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DRAFT REPORT

HUMAN RESOURCES DEVELOPMENT ANALYSIS

[RURAL WATER SUPPLY AND SANITATION SECTOR STUDY]

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EXECUTIVE SUMMARY

Background

The Government of Ghana has established the goal of improving living conditions of the rural and urban poor. A key objective is to provide potable water and sanitation for this target group. This report seeks to analyse the human resource development (HRD) aspects of the objective.

The method of analysis was to assess the current and future demand for manpower of different skill categories (demand analysis) and the capability of the education and training system to meet this demand (supply analysis). Questionnaires and field surveys were the means of data capture, and the Lotus 123 computer software package was used to transform the raw data into useful information which was fed into the analyses.

The scope of the study covered the following key areas ;

- ♦ training requirements of sector personnel;
- ♦ the capacity of training institutions to provide the required training;
- ♦ training needs of trainers;
- ♦ availability and appropriateness of training materials in the light of new concepts; curricula and course content of training institutions with emphasis on health workers.

Findings

A summary of specific findings were as follows;

- the guiding concept of all sector activities regarding water supply and sanitation is Village Level and Maintenance (VLOM) ;
- occupational demands of the sector are the following key occupations ;
 - * Handpump/Latrines Maintenance Managers
 - * Mass Education and Community Development Officers
 - * Health Inspection Assistants
 - * Environmental Health Technologists
 - * Hydrogeological Technicians
 - * Drilling Technicians
 - * Public Health Engineers
- the existing education and training system for meeting some of the manpower demands is made up of the Universities; Polytechnics; Technical Schools; GWSC Training Schools; MDPI; GIMPA; Rural Training Centres and Rural Training College of the Department of Community Development; and NGO's notably the Catholic Church, UNICEF, CIDA and UNDP.
- a major gap in the education and training system is that there are no programmes specifically designed for hydrogeological technicians and drilling technicians.
- Trainers training needs include the following key areas;
 - * Management and Community Participation;
 - * Health and Hygiene; and
 - * Rural Water and Sanitation Technologies.

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Recommendations

Recommendations emerging from the study were as follows;

- A two tier institutional arrangement of sector personnel at district and regional levels.
- Networking of training institutions to ensure interdisciplinary programme formulation and exchange of trainers, information and materials for production of required manpower skills.
- Orientation of Health Inspection Assistants and Mass Education Officers for Hygiene and User Education to use Schools of Hygiene and Rural Training College at Kwaso as training bases linked to satellite Rural Training Centres covering the whole country.
- Medium term curricula expansion of Schools of Hygiene to include more Management and Community Participation, Health and Hygiene and Water Supply and Sanitation in rural context.
- UST Department of Civil Engineering to increase annual intake of trainees for Environmental Health Technologists from 10 to 40.
- Owabi and Weija Training Schools of GWSC and MDPI to collaborate in training of artisans from technical schools as Handpump Maintenance Managers at a rate of between 36 - 40 per annum.
- Regular University graduates with the qualifications; B.Sc Planning/B.A. Social Science/B.A; Dip. Ed. to be recruited by DCD, given 2 weeks post qualification orientation course and designated as Community Development Officers for Rural Water and Sanitation (one officer per region).
- Part-time staff should be recruited from the Universities (including School of Mines. Tarkwa), GWSC and NGO's to train hydrogeological and drilling technicians at the Owabi and Weija Training Schools of GWSC as a short term (1 year) measure. Regular staff of these institutions should be sponsored on short term training courses in appropriate institutions overseas to run courses in the medium term (2 - 3 years).

HUMAN RESOURCES DEVELOPMENT ANALYSIS

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CHAPTER ONE

HUMAN RESOURCE DEVELOPMENT FOR RURAL WATER SUPPLY AND SANITATION

1.0 Introduction

1.1 Ghana's Rural Sector

Ghana's population is about 12.2 million (1984 Census). The rural sector, made up of localities with less than 5000 inhabitants constitutes 68% (8.3 million) of the overall population, and grew at the rate of 2.2% between 1970 and 1984. Over the same period, the urban sector grew faster, with rates ranging from 2.6% to 3.4%.

One significant cause of lower growth in the rural sector is the inadequate social infrastructure. With particular reference to water supply and sanitation;

"It is estimated that (only) 30% of the rural population has access to potable water generally from boreholes fitted with handpumps. The remainder take water from hand-dug wells, springs, ponds, streams and rivers. With the exception of a few pilot programmes for providing improved latrines in conjunction with rural water supply and health education programmes, there has been no large scale implementation of appropriate sanitation facilities in rural areas. It is estimated that only 15% of the rural population are served by some form of excreta disposal system, usually basic pit latrines or public latrines."¹

Moreover, nutritional and general living habits of rural dwellers worsen the effects of infrastructural deficiency by exposing the people to armies of disease vectors. Hence, diarrhoea, schistosomiasis, onchocerciasis, typhoid fever, cholera and guinea worm remain widespread in large parts of the country. These conditions promote high mortalities, low productivity and incomes and rural-urban migration.

At the beginning of ERP II 1986-1991, the Government of Ghana (GOG) established the objective of improving living conditions of the rural and urban poor. This report is concerned with manpower resources for achieving water supply and sanitation aspects of this objective. Accordingly, a review is undertaken of the current institutional framework within which manpower resources are organised.

¹Republic of Ghana, 1989. Rural Water Supply and Sanitation Sector Study : Terms of Reference

1.2 Institutional Structure for Rural Water Supply and Sanitation

The provision of water supply and sanitation facilities as well as user education and management support is the responsibility of a number of organisations.

1.2.1 Government and Bilateral Agencies

The Government of Ghana establishes general sector policies on which the Ministry of Health (MOH), Ministry of Local Government (MLG) and Ministry of Works and Housing (MWH) are to base their planning and administrative operations. The Bilateral Agencies such as CIDA, UNDP/World Bank provide technical and financial inputs to the three ministries, and are guided in this by policies of GOG, foreign interests and general international economic and political trends.

1.2.2 Ghana Water and Sewerage Corporation (GWSC)

The GWSC was created by the GWSC Act 1965 and made responsible for potable water supply and sewerage sanitation in both urban and rural areas. It is under the general direction of the Ministry of Works and Housing the Corporation whose head office is in the capital, Accra, now operates and maintains 208 piped water supply systems for urban and peri-urban areas, in addition to over 6000 drilled wells fitted with handpumps in rural communities.

A Rural Water Supply Department (RWSD) has been set up within the Corporation. The head of this department coordinates rural water development and maintenance under the direct supervision of the Deputy Managing Director for Operations. Workshops located in service areas carry out maintenance of rural water points and rely on imported components and equipment. Hence there is little domestic capability for providing and maintaining good drinking water to the rural hinterland.

A Drilling Unit, based in Kumasi has also been established with the sole responsibility of groundwater development. It is also responsible for erection of elevated steel tanks and installation and testing of borehole pumps. The Unit is supposed to generate enough revenue from the services it provides to government, communities and private customers, to finance its operations.

1.2.3. Department of Community Development (DCD)

The Department of Community Development (DCD) which has 10 regional offices and 65 district offices is mainly responsible for community education and mobilisation towards installation and maintenance of handpumps, hand-dug wells and VIP latrines. Of late, they have also been assisting the GWSC in educating communities on the need to pay water rates for pump maintenance. On the whole, the Department's role in the Sector could be enhanced if its deficiencies in technical staff, transport and finance are eliminated.

1.2.4 Environmental Health Division (EHD) and Health Education and Epidemiological Division (HEED) of Ministry of Health

The main functions of EHD and HEED in the sector are health education and the planning and implementation of preventive measures against communicable diseases such as malaria, measles, polio and guinea worm. The functions represent the 'software' aspects of water supply and sanitation. Here, the aim is to generate basic changes in the perceptions, habits and lifestyles of rural dwellers with regards to nutrition and excreta disposal. The expected output is a more healthy population which is capable of sustaining their existing and planned facilities.

1.2.5 Grass Roots Organisations

These organisations such as the Committees for the Defence of the Revolution (CDR) and Town Development Committees (TDC) have become very much involved in a wide range of community development activities such as mobilisation of communal labour and adult education. Hence, they are often the main points of contact between the main sector departments and agencies such as the EHD, HEED, DCD and GWSC, and specific target communities for project implementation and the operation and maintenance of handpumped boreholes, hand dug wells and public VIP toilets.

The effectiveness of the overall institutional structure depends on correct deployment of skilled manpower at all levels. Hence, strong feedback mechanisms must exist between sector organisations and manpower training institutions. Simultaneously, these institutions must be abreast of past experiences, current concepts and the state of the art in water supply and sanitation projects and programmes. These are basic requirements for development of an appropriate human resources base (HRB) for the sector. The rationale for the present study will thus be built upon a brief review of the Ghanaian experience and new directions for manpower development in the sector.

1.3 Past Experiences and New Directions in Human Resources Development.

In 1977, the International Drinking Water Supply and Sanitation Decade (IDWSSD) was announced at the UN Water Conference. The goal was to supply safe drinking water for all by 1990. In Ghana, as in many other developing countries this goal has not been achieved. The current estimated coverage of water supply and sanitation services presented in Table 1 elaborates an earlier point.

Table 1 Estimated Coverage of Water Supply and Sanitation Services

Category	Population Served (1990)			
	Water Supply		Sanitation	
	Number of People	Percent	Number of People	Percent
Urban Population	3,700,000	94	2,310,000	59
Rural Population	3,320,000	40	1,370,000	17

Source: Ato Brown, "Summary Report on Rural Water and Sanitation Activities in Ghana", 1989.

In spatial terms, the rural sector continues to be at a disadvantage with regards to both water supply and sanitation. Clearly, the situation as a whole leaves much to be desired. Low rural water supply coverage is peculiar not only to Ghana but also to most developing countries. The fact is that as a result of financial constraints brought about by serious balance of payments difficulties most governments in developing countries, in particular, allocate less than 10% of their national annual budgets towards the provision of safe drinking water and suitable sanitation facilities. Heads of Governments are, no doubt, aware of the implications but seem helpless in coping with the situation.

Until the launching of the Decade programmes, those governments which attempted to provide potable water, invariably, did so by conventional approaches whose costs were very much beyond their capacities to fund. The Decade programme, therefore, laid emphasis on the need for the use of appropriate technologies in the water and sanitation delivery systems.

Very unfortunately the Decade activities were not preceded by a comprehensive manpower review and development effort to produce appropriate job skills. This has resulted in a situation where many of the Decade's strategies, programmes, projects and technologies were superimposed on the already existing human resource base (HRB) of the sector.

This HRB had been created during the colonial period to support large scale urban biased systems. Development of job skills in the 1960s and early 1970s was still dominated at country and global levels by the conventional high technology perspective. IDWSSD, on the other hand, had a radically different technological orientation. Hence, an effort should have been made to produce appropriate job skills, as an essential component of the Decade programmes. This would involve retraining of existing sector personnel and training of fresh people. In the absence of this, the Decade suffered the following negative conditions;

- weak policy-making capabilities of sector institutions;
- absence of criteria for selecting and siting new technologies and inputs;
- inappropriate utilisation and poor maintenance of facilities by regular sector personnel and end-users; and
- lack of appropriate mechanisms and procedures for entering, educating and working with user communities.

If current government policies and follow-up activities are to have any positive impacts, manpower training must be seen as a critical issue especially for rural water supply and sanitation in coming years. Training decisions must be based on current trends in concepts, technological options, composition of demand for human resources in the sector and the capability of available training institutions to meet this demand.

