures?
3. Can the allocation of financial resources to deconcentrated units of a CWS agency take place without hampering the development of its central structure and the pursuit of its original objective?
4. Can the devolution of financial management functions to community level take place without considerable loss in financial performance of the sector as a whole (e.g., as a result of absence of economies of scale and less possibilities to pool resources together for procurement, etc)? Can methods (standardized designs, common procurement, etc) be developed to overcome this potential loss of financial effectiveness? Or should the rural subsector continue to be regarded as a satellite of large urban utilities?
5. Should inflation be accounted for in the calculation of urban tariffs? Can these include a provision for extension of service to rural areas, without exceeding permissible limits? Is "permissible" correctly defined as the maximum amount that beneficiaries are capable and willing to pay? What are the trade-offs between considerations of social justice (through cross-subsidies) and economic efficiency in setting tariffs? How effective has cross-subsidisation been where it has been applied?
6. Are revolving funds well adapted to the specific supply/demand conditions and expansion needs of the water market? Is it an accepted principle of sound financial management to provide in advance for the need to construct new works and rehabilitate existing ones?

7. Since the ratio of capital-related costs to overall cost will in many cases reach 70% to 90%, leaving virtually no resource to cover recurrent operation and maintenance expenditures (let alone preventive maintenance), should these be left entirely to the community, while the central agency would bear the burden of capital costs, including for instance financial losses in debt service as a result of currency fluctuations? Is it permissible to a community to run a financial risk? Is it permissible to a CWS agency? Should government subsidize the capital-related costs? All costs? Can water be given free to rural dwellers? Conversely, should rural dwellers pay the full cost of water?

8. Since revolving funds can revolve only if growth occurs at every stage of the development process, will growth in CWS demand be sufficient to allow for service extension to rural areas? Are some developing countries in a zero growth situation as regards urban demand, as the collective demand of most urban communities becomes stagnant or declines as a result of the impact of a fast-growing low-income consumers' category, and of supply limitations due to intermittent systems and high levels of leakage and wastage?

9. Does the operation of a revolving fund require a delivery system to transfer resources from large urban centres to rural areas? Can such a delivery system be organized in the framework of deconcentration of CWS agencies? Can devolution of financial management to local authorities be a constraint? Can the gap between CWS agencies and the communities be an obstacle?

10. Do revolving funds have the merit of forcing the sector into a disciplined and reliable organizational framework? Do they generate resources? Can they act as catalysts and long-term regulators? Do they have an intersectoral development effect (e.g., as long as they continue to revolve, the entire CWS sector can rely on their proceeds, industry can expand, labour can be hired, foreign currencies can be saved, and increasing health benefits can be expected)? Is it advisable to appreciate the benefits of revolving funds to the economy as a whole? Is it essential that all surplus generated in the sector be earmarked to ensure that revolving funds do revolve?

11. Can revolving funds be effective in supporting the development of a reliable CWS institutional framework?

12. Since lack of motivated staff is often an obstacle to successful deconcentration, can there be a substitute to the decentralization process of hardware providers? Can Project Units be conceived as shadow organizations likely to expand to the level of permanent regional structures capable of attracting staff or preventing their return to urban areas at the time when construction has been completed and the less rewarding tasks of operation and maintenance and provision of software begin?

3.03 ISSUE III : INTERSECTORAL ACTION

The full health impacts and benefits of water supply and sanitation investments depend on many factors of which the appropriate design of the water and sanitation facilities is but one. Among other factors are educational level, personal hygiene practices, nutritional status and, for the continued functioning of facilities, access to technical assistance and spare parts. These interactions require the active involvement of a variety of organizations.

Issue

The various organizations which should make a contribution towards rural water supply and sanitation, have their own objectives and priorities. Helping another institution achieve its objectives is usually not considered a high priority. As a consequence, efforts at organizing the coordination of the activities of these agencies may fail.

Questions

1. Is the principal purpose of coordination to achieve better working relationship among various organizations or to assist specific programmes? Among these organizations, which are more concerned with overall coordination and which with field activities?
2. What are the activities which require a more general coordination (central, policy-making level) and which are activities related specifically to field work?
3. Should the user community (village, town, rural water supply/sanitation organization) undertake the coordination of field activities (bottom-up coordination)? What tools should be provided for the community to do so effectively? What internal action needs to be taken by organizations and by government to ensure their field offices respond adequately to requests?
4. What steps need to be taken by the organization or agency with principal responsibility in the water supply and sanitation sector to be able to respond to community requests and to coordinate internally and with other organizations in response to such requests?
5. Can an outline/contents be prepared for a communications package to provide assistance to those with a need to establish successful communications (list of "actors", their responsibilities, addresses, procedures, forms for requests, letters, etc)?

### 3.04 ISSUE IV : COMMUNITY MOTIVATION AND INVOLVEMENT

Evidence from many countries and projects indicates that whenever user communities do not have a sense of ownership or pride, or are not convinced of the usefulness of the water supply and sanitation facilities, systems quickly fall into disuse and disrepair. As a consequence, the desired benefits are not achieved.

#### Issue

Users need to be informed and motivated to use and benefit from water supply and sanitation facilities. Communities should participate in the development (concept, design) of a project, not just contribute to construction, and maintain the facilities (by paying for maintenance or undertaking it).

#### Questions

1. What are the users' traditional beliefs about water supply and sanitation and their relationship to health? Can these beliefs be used to support a personal hygiene education programme, or is such a programme necessary to correct mistaken beliefs? How can such a programme be designed and implemented?
2. How does the community determine the priority or urgency of its perceived needs? If water and sanitation are not regarded as urgent, what, if any reasons are there that they should be of higher priority? What, if any steps should be undertaken to provide community with information about water supply, sanitation and health which would lead to a reassessment of priorities?
3. What consultative process is available or can be developed (observation, survey, etc) to determine the community's preferences among alternative solutions, methods of implementation, financing, cost recovery, operation and maintenance? Is community participation practised in other sectors and does a consultative mechanism exist which could be used for water supply and sanitation? Is the community aware of existence of resources in other sectors? Is there a mechanism for access to these resources?
4. Can an algorithm, decision tree or other process be designed, that would help determine community priorities, the background and reasons for these priorities, and permit the development of an information and education programme which will lead the community to a re-examination of its priorities on the basis of improved information?
5. How do urban and rural communities differ in the potential use of community participation? What level of involvement should the individual user have and how should he be represented in the decision-making process in a large/small community?
6. Where the community assumes responsibility for operation and maintenance, what is the most appropriate permanent mechanism to select/train caretakers, collect funds, purchase spare parts, etc?

3.05 ISSUE V : HUMAN RESOURCES DEVELOPMENT

The most important resource of any service organization is its staff. Without competent and dedicated staff, even an abundance of financial resources will not lead to improvement or permanence in service. The implementation of Decade approaches requires staff qualifications and performance standards which differ from those of conventional CWS agencies personnel.

Issue

Public service organizations, frequently suffer from lack of sufficiently trained and motivated staff. This is particularly true for organizations responsible for rural water supply and sanitation. If IDWSSD goals are to be achieved, organizations' staff and village caretakers have to be able to better plan, implement, operate and maintain facilities.

Questions

1. What causes the lack of motivated and competent staff? Is it low remuneration, lack of benefits, insufficient training, no career prospects?
2. Can a careerpath be developed that rewards competent staff with promotion to higher level positions? Can this careerpath be developed in the existing organization or should a new "software" organization be established?
3. How can careerpaths in an organization be designed so software and hardware professionals have equal access to promotion and prestige jobs? By mandatory field service, rotation between construction, operation and maintenance, community participation, etc, or by separate vertical careerpaths to the highest organizational level?
4. Can a careerpath be developed for software/rural CWS staff using an appropriate format showing phases?
5. What training programme is required to achieve these objectives? What in house training should be given (managerial, operation), what external training opportunities (technical upgrading) should be made available?
6. How should village caretakers be selected, trained, compensated? To whom should they report and who should provide them with technical/administrative support?

3.06 ISSUE VI : PROJECT CONTENT

Access to water supply and sanitation facilities is often limited to the better-off members of a community or to wealthier communities because the cost of these systems exceeds the capacity of low-income groups to pay for them. In addition, the impact of projects is frequently less than desired because efforts are limited to water supply in situations where sanitation is equally important, supplementary inputs such as hygiene education are not provided, or the user community does not participate in project development.

Issue

To ensure that water supply and sanitation investments achieve the intended benefits, projects should be designed on the basis of clearly defined environmental health and service objectives and reflect socio-cultural and economic conditions of the users.

Questions

1. What are the objectives of the CWS projects (elimination of specific health hazards, reducing waste of time carrying water, achieving greater convenience, etc) and what are the specific standards of service, technologies and corollary actions necessary to achieve these objectives?
2. What are the interactions of different projects or project components (water, sanitation, solid waste disposal, storm water drainage, personal hygiene education) and how should priorities in their implementation be determined?
3. What precautions should be taken when financial constraints require a limitation of investment to a single component, e.g., water supply only in lieu of water supply and sanitation?
4. Do appraisal criteria based on financial considerations alone apply well to Decade projects? What are the economic implications of associating CWS with personal hygiene education, labour-intensive construction and community participation? Do CWS projects have values to the individual and the economy which are higher than those reflected by market prices? Is it feasible to account for intersectoral impacts in project evaluation?
5. What are the institutional implications of these new Decade project approaches? Should CWS projects always have an institution-building component? Does this mean that the well-structured conventional CWS institutions should pool their important resources with those of usually less favoured sectors such as Public Health? How? What effect has the introduction of a sanitation or health education component in a water supply programme on the financial performance of a water supply institution? How should such components be financed? Who should take responsibility for them?
6. Is a long transition period in institutional development compatible with the cycle of construction projects? What interim arrangements can take place? Can Project Units be institutionalized? Or is it preferable to create new agencies, or develop new structures within existing agencies?