1.3.1. Technological Options and Concepts

A wealth of technological options for the provision of services has been built up over the years through intensive research and development by various national and international organisations. In coming years, it is anticipated that selection of appropriate options for specific situations, and hence manpower training needs, will be based on the Village Level Operation and Maintenance (VLOM) concept. The VLOM idea is essentially a synthesis of two earlier concepts: appropriate technology (AT) and community participation (CP).

The AT concept was introduced to the sector in the late 1970s. It was taken to mean development of handpumps, small scale water treatment plants and on-site sanitation systems such as Ventilated Improved Pit latrines, Pour Flush and Low Volume Flush toilets. The rationale for these technologies was to make them relevant to the needs of communities, and to their capacity to maintain the units.

In the early 1980s, the CP concept was also brought in. As the name implies consumers were to participate in all phases of projects. Women in the rural areas and in enclaves of low income communities in urban centres were viewed as important components of new organisational designs for projects.

In practice however, CP and AT have proved to be difficult concepts to apply within low income communities where illiteracy, apathy and suspicion prevail. Hence, the VLOM concept was evolved.

It is oriented towards integrated approaches to project design and implementation with a strong educational content. It views water supply, sanitation and health education as elements of a self-supporting system. In practice, it emphasises the setting up and maintenance of efficient communication channels between project sponsors and target communities. The rationale is that only by interacting and negotiating with people can agreement be reached on what is appropriate for them as well as where and how they can participate in different phases of any project. Under VLOM, measures of project outputs are not only the number of units put in place and populations served, but also changes in water utilisation and sanitation habits of people.

1.3.2. Demand for Human Resources

As a result of these shifts of concepts, the type of skills now demanded by GWSC and indeed the sector as a whole, represent a departure from large-scale, high technology systems. Skill needs are now guided by non-conventional engineering and organisational methods at the agency and community level. There is clearly a need to assess all the qualitative and quantitative implications of these changes in institutional demand as a basis for future HRD planning in the sub-sector.

1.4 Terms of Reference

1.4.1. Background

(a) General Objective of Sector Study

A group of consultants have been commissioned by the UNDP/World Bank to carry out a detailed Rural Water Supply and Sanitation Sector Study. The objective of the study has been given in a general terms of reference as follows:

"The Government of Ghana wishes to embark on a major rural water supply development programme to substantially increase coverage of rural communities throughout the country. The objective of the proposed study is to provide the analytical framework and recommendations necessary to enable the Government of Ghana to adopt sound policies and appropriate strategies for the future development of the sub-sector. This will be done through a review of past experience and an assessment of the current status of the rural water supply and sanitation subsector in Ghana. Important sector issues will be analysed, alternative solutions will be proposed and, other relevant authorities agree on a set of policies, an action plan will be prepared ².

(b) Content of Sector Study

In specifying the contents of the proposed study, it was further stated in the Terms of Reference that:

The proposed sector study will include two main phases. Between these a workshop will be held in which the policies and program proposed by government will be presented and the support of financing agencies will be solicited.

- (i) In the first phase a detailed review of the sector will be made. Current rural water supply, sanitation and health education programmes of GWSC, the Department of Community Development, Ministry of Health and District Councils including inputs by financing agencies will be reviewed. Special attention will be paid to institutional arrangements, financing of facilities (capital and operation & maintenance), construction (particularly drilling and manufacturing), and operations and maintenance of both handpump and small piped systems. The study team will propose policies and strategies to strengthen the sector, to the extent possible, based on cost analyses and human resource requirements, sustainability and replicability. A summary of these analyses will be presented in a full report including an executive summary.

²Republic of Ghana, 1989. Rural Water Supply and Sanitation Sector Study : Terms of Reference

(ii) After the mid-term workshop is held and agreement on policies and strategies are reached, an action plan will be prepared that;

- (a) identifies the main activities required to implement the new policies; and
- (b) defines the role and intervention modalities of the various institutions and donors involved in the sector.

(c) **Management of the Study**

With regard to management of the sector study, the terms of reference indicated that:

"The study will be guided by staff of the World Bank/UNDP Regional Water and Sanitation Group in West Africa based in Accra and Abidjan. They will work closely with relevant ministries and donors active in the sector. Funding for the study will be shared by UNDP through GHA/87/003, the Infrastructure Operations Division of the World Bank and the World Bank/UNDP RWSG in West Africa".

1.4.2 **Objectives and Scope of HRD Study**

This report covers the HRD component of the sector study (see content of sector study, page 7). Its objectives are two fold; first, to determine the occupational demand for job skills in the sector; and second, to assess the existing and potential capability of training institutions and programmes to supply the needed skills. Achievement of these two objectives will lead to measures designed to make up for the deficits in the HRB and strengthen the ability of sector institutions to carry out continuous manpower planning. To this end, the Training Network Centre will undertake certain specific activities which will yield two intermediary outputs. These are to dovetail with institutional proposals to be prepared by another consultant, and are as follows:

OutputsActivities

A. Description of training requirements for implementation of the proposed institutional model

A1 In consultation with the institutional consultant, analyse the training requirements for technicians, accountants, engineers, extension agents, etc.

A2 Review the capacity of training institutions to provide the required training and recommend specific institutions to conduct different training activities.

A3 Identify training needs of the trainers of these institutions.

A4 Review available training materials to be used by the institutions and recommend modifications of additional materials.

B. Description of Current Training programs for staff working in the sector focusing on sub-sector activities

B1 Identify public and private institutions and agencies which provide training within the sector for engineers, technicians, accountants, planners, and extension workers.

B2 Conduct a review of the curricula and course content of these institutions.

B3 Review and summarise curricula and course content of training programs for health workers.

1.4.3 Audience

This report is directed primarily at the key decision makers in the PNDC, World Bank-RWSG, Ministry of Finance and Economic Planning (MFEP), MWH, MOH and MLG. It is therefore anticipated that this audience will be a composite group of skilled personnel with different professional backgrounds and perspectives. In such a group, the same terminologies may mean different things. Hence, the next section establishes certain basic definitions and concepts in order to avoid ambiguity.

1.5 Conceptual Basis

HRD is defined as a continuous process of increasing the capacity of human beings for achievement of sector goals¹. This process takes place in a system whose main elements are the following;

- (a) agencies which provide improved water supply and sanitation or influence resource flows to the sector;
- (b) education and training institutions and programmes for generating the required manpower skills;
- (c) a data base on human resource skill requirements; and
- (d) government policies and planning agencies.

Continuous interaction among these elements results from data, labour, material and financial resource flows. The system is illustrated in Figure 1.

¹Adapted from U.S. Agency for International Development. Wash Technical Report No. 20. Human Resource Development Planning : Guidelines for Water Supply and Sanitation Sector, 1988, P. 1.

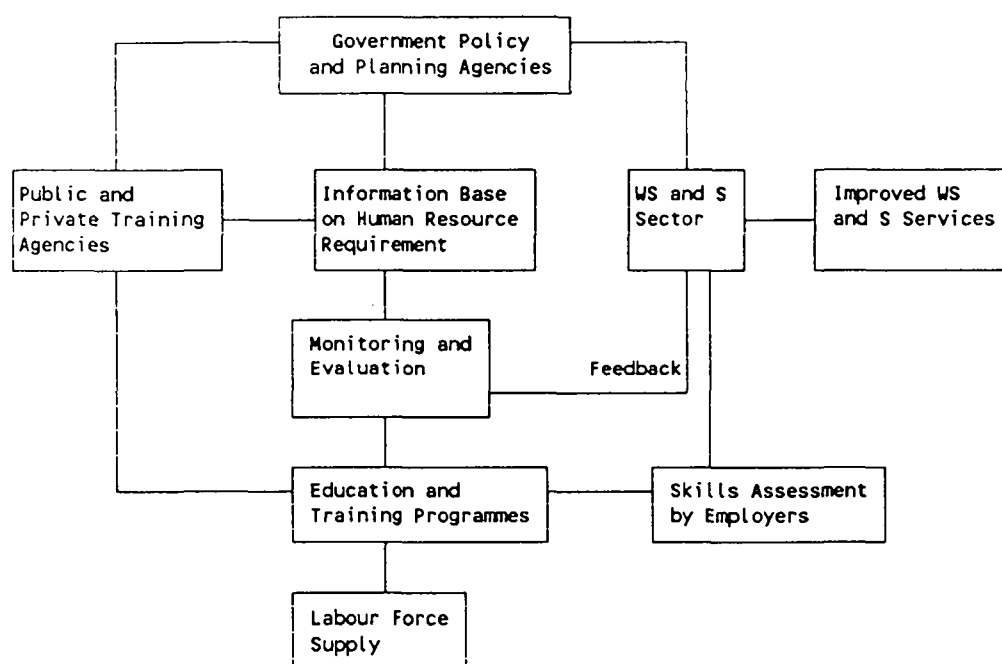


Fig. 1 The HRD System

1.6 Methodology

A variety of sampling, data collection and analytical methods were used in the study. These are briefly presented below.

1.6.1 Sample

Non-probability technique was used to select agencies and institutions according to their involvement in;

- (a) the provision of water supply and sanitation services; and
- (b) training of personnel in sector related skills.

A full list of selected organisations is presented in Appendix

1.6.2 Data Collection

Data collection comprised desk studies, formal and informal interviews.

i) Desk Studies

Documents were obtained from a variety of sources and reviewed. The main subject areas investigated were;

- national policies relevant to HRD planning;
- institutional structure and decision-making procedures in the sector;
- roles and activities of external donor agencies in the sector;
- socio-economic and physical conditions which influence labour flows and activity patterns in the country; and

The main sources of this documentary information included the Kumasi Sanitation Project (KSP) office and the Training Network Centre in Kumasi, the GWSC regional offices and the World Bank office in Accra.

ii) Interviews

Formal interview schedules were prepared and administered in all regions of the country to key personnel in the selected organisations. These were supplemented with informal discussions in all cases. Questions were categorised under "Demand" and "Supply" of job skills for both user-agencies and training institutions. Detailed job descriptions, training needs and educational backgrounds of individual employees were also obtained, in addition to critical factors which affect the training and subsequent utilisation of trained manpower. Appendix gives the full list of heads of organisations who were contacted for information. It includes specific dates and places.

1.6.3 Analysis

The analytical framework was made up of the following key components;

- (a) Analysis of Government Policy as it affects the sector.

- (b) Evaluation of occupational demand for skills;
- (c) Evaluation of occupational supply; and
- (d) Synthesis of occupational demand and supply.

Figure 2 shows how these components are related to each other. Quantitative data captured for the study were analysed using the Lotus 1-2-3 Computer Software.

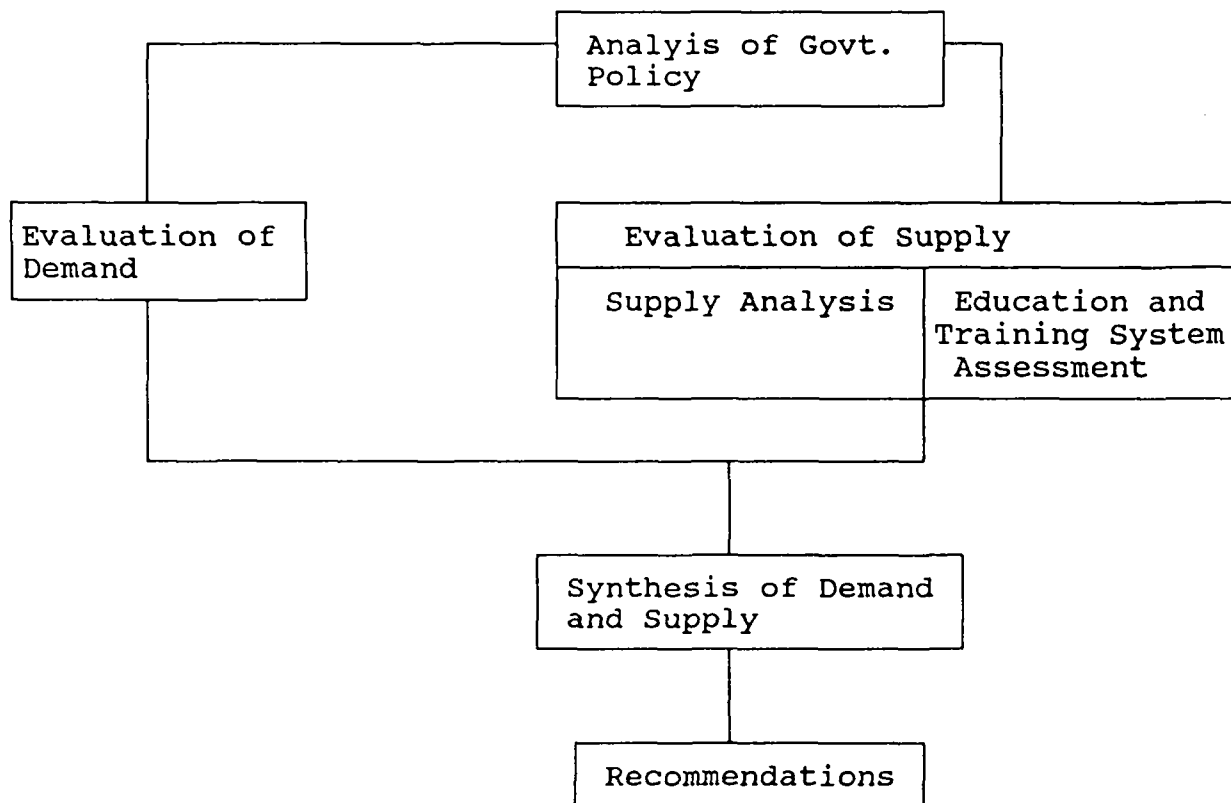


Figure 2. Analytical Framework for the Study

1.6.4 Limitations of the Study

Time constraints prevented the study team from carrying out detailed investigation of the qualitative variables affecting demand and supply of job skills in the sector. There is, therefore a possibility that some of the assumptions for estimating future occupational supply and demand may not hold within the next few years.

1.6.5 Organisation of Subsequent Chapters

Chapter two assesses current and future manpower needs against a background of on-going and planned sector activities, expected outputs and policies.

The above information leads in the third Chapter, to an analysis of the structure and capacity of the education and training system for producing the required job skills.

Chapter four comes out with recommendations on how to make up for deficiencies; absorb trained personnel; and strengthen the capability of sector agencies to carry out routine HRD planning.

CHAPTER TWO

ASSESSMENT OF MANPOWER AND TRAINING NEEDS

2.1 Determinants of Employment and Training Needs

Employment and Training needs of Sector agencies depend on a number of factors. Some of the main ones are as follows:

- (a) government and donor policies on employment and social infrastructure development;
- (b) on going and planned agency activities; and
- (c) occupational replacement demand.

The model shown in Figure 3, shows how these factors relate to each other

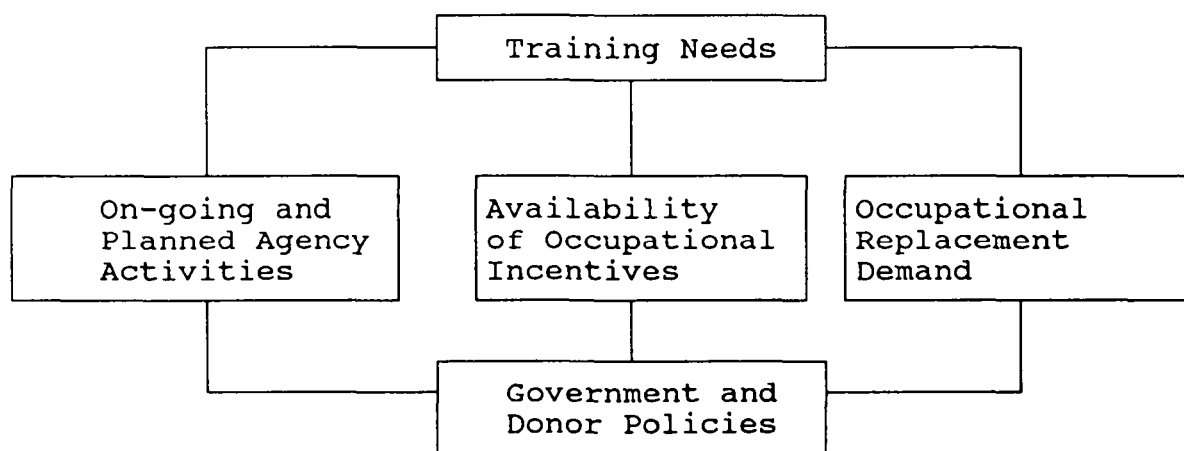


Fig. 3 : Determinants of Employment and Training Needs

On-going and planned agency activities are based on the application of specific concepts and technologies. These create demands for job skills and hence training needs. The actual enrolment for training programmes and the subsequent occupational distribution of personnel is, however, conditioned by occupational incentives, which, like agency activities, are derivatives of government and donor policies on employment and social infrastructure development. A peripheral determinant of employment and training needs is occupational replacement demand, the sum of job vacancies created by deaths, retirements, quits, transfers, etc.

2.2. Government and Donor Policies on Social Overhead Capital and Employment

Despite the government's aim of improving the RWS and S Sector, actual allocation of public investment to the sector is expected to remain as low as it has been over the years. A combination of reasons are responsible for this apparent paradox.

Within the framework of the ERP II 1988-1991, the main thrust of the 1990 Budget is the use of fiscal policy instruments to maintain high rates of economic growth and to reduce inflation. These broad dual objectives have a number of negative implications for the RWS and S Sector.

First, it means that the sector will be relegated to the bottom of any list of priority sectors. More funds will be channeled to those sectors which are deemed as immediate prerequisites for output growth. These include technical infrastructure such as transport (ports, roads, and railways) and energy.

Moreover, the objective of reducing inflation rates means that investments will be biased in favour of export oriented Directly Productive Activities (DPAs) for export. These investments increase directly and indirectly the supply of commodities available for local consumption. With specific reference to remuneration for labour, wage increases in the economy as a whole are to be 'justified and indeed paid for from increases in production ... increases in remuneration in excess of gains in productivity are not sustainable and sooner or later only serve to increase prices'³.

It is clear, therefore, that additional employment in the RWS and S Sector will be seen as inflationary; overall incomes will increase for no observable increase in output. Hence, government policy as a whole is not likely to favour expanding the labour force employed in the Sector. Recent events on the international scene would seem to reinforce this view. A fall in commodity prices resulted in a reduction of targetted balance of payment surplus for 1990 from \$110m to \$90m. This forced an upward revision of inflation rates from 10% to 15% and a downward revision of Gross Domestic Product (GDP) from 10% to 5%. Against this whole unfavourable environment is the fact that RWS and S is one sector which is particularly sensitive to balance of payments difficulties. Most of the key inputs such as drilling rigs, handpump components, trucks, etc have a high foreign exchange component: Indeed, the effectiveness of handpump maintenance by

³Daily Graphic, January 11, 1990, pp. 8-9.

GWSC has fluctuated from as low as 50% to as high as 95%⁴ operational pumps, depending on the availability of parts.

These considerations lead to the obvious conclusion that the government's aim of improving the RWS and S Sector will be financed initially at least largely from foreign sources such as UNDP, World Bank, CIDA, JICA, ODA etc. NGOs like WVI, the Catholic Church, etc. will also continue to play significant roles in the sector.

Almost without exception, financial and technical support from these organisations are likely to continue, and even increase in coming years. However, the impact on absolute size of the labour force will be minimum. This is because, the general policy of these organisations is to hand over full responsibility for projects to appropriate government organisations involved in the Sector. Since this invariably means responsibility for the salaries of any extra personnel, there will be a tendency to limit the number of additional project staff at the beginning. Indeed, it is more common to 'second' existing government agency employees to such donor-assisted projects than to employ completely new staff.

The general assumptions arising from this review of policies are;

- * that policies will encourage increased utilisation and reorientation of existing Staff. Thus the tendency toward cross-mobility of labour across sector occupations will be greater than absolute increases in labour force; and
- * absolute labour force increases will occur if planned sector activities and adoption of certain technological and institutional innovations call for new occupational categories in the sector.

The next section focuses on how the sector agencies respond to government and donor policies in terms of on-going and planned activities and staffing.

2.3 Agency Activities and Employment Structure

2.3.1 On-going and Planned Activities

On-going and planned rural water supply and sanitation activities fall within two major programmes;

⁴Republic of Ghana, 1989. Rural Water Supply and Sanitation Sector Study : Terms of Reference

- (i) the 10,000 hand dug wells programme ("Operation Dry throat") for communities with population below 500, and
- (ii) 6,000 drilled wells programme ("Operation Sparkling Groundwater") aimed at communities within the 500 2,000 population range.

Even though a programme of comparable scale and resource commitment has yet to be drawn up exclusively for sanitation, this report draws attention to the on-going Kumasi Sanitation Project. As a pilot project being sponsored by the UNDP, it is rapidly becoming a valuable store house of well-documented experience in not only the use of alternative and low cost sanitation technologies such as the KVIP and Pour Flush latrines amongst others but more importantly in the setting up of participatory institutional framework. In spite of their current application in an urban setting, experience indicates their applicability to rural areas as well.

The 6,000 drilled wells programme is being undertaken by the GWSC's Rural Water Division in collaboration with multilateral and bilateral agencies and NGOs. The RWD also supports local organisations such as the DCD in the 10,000 hand dug well programme mainly in the context of PAMSCAD.

A significant feature of these activities is the high prominence given to the concept of VLOM. To this end, the GWSC has drawn up a detailed schedule of steps towards community participation in target settlements with the ultimate aim of strengthening the communities to assume a number of educational, financial and administrative responsibilities for water supply and sanitation projects⁵.

2.2.3 Technologies and Resources

In general, the activities reduce to the following technologies:

- handpumped boreholes;
- hand-dug wells fitted with handpumps;
- Ventilated Improved Pit and Pour Flush latrines; and
- Community-based management systems.

⁵GWSC, Rural Water Development Department, 1987. 6,000 Drilled Wells Programme

For successful application, sector personnel have to be trained in the use of the following hard and software inputs.

A. Drilling Equipment, Materials and Associated Services

A.1 Equipment and Materials (Foreign Inputs)

1. Drilling rigs and accessories (compressors, etc) and consumables
2. Vehicles and spares
3. Earthmoving equipment

A.2 Materials (local inputs)

1. Cement
2. Petroleum products (fuel, lubricants)

A.3 Manpower

Local consultancy in;

- project planning, implementation, monitoring and evaluation methods; and
- community and hygiene education and resource mobilisation techniques.

B. KVIP Construction Equipment, Materials and Associated Services.

B.1 Equipment and Materials (Foreign input)

1. Block-making machines
2. Manual digging equipment
3. Masons and carpenters tools

B.2 Materials (local)

1. PVC pipes;
2. Cement, roofing materials and insect screens.

B.3 Manpower

(Same as for A3 above)

2.3.3 Organisational Framework at Community levels.

The creation and maintenance of community-based management systems is also a vital input of agency activities within the VLOM concept. This has often taken the form of Water and Sanitation (WATSAN) Committees in target settlements.