ANNEX I

Annex I  
Page 1

SITUATION OF THE CWS SECTOR  
IN THE REPUBLIC OF TERRANIA IN OCTOBER 1979

The country

1. Terrania (Map I) is a country of 300 000 km<sup>2</sup> and 10 million people in central Africa; 85% of the population is rural. The capital city Hauterre in the Southern region has a population of about 1.2 million; there are two other towns of over 50 000 population and the remainder are below 10 000. The climate is tropical with seasonal rains twice a year, but in recent years these have varied highly in extent and timing. The centre and most populated part of the country is a high plateau containing 70% of the rural population. The Northern region with 50% of the area has only 12% of the population, living a semi-nomadic life on traditional seasonal pasture lands and marginal farms. The population has been growing at the rate of 2.7% per annum over the last four years and demographers predict another 3 million people by 1990 on median forecasts (Table I).

2. Throughout the high plateau there are a number of perennial and seasonal rivers. Shallow well potential currently could reach 40% of the rural population. There is deep groundwater potential for much of the plateau at depths around 100 metres and for the Northern areas at 300 metres. Gravity-fed systems could potentially serve 35% of the rural population almost all of whom live in the central and Southern regions (Table II).

3. The economy is mainly agricultural but there is a major mining industry which accounts for 60% of the export receipts, the rest coming from a range of tropical products. Recent oil price rises have placed a considerable strain on the balance of payments and there are tight import controls. The value of the Terrania dollar has been maintained artificially high<sup>(1)</sup>. Gross domestic product (GDP) per head is \$ 204 but average rural incomes are much lower. GDP is forecast by government planners to increase in real terms by 4% annually over the next five years. The current rate of inflation is 20% per annum.

4. In the capital city there are a number of light manufacturing industries. The small farmers have been given incentives to increase the production of cash crops for export, especially cocoa, coffee, tropical fruits and maize, and there have been significant increases in income in the high potential farming areas. Small towns in the central plateau have expanded and a number of small industries have been established. The cost of capital is kept artificially low to encourage new industrial investment and expansion of cash crop farming<sup>(2)</sup>. Strong urban unions, strict professional entry qualifications and industrial labour laws have kept urban wages high in relation to what unemployed labour would accept. There is a nationwide problem of youth unemployment amongst primary and secondary school leavers and this problem is growing as the population entering these age groups grow<sup>(3)</sup>.

5. The 1972-1974 oil crisis and drought period together forced the government to borrow abroad heavily to pay for its development programme, although extra aid was received to cover higher food imports. The government has attempted to maintain its development momentum throughout the 1970's despite the increasing problems. The servicing of foreign debt is currently under discussion with the IMF. Public sector investment in 1979 is the equivalent of US\$ 300 million.

6. The government is democratic, there being elections each four years, but there is only one major party. The administration is regionalized (four regions north, centre and south, plus the capital city) but currently all major decisions are taken by the central government. The government is acutely sensitive to the trend in rural opinions because of

(1) A shadow price of foreign exchange of 1.3 is used by the Ministry of Planning: 1 Terrania dollar (\$) = 1.05 US\$ at the official rate.

(2) A shadow rate of interest of 10% is used by the Ministry of Planning.

(3) The shadow price of labour used by Ministry of Planning is 0.6 W where W is the market labour cost.

pending elections early in 1980. It is giving consideration to increasing the range of responsibilities of the regional administrations and is prepared to consider all ideas which are not socially and politically disruptive for raising rural living standards .

7. Pilot projects in rural development with the assistance of the World Bank and under the leadership of the Ministry of Community Development and the Ministry of Agriculture are underway in two districts of the central region and one in the Southern region covering on average 100 000 population per district. The Ministry of Health aims to establish rural dispensaries for every 3 000 persons and health centres for every 30 000, but at present coverage of health centres is only 50% and of rural dispensaries 20%. There is better coverage in the central region than in the other regions. The community organization is strong, with both traditional chiefs and new village development councils.

#### The sector

8. The National Water Agency (NWA) is responsible for national coverage of rural and urban areas, except for the capital city which has its own Water Supply Authority under the Municipal Council. The NWA is responsible for urban sewerage outside the capital city. The Ministry of Health (MOH) is responsible for national sanitation, water quality surveillance and control but is mainly active in selected pilot rural sanitation projects as well as some urban water quality testing. Shallow wells have not been a major feature of NWA activities in the past; the Ministries of Agriculture and Community Development have had some projects to develop shallow wells to support their own activities.

9. Only 20% of the rural areas are "covered" with protected water systems. The urban areas have 70% coverage. The urban areas are 40% sewered, the rest served by septic tanks or pit latrines. Rural areas have either pit latrines or no sanitation system and statistics are insufficiently reliable to present coverage figures (Table III).

10. Operation and maintenance has been a severe problem in both urban and rural water systems. The government is currently engaging consultants to examine the need to rehabilitate and expand the urban water supply installations operated by the NWA. Training programmes for both urban and rural water supply have been organized for four years in a training unit of the NWA. The unit gives three-year courses and trains 100 assorted craftsmen and 10 technicians each year. Wastage rates for both craftsmen and technicians in the NWA to the private sector have been high. Much of the design work is undertaken by consultants and most of the larger schemes are carried out by private contractors.

11. Charging for metered house connections is on a national two-part tariff. There is no charge for unmetered standpipes in the urban or rural areas. In the rural areas villages contribute to laying pipes. The rapidly rising cost of water supplies to the Government has been forcing it to rethink policies on charging for rural water supplies. The prospect of the International Drinking Water Supply and Sanitation Decade has slowed decisions on this issue because the governments want to see whether foreign aid for water may cover their extra funding needs.

12. In theory, the NWA supplies water for other government departments' schemes, such as in housing and irrigation, but in practice these departments do most of their own work through their own sub-contractors. There is little intersectoral coordination except at the highest central policy levels. There is no inter-departmental machinery for relating water, sanitation, health and nutrition programmes, although the government is aware of the need and there is some training of district nurses and community development officers along these lines.

13. The government does not pay for its water supplies and it does in fact consume 5% of the total output of the NWA. Before 1975 the NWA was not allowed to borrow; capital funds were received through the Government Development Budget. After 1975 the NWA could borrow (through government loans) and from that date the NWA became responsible for its own debt

servicing. Investment (1975-1979) in the sector has been between 3-3.5% of the public sector investment, the equivalent of US\$ 11.4 million in 1979, divided 48% urban and 52% rural, with all but US\$ 1 million going to the water subsector.

14. Government funds are channelled into the NWA in four ways. First, as an indirect subsidy by lower than market rates of interest on the government loans; second, through a direct contribution to the operation budget of the NWA; third, by a development budget annual contribution to the Rural Water Development Fund which finances a large part of the rural water supply capital programmes; fourth, the government indirectly assists in training programmes and research and technology development.

15. A recent consultant report on management of NWA has recommended splitting the urban and rural services of the agency. It is also critical of the design criteria guidelines of NWA, saying that they are outdated and do not take into account the social and economic framework in which they should be applied, nor do they match the local development goals of the government (Table IV).

#### The rural water supply programme

16. Although there is currently no rural water supply organization, a rural water supply programme supported by a major bilateral donor has been in operation for ten years. A recent review has criticized the programme on the following basis: (i) its coverage rate has been too slow; (ii) schemes are going out of service almost as fast as new schemes are being inaugurated.

17. The review recommended a much larger operation and maintenance division of the NWA and regional operation and maintenance workshops. A university of Terrania study, on the other hand, has attributed the relative failure to inappropriate technology and an absence of community participation. Both the government and the bilateral donor are looking to a rural project supported by an international development bank to suggest new approaches to solve these various problems.

#### The Three Districts project

18. The Terrania government is rethinking its rural water supply programme and has proposed three districts, one in each region, for consideration for funding by a major international bank. The districts are Aban in the northern region, Bekili in the central region and Kalive in the southern region (Map I). Some of the basic data for the Three Districts project are given in Tables V and VI. The population of the three districts is estimated at 1.4 million in 1979, which is therefore 14% of the total population and 16% of the population excluding Hauterre, the capital city.

19. The government has asked that the Three Districts project be prepared as if it could be replicated throughout Terrania. The implication is that there would need to be another six such projects to achieve national coverage. The government has laid down certain cost limits on the project as well as required components. Linked sanitation inputs are mandatory whilst components related to other sector or multisector projects, already planned for the district, are discretionary inputs.

#### The Kalive district component of the Three Districts project

20. The Kalive district (Map II) is one of the largest districts in the southern region of Terrania. It is bounded on three sides by land and on the fourth side by Lake Kandi. Large mineral salt deposits on the lake bottom make the waters of Lake Kandi mildly saline. The total area of the district is 67 000 km<sup>2</sup>. The district is bounded on the South side by the major Ledikulu River.

21. The climate of Kalive is similar to the rest of Terrania, tropical with two rainy seasons. There is, however, a considerable variation from 900 - 1,300 mm in the annual average rainfall. The principal rainy season lasts from November/December until February/March and there is a second rainy period covering the months of May and June.

22. The population is estimated at 506 000 people in 1979/1980. The Eastern and Southern parts of the District are quite densely populated, while the population is very sparse in the North-Western parts of the area, especially in Lale division. The capital of Terrania lies 200 km to the South-East of Kalive.