2.4 Training and Employment Needs

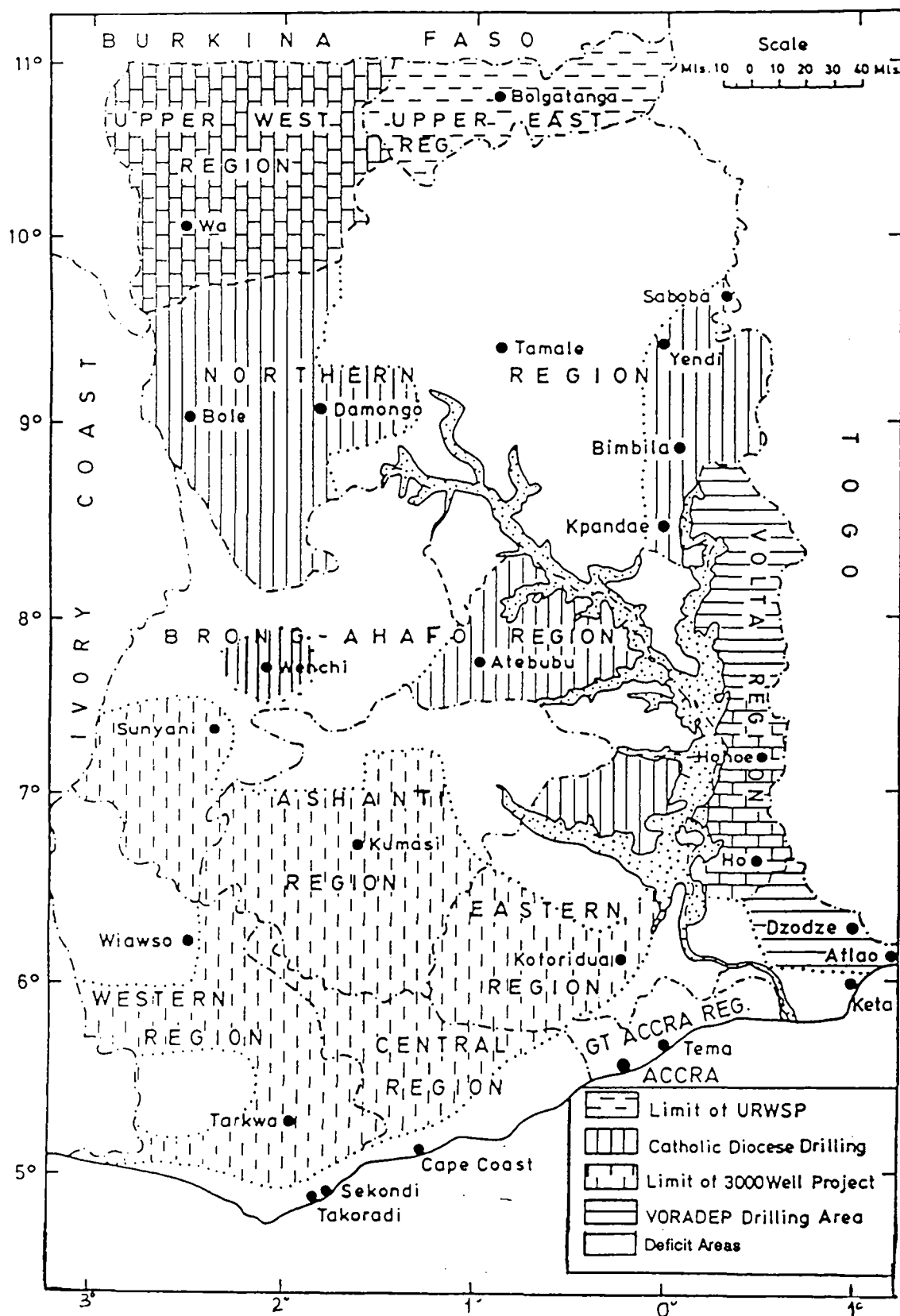
Against this background of activities and technologies, a review of the existing employment structure of selected agencies reveals significant manpower strengths and weaknesses in the sector as a whole and is a pointer to manpower and training needs.

2.4.1. GWSC Rural Water Department

(a) Current Staffing Pattern

The most deprived regions are the Upper East, Northern and Volta Regions where professional staff are completely absent from the rural water departments of the Corporation. This weak staffing position is compensated for, to some extent by the intensive NGO activities which tend to support and supplement the efforts of the GWSC throughout the country. A summary of NGO activities in the country is presented in Appendix . Nevertheless, as map 1 illustrates, many areas still remain uncovered in spite of these joint efforts. Hence more personnel, especially those falling within the professional and technical categories are urgently required to enable the Rural Water Department to identify and install a wider range of low cost water treatment plants in areas where drilled wells are inoperable for geophysical and socio-economic reasons. Attention is also drawn to the fact that monitoring of water quality from already installed hand-dug wells and boreholes systems is also lacking due to the deficit of chemist-bacteriologists in the sub-sector, lack of inputs such as water quality test kits and means of transport.

The RWD is, however, in a relatively better position in terms of craftsmen and supervisors. This is due mainly to the technical assistance which the department has been receiving over the years from donor agencies. This has attracted the requisite labour skills and also provided opportunities for on-the-job training. There is a strong case for promoting this kind of donor assistance and staff learning process while filling the gaps in the professional and technical categories.



Map 1. Areas in Ghana not covered by Groundwater Development

Source: Adapted from UNESCO, Ground Water in Rural Water Supply : Report of the West African Sub-Regional Workshop held in Accra, Ghana, 20-24 October, 1986. Published in 1988, P. 104.

Table 2. **Current Staffing Pattern (GWSC RWD)**
Staff Strength (By Region)

Occupational Category	Occupations	Drilling Unit	Volta	Central	Western	Upper West	Northern	Upper East	B. Ahafo	Total
Professional	Engineers (Drilling)	1	-	1	-	-	-	-	1	3
	Technician Engineers	2	-	-	1	1	-	-	-	4
	Chemist/Bacteriologists	-	-	-	-	-	-	-	-	-
	Training Officers	1	-	-	-	-	-	-	-	-
	Administrative Officers	2	-	-	-	-	-	-	-	-
	Hydrogeologists	6	-	-	-	-	-	-	-	-
Sub-total		12	-	1	1	1	-	-	1	12
Technical	Lab Technicians	-	-	-	-	-	-	-	-	-
	Draughting/Surveying	-	-	-	-	-	-	-	-	-
	Accounting/Booking	6	-	-	1	-	-	-	-	-
	Technical Officer/Asst.	7	1	-	-	2	-	1	-	11
	Pump Mechanics	-	2	-	-	-	-	-	-	2
	Others (Clerks, Typists)	3	-	-	-	-	-	-	-	3
Sub-total		16	3	-	1	2	-	1	-	23
Supervisors	Superintendents	13	2	-	1	-	1	2	-	19
	Foremen	27	2	-	1	1	-	1	-	32
	Stores Officer/Keeper	8	-	-	1	-	-	-	-	9
	Others(Supervisor-Civil)	-	-	-	-	-	1	-	-	1
Sub-total		48	4	-	3	1	2	3	-	61
Craftsmen	Rigman	-	-	-	-	-	-	1	-	1
	Artisan (Mason)	-	-	-	-	3	-	1	-	4
	Artisan (Mech)	13	2	-	1	13	2	1	-	32
	Artisan(Drilling)	6	-	-	-	-	1	-	-	7
	Artisan(Auto Elect.)	3	-	-	-	-	-	-	-	3
	Artisan(Welding)	4	-	-	-	-	-	-	-	4
	Trade Attendant	13	-	-	-	-	-	-	-	13
	Jigmen	5	-	-	-	-	-	-	-	5
	Apprentices	-	-	1	-	2	-	-	-	3
	Sub-total		44	2	1	1	18	3	3	-
Semi-Skilled/Unskilled	Securitymen	20	-	-	1	-	-	-	-	21
	Labourers	11	-	2	-	-	-	1	2	16
	Drivers/Riders	17	-	-	2	3	1	-	-	23
	Headwell Sinkers	-	-	1	2	-	1	-	2	6
Sub-total		48	-	3	5	3	2	1	4	68
Grand-total		162	9	5	11	25	7	8	5	238

Source: TNC:HRD Survey, December, 1989 - February, 1990

(b) Manpower Needs

The key occupations which are required to strengthen the department are presented in Table 3.

Table 3: **Manpower Needs by Occupation (GWSC)**

Occupation	Additional Strength	Anticipated Total Employment
Rural Water Engineers	10	13
Technicians	110	114
Hydrogeological Technicians	30	30
Drilling Technicians	20	27
Handpump Maintenance Managers	22	22
Total	192	206

Source : TNC, 1990. Workshop on the Current Training Programmes and Training Needs of User Agencies (17th-18th October, 1989).

(c) Planned Staffing Pattern

Meanwhile, the GWSC Drilling Unit intends to cut down its staff strength from the current 170 to 91 over the next 5-year period⁶. Table 4a shows the intended staffing position for different occupational categories. Table 4b also shows the surplus labour which is going to be generated when this retrenchment exercise takes effect. In view of the disparities in staffing position of the RWD across the nation (see Table 2), the possibility of retraining and recruiting some of these laid-off workers in other regional units of the RWD should be food for thought. In latter sections of this report, specific recommendations in this direction have been made.

⁶See Appendix 2 for Organisation Chart and Current Staff Strength of the Drilling Unit.

Table 4a Intended Staffing Pattern (Drilling Unit)

Occupational Category	Occupation	No. of Personnel (1990-95)
Professional	Engineers	1
	Tech. Engineers	2
	Chemist/Bacteriologist	0
	Training Officers	1
	Hydrogeologist	6
	Others (Sen. Acct/Admin. Officer)	3
Sub-total		13
Technical	Lab. technicians	0
	Draughtsmen/ Surveyors	0
	Technical Officers/Assts.	5
	Others (Accts. Clerks)	5
	Sub-total	
Supervisors	Superintendents	12
	Foremen	16
	Stores Officers/Keeper	5
Sub-total		33
Craftsmen	Artisan(Mech)	6
	" (drilling)	3
	" (Auto elect)	1
	" (Welding)	0
	Trade Attendant	0
	Jigmen	0
Sub-total		10
Semi-Skilled/ Unskilled	Securitymen	9
	Labourers	0
	Drivers	12
Sub-total		21
TOTAL		87

Table 4b : Anticipated Labour Surpluses of Drilling Unit, Kumasi.

Occupational Category	Occupation	Surplus Labour
Technical	Technical Officers/Assts	2
Sub-total		2
Supervisors	Superintendents	1
	Foremen	11
	Stores Officer/Keeper	3
Sub-total		15
Craftsmen	Artisan (Mechanical)	7
	Artisan(Drill)	3
	Artisan(Auto-Elect.)	2
	Artisan(Welding)	4
	Trade Attendants	13
	Jigmen	5
Sub-total		34
Semi-Skilled/ Unskilled	Securitymen	11
	Labourers	11
	Drivers/Riders	5
Sub-total		27

2.4.2 Department of Community Development⁷

a) Current Staffing Pattern

The current structure of employment in the DCD is shown in Table 5.

Table 5. Current Staffing Pattern (DCD)

Occupational Category	Occupation	Upper West	Volta	Eastern	G. Accra	Central	Northern	Total
Professional	Director/Asst. Director				1		1	2
	Community Dev. Officer	18	-	21	28	24	13	104
	Community Dev. Asst.	7	-	14	10	7	19	57
	Mass Educ. Officers	5	-	18	10	8	2	43
	Mass Educ. Assts.	15	-	11	14	16	12	68
	Principal Acct. Officer	-	-	-	-	1	-	1
Sub-total		45	-	64	63	56	47	275
Technical	Technical Officer	-	2	3	-	3	-	8
	Executive Officer	-	-	8	-	5	-	11
	Project Officer	-	-	-	-	1	-	1
	Tech. Asst.	-	-	-	-	3	-	3
	Tech. Inst.	-	-	-	-	1	-	1
	Others (Typists, etc.)	-	-	-	-	1	-	1
Sub-Total		-	2	9	-	14	-	25
Supervisors	Superintendent	2	4	3	-	3	1	13
	Foremen	2	4	4	-	4	1	15
	Store Keeper/Officer	-	-	2	-	3	-	5
	Others (Superv. Tech. etc.)	-	-	4	-	4	-	8
Sub-total	4	8	13	-	14	2	41	
Artisans	Mechanics	-	-	2	-	1	-	3
	Auto Electricians	-	-	1	-	1	-	2
	Carpenters	-	-	5	-	8	-	13
	Masons	-	-	12	-	5	-	17
	Domestic Elect.	-	-	1	-	-	-	1
	Weilder	-	1	-	-	-	-	1
Sub-total	-	1	21	-	15	-	37	
Semi-Skilled/ Unskilled	Drivers/Operators	-	-	5	-	4	-	9
	Securitymen	-	-	13	-	12	-	25
	Messengers/Labourers	-	-	31	-	21	-	52
	Others (Cooks, Painters etc.)	-	-	-	-	2	-	2
	Sub-total	-	-	49	-	39	-	88
Grand total	49	11	156	63	138	49	466	

Community Development and Mass Education Officers make up more than 50 per cent of total employment in the DCD. It is, therefore in a potentially strong position to undertake 'software' activities. The Department is however poorly staffed with technical personnel and craftsmen (mason, carpenters). Two of the most severely limited regions are the Upper East and Northern and

⁷The information so far available covers 6 regional headquarters of the DCD. These are Upper East, Volta, Eastern, Greater Accra, Central and Northern.

this is particularly serious in view of the important role of the Department in the hand-dug well programme and associated latrine construction and management projects.

(b) Manpower Needs

The current need for personnel of different occupational categories is shown in Table 6 covering six regions.

These occupational needs of the DCD, as expressed in the table indicate the increasing pressure on the department to expand its role in the hand-dug and drilled well programmes and sanitation projects. This is to take the form of community mobilisation and education as well as technical assistance for communities in hand-dug wells and latrine construction.

Table 6. Manpower Needs by Occupation (DCD)

Occupational Category	Occupation	Upper West	Volta	Eastern	G. Accra	Central	Northern	Total	Anticipated Total Establishment
Professional	Comm. Dev. Officer	20						20	124
	Mass Educ. Officer	30						30	73
	Mass Educ. Asst.	25					40	65	133
Sub-total		75					40	115	330
Technical	Draughtsmen/Surveyor	2						2	2
Sub-total		2						2	2
Supervisors	Works Foreman			4		12		16	29
Sub-total				4		12		16	29
Craftsmen	Masons	12		8	5	12		35	52
	Carpenter			4	5	24		33	46
	Electricians			1				1	2
	Well Sinkers				5	12	10	27	27
Sub-total		12		11	15	48	10	66	127
Semi Skilled/ Unskilled	Drivers			2				2	11
	Painter			3				3	4
Sub-total				5				5	15
Grand total		77	12	20	15	60	50	234	503

The DCD in Upper West and Northern regions record the highest manpower needs. This is perhaps due to the fact that these regions are currently one of the most deprived parts of the country in terms of potable water supply and healthy sanitary facilities and practices. Clearly, the DCD is attempting to improve its human resource base in order to expand its role in the community mobilisation and education aspects of the sector projects. The relative absence of demand for technical and supervisory personnel in the Upper West is compensated for mainly by the manpower

resources of NGO. Nevertheless, the VLOM concept necessitates the development of local technical and supervisory capability by the DCD and the government agencies.

In other parts of the country, the table indicates an emphasis on craftsmen and supervisors. The development of these occupational categories will go a long way to ensure sustainability of water and sanitation systems which have already been put in place in these parts.

2.4.3 Environmental Health Division

a) Current Staffing Pattern

Current employment in the division is shown in Table 7a.

Occupational Category	Occupation	Staff Strength (by Region)					Total	
		Upper West	Volta	Eastern	Western	Central		Ashanti
Professional	Public Health Engineer	-	-	-	-	-	-	
Sub-total		-	-	-	-	-	-	
Technical	Technical Officer Environmental Health Technologist	-	-	1	-	-	-	
		3	-	-	-	-	3	
Sub-total		3	-	1	-	-	4	
Supervisory	Principal Health Inspectors	4	9	15	8	12	9	55
	Health Inspector	8	23	31	13	19	14	99
	Health Inspection Assistants	58	172	243	122	198	-	791
	Overseer	-	-	-	-	20	-	20
Sub-total		68	204	289	141	240	23	965
Grand total		71	204	290	141	249	23	969

Health Inspection Assistants are the main occupational group, representing about 80 per cent of total staff strength. Professional (middle level) staff are in short supply. A summarised version of Table 7a i.e. Table 7b showing the establishment position of the EHD reinforces this observation⁸.

⁸This information was obtained from the EHD Headquarters in Accra in the form presented in the table.

Table 7b. **Aggregate Staffing Pattern**

Occupation	Staff Strength
Public Health Engineers	1
Public Health Inspectors	337
Health Inspection Assistants	1207
Total	1545

There is only one Public Health Engineer in the EHD based at the National headquarters. A basic implication is that the Division is limited at the regional and district levels in its ability to evolve and coordinate health education messages and programmes in support of water and sanitation projects. In the Upper West Region, this shortcoming has been compensated for to a large extent by the sponsored Water Utilisation Project which provides technical, financial and institutional backstopping to an interdisciplinary project team made up of personnel from the EHD, GWSC and DCD.

b) Manpower Needs by Occupation

The expressed manpower needs of the Division are presented in Table 8.

Table 8 . **Manpower Needs by Occupation**

Occupational Category	Occupation	Upper West	Volta	Western	Central	Total Addition	Anticipated Total Establishment
Professional	Public Health Engineer	-	-	-	-	-	-
Sub-total		-	-	-	-	-	-
Technical	Technical Officer Environmental Health Technologist	2	-	-	1	3	4
Sub-total		2	-	-	1	3	7
Supervisory	Principal/Snr. Health Inspector	2	8	3	18	31	86
	Health Inspector	464	54	13	82	613	712
	Health Inspection Assistants	568	111	-	256	935	1726
Sub-total		1034	173	16	358	1579	2524
Grand total		1034	175	16	357	1582	2531

The expressed occupational needs of the Division reflects atendency towards perpetuation of its 'bottom-heavy' structure even though some recognition has been given in the Central and Volta regions to the need for middle level occupation such as the Environmental Health Technologists and technical officers. Given the new thinking that pervades the sector however, the emphasis on Health Inspectors and Health Inspection Assistants implies that these personnel are now expected to rise above regulatory job skills - enforcement of health 'standards' and prosecution of

offenders which has earned them the unfriendly name 'Tankasi'. They are now seen by their employers (EHD, DCD, GWSC, NGO's) as change-agents whose promotional activities focus on hygiene and user education in a basically user-friendly approach.

2.5 Projection of Occupational Demand

The state of HRD planning in the sector has not reached the stage where a suitable data base has been evolved to permit a trend-based projection of occupational demand. However, this report attempts to give a rough indication of future occupational demand using a proposed institutional and employment model based on ;

- multilevel interdisciplinary team work;
- empirical ratios of personnel to population served in selected on-going projects; and
- a three year projection period.

2.5.1 Multi-level Interdisciplinary Team Structures

In a workshop organised to assess the training needs of sector agencies, the GWSC came out with certain illustrative proposals on which this report bases the multi-level interdisciplinary team structures. The GWSC proposals, in part here as follows ;

- 1 rural Water Engineer in each region
- 1 Technician in each district to plan, design and supervise construction of low-cost water and sanitation systems.
- 110 and 55 Community animators drawn from the DCD and MOH respectively to give the necessary orientation for water supply and sanitation purposes located at district centres; and
- 3 Hydrogeological technicians in each region.

Proposals were also made for the training of 22 handpump maintenance managers and 20 drilling technicians through their spatial distribution was not specified as for other occupations.

This report however uses the spatial logic implied in some of the GWSC proposals to modify and recommend further that ;

- a) at the regional level, the multidisciplinary team should

be made up of the Rural Water Engineer supported by the following

- 1 Hydrogeological Technician ;
- 1 Drilling Technician ;
- 1 Community Development Officer ; and
- 1 Public Health Engineer.

b) at the district level, the team should comprise GWSC Technician (Rural Water Specialist) in collaboration with the following ;

- 1 Handpump and Latrine Maintenance Manager (Artisan) ;
- 1 Assistant Community Development Officer.
- 1 Mass Education Officer ; and
- 1 Environmental Health Technologist

The district team is to coordinate and supervise the activities of a number of field workers in each district. These field workers are to be made up of Mass Education Assistants and Health Inspection Assistants who will be involved in hygiene and user education and the collection of basic data for monitoring and evaluation purposes. Obviously, the actual number of field workers will be population dependent.

2.5.2 Empirical Ratio of Personnel to Population Served

To project the numbers of field workers who will be required, the personnel : population ratio of 1:1500 is chosen. This is based on the Water Utilisation Project (WUP) currently going on in the Upper West Region where about 200 field workers are able to reach about 300,000 people in areas lacking water supply and sanitation facilities.

The GWSC is committed to providing potable water to 60 per cent of rural dwellers⁹. That commitment reduces to about 5.7 million people in 1993¹⁰. On the basis of the personnel-population ratio of 1:1500, the total additional field workers who will be required will be about 3805.

⁹GWSC Rural Water Development Programme. 1987. Drilled Wells Programme

¹⁰See Appendix .

2.5.3 Anticipated Staffing Pattern

Assuming the multi-level interdisciplinary team structures are adopted and the personnel-population ratios for field workers applied over the next three-year period, the aggregate manpower demands of selected occupations in the sector are estimated and presented in Table 9.

Table 9. Projected Aggregate Occupational Demand

Occupation	Expressed Need	Projected Addition	Total
<u>Regional Level</u>			
Rural Water Engineer	10	-	10
Public Health Engineer	-	10	10
Community Dev. Officer for Rural Water and Sanitation	20	-10	10
Hydrogeological Technicians	30	-	30
Drilling Technician	10	-	10
<u>District Level</u>			
Handpump/Latrine Maintenance Manager	22	88	110
Assist. Comm. Dev. Officer	-	110	110
Mass Educ. Officer	30	80	110
Environmental Health Technologists	-	110	110
Health Inspection Assistant	935	2625	3560 ¹¹
Mass Education Assistant	65	183	248 ¹²
Total	1122	3197	4248

Assessment of the types and numbers of skilled personnel required by the sector in the next three years serves as a frame of reference for an assessment of the education and training system. The specific questions to be answered in the next section are;

¹¹See Appendix for estimation of employment levels for these occupations.

¹²See Appendix for estimation of employment levels for these occupations.

* what institutions and programmes exist for training of personnel who can fit into the relevant occupations ?; and

* what is the capacity of these institutitons in terms of numbers of graduates produced, training staff and equipment available?