23. The government has a number of plans for rural CWS and studies have been made. The most comprehensive study available is that which has been made for water development of the Kalive district. No particular studies have been made of the sanitation and health status of the population of this district.

24. Available statistics of health centre attendances in the four divisional centres of Ilawa, Lale, Wangwea and Kalive suggest that there is little difference in health status between the Kalive population and the rest of Terrania. A number of recent cases of cholera which have been difficult to contain have been reported in Lale and Sokoko towns and outlying villages in both Lale and Ilawe divisions. There is a prevalence of gastro-enteric diseases, malaria and schistosomiasis, on a par with the rest of Terrania.

#### Other rural development studies

25. Well-defined projects assisted by international and bilateral agencies are in an advanced state of preparation to increase the agricultural output of the Kalive district and raise its level of economic activity in conjunction with other rural development objectives.

26. These programmes include: (i) pilot approaches to intensified crop and live-stock production in 42 villages; (ii) pilot reforestation programme in the old tobacco growing areas of Wangwea division; (iii) equipment and workshops to increase capacity to maintain and improve access and network roads throughout the district; (iv) credit inputs to the Artisan Development Agency to start rural workshops, increase the number of village and small town industries and improve maintenance of local machinery and equipment; (v) support to a large mission of the Charitable Group in the development of an irrigation perimeter on the Pumani Plateau (18 villages are involved in this project).

27. Other development efforts in the same programmes, include: (i) support for expansion of primary health care network to, in particular, improve schistosomiasis and malaria control programmes, improve district environmental health and raise the standard of mother and child health services, and (ii) financing for the development of the principal rural market and cooperative distribution centres in Lale, Wailka, Sokoko, Kalive and Wangwea townships.



REPUBLIC OF TERRANIA

POPULATION FORECASTS

	Population (m)		
	1979	1984	1990
Urban <u>1/</u>	1.5	1.9	2.5
(Hauterre)	(1.2)	(1.6)	(n/a)
Rural <u>2/</u>	8.5	9.5	10.5
	10.0	11.4	13.0

Regions

Northern	1.3
Central	4.7
Southern (excluding Hauterre)	2.8
(Hauterre)	<u>1.2</u>
	10.0
	<u><u>        </u></u>

1/ The census officials have adopted a definition of "urban" based on the size of the agglomeration as well as the suitability of urban-type infrastructure services. Also all administrative centres are treated as urban. Following this definition, there are 23 urban communities (20 of which have less than 10,000 population, average urban population density 50 persons/ha).

2/ The rural community comprises 1 million nomads, and 7.5 million population living in 15,000 villages and hamlets, 1,500 of which have village councils.

Source - Economic Planning Unit

ANNEX I  
Table II

RURAL WATER SUPPLY  
A. TECHNOLOGY CHOICES AVAILABLE FOR SOURCE DEVELOPMENT

REGION	Estimated 1979 rural pop. (m)	TYPE OF SOURCE DEVELOPMENT AVAILABLE											
		Shallow wells			Gravity Systems			Other Surface Systems			Deep Wells		
		Max. % of pop. which option can serve	Dev. cost per capita (\$)	Max. % of pop. which option can serve	Dev. cost per capita (\$)	Max. % of pop. which option can serve	Dev. cost per capita (\$)	Max. % of pop. which option can serve	Dev. cost per capita (\$)	Max. % of pop. which option can serve	Dev. cost per capita (\$)		
NORTHERN	1.2	20	15	-	40	35	45	60	50	50			
CENTRAL	4.5	60	15	50	40	45	80	50	50				
SOUTHERN	2.8	70	15	20	40	45	80	50	50				

B. EXAMPLE OF EFFECT OF TECHNOLOGY CHOICE ON DEVELOPMENT COST

REGION	Development cost	TYPE OF SOURCE DEVELOPMENT SELECTED												Total Development cost (\$ m)
		Shallow wells			Gravity Systems			Other Surface Systems			Deep Wells			
		% of Pop. served	Pop. (m)	Development cost (\$ m)	% of Pop. served	Pop. (m)	Development cost (\$ m)	% of Pop. served	Pop. (m)	Development cost (\$ m)	% of Pop. served	Pop. (m)	Development cost (\$ m)	
NORTHERN	Least	20	0.24	3.6	-	-	35	0.42	18.9	45	0.54	27	49.5	
	Intermediate	15	0.18	2.3	-	-	30	0.36	16.2	55	0.66	33	51.5	
	Highest	5	0.06	0.9	-	-	35	0.42	18.9	60	0.72	36	55.8	
CENTRAL	Least	60	2.7	40.5	40	1.8	72	-	-	-	-	-	112.5	
	Intermediate	25	1.125	16.9	25	1.125	45	1.125	50.6	25	1.125	56.3	168.8	
	Highest	-	-	-	-	-	-	0.9	40.5	80	3.6	180	220.5	
SOUTHERN	Least	70	1.96	29.4	20	0.56	22.4	10	0.28	12.6	-	-	64.4	
	Intermediate	30	0.84	12.6	20	0.56	22.4	20	0.56	25.2	30	0.84	102.2	
	Highest	-	-	-	-	-	-	20	0.56	25.2	80	2.24	237.2	

Note: From the Table B it can be noted that on a national basis the least-cost programme, based on the development of the cheapest technology available in each Region, would amount to \$ 226.4 m. The highest cost on the other hand, based on the development of the most expensive technology in each Region, would escalate the National Programme cost to \$ 513.5 m. In reality the practical cost will probably lie somewhere between these two amounts but the figures clearly illustrate the advantage of adopting least-cost technical solutions to the greatest extent possible.

REPUBLIC OF TERRANIA

SECTOR COVERAGE

Water

The best estimates made of the proportion of the Terrania population who have "access" to safe water supplies, either protected well, or house connection, or standpost at less than 400 metres, are as follows:

Proportion of population covered - 1979	
Rural	20%
Urban	70%

4-Year average, per annum Rate of increase of population covered	
Gross*	Net*
2%	1.5%
4%	3.0%

\* Gross rate of coverage is excluding schemes going out of service and net rate of coverage allows for this factor.

Sanitation

70% of the Hauterre population is served by an "approved" system of sanitation (50% sewerred, 5% septic tanks and 15% pit latrines). Of the other urban areas, 20% have septic tanks, 30% pit latrines. The availability of sanitation systems in the rural areas is unknown; there have been no official programmes or statistical records of coverage progress.

Source - NWSB, NAC

ANNEX I  
Table IV

DESIGN CRITERIA AND UNIT COST DATA

I. WATER SUPPLY DESIGN CRITERIA

Urban

Existing NWA design criteria and unit costs are based on a consumption of 150 lcd for house connections and 40 lcd for standposts; 50% of the people are served through house connections and 50% through standposts. Unit investment costs with these design criteria are on average the equivalent of US \$ 110 per capita.

Rural

Existing rural schemes are based on a consumption of 120 lcd for house connections and 35 lcd for village distribution systems to standposts not more than 100 metres from households. Scheme unit design costs have averaged the equivalent of US \$ 45 per capita.

The average unit cost of US \$ 45 per capita has included some shallow wells with no distribution systems. The unit costs for types of schemes and the existing mix of schemes (1975-1979) are as in the table below:

<u>Unit Costs of Rural Water Supply</u>		Percentage of population supplied 1975-1979
	Unit Cost US \$ per capita	
(1) Shallow wells	15	8
(2) Boreholes	50	32
(3) Surface pumped	45	15
(4) Surface gravity	40	45
	<u>Total served</u>	<u>100</u> (20% of rural population)

Consultants have calculated that for every 100 metres increase in distance to a standpost, unit costs of (2), (3) and (4) above will be reduced by 20%.

II. SANITATION DESIGN CRITERIA

The National Water Agency has no design criteria for sewerage; all the development budget of US \$ 0.8 million has been used for major rehabilitation projects for the Hauterre sewerage system.

The Ministry of Health also does not use specific design criteria for any sanitation schemes.

Unit investment costs per capita recommended by the Ministry of Planning for 1979 Sector planning purposes are:

	US\$
- Sewerage	250
- Septic tank	180 (majority of investment cost is borne by user)
- Pit latrine	15
- Improved pit latrine	30
- Communal toilet	25

3 District Project Design Cost Limits

The Kalive District Water Supply Study ... produced by consultants, has used slightly different design criteria; the only changes required by Government arise as a result of the special cost criteria pertaining to the final preparation of the 3 Districts Study. These are to limit per capita costs directly or indirectly chargeable to the Treasury to:

<u>Capital costs:</u>	\$	78
- water	60	
- sanitation	18	
<u>Recurrent costs:</u>		5

ANNEX I  
Table V

TERRANIA - 3 DISTRICTS PROJECT

POPULATION PROJECTIONS AND WATER SUPPLY COVERAGE IN THE PROJECT DISTRICTS

REGION	DISTRICT	POPULATION (000' s)			POPULATION GROWTH RATE % p.a.	% COVERED WITH APPROVED SYSTEMS	COVERAGE REQUIREMENTS (000' s)			
		1979	1984	1999			BACKLOG	GROWTH	TOTAL	AVERAGED p.a. (proximate)
NORTHERN	ABAN	250	282	452	3.0	10	225	202	427	20
CENTRAL	BEKILI	600	657	946	2.3	34	396	346	742	40
SOUTHERN	KALIVE	505	566	890	2.9	28	364	385	749	40
TOTAL	3 DISTRICTS PROJECT	1,355	1,505	2,288	2.7	27	985	933	1,918	100

ANNEX I  
Table VI

ANNEX I  
Table VI

TERRANIA - 3 DISTRICTS PROJECT  
PERSONS TO BE SERVED WITH WATER SUPPLY\*

DISTRICT	1979	1980	1981	1982	1983	1984	5-year total 1984-1989
<u>ABAN</u>							
urban HC	/	/	0.1	0.2	0.4	0.5	2.5
urban SP	/	/	0.3	0.6	1.5	1.5	7.5
rural HC	/	/	0	0	0	0	0
rural SP	/	/	18.0	20.0	24.0	26.0	150.0
<u>BEKILI</u>							
urban HC	/	/	1.0	2.0	2.5	3.0	15.0
urban SP	/	/	1.0	2.0	2.5	3.0	15.0
rural HC	/	/	5.0	10.0	20.0	25.0	120.0
rural SP	/	/	8.0	11.0	21.0	20.0	100.0
<u>KALIVE</u>							
urban HC	/	/	0.5	1.0	1.0	3.0	8.0
urban SP	/	/	1.0	1.0	1.0	2.5	8.0
rural HC	/	/	3.0	9.0	12.0	15.0	60.0
rural SP	/	/	12.0	24.0	29.0	36.0	144.0
<u>3 DISTRICTS PROJECT</u>							
urban HC	/	/	1.6	3.2	3.9	6.5	25.5
urban SP	/	/	2.3	3.6	5.0	7.0	30.5
rural HC	/	/	8.0	19.0	32.0	40.0	180.0
rural SP	/	/	38.0	55.0	74.0	82.0	394.0
Total 3 Districts project			49.9	80.8	114.9	135.5	630.0

\* To achieve 100% coverage by 1995/2000.

NOTES

1. The Kalive District figures are based on the Water Supply Report and initial appraisal by Government but would be subject to change after final project preparation and appraisal.
2. Urban house connections (HC) to standpipes (SP) are assumed to be in a ratio of 50:50 except for Aban where the HC/SP ratio is assumed to be 25:75. Rural Aban is projected not to require house connections before 1989.

INVESTMENT REQUIREMENTS TO PRODUCE COVERAGE

A. TREND SCENARIO

1. Population presently covered (1979) (million)

<u>Water</u>			
- Rural	Pop 8.5	20% covered = 1.7	- Deficit ..... = 6.8
- Urban	Pop 1.5	70% covered = 1.05	- Deficit ..... = 0.45
<u>Sanitation</u>			
- Rural	Pop 8.5	coverage unknown	- Probable deficit = 8.5
- Urban	Pop 1.5	70% of Hauterrie (1.2) served = 0.84	
		50% of rest (0.3) served = 0.15	
		Total served = 0.99	- Deficit ..... = 0.51

2. Backlog required to be covered per annum (1980-1990 → 11 years)

Urban	[ Water	41,000 persons
	[ Sanitation	46,000 persons
Rural	[ Water	618,000 persons
	[ Sanitation	773,000 persons

3. Increase per annum (average) of population to be covered

Urban: 91,000      Rural: 182,000

Total to be covered per annum: Urban Water 132,000      Rural Water 800,000  
Sanitation 137,000      Sanitation 955,000

Population not served anymore each year (schemes going out of service)

(Assumption: sanitation same as water)

Urban 1% of population (total)      Approximately 1% and 0.5% of 1979 average (new schemes won't have time to deteriorate until 1990, thus investment increase plays no role)

Rural 0.5% of population (total)

Urban	[ Water	15,000
	[ Sanitation	15,000
Rural	[ Water	43,000
	[ Sanitation	0

Total to be served on average per year: Urban [ Water 147,000      Rural [ Water 843,000  
Sanitation 152,000      Sanitation 955,000

4. Investment requirements per year (1979 prices)

Unit costs (1979 prices) Water supply: Urban US\$ 110      Sanitation: Urban US\$ 166  
Rural US\$ 45      Rural US\$ 15

Sanitation breakdown

- Urban:	40% of all sewered at 250	= 600,000 at 250 (all in Hauterrie)
	3% of Hauterrie septic tanks at 180	= 60,000 at 180
	15% of Hauterrie pit latrines at 30	= 180,000 at 30 (improved)
	20% of other urban septic tanks at 180	= 60,000 at 180
	30% of other urban improved pits at 30	= 90,000 at 30
		990,000 of which 600,000 at 250
		120,000 at 180 → 30% public investment in septic tanks
		270,000 at 30
		600,000 at 250      150,000,000
		120,000 at 30      6,480,000
		270,000 at 30      8,100,000
		990,000 at 166\$      164,580,000
		(average)

- Rural: simple pit latrines at 15

	<u>Annual costs</u>		<u>Total Decade costs</u>
<u>Water</u>	- Urban 147,000 x 110 = 16,170,000	] x 11 =	177,870,000 17.3%
	- Rural 843,000 x 45 = 37,935,000		417,285,000 40.5%
<u>Sanitation</u>	- Urban 152,000 x 166 = 25,232,000		277,552,000 26.9%
	(varies with availability of water and density)		
	- Rural 955,000 x 15 = 14,325,000		157,575,000 15.3%
	93,662,000		1,030,282,000 100.0%

Projection of GDP and public investment

1979 GDP = 204 x 10 million = 2,040 million \$  
at 4% 1990 GDP = 2,040 x 1.5395 = 3,141 million \$  
Average =  $\frac{2,040 + 3,141}{2}$  = 2,591 million x 11 = 28,500 million \$

5. Investment potential

Public sector investment 1979 = 300 million = 14.7% of GDP  
Water/sanitation investment 1979 = 11.4 million = 3.8% of public investment  
- 48% urban Water = 10.4 million  
- 52% rural Sanitation = 1.0 million

Total public investment during Decade: 14.7% x 28,500 million = 4,189.5 million (constant prices)

Total sector investment during Decade (1): I = 4,189.5 million x 3.8% = 159.2 million instead of 1,030.3 million (with same ratio of sector to total public investment)

I = 15.5% of requirements

B. POLICY OPTIONS

1. Changes in design criteria

a) Changes in proportion of standpipes to connections (urban)

Presently 50/50 with Unit investment cost = \$ 110 per capita (average)  
Would become \$ 45 if all like rural average  
 $45 \times 50 + 110 \times 50 = 110 \times 100$   $\rightarrow$   $175$  \$

House connections cost 175\$/head  
Public standposts cost 45\$/head

Saving = 130\$/head for 50% of additional population to be served (maximum) =  $\frac{130 \times 147,000 \times 11}{2} = 105,105,000$

To which extent is this feasible?

Replacement of existing systems? No, keep 50/50 proportion

Expansion of Hauterre system? Limited possibilities - Same for 2 other towns of over 50,000

Remainder is 20 towns of less than 10,000 each - possible but effect is limited to maximum saving perhaps 50 million \$ (with less revenue from house connections and drastic change in level of service)

Say maximum savings = 50 million \$

b) Changes in urban sanitation technology

All served by improved pit latrines or septic tanks with maximum government participation of \$ 30 per head (communal septic in periphery, etc.)  $\rightarrow$  saving = 166 - 30 = \$ 136 per head

Total savings = 136 x 152,000 x 11 = 227,392,000

Say maximum savings = 200 million \$

(Those already sewered must be subtracted)

c) Changes in rural water systems: source development

High-cost = 513.5 million \$ for 8.5 million people  $\rightarrow$  60.4 \$ per head, say 60 \$

Least-cost solution amounts to 226.4 million \$ to serve population of 8,500,000 = 26.6 \$ per head, say 27 \$

Intermediate cost 322.5 for 8.5 million  $\rightarrow$  37.9, say 38 \$

20% of the rural population, or 1.7 million people are already served at per capita cost of 45 \$ = weighted average of persons served at 60 \$, 38 \$ and 27 \$.

Assume uniform proportion and check

$45 = 60k + 38k + 27k = 125k$

$k = 0.36 \rightarrow$  roughly 1/3 equally

Savings per capita:  $45 - 27 = 18$  \$ for least-cost option (a)

$45 - 38 = 7$  \$ for intermediate cost option (b)

$-60 + 45 = -15$  \$ for high-cost option (c)

Total savings (maximum population in least-cost solution - shallow wells =  $\frac{4.9}{8.5} = 58\%$  of population)

$58\% \times 843,000 = 489,000$  (rest 1/2 high 1/2 intermediate)

Savings =  $(489,000 \times 18 + 177,000 \times 7 - 177,000 \times 15) = 81$  million, say maximum 100 million \$

d) Increasing distance walked to water source (rural)

$\rightarrow$  20% reduction in cost for 92% of population (8% is served from shallow wells) in present situation; in future maximum use is to be made of shallow wells. Limit of use of shallow wells:

North	= 240,000 people
Centre	= 2,700,000 people
South	= 1,960,000 people
	<u>4,900,000</u>

$\rightarrow$  Economy on walking distance is for (rural only)  $\frac{85 - 49}{85} \times 843,000 \times 11 = 3,927,000$  persons

Total savings for 200 metres additional walking distance =  $45 \times 40\% \times 3,927,000 = 70.7$  million, say 50 million \$ for 250 m.