CHAPTER THREE

3.0 Structure of Education and Training System

3.1 Training Institutions and Occupational Qualifications

For employment in any of the needed occupations, qualifications can be obtained from a number of institutions as shown in Table 10.

Table 10. Institutions and Qualifications for Needed Occupations

<u>Occupation</u>	<u>Qualification</u>	<u>Institution(s)</u>
1. Community Development Officer	a. BA/BSc in Social Science (Sociology, Planning etc.)	1. University of Ghana 2. University of Science & Technology (Depts. of Planning & Social Sciences) 3. University of Cape Coast (Centre for Development Studies)
2. Assistant Community Development Officer	a. Diploma in Community Development b. Diploma in Social Administration	1. Kwaso Rural Training College ¹³
3. Artisan (Masonry)	a. National Craftsman Certificate Grades I & II or equivalent	1. Technical Institutes 2. Polytechnics 3. DCD Rural Training Centres
4. Artisan (Carpentry)	-do-	-do-
5. Artisan (Drill)	-do-	1. -do- 2. GWSC Training Schools (Owabi & Weija)
6. Handpump Maintenance Managers	-do-	-do-
7. Health Inspection Assistants	RSH Diploma In Public Health	School of Hygiene
8. Mass Education Assistants	Certificate for Social or equivalent	Rural Training College
9. Environ. Health Technologist	Diploma	University of Science and Technology
10. Public Health Engineers	M.Sc Sanitary Engineering	- do -
11. Hydrogeological Technicians	Diploma In Mining & Mineral Engineering City & Guilds Certificate	U.S.T. Institute of Mining & Mineral Engineering Polytechnics
12. Drilling Technicians	- do -	- do -

¹³Community Development Assistants are promoted to the rank of Assistant Community Development Officers and then to Community Development Officers on the basis of experience.

3.2 Occupational Supply of Training Institutions

By 1993, if current annual rates of enrolment and graduation from the training institutions continue, the supply of personnel qualified for employment in the needed occupations will be as shown in Table 11.

Table 11. Aggregate Occupational Supply of Training Institutions

Institution	Occupations	Average Annual Enrolment	Average Annual Graduation	Occupational Supply Projection 1993
1. Schools of Hygiene	Health Inspection Assistants	182	157	468
2. DCD Rural Training Centres	a. Artisans (Masonry)	24	24	72
	b. -do- (Carpentry)	12	12	36
	c. Non-formal Educationalist	432	384	1052
4. GWSC Training School (Weija)	a. Sen. Water Works Attendant	25 (Total)	25	75
	b. Laboratory Technicians			
	c. Plumbers/Pipe fitters			
	d. Mechanics			
	e. Pump Repairers			
5. GWSC Training School (Owabi)	a. Pump Repairers	35 (Total)	35	105
	b. Mechanics			
	c. Artisans (Drill)			
	d. Water Works Attendant			
	e. General Maintenance Craftsman			
6. Technical ⁴ Institutes	a. Artisans (Building)	85	83	249
	b. -do- (Block laying, concreting)	1394	1368	4098
	c. -do- (Carpentry)	908	890	2670
	d. -do- (Mech. Eng. Craft Practice)	401	393	1179
	e. -do- (Plumbing)	184	180	540
7. MDPI & GIMPA	Enhanced management and policy making skills of - regional directors (mainly GWSC & DCD) - engineers - Community Development Officer - District Managers (GWSC) - Administrative/Financial Staff			
8. UST Dept. of Civil Engineering	a. Sanitary Engineers	40	40	120
	b. Civil Engineers			
	c. Environmental Health Technologist			

¹⁴Information was available only for full-time enrolment by courses. A graduation rate of 98% was therefore assumed to cut across all courses offered.

Table 11. (continued) **Aggregate Occupational Supply of Training Institutions**

Institution	Occupations	Average Annual Enrolment	Average Annual Graduation	Occupational Supply Projection 1993
9. UST Dept. of Planning	a. Planners	18	18	54
10. University of Ghana	a. Economists b. Sociologists			
11. University of Cape Coast Centre for Development Studies	a. Economists b. Sociologists c. Specialists in Education			

Source: TNC:HRD Survey, December 1989 - February 1990.

A comparison of the estimates of employment needs with the occupational supply estimates of the same period reveals the following ;

- technical Institutes are more than capable of producing artisans in masonry, carpentry and drilling who can be given post qualification training as handpump maintenance managers. This potential, however, is deceptive ; due to a relative lack of adequate incentives, most graduates from these institutions are absorbed by other employers especially in the private informal sector usually in the form of "One man" operations.
- on the contrary, the Rural Training Centres whose graduates are specifically trained for employment in the sector will be unable to meet the occupational demand for artisans, and mass education officers.
- the same problem of inadequate supply capability afflicts the GWSC training schools. Even taken together, the Owabi and Weiija schools will be unable to meet the demand for handpump maintenance managers by the end of the three-year projection period given current enrolment and graduation rates.
- the demand for occupations such as Rural Water Engineers and Public Health Engineers can be met by the Universities in the country. Again, the qualifications of graduated who can be employed are equally applicable to a wide range of competitive job openings outside the sector hence prospects for attracting them to the sector can only be realised by developing and providing

efficient working environment and an appropriate set of incentives.

Obviously, there is a need to increase the supply capability of the Rural Training Centres and the GWSC training schools by taking a critical look at their training facilities, trainer-training needs and curricula. It is also necessary to examine the curricula of the universities, GIMPA and MDPI in order to determine the suitability of their products as trainers in the rural training centres and GWSC training schools.

3.3 Inventory of Training Institutions and Curricula

3.3.1 Schools of Hygiene (Tamale, Ho, Accra)

Courses Offered.

- A. Public Health History and Administration;
Waste Matter Disposal;
Primary Health Care; and
Office Management.
- B. Medical Entomology;
Public Health Law and Practice;
Inspection and Report Writing.
- C. Food Hygiene and Inspection of other foods (meat inspection)
Town and Country Planning;
Building Design and Construction.
- D. Control of Rodents and other Pests;
Disinfection and Disinfestation;
Water Supply;
Epidemiology and Communicable Diseases Control;
Family Planning.
- E. Human Anatomy and Physiology;
Port Health and Border Post Duties;
Vital and Health Statistics.
- F. Nutrition;
Helminthology;
Hygiene Education and Community Mobilisation.

3.3.2 **Rural Training Centres of Community Development Department Courses offered.**

- A. Masonry
- B. Carpentry
- C. Fitting (Auto mechanical)
- D. Adult literacy
- E. Women's Work
- F. Non-formal Education
- G. Catering
- H. Dress-making
- I. Home-management

3.3.3 **GWSC Training School (Weiija)**

Courses offered.

The GWSC Training School at Weiija is the Corporation's main institution for running advanced refresher courses for Senior Waterworks attendants and refresher courses for laboratory Staff lasting 13 weeks and 4 weeks respectively. The Weiija School also runs a 3 year course for Waterworks Operators. The main subjects covered are;

- A. Water Supply and Treatment;
- B. Basic Electricity;
- C. Plumbing;
- D. Meters and Metering Devices;
- E. Water Distribution;
- F. Micro-Biology; and
- G. Water works Operations and Management.

In addition to these courses, short courses, usually lasting for one month are organised during the first half of each year for Secretarial staff, Clerical officers, Accounts Clerks, Audit Clerks, Revenue Assistants/Meter Readers, Data Processing staff, Receptionists/Telephonist, and Store/Purchasing clerks.

Future Plans:

Plans are well advanced for holding a Supervisory Management Course for District/Station Managers in Takoradi in March, 1990. During the year, a training course for Revenue Officers, District Sales Managers and District Managers for 3 days in all regions is also planned. Finally, the Weiija Training School will also hold a three month course for accounting staff in August - October, 1990.

These future training plans are a direct reflection of the emphasis which is being placed on rural water supply (where District Managers will play vital roles in project implementation, operation and maintenance and the problems of revenue generation and accounting involved in any rural water supply effort.

These training programmes are to be supplemented by a number of seminars/conferences designed to highlight some of the critical areas requiring greater attention by decision makers in the Corporation.

3.3.4 GWSC Training School (Owabi)

The Owabi Training School runs an introductory and follow-up courses on Water Treatment and Pumping. The key subjects taught are;

- A. Water Chemistry;
- B. Preparation and Dosing of Chemicals;
- C. Ground Water;
- D. Water Treatment;
- E. Water Plant Electricity;
- F. Water Distribution;
- G. Hydraulics;
- H. Applied Electricity;
- I. Mechanics (Pumps, Prime Movers); and
- J. Plant Arithmetic.

3.3.5 Management Development Productivity Institute and GIMPA.

There are four basic courses run by MDPI. These are; General Management, Financial Management and Management Information Systems, Industrial Engineering and Management Research. The specific subjects taught under each course are presented below;

A. General Management

Intoduction to Management;
 The Practice of Supervision;
 Office Management and ADministration;
 Introduction to personnel Management;
 Management Practice;
 Human Relations and Communications; and
 Seminar on Corporate Planning and Strategy Formation.

B. Financial Mangement and Management Information Systems

Data Processing;
 Financing Management;
 Cost Accounting;
 Purchasing and Supply Management;
 Financial Accounting;
 Stores Management;

Management Information Systems (MIS) ;
 Financial Control Systems;
 Management Systems and Computer Applications;
 Management Accounting;
 Internal Auditing; and
 Records Management.

C. Industrial Engineering

Maintenance Management;
 Management of Business Property;
 Management Development for Professionals;
 Network Analysis;
 Work Study; and
 Quality Control.

D. Management Research

Project Management;
 Feasibility Studies;
 Supervision of Productivity;
 Sales Management;
 Marketing Planning and Control; and
 Marketing Research Techniques.

The GIMPA also runs a management course covering the following subjects;

- Project Planning and Management;
- Senior Management Development;
- Personnel and Supervisory Management;
- Strategic Planning and Management;
- Administrative Management;
- Financial Management and Budgeting; and
- Chief Executive Programme.

3.3.6 University of Science and Technology.
(School of Engineering)

The Department of Civil Engineering within the School runs a number of programmes which are relevant to the training needs of the sector. These are; B.Sc. Civil Engineering (Degree Programme), the Civil Engineering (Diploma Programme), the Environmental Health Technology (Diploma Programme), and Sanitary Engineering (Post Graduate Degree).

Details of the courses offered by the school under each of these programmes are presented below;

Sanitary Engineering (Post Graduate Diploma)

The courses are run in two parts (I and II) with part I further sub divided into Part IA and Part IB as follows;

Part IA: Courses

1A - Environment and Environmental Impact:

Principles of environment, environmental impact and ecology. Pollution of streams and lakes; role of oxygen in natural water. Introduction to limnology, marine and coastal pollution. Air pollution as related to water pollution.

B - Environmental Chemistry:

Stoichiometry, type of chemical bonds, equilibria, solutions and solubility, Acid - Base concept and redox system. Reaction kinetics. Types of chemical pollutants in the environment. Physical chemical and radiological quality criteria. Water quality monitoring methods; advanced methods of water and wastewater analysis.

C - Environmental Microbiology:

Introduction to microbiology; microorganisms and higher organisms; principles of taxonomy, morphology, cytology and growth of microorganisms. Biological indicators of pollution. Role of different microorganisms in environmental engineering processes. Biological water quality considerations. Biological indicators of pollution.

D - Water Resources Engineering:

Revision of basic hydrology and hydrogeology. Water sources and their yields, including groundwater. Design of reservoir storage. River basin management. Storm water drainage.