(design criteria become 250 m from standpost)

TOTAL SAVINGS:	Urban	Standposts/connections	50 million \$	
		Sanitation	200 million \$	
	Rural	Source development	100 million \$	
		Distance	50 million \$	
			<u>400 million \$</u>	New cost about <u>600 million \$</u>

2. Increase in public investment in sector to 6% of overall public investment

In 1979, 6% x 100 million = 6 million \$

Other years, 4,189.5 million x 6% = 251.4 million \$

258.0 million \$ = 43% of requirements

Note: What happens if investment stays in per capita cost within limits defined at page 2 Annex 4 (for 3 districts project)

Water	60 \$	$\rightarrow$	$(147,000 + 843,000) \times 60 \times 11 =$	653,400,000
Sanitation	18 \$	$\rightarrow$	$(152,000 + 995,000) \times 18 \times 11 =$	<u>219,186,000</u>
				<u>872,586,000</u>

The programme is even less feasible (design criteria remain high)

INVESTMENT REQUIREMENTS TO PRODUCE COVERAGE (cont'd)

3. Reducing targets

a) Maximum advantage can be taken of self-help

- The Rural sanitation programme is limited to supplies at about 3 \$ per head if free labour is obtained from the community. Investment would be reduced from 158 million \$ to  $1/5 \times 158 = 31.6$  million \$ - Add 2 \$ per person (1,000 \$ for village of 500) for health education and assistance in construction = 21 million \$  
Say maximum savings = 100 million \$ (communal latrines, etc.)
- The Rural water supply programme for population covered by health centers (50% of total) can benefit from free labour. Least cost solution = 417 million \$ - 150 million \$ (see policy options)  
Assume labour amounts to 30% of cost (minimum):  $30\% \times 267$  million = 80 million \$  
Assume 3 \$ per person for health education and assistance in construction = 28 million \$  
Say maximum savings = 50 million \$
- The Urban water supply programme can be further reduced by provision of self-help; however any additional savings would probably be best used in the provision of more house connections, in order to improve overall service level and generate more internal revenue which in turn can improve and facilitate service to urban poor and rural areas. Thus it is assumed here that no further savings can be made on this programme.
- The Urban sanitation programme can be reduced by letting the beneficiaries pay for the full cost of septic tanks; self-help can also be organized not only for maintenance, but for part of the construction work.  
Savings =  $120,000 \times 30 \times 11 = 40$  million \$  
Say maximum savings = 50 million \$ (includes some savings on pit latrines)

b) Local manufacture can be encouraged

This has the advantage of providing jobs to the unemployed and reducing the foreign exchange component of projects. The sector would also benefit from indirect government subsidy if loans at concessionary rates can be obtained. However such advantages are difficult to quantify, as the overall cost price of local manufacture can only be assumed, and may in some instances (urban water supply and sewerage) be higher than that of imported materials. In the rural sub-sector, PVC pipes or latrine slabs probably represent a potential saving. Maximum savings are conservatively assumed not to exceed 5% of urban water cost and 15% of urban sanitation and rural costs.

c) Adoption of new targets

Taking account of new savings described above, the overall programme becomes:

- Urban water supply	178 - 50 = 128 - 5% (128)	= 122 million \$
- Urban sanitation	278 - 250 = 28 - 15% (28)	= 24 million \$
- Total urban	<u>456 - 300 = 156 - 10</u>	<u>= 146 million \$</u>
- Rural water supply	417 - 200 = 217 - 15% (217)	= 184 million \$
- Rural sanitation	158 - 100 = 58 - 15% (58)	= 49 million \$
- Total rural	<u>575 - 300 = 275 - 42</u>	<u>= 233 million \$</u>
- Grand total	<u>1,031 - 600 = 431 - 52</u>	<u>= 379 million \$</u>

Total investment potential = 258 million \$

Investment potential = 68% of requirements

Present breakdown is 48% urban, 52% rural

New breakdown should be  $146/379 = 39\%$  urban and  $233/379 = 61\%$  rural

Present breakdown is 10.4/11.4 = 91% water and 1/11.4 = 9% sanitation

New breakdown should be  $306/379 = 81\%$  water and  $73/379 = 19\%$  sanitation

Investment potential = 209 million \$ in water and 49 million \$ in sanitation

The breakdown of reduced targets is approximately:

- Urban water supply	= $39\% \times 209 = 82$ million \$	= 67% of requirements
- Urban sanitation	= $39\% \times 49 = 19$ million \$	= 79% of requirements
- Rural water supply	= $61\% \times 209 = 127$ million \$	= 69% of requirements
- Rural sanitation	= $61\% \times 49 = 30$ million \$	= 61% of requirements
- Total sector	<u>258 million \$</u>	<u>= 68% of requirements</u>

d) Where should the emphasis be?

If the programme is applied with the investment breakdown indicated above, by 1990 the situation will be as follows (for each sub-sector = Population served P = population served in 1979 + x% of additional population to be served during Decade with x = 67, 79, 69 and 61; deduct schemes going out of service):

- Urban water supply	= $P = 1.05 + 67\% (132,000 \times 11) = 2.0$ million served	= 81% of 1990 population (2.5)
- Urban sanitation	= $P = 0.99 + 79\% (137,000 \times 11) = 2.2$ million served	= 87% of 1990 population (2.5)
- Rural water supply	= $P = 1.7 + 69\% (800,000 \times 11) = 7.8$ million served	= 74% of 1990 population (10.5)
- Rural sanitation	= $P = 0 + 61\% (955,000 \times 11) = 6.4$ million served	= 61% of 1990 population (10.5)

The programme as such is sound, because it results in service to more than 80% of the urban population and more than 60% of the rural. Beyond these levels, unit costs probably increase sharply. The programme can however be improved by placing emphasis on the rural sub-sector. If more than 75% of the urban population is directly served by private connections or public standposts, it can be assumed that all are served by redistribution effects (for instance through neighbours or water vendors); also sewerage is neither needed nor feasible in the last years of the Decade for the water systems built in that period. Thus substantial savings (probably about 10%) can be made on the urban programme, to be transferred to the rural programme which because of its dispersion has limited redistribution effects. The overall sector coverage target should be set at approximately 75% of the 1990 population, with equal proportion of people served per sub-sector.

The deficit is considerable = 3.25 million people, of which 2.6 million rural dwellers. Unless the gap can be bridged by internal fund generation (from tariffs), the only approach to complete coverage is qualitative, and financed from regular budget. It consists essentially in health education, surveillance of water sources and mobilization of community participation for contributions, not only in labour, but also in cash, raw materials, etc. Savings which can result from such actions have generally been minimized, and could be much more substantial if the communities are properly motivated and organized.

On the whole, the Decade targets can be achieved (housing and irrigation projects include in most cases a water supply component financed by the relevant departments), but it is important to ensure from the beginning that adequate provisions are made in the regular budget to achieve those qualitative improvements which are needed to compensate for the insufficient investment resources. Also, the one million nomads who represent one-third of the deficit population of the investment programme should be served in the framework of multipurpose projects. The same applies to the very scattered rural population. The average population of a village is 567 in 1979, with density as low as eight inhabitants per km<sup>2</sup> in the Northern region. On the entire territory there are thousands of isolated hamlets, where public investment is best applied through integrated rural development projects.

Finally the development of local manufacture would result in an increase in GDP growth rate and could increase sector investment resources. However, with a total sector programme reduced to about 400 million \$, and assuming a high local materials component of 20% (80 million \$), total GDP in the period would grow by less than 3 per thousand; 100% of this is negligible; thus the only effect on the sector can come from cost reductions, if they are feasible as assumed above.

ANNEX III

MINISTRY OF FINANCE - TERRANIA

18 January 1979

The Hon. H.J. Awango  
Chairman  
National Water Agency

Dear Haré,

You will appreciate that I have been worried for some considerable period about the 3 Districts Project. It is only last month that the Cabinet, in approving the setting up of the National Action Committee for the International Water Decade, confirmed its serious intent to reach the goals of the Decade. I am concerned to ensure that the Decade is set on a financially sound course for the country.

The Government has asked the NWA to prepare the 3 Districts Water Project with an aim to replicating the approach as far as possible throughout Terrania. My advisors inform me that this may be difficult to do as the project is currently conceived. First, a large part of the burden of the project falls on the Government through its purchase of unmetered water. The Treasury is being asked to pay any increase in tariff for this water. Second, the project is being financed with 3% loans when current market rates are very much higher and the pressure to use this money elsewhere is considerable. Third, the recurrent cost implications go above the guidelines set by Government to prepare for the project. There will also be additional repercussions on the training and support role of civil service personnel.

From the accounts that have been made available, up to 1984, it appears that the Treasury may be able to accept the extra burdens of the project. However I am not so certain that I am prepared to accept this project if it will automatically bind me to an acceptance of future replications throughout Terrania. This also becomes important as the project moves beyond 1984 into the 1984-1989 period and beyond. The early burdens are less than the later ones as the project builds up momentum.

If the 3 Districts Project is to be acceptable to my Ministry, it must become more financially independent of Treasury assistance. Before taking the matter to my colleagues, I would be grateful if you would review the Project and give me your views.

Yours sincerely,

The Hon. B.J. Barudé, M.P.  
Minister of Finance

MINISTRY OF FINANCE  
TERRANIA

20 March 1979

The Hon. H.J. Awango  
Chairman  
National Water Agency

Dear *Hano,*

Please refer to my letter of 18 January 1979 concerning the 3 Districts Project.

I have now received from the National Action Committee the tabulation of investment required to produce nationwide coverage in accordance with the objectives of the International Drinking Water Supply and Sanitation Decade.  
... I am aware that you also received this document, a copy of which is attached for easy reference.

Besides the Kalive Project preparation report from the NWA project planners, I have also received a paper containing various elements which can be used in the preparation of this Project, and which I am also including for your information.  
...

All these documents have been quite useful in my review of the financial statements showing the impact of the Terrania 3 Districts Project; I have also reviewed your request for a water tariff increase, the covering draft legislation, and the note from EPU to the Prime Minister on this subject.

Two comments, which I believe are of major importance, have been made by staff from this Ministry in connexion with NWA and the sector in general;

- (i) NWA present situation does not seem to be adequately reflected in the financial statements which we have received;

... ATTACH.

- (ii) The optimum solution to overall sector problems can be approached through some of the strategies which have been suggested; however the optimum solution, and in my view the only one which can lead to the achievement of the Decade objectives, is institutional, and consists of merging the resources and consumer markets of NWA with those of the Hauterre Water Authority.

In support of (i), the following has been noted:

1. Rural house connections: real consumption in 1979<sup>1/</sup> was 3.7 million m<sup>3</sup>; recorded consumption was only 2.1 million m<sup>3</sup>; thus what was really metered amounted to about 57% of total consumption.
2. Urban house connections: real consumption must have been of the order of 8.2 million m<sup>3</sup>, while recorded consumption amounted to 25.6 million m<sup>3</sup>; the only explanation I can find for this is that the large diameter meters, which represent 6% of consumption, are probably out of order. Thus Government offices, army camps, industry and other large consumers in secondary towns are probably charged very high lumpsum amounts which I doubt could be increased.
3. Rural standposts: the recorded consumption of 18 million m<sup>3</sup> corresponds to a per capita allowance of more than 30 lcd, which is a high figure in view of the present access difficulties.
4. Urban standposts: while the real consumption, if a high allowance of 40 lcd was adopted, would amount to less than 1 million m<sup>3</sup>, the statistics show billings based on the double of this figure. After a brief enquiry, I have found that half of the standposts are either out of order or closed by NWA; however the Government continues to be billed for water which is in fact not delivered. On the other hand these standposts do exist and could be used to relieve some of the present difficulties.
5. Total house connections: their real consumption probably does not exceed 12 million m<sup>3</sup>, but is recorded at a level close to 28 million m<sup>3</sup>. While in theory the average tariff for house connections is about 16 c/m<sup>3</sup>, in reality it is close to 38 c/m<sup>3</sup>.
6. Total standposts: the consumption should amount to 21.5 million m<sup>3</sup>, and is recorded at the level of 20 million m<sup>3</sup>; I have no problem with this small difference, except for my serious reservation concerning the use of standposts in urban areas.

In support of (ii) (institutional reform) I find that, based on estimates of Hauterre water supply statistical and financial situation, the consolidation of the Hauterre Water Authority and NWA is probably the best way to achieve our objective without imposing a heavy burden on the consumers.

---

1/ As per NWA's design criteria.

... Please find attached in support of statements (i) and (ii) some revised estimates which have been prepared in this Ministry, in an attempt to reflect more accurately the operational and financial situation of NWA, to describe the situation of the Hauterre Water Authority, and to envisage the possible outcome (in terms of expenses, sales and tariff) of a consolidation of NWA and the Hauterre Water Authority; kindly note that in view of the present situation I shall strongly recommend that this proposal be given adequate consideration.

In this connexion you may wish to review the various statements and forecasts related to the 3 Districts Project, the rural water supply programme, and more generally the development of the water supply and sanitation sector during the forthcoming Decade.

Yours sincerely,



The Hon. B.J. Barudé, M.P.  
Minister of Finance

Ministry of Finance  
March 1979 - DRAFT

ANNEX V

CONSOLIDATION OF NWA AND HAUTERRE RESOURCES AND ACTIVITIES

NWA - Population served, consumptions, financial estimates and projections

Constant prices (million m <sup>3</sup> and \$, cents/m <sup>3</sup> )	ESTIMATE		PROJECTIONS			
	1979	1980	1981	1982	1983	1984
Total population (million)	8.8	9.0	9.2	9.4	9.6	9.8
- Rural population <sup>1/</sup>	8.5	8.7	8.9	9.1	9.3	9.5
% served by house connections	5% x 20%	5% x 26%	5% x 32%	5% x 38%	5% x 44%	5% x 50%
Number served by house connections	85,000	113,100	142,400	172,900	204,600	237,500
Consumption by house connections (120 lcd)	3.7	5.0	6.2	7.6	9.0	10.4
% served by standposts	95% x 20%	95% x 26%	95% x 32%	95% x 38%	95% x 44%	95% x 50%
Number served by standposts	1,615,000	2,148,900	2,705,600	3,285,100	3,887,400	4,512,500
Consumption by standposts (35 lcd)	20.6	27.5	34.6	42.0	49.7	57.6
- Urban population <sup>2/</sup>	0.3	0.3	0.3	0.3	0.3	0.3
% served by house connections	50%	50%	50%	50%	50%	50%
Number served by house connections	150,000	150,000	150,000	150,000	150,000	150,000
Consumption by house connections (150 lcd)	8.2	8.2	8.2	8.2	8.2	8.2
% served by standposts	20%	26%	32%	38%	44%	50%
Number served by standposts	60,000	78,000	96,000	114,000	132,000	150,000
Consumption by standposts (40 lcd)	0.9	1.1	1.4	1.7	1.9	2.2
Total served by house connections	235,000	263,100	292,400	322,900	354,600	387,500
Total served by standposts	1,675,000	2,226,900	2,801,600	3,399,100	4,019,400	4,662,500
Volumes sold to house connections	11.9	13.2	14.4	15.8	17.2	18.6
Volumes sold to Government	21.5	28.6	36.0	43.7	51.6	59.8
Income (cents/m <sup>3</sup> ) - house connections	37.8	39.4	38.2	40.5	39.0	38.2
Income (cents/m <sup>3</sup> ) - standposts	9.3	10.5	10.3	9.4	8.1	7.0
Plant in service (mid-year)						
- House connections at 175 \$ per head	41.1	46.0	51.2	56.5	62.1	67.8
- Standposts at 45 \$ per head	75.4	100.2	126.1	153.0	180.9	209.8
Total replacement value	116.5	146.2	177.3	209.5	243.0	277.6
Annual depreciation allowance	3.5	4.4	5.3	6.3	7.3	8.3
Other operating expenses <sup>a/</sup>	3.7	4.6	5.5	6.6	7.6	8.6
Interest <sup>b/</sup>	1.0	1.1	1.2	1.5	1.6	2.0
Total expenses	8.2	10.1	12.0	14.4	16.5	18.9
Income from house connections at 40 c/m <sup>3</sup>	4.8	5.3	5.8	6.3	6.9	7.4
Income from standposts at 18 c/m <sup>3</sup>	3.9	5.1	6.5	7.9	9.3	10.8
Total income	8.7	10.4	12.3	14.2	16.2	18.2
Surplus (deficit) <sup>b/</sup>	0.5	0.3	0.3	(0.2)	(0.3)	(0.7)

<sup>1/</sup> To reach 50% coverage by end 1984.

<sup>2/</sup> Per capita demand growing at 2% per year (150 lcd in 1979).

<sup>a/</sup> Based on 1979 estimates per m<sup>3</sup> sold.

<sup>b/</sup> Deficit compensated because interest is not inflated.

HAUTERRE - Statistical and financial estimates and projections

Constant prices, (million inhabitants, m <sup>3</sup> and \$)	1979	1980	1981	1982	1983	1984
Population	1.20	1.27	1.35	1.43	1.51	1.60
- 50% private connections (constant)	0.60	0.64	0.68	0.72	0.76	0.80
- 20% standposts (+ 6% per year) <sup>1/</sup>	0.24	0.33	0.43	0.54	0.66	0.80
Water production	46.3	50.8	55.7	60.9	66.3	72.4
Unaccounted for water	25%	25%	25%	25%	25%	25%
Water sales	34.7	38.1	41.8	45.7	49.7	54.3
- by private connections <sup>2/</sup>	32.9	35.7	38.7	41.8	44.9	48.5
- by public standposts (20 lcd)	1.8	2.4	3.1	3.9	4.8	5.8
Plant in service (mid-year)						
- private connections at 175 \$ per head	105.0	112.0	119.0	126.0	133.0	140.0
- standposts at 45 \$ per head	10.8	14.9	19.4	24.3	29.7	36.0
Total replacement value	115.8	126.9	138.4	150.3	162.7	176.0
Annual depreciation allowance	3.5	3.8	4.2	4.5	4.9	5.3
Other operating expenses <sup>3/</sup>	3.5	3.8	4.2	4.6	5.0	5.4
Interest <sup>4/</sup>	1.0	1.1	1.2	1.3	1.4	1.5
Total expenses	8.0	8.7	9.5	10.4	11.3	12.2
Income from private connections at 40 c/m <sup>3</sup>	13.2	14.3	15.5	16.7	18.0	19.4
Income from standposts at 18 c/m <sup>3</sup>	0.3	0.4	0.6	0.7	0.9	1.0
Total income	13.5	14.7	16.1	17.4	18.9	20.4

<sup>1/</sup> To reach 50% coverage by end 1984.

<sup>2/</sup> Per capita demand growing at 2% per year (150 lcd in 1979).

<sup>3/</sup> Based on NWA estimates for 1979 less 10%, per m<sup>3</sup> sold.

<sup>4/</sup> Assumes same financing terms as NWA.