E - Water Supply:

Water demand and estimation. Patterns of water use in rural, urban and municipal areas. Groundwater abstraction methods, including well hydraulics. Surface water supply. Pumping plant; selection, installation, operation and maintenance. Water distribution systems, including design and analysis of networks. Pipe fittings and special pipe materials and jointing techniques. Water losses and maintenance procedures.

F - Applied Statistics:

Presentation of data. Probability. Distribution functions binomial, geometric, exponential, poisson and normal. Hypothesis testing and significance test. Goodness of fit test. Regression. Bayesian statistics. Decision theory, Extremal statistics, Design of experiments.

G - Engineering Hydraulics:

Hydraulics of water supply and sewerage. Revision of fundamentals of flow in pipes and open channels. Flow of water in non rectangular section channels. Velocity gradient and curvature. Flow controls. Effects of friction and local losses. Secondary flows in rivers.

H - Environmental Health and Education:

Tropical public health; introduction to epidemiology, water borne, insects borne and helminth diseases and control in relation to water supply, sanitation and irrigation.
Introduction to health education; techniques and approaches. Importance of community participation. Attributes and belief systems.

I - Environmental Quality Engineering Laboratory I & II

Analytical determinations of water quality parameters; Alkalinity, pH, hardness, colour, turbidity, solids, chlorine, oxygen demand, electrical conductivity, forms of nitrogen, iron and manganese. Visual characteristics of water. Sampling techniques and role of laboratory services. Biological examination using microscopes. Interpretation of laboratory results.

J - Hydraulics Laboratory:

Flow over weir. Flow through venturi flume. Pump tests and pipe flow.

Part 1B; Courses:

K - Water Treatment:

Examples of raw water quality. Standards for drinking water. Objectives of water treatment. Water source selection. Design of alternative treatment processes,

including low cost rural technologies. Conventional urban water treatment processes. Advanced water treatment and special processes.

L - Sanitation and Wastewater Treatment:

Low cost designs for sanitation systems. Design of septic tanks, water and non water borne systems. Design of water borne sewerage systems, including pumping plant. Sewer materials. Treatment methods, including stabilization ponds, oxidation, ditches and other conventional treatment systems. Reactor kinetics applied to treatment systems. Sludge handling.

Reuse of sewage sludges and excreta in agriculture (irrigation and fertilization) and aquaculture (production of algae, water plants crustaceans and fish etc). Production of biogas. Health implications.

M - Solid Waste Management:

Quantities and collection of refuse. Methods of disposal and treatment (land filling, composting, incineration, alternative method) Problems with leachates and ground water contamination; health implications.

N - Irrigation:

Irrigation methods. Water requirements; soil and plant water relationships. Design, operation and maintenance of irrigation systems. Effluent reuse. Case studies.

O - Industrial Waste Treatment:

Characteristics of industrial waste. Principles of industrial waste treatment. Treatment and disposal of selected industrial waste common to Ghana. Case studies. Recycling and recovery. Siting of Industries.

P - Planning and Management I:

Management:

Principle of effective management as related to water supply and sanitation. Balance between human resources management. Personnel planning and human resources development; personnel policies. Organizational structures.

Q - Planning:

Introduction to planning mechanisms; formulation of policies, strategies and plans of action. Development and formulation of programmes and projects.

R - Design Project:

Students will carry out engineering design study either individually or in groups of an aspect of water or wastewater treatment. This may be a detailed engineering design or technical feasibility study.

A - Engineering and Disease:

Water-related diseases;
Refuse-related diseases;
Housing-related diseases;
Excreta-related diseases.

B - Surface Water Systems and Water Related Diseases:

The Hydrologic cycle;
Impoundment reservoirs;
Irrigation schemes with case studies;
Checklist for reservoirs and irrigation schemes.

C - Urbanisation and Disease:

Introduction to urban drainage.

D - Environmental Control Measures to Mitigate Disease vectors:

Historical background of vector control.
The techniques of vector control.

Environmental control - source reduction, water management, weed control and cultural control;
possible adverse effects of these practices on the environment.

E - Diseases:

Life cycles of causative agents
Clinical features and treatment
Epidemiology
Geographical distribution of malaria and schistosomiasis in the world.
Disease control, present status and perspectives.

F - Vectors:

Definition of "vector" and "intermediate host".
 Biology of mosquito: life cycle, habitat of mosquitoes,
 Ecological factors: temperature, pH, light, salinity,
 depth, movement, chemical composition, vegetation.
 Biology and ecology of snails. Habitat of snails.

Laboratory Work

1. Examination and identification of prepared slides of various parasites discussed.
2. Identification of blood films for malaria parasites.
3. Identification of slides of various species of schistosomiasis and snails which act as intermediate hosts.
4. Identification of worms and simulum flies which cause onchocerciasis.
5. Identification of cyclops which serve as intermediate hosts for drancunliasis (i.e, Guinea worm).

Field Visits.

Irrigation works, impounder reservoirs for water supply and hydro power.

PART II ; CoursesS - Planning and Management II:T - Management:

Project cycle; identification and definition of the project. Formulation, preparation and feasibility analysis. Design of the project; selection, negotiation and approval. Activation and organisation. Implementation and operation. Supervision, monitoring and control. Completion or termination. Out put diffusion and transition to normal administration. Evaluation; follow-up analysis and action.

U - Planning :

Financial considerations. Socio-economic consideration. Project Management Team; network analysis (construction) network analysis (determination of critical patch, float analysis), network analysis (scheduling, resource

allocation), network analysis (project compression), network analysis (exercises). Choice of technology, Budgeting, Legal aspects of project management. Project information. Implementation scheduling. Project monitoring and control. Case study and evaluation.

V - Seminar:

Individual presentations on topics of current interest and reports on field project work.

W - Research Project with Dissertation or Project Design with Long Essay:

Candidates shall have the option either to write a dissertation on a research topic or to undertake a design project with a long essay on an approved aspect of sanitary engineering related to the conditions in developing countries.

The dissertation option involves the study of research topics either in the field of unit processes or in the field of unit operations.

The design and long essay option involves the design of large public health engineering scheme or some major component of it, alongside critical literature review in some aspect of sanitary engineering relevant to tropical conditions.

Research and design project normally will be related to areas identified by the Ghana Water and Sewerage Corporation requiring further research to contribute to the improvement of their operations. The project work must be completed by the end of the twelfth month.

Candidates are expected to complete the above courses in a period of two academic years.

Environmental Health Technology (Diploma Programme)

Courses within this programme are run in two academic years, and are as follows;

Year 1 : Courses

Course Description:

A - Mathematics:

Post 'O' Level Mathematics, basic statistics, linear algebra.

B - Principles of Land Surveying:

Surveys of small areas for producing large scale plans for all purposes (except cadastral); setting out of simple buildings, gradients and slope stakes.

C - Fundamentals of Drainage I/II

Introduction in fluid mechanics; fluids statics, equations of fluid motion; fluid properties and their measurement, principles of flotation, continuity, momentum and energy equations; dimensional analysis, descriptive treatment of laminar and turbulent flows, flow around bodies steady flow in pipes, water hammer, time of emptying vessels and calibration of flow meters.

D - Food Hygiene:

Introduction to food hygiene, principles of clean food handling in homes, businesses and food factories; layouts of kitchens and food factories; disposal of waste; food poisoning; preservation of food.

E - Human Habitat:

Site selection for various settlements; improvement of sites; house design; structure of houses; homesteads; village layouts; schools, markets and public buildings, rural and urban development, field work.

F - Communicable Diseases & Vector Control:

Introduction, definition and common terminology; micro-biology and helminthology; epidemiology of communicable diseases; vectors and vector control; health impact of water resources development; field work.

G - Occupational health:

Occupational hazards; chemical; physical and biological agents and conditions; psychosocial factors; ergonomics; effects of exposure to combined stress; occupational accidents; controls and regulatory actions.

H - Community Health:

Introduction to Community Health; importance of preventive medical care in community health, maternal and child health and family planning; nutrition; communicable diseases; dental health; hygiene and sanitation; mental health; importance and concept of Primary Health Care, planning and executing Primary Health Care as part of Community Health; basic demography and population statistics; field work.

I - Environmental Science I (Chemistry and Microbiology)

Basic chemistry (inorganic and organic); chemistry of water and air; principles of physical chemistry; introduction to microbiology; classification of microorganisms; identification methods; microbiological quality parameters of water, food and air; laboratory work.

J - Environmental Science (Man and his Environment)

Humans and nature, introductory ecology, population, resources, pollution, environmental impact of man's activities, environmental quality and environmental quality parameters, environment and society.

Year 2 : Courses

K - Hydraulics:

Introduction to hydraulic engineering; specific energy and critical depths; hydraulic jump, uniform flow in open channels; best hydraulic section; classification operation and selection of pumps and turbines; hydraulic structures.

M - Hydrology:

The hydrologic cycle, deviation intensity and frequency of rainfall, consumptive use, run-off analysis, measurement of stream discharge, rating curves, simple storage problems, groundwater flow; yield of wells, well testing.

N - Sewerage & Water Distribution:

Separate and combined sewerage systems, sewer corrosion and ventilation, pumping and booster station design inverted syphon, the rational method of run-off calculation, the Hardy-Cross method of network analysis, trunk and distribution mains, service.

O - Water & Wastewater Treatment:

Conditions best suited for the use of various types of treatment systems, design of simple treatment systems; methods for excreta and nightsoil; function, operation and maintenance, laboratory test of basic parameters.

P - Public Health Sociology

Introduction; social analysis, agent of social change social behaviour (value system and belief system, attitudes towards health and illness); medical systems (mobilisation of community resources, professionalisation, social organisation of health professionals); social policy and medicine.

Q - Construction I

General considerations in civil engineering construction; construction plant and equipment; earthworks; works associated with river or groundwater environment, concrete, steel and timber construction, safety in construction.

R - Construction II

Construction planning, management and control, work study, budgetary and cost control, operational research and construction, law and arbitration.

S - Solid Wastes & Public Cleansing

Origin and classification of solid wastes, collection and storage; treatment and disposal (landfilling; composting and incineration); field work. Organisation of public cleansing in cities and towns; vehicles, equipment and manpower; street gullies and street washing, field visits.

- Seminar

Individual reports on field work projects.

T - Introductory Civil Engineering Drawing II

Introduction to plane and solid geometry; construction of triangles, squares, rectangles, polygons principles of tangency, oblique and isometric projections orthographic projections.

U - Introductory Civil Engineering Drawing II

Interpretation of simple maps; drawing profiles from contours; sections through drains, manholes, septic tanks and free hand sketches of sewer appertenances.

V - Engineering Economics

Introduction to engineering economics, economic analysis of projects; methods and application of appraisal financial planning and budgeting; measurement and bill preparation processes; elements of estimating.

W - Public Health Planning

Definition of health, importance of national and inter-national health planning; principles of Primary Health Care; formulation of policies, strategies and plans of action development and formulation of detailed programmes and projects; programme and project budgeting; health information systems.

X - Public Health Administration & Legislation

Principles of sound Public Health Administration and Management; Public Health Administration in Ghana, role of various Ministries, departments and authorities, national Public health regulations, international sanitary regulations.

Y - Industrial Wastes and Air Pollution

Introduction to industrial wastes, characteristics of industrial waste; disposal versus recycling wastes from specified industries, their characteristics and disposal; various forms of air pollution; effects of air pollution on human health and environment, air pollution standards; air pollution control; laboratory and field work.