CONSOLIDATION OF HAUTERRE AND NWA

Constant prices (million m <sup>3</sup> and \$)	1979	1980	1981	1982	1983	1984
Total expenses	16.2	18.8	21.6	24.8	27.8	31.1
Sales by private connections	44.8	48.9	53.1	57.6	62.1	67.1
Sales by public standposts	23.3	31.0	39.1	47.6	56.4	65.6
Income from connections (30 c/m <sup>3</sup> )	13.4	14.7	15.9	17.3	18.6	20.1
Income from standposts (15 c/m <sup>3</sup> )	3.5	4.7	5.6	7.1	8.5	9.8
Total income	16.9	19.4	21.5	24.4	27.1	29.9
Breakeven tariffs (standposts, connections)	12 and 30	13 and 30	15 and 30	15 and 31	15 and 31	15 and 32

TERRANIA  
NATIONAL WATER SUPPLY AND SANITATION BOARD  
OPENING BALANCE SHEET  
(at 31 December 1979)

Million \$

	NWA <sup>1/</sup>	Hauterre <sup>1/</sup> Water Authority	NWSB
<u>ASSETS</u>			
Gross fixed assets	131.4	121.5	252.9
<u>less</u> depreciation	53.2	46.0	99.2
Net fixed assets	78.2	75.5	153.7
Work in progress	10.8	4.5	15.3
Total fixed assets	89.0	80.0	169.0
Inventory	5.0	3.5	8.5
Accounts receivable	2.4	1.2	3.6
Cash and banks	4.9	5.8	10.7
Total current assets	12.3	10.5	22.8
<b>TOTAL ASSETS</b>	<b>101.3</b>	<b>90.5</b>	<b>191.8</b>
<u>LIABILITIES AND EQUITY</u>			
Capital	40.0	55.0	95.0
Water Development Fund	17.0	0	17.0
Total equity	57.0	55.0	112.0
Long-term loans	40.9	30.4	71.3
Current liabilities <sup>2/</sup>	3.4	5.1	8.5
Total liabilities	44.3	35.5	79.8
<b>TOTAL LIABILITIES AND EQUITY</b>	<b>101.3</b>	<b>90.5</b>	<b>191.8</b>

Source - NWSB

<sup>1/</sup> These columns show the respective contributions of NWA and Hauterre to the assets of NWSB

<sup>2/</sup> Including year's maturation of long-term loan

TERRANIA  
NATIONAL WATER SUPPLY AND SANITATION BOARD  
STATEMENT OF INCOME AND EXPENDITURES (1980)

Unit	Million m <sup>3</sup> (Mm <sup>3</sup> ) and \$ (M\$)	NWA <sup>1/</sup>	Hauterre Water Authority <sup>1/</sup>	NWSB
Mm <sup>3</sup>	Water produced	68.0	50.8	118.8
	Water sold . in Hauterre		38.1	38.1
	. in other urban areas	9.3		9.3
	. in rural areas	32.5		32.5
	TOTAL WATER SALES	41.8	38.1	79.9
	- through house connections	13.2	35.7	48.9
	- through public standposts	28.6	2.4	31.0
%	Unaccounted for water	39%	25%	33%
M\$	Operating income			
	. from house connections	4.8	12.8	17.6
	. from public standposts	5.2	0.4	5.6
	TOTAL INCOME	10.0	13.2	23.2
	Operating expenses			
	. personnel	1.8	2.1	3.9
	. fuel	0.4	0.3	0.7
	. maintenance	3.0 <sup>2/</sup>	1.4	4.4
	. overheads	1.3	0.8	2.1
	. depreciation allowance	5.3	4.6	9.9
TOTAL OPERATING EXPENSES	11.8	9.2	21.0	
Net income before interest (interest)	(1.8) (1.1)	4.0 (1.1)	2.2 (2.2)	
Net surplus (deficit)	(2.9)	2.9	0	

Source NWSB

1/ These columns show the respective shares of NWA and Hauterre in NWSB's expenditures and income

2/ Include cost of first preventive maintenance campaign (subcontracted)

TERRANIA  
NATIONAL WATER SUPPLY AND SANITATION BOARD

BALANCE SHEET

(at 31 December 1980)

Million \$

	NWA <sup>1/</sup>	Hauterre Water Authority <sup>1/</sup>	NWSB
<u>ASSETS</u>			
Gross fixed assets	194.1	159.2	353.3
less depreciation	70.2	60.7	130.9
Net fixed assets	123.9	98.5	222.4
Work in progress	18.7	0.5	19.2
Total fixed assets	142.6	99.0	241.6
Inventory	6.0	4.5	10.5
Accounts receivable	2.9	1.5	4.4
Cash and banks	5.9	2.0	7.9
Total current assets	14.8	8.0	22.8
TOTAL ASSETS	157.4	107.0	264.4
<u>LIABILITIES AND EQUITY</u>			
Capital	40.0	55.0	95.0
Water Development Fund	20.0	0	20.0
Revaluation reserve	33.0	17.0	50.0
Total equity	93.0	72.0	165.0
Long-term loans	57.2	28.9	86.1
Current liabilities <sup>2/</sup>	7.2	6.1	13.3
Total liabilities	64.4	35.0	99.4
TOTAL LIABILITIES AND EQUITY	157.4	107.0	264.4

Source NWSB

<sup>1/</sup> These columns show the respective contributions of NWA and Hauterre to the assets of NWSB

<sup>2/</sup> Including year's maturation of long-term loan

TERRANIA  
NATIONAL WATER SUPPLY AND SANITATION BOARD  
CASH-FLOW STATEMENT (1980)

Million \$

	NWA	Hauterre Water Authority	NWSB
<u>SOURCES</u>			
Net income before interest	(1.8)	4.0	2.2
Depreciation allowance	5.3	4.6	9.9
Total internal cash generation	3.5	8.6	12.1
Water Development Fund	3.0	0	3.0
Government long-term loan	18.3	0	18.3
Proceedings from grants and loans	21.3	0	21.3
TOTAL SOURCES OF FUNDS	24.8	8.6	33.4
<u>APPLICATIONS</u>			
Investment expenditures	23.0	9.5	32.5
Repayment of principal	2.0	1.5	3.5
Interest	1.1	1.1	2.2
Total debt-service	3.1	2.6	5.7
Change in inventory	1.0	1.0	2.0
Change in receivables	0.5	0.3	0.8
Change in payables	(3.8)	(1.0)	(4.8)
Increase (decrease) in working capital	(2.3)	0.3	(2.0)
TOTAL APPLICATIONS OF FUNDS	23.8	12.4	36.2
NET FLOW OF FUNDS	1.0	(3.8)	(2.8)
Cash at beginning of year	4.9	5.8	10.7
Cash at end of year	5.9	2.0	7.9

Source NWSB

ANNEX VII  
Table I

TERRANIA - 3 DISTRICTS PROJECT

PROJECT DATA

	1979	1980	1981	1982	1983	1984	Average annual increment (1985-1989)
<b>A. Water demand (000 m<sup>3</sup>)</b>							
- urban HC 1/	0	0	87.4	262.1	475.0	829.9	279.5
- urban SP 2/	0	0	33.5	86.1	159.1	261.3	89.1
- rural HC 3/	0	0	349.6	1179.9	2578.3	4326.3	1573.2
- rural SP 4/	0	0	482.6	1181.1	2120.9	3162.3	1000.8
- industry and municipal	0	0	300.0	800.0	1500.0	2350.0	1000.0
- small irrigation 5/ and cattle	0	0	500.0	1390.0	2240.0	3240.0	1200.0
TOTAL	0	0	1753.1	4899.2	9073.3	14169.8	5142.6
<b>B. Water sales (million \$) 6/</b>							
- metered sales	0	0	0.22	0.73	1.36	2.15	0.8
- sales to Government	0	0	0.09	0.25	0.46	0.68	0.2
TOTAL	0	0	0.31	0.98	1.82	2.83	1.0
<b>C. Project accounts (million \$)</b>							
- investment expenditures	6.0	10.0	4.3	6.5	7.0	7.5	7.0 1/
- fixed assets (gross)	3.0	9.0	18.5	22.0	26.5	30.5	7.0
- personnel	0.04	0.13	0.23	0.33	0.43	0.54	0.12
- fuel	0	0	0.01	0.02	0.04	0.06	0.03
- maintenance and overheads	0	0.01	0.05	0.13	0.25	0.37	0.13
- depreciation allowance	0	0.12	0.36	0.74	0.88	1.06	0.28
TOTAL operating expenses	0.04	0.26	0.65	1.22	1.60	2.03	0.56
Interest 8/	0	0.18	0.48	0.61	0.80	1.01	0.21

1/ Urban HC = 150 litres/day.

2/ Urban SP = 40 litres/day.

3/ Rural HC = 120 litres/day.

4/ Rural SP = 35 litres/day.

5/ Plot sprinklers only.

6/ Tariffs as in Annex V

7/ 7 million \$ is the average annual investment.

8/ Two loans for the project:

(i) a \$ 30 million loan to cover foreign exchange components, 20 years, 3%, 5-year grace period, interest during construction.

(ii) a \$ 20 million Government loan, 50 years, 3%, 10-year grace period, interest during construction.

TERRANIA

ESTIMATED INCREASE IN COVERAGE

(1981 - 1985)

ANNEX VII  
Table II

	1980	1981	1982	1983	1984	1985
Million dollars (M\$) at constant 1980 prices Based on NWSB and MOH reports	49.8	28.9	23.5	22.9	23.9	10.0
-Change in gross fixed assets in operation* of which:						
• Hauteerre water supply *	13.4	5.4*	4.0	4.0	4.0	4.0
• Other urban water supplies*	1.2	1.0	0.8	1.0	1.2	0.2
• Three Districts Project	12.0	3.6	4.5	4.1	3.6	3.0*
• Other rural water supplies	23.2	18.3*	12.6	10.5	14.8	2.5
• Hauteerre sewerage	0	0.5*	1.5	3.0	0	0
• Other urban sewerage	0	0.1*	0.1	0.1*	0.1	0.1
• Rural sanitation	0	0	0	0.2	0.2	0.2
-Additional population served (000)						
• In water supply *	93.7	37.8	28.0	28.0	28.0	28.0
- Hauteerre *	8.4	7.0	5.6	7.0	8.4	1.4
- other urban *	651.9	405.6	316.7	270.4	340.7	101.9
- rural						
• In sewerage *	0	1.7	5.0	10.0	0	0
- Hauteerre *	0	0.6	0.6	0.6	0.6	0.6
- other urban *	0	0	0	40.0	40.0	40.0
• In rural sanitation						
-Deficit						
• Urban water supply*	44.9	102.2	113.4	112.0	110.6	117.6
• Urban sanitation *	152.0	149.7	146.4	141.4	151.4	151.4
• Rural water supply*	191.1	437.4	526.3	572.6	502.3	741.1
• Rural sanitation	955.0	955.0	955.0	915.0	915.0	915.0
-Accumulated deficit for the period						
• Urban water supply	44.9	147.1	260.5	372.5	483.1	600.7*
• Urban sanitation	152.0	301.7	448.1	589.5	740.9	892.3*
• Rural water supply	191.1	628.5	1154.8	1727.4	2229.7	2970.8*
• Rural sanitation	955.0	1910.0	2865.0	3780.0	4695.0	5610.0

Less than constant at current prices until end-1984  
 Drop after 1981 due to lack of funds  
 Service extensions and two new systems (small towns)  
 Rural standards adopted throughout project area  
 Drop due to constraints in implementation  
 Network expansion to a new development area  
 Small extensions to existing system  
 Cooperation with MOH started November 1982

\$143/head  
 \$143/head  
 \$ 54/head

\$300/head  
 \$166/head (sewers and septic tanks)  
 3\$/head + free labour + 2\$ per head MOH budget

by comparison with requirements in National Decade Plan:  
 - 147.0 per year (000)  
 - 152.0 per year (000)  
 - 843.0 per year (000)  
 - 955.0 per year (000)

compensation of deficit before end-1990 would require:  
 - 3 times present construction capacity (and O&M)  
 - setting up participatory programme  
 - 2.4 times present construction capacity (and O&M)  
 - setting up strong intersectoral programme

ANNEX VII  
Table II

TERRANTIA  
ANNEX VIII  
Table I

NATIONAL WATER SUPPLY AND SANITATION BOARD  
STATEMENTS OF INCOME AND EXPENDITURES (1980-1985)

Unit	1980	1981	1982	1983	1984	1985
Million m <sup>3</sup> (Mm <sup>3</sup> )						
Million dollars (M\$) at constant 1980 prices						
Water produced	118.8	129.3	141.8	156.6	173.5	192.6
Water sold						
. in Hauterre *	38.1	39.1	41.9	44.8	47.8	51.0
. in other urban areas	9.3	9.6	9.9	10.1	10.4*	10.7
. in rural areas	32.5	40.8	41.0	45.0	55.2	60.1
TOTAL WATER SALES	79.9	89.5	92.8	99.9	113.4	121.8
- through house connections *	48.9	50.4	55.8*	57.2	60.6	64.2
- through public standposts	31.0	39.1	37.0	42.7	52.8	57.6
%						
Unaccounted for water	33%	31%*	35%	36%	35%	37%
Operating income *						
. from private connections	17.6	15.1*	20.1	20.6	21.8	23.1
. from public standposts *	5.6	7.0	6.7	7.7	9.5	10.4
TOTAL INCOME	23.2	22.1	26.8	28.3	31.3	33.5
Operating expenses						
. personnel	3.9	3.9*	4.5	5.2*	5.9	6.8
. fuel	0.7	1.0	1.0	1.5	1.5	1.5
. maintenance *	4.4	4.8	5.3	5.9	6.4	7.1
. overheads	2.1	2.5	3.0	3.6	4.4	5.2
. depreciation allowance	9.9	11.4	13.0	14.6	16.3	18.3
TOTAL OPERATING EXPENSES	21.0	23.6	26.8	30.8	34.5	38.9
Net income before interest (interest)	2.2 (2.2)	(1.5) (2.4)	0 (2.8)	(2.5) (3.0)	(3.2) (3.5)	(5.4) (4.1)
Net surplus (deficit)	0	(3.9)	(2.8)	(5.5)	(6.7)	(9.5)

\*

Slow growth due to backlog in supply of connections  
As planned  
Some new works not commissioned until end-1983

Reflects slow growth in total number of connections  
Correction of rates at standposts, January 1982

Large consumption meters revised during second-half of 1981

Rate for private connections=36c/m<sup>3</sup> except in 1981 (30c/m<sup>3</sup>)  
Request for tariff adjustment rejected until Dec. 81  
Tariff adjusted as planned

1985 rate for private connections=75c/m<sup>3</sup> (current prices)

Increased by 15% each year (constant prices) after 1982  
Fluctuations on world market  
Incidence of prevention campaign=10% increase per year  
Increased by 20% each year  
Yearly allowance rate increased by 0.1% each year (1981/85) up to .4%  
1985 cost=80c/m<sup>3</sup> sold (current prices, no interest)

Source - NWSB

Million dollars (M\$) at constant 1980 prices	1980	1981	1982	1983	1984	1985
<u>ASSETS</u>						
Gross fixed assets *	353.3	382.2	405.7	428.6	452.5	462.5
less depreciation	130.9	142.3	155.3	169.9	186.2	204.5
Net fixed assets	222.4	239.9	250.4	258.7	266.3	258.0
Work in progress	19.2	22.2	22.2	22.2	7.2	8.2
Total fixed assets	241.6	262.1	272.6	280.9	273.5	266.2
Inventory *	10.5	11.5	13.5	13.0	14.0	15.0
Accounts receivable *	4.4	4.6	4.8	5.0	5.5	5.2
Cash and banks	7.9	4.7	4.7	5.0	17.9	32.4
Total current assets	22.8	20.8	23.0	23.0	37.4	52.6
<b>TOTAL ASSETS</b>	<b>264.4</b>	<b>282.9</b>	<b>295.6</b>	<b>303.9</b>	<b>310.9</b>	<b>318.8</b>
Accumulated deficit	0	3.9	6.7	12.2	18.9	28.4
<u>LIABILITIES AND EQUITY</u>						
Capital	95.0	145.0	145.0	145.0	145.0	175.0*
Water Development Fund	20.0	25.0	30.0	30.0	30.0	0
Revaluation reserve	50.0	0	0	0	0	0
Total equity	165.0	170.0	175.0	175.0	175.0	175.0
Long-term loans *	86.1	101.8	111.3	124.1	136.8	153.2
Current liabilities *	13.3	15.0	16.0	17.0	18.0	19.0
Total liabilities	99.4	116.8	127.3	141.1	154.8	172.2
<b>TOTAL LIABILITIES AND EQUITY</b>	<b>264.4</b>	<b>286.8</b>	<b>302.3</b>	<b>316.1</b>	<b>329.8</b>	<b>347.2</b>

\*

-Average increase 21.8M\$/year  
-As planned

-Missing components until end-1983

-Increased with size of operation  
-Increased with size of operation  
-Excess cash 1984/5 corresponds to drop in investment

-Capitalization of Fund 1985  
-Contribution to rural programme  
-Contribution to equity, capitalized 1981

Slow disbursements on 3-Districts project  
-Increased with size of operation

ANNEX VIII Table III

Source - NWSB

\*

-Gradual rate increase corresponding to accelerated depreciation in rural CNS

-To alleviate temporary cash problems  
-Proceedings in excess of needs after end-1983

Drop in investment resulting from  
-NWSB's difficulties  
Accelerated repayment (absorption  
of excess cash)  
-Slow growth (old loans amortized,  
grace period on new loans)

-Reflects very slow growth

ANNEX VIII  
Table III

Excess cash due to drop in  
-investment

TERRANIA NATIONAL WATER SUPPLY AND SANITATION BOARD CASH FLOW STATEMENTS (1980-1985)

Million dollars at constant 1980 prices	1980	1981	1982	1983	1984	1985
<b>SOURCES</b>						
Net income before interest	2.2	(1.5)	0	(2.5)	(3.2)	(5.4)
Depreciation allowance *	9.9	11.4	13.0	14.6	16.3	18.3
Total internal cash generation	12.1	9.9	13.0	12.1	13.1	12.9
Water Development Fund *	3.0	5.0*	5.0	0	0	0
Government long-term loan *	18.3	20.7	14.5	17.8	17.7	21.4
Proceedings from grants and loans	21.3	25.7	19.5	17.8	17.7	21.4
<b>TOTAL SOURCES OF FUNDS</b>	33.4	35.6	32.5	29.9	30.8	34.3
<b>APPLICATIONS</b>						
Investment expenditures	32.5	31.9	23.5	22.9	8.9*	11.0
Repayment of principal	3.5	5.0*	5.0	5.0	5.0	5.0
Interest	2.2	2.4	2.8	3.0	3.5	4.1
Total debt-service	5.7	7.4	7.8	8.0	8.5	9.1
Change in inventory	2.0	1.0	2.0	(0.5)	1.0	1.0
Change in receivables	0.8	0.2	0.2	0.2	0.5	(0.3)
Change in payables	(4.8)	(1.7)	(1.0)	(1.0)	(1.0)	(1.0)
Increase (decrease) in working capital*	(2.0)	(0.5)	1.2	(1.3)	0.5	(0.3)
<b>TOTAL APPLICATIONS OF FUNDS</b>	36.2	38.8	32.5	29.6	17.9	19.8
<b>NET FLOW OF FUNDS</b>	(2.8)	(3.2)	0	0.3	12.9	14.5
Cash at beginning of year	10.7	7.9	4.7	4.7	5.0	17.9
Cash at end of year	7.9	4.7	4.7	5.0	17.9*	32.4