Z - Construction Technology

Hand dug wells, rain water catchments; infiltration galleries, drilling and mechanisation of boreholes, dams, drainage, pipelines, latrines, filters, tanks and reservoirs; drawing exercises; laboratory; work-shop and field work.

A - Student Project

In addition to satisfying the course requirements, each student is expected to extensively survey the relevant literature and submit a report on an approved environmental health related topic.

Civil Engineering (Diploma) Programme

A number of courses relevant to the sub-sector are covered within this programme. These are as follows;

A - Hydrology

Hydrological cycle; duration, intensity and frequency of rainfall; Consumptive use; run-off analysis, measurement of stream discharge; rating curves; simple storage problems; groundwater flow; yield of well; well testing.

B - Soil Engineering

Principles of site investigation; bearing capacity and settlement of foundations; foundations of structures; seepage and drainage; stability of Soil masses; braced foundations; Compaction of earth works; principles of soil stabilisation.

C - Engineering Economy

Economic analysis of projects; methods and application of project appraisal. Financial planning and budgeting. General arrangement and contents of civil engineering bills of quantities. Measurement and bill preparation processes. Elements of estimating.

D - Sewerage & Water Distribution (see N of page 48)

E - Water and Wastewater Treatment (see O of page 48)

Civil Engineering (Degree Programme)

This programme covers a wide range of courses including Environmental Quality Engineering, whose main subjects are the same as those covered under the Sanitary Engineering and Environmental Health Technology programmes. In the Third Year of the programme, Civil engineering students are introduced to all aspects of Public Health (Sanitary) Engineering principles and practices. Then in the final year the course is offered as optional for those who would like to go into greater depths.

3.3.7 University of Science and Technology

Department of Planning

Courses Offered

First Year

Planning Surveys
Basic Mathematics
Graphic Communication
Geography for Planners
Fundamentals of Planning
Economics for Development

Second Year

Planning the Physical Environment
Development Planning Process
Population Analysis
Social Policy Planning
Resource Planning & Development

Third Year

Project Analysis
Transportation Planning
Industrial Development Policy
Population Analysis
Research Methodology
Infrastructure Planning

Fourth Year

Development Planning Theory
Governance of Development
Management for Planners
Special Study

There is an obvious need for these institutions especially the GWSC Training School, the Schools of Hygiene the Rural Training College (at Kwaso) to be adequately provided with trainers and training facilities to enable them run their courses on a sustainable basis. The HRD survey revealed a number of peculiarities regarding these vital aspects of the education and training system.

3.4 Training Facilities

Without exception, a major shortcoming of the Rural Training Centres, the Schools of Hygiene and the GWSC training schools is the absence of recent literature on Low-cost Sanitation, Rural Water Supply, Community Mobilisation and Management Techniques, Hygiene and User education. This problem is compounded by ubiquitous deterioration of existing library facilities and the lack of standard textbooks.

3.5 Trainers Training Needs

In view of the new messages which have to be transmitted to the rural users of water and sanitation facilities and the functions sector personnel are expected to perform, it is inevitable that these will be fed back to the education and training system in the form of trainers training needs. In this respect, some of the institutions which have been considered in this study viz. the Universities, Technical institutions, MDPI and GIMPA, by virtue of their greater endowment of facilities and staff, have an important role to play. Failure to effectively and quickly respond to trainers training needs will render useless any improvements in curricula and training facilities of the other training institutions. The HRD survey revealed the main trainers training needs of these training institutions.

3.5.1 Rural Training Centres

Training Needs

Trainers are to undergo courses which will enhance their skill and knowledge in the following key areas ;

- Human waste disposal. Emphasis on construction techniques, materials, operation and maintenance of on-site sanitation facilities (eg. KVIP latrine).
- Solid waste disposal. Emphasis on landfill management, site selection and refuse transfer;

- The establishment and maintenance of institutional/organisational framework for refuse disposal, and general community level institution building ;
- Drainage. Emphasis on prevention of house erosion and elimination of health hazards e.g. stagnant pools. Need for good drainage around wells and boreholes.
- Rainwater. Emphasis on rainwater catchment as integral parts of private house design especially in rural areas.
- Groundwater. Emphasis on borehole drilling, pump installation and maintenance.
- Planning and implementation of communication support for water supply and sanitation projects.

3.5.2 GWSC Training Schools

Training Needs

Thirty-two instructors need to be trained in technical and non-technical subjects to update the courses offered at Owabi and Weija to suit rural water supply.

3.5.3 Schools of Hygiene

As at the time of the survey, information on the trainers training needs of the schools of hygiene was not available.

CHAPTER FOUR

4.0

RECOMMENDATIONS

From the analysis of the education and training system in relation to manpower and training needs of the sector, this report now makes recommendations covering the organisational and programme up-grading necessary to improve the delivery of required job skills.

4.1 Operational Objectives

Institutional and programmatic improvements should be directed towards enhancing the following institutional capabilities;

- (a) special orientation courses to train,
 - (i) selected artisans (drilling, masonry) as handpump and latrine maintenance managers (37 annually for the next 3 years)
 - (ii) Health Inspection Assistants and Mass Education assistants as field workers in the latest health and hygiene education and community animation techniques (1269 annually). This works out to the training of about 13 field workers/district/year.
- (b) increased enrolment and graduation of Environmental Health Technologists (An increase from the current 10 to 36 annually.)
- (c) Training of 10 Public Health Engineers (3 or 4 annually)
- (d) Training of 30 Hydrologeological Technicians (10 annually)
- (e) Training of 10 Drilling Technicians (3 or 4 annually)
- (f) Orientation courses for Community Development Officers in Rural Water Supply and Sanitation.

4.2 Networking of Training Institutions

A network of training institutions covering the whole country and incorporating training programmes of some NGOs should collaborate in achieving these objectives. The responsible institutions are;

- polytechniques (Tamale, Kumasi, Accra, Sekondi-Takoradi, Ho);
- technical schools (Bolga, Nandom, Wa, Kumasi, Accra, Kpandu);
- the Universities (Kumasi, Accra, Cape Coast);
- the Rural Training Centre, Kwaso; and
- Schools of Hygiene (Ho, Accra, Tamale).

Within the network of institutions, the following recommendations are proposed covering institutional responsibilities, curricula expansion/modification, staff training, inter-institutional linkages, training materials and equipment and possible sources of local and external funding.

4.3 Orientation of Health Inspection Assistants and Mass Education Officers

Responsible Institutions, Course Contents and Linkages

Short Term:

1. Within one year, post qualification training workshops should be organised at the Schools of Hygiene (Tamale, Accra and Ho) and Rural Training College (Kwaso) for Mass Education Officers and Health Inspection Assistants. The main subjects should be; Techniques of Hygiene Education, User Participation in Water Supply and Sanitation projects. The Spatial distribution should be such as to cover the target groups in all parts of the Country.

2. Hence the country will be divided into broad sectors;

- * the North comprising Upper West and East and Northern Regions.
- * the Centre; comprising Brong Ahafo and Ashanti Regions.
- * the Southern; comprising Western, Central, Eastern, Greater Accra and Volta Regions.

3. In each of these broad sectors the workshops are to be organised at the Rural Training Centres. The Schools of Hygiene and Rural Training College will act as bases from which trainers, teaching materials and administrative/logistic support will be planned and provided. Technical assistance will be provided by the Training Network Centre, Kumasi. The training bases and associated rural training centres are as follows;

Sector	Training Base	Rural Training Centres
Northern	Tamale School of Hygiene	Tamale, Wa, Bolga, Bawku
Central	Kwaso Rural Training College	Sunyani, Kwaso
Southern	Accra School of Hygiene	Ho, Kibi, Sekondi, Cape-Coast

Staff Training

Prior to the initiation of the workshops, existing Staff of the Training Bases are to undergo an intensive staff training course to be organised by the Training Network Centre, Kumasi. The main objectives of this course will be to expose the trainers to the latest techniques of hygiene education, community participation and appropriate case studies in other parts of the World. They will also be introduced to the use of new training materials, equipment and skills assessment methods.

Materials and Equipments

To ensure successful running of the workshops for the Health Inspection Assistants and Mass Education Officers, the following materials are recommended for each Training Base;

- Training Modules on; Health and Hygiene; and Management and Community Participation.
- Slide Sound Equipment

Possible Sources of Funding

The possible sources of funding and technical assistance which could be examined are;

- NGOs such as the Catholic Church which are already actively engaged in training workshops in all the sectors, with specific references to; Bole, Nandom, and Zuarungu in the Northern Sector; and Wenchi and Kumasi in the Central Sector.
- All donor Agencies currently involved in the sector

Medium Term

(1) By the end of three years 1994, the curricula of the Schools of Hygiene should be sufficiently expanded to incorporate more aspects of Management and Community Participation, Health and Hygiene, as well as introductory aspects of Rural Water Supply and Sanitation Systems as follows;

Management and Community Participation

- the Rationale for User Participation in projects
- Basic Assessment of User Participation potentials
- Development, Implementation and Evaluation of User Participation Programmes.

Health and Hygiene

- Hygiene Education as an Inter-disciplinary Team Effort.
- Understanding the Community as a Socio-Economic System
- Developing the Programme for change

Water Supply and Sanitation in the Rural Context

- Wells and Handpumps in Theory and Practice
- Rural Water Supply, Treatment and Distribution
- On-site Sanitation; Technological Options and Decision-making Methods
- Case Studies in Ghana and other Countries.

4.4 Training of Environmental Health Technologist

Responsible Institution, Course Content and Linkages

(1) Since the attractiveness of the course has fallen among the potential target group of candidates (Health Inspectors) due to the absence of a suitable institutional framework in which they could be absorbed, there is a clear need to consider and speed up implementation of the institutional proposals made earlier.

(2) The training of Environmental Health Technologists is currently the responsibility of the Department of Civil Engineering (UST) which produces about 10 graduates annually. It is recommended that the annual intake should be increased to about 40 in order to ensure a graduation rate of about 36 per annum.

(3) On the assumption that job openings will be available for graduates, it is recommended that the TNC should organise workshops aimed at eliciting the interest of Health Inspectors and other interested sector personnel in the EHT Course. The theme of such workshops should cover the status, job description and prospects of Environmental Health Technologists in Rural Water Supply and Sanitation.

(4) At the same time, the TNC is to collaborate with the appropriate University authorities to review and modify the entry requirements for the EHT course with emphasis on practical experience in rural environments as an important entry requirement rather than academic qualification. This will ensure that less academically qualified staff in the Sector can gain access to the programme.

Materials and Equipment

Training materials and equipment required for running the programme are already available in the Department of Civil Engineering.

Sources of Funding

Current source: Government of Ghana.

4.5 Training of Artisans as Handpump/Latrines Maintenance Managers

Responsible Institutions, Course Contents and Linkages

(1) The Owabi and Weiya Training Schools of GWSC, MDPI and Training Network Centre are to collaborate in the training of artisans as Handpump/Latrines Maintenance Managers.

(2) A two-pronged approach is recommended :

(i) to select some of the artisans who are being laid off by the Drilling Unit, Kumasi (refer to page 25 of this report) and already have working experience to undergo the 6 week Maintenance Management Course at MDPI (Feb. 6 - March 17) in 1991. Selection Criteria should include; remaining length of employment ; possession of basic qualification ; Certificate in City and Guilds in appropriate technical subjects.

(ii) to select fresh graduates from technical schools and polytechnics in the following areas ; basic engineering and building construction.

Graduates are to be employed as maintenance management Assistants after 1 week orientation courses to be jointly organised by the TNC in collaboration with the Owabi and Weija Training Schools on "Operation, Maintenance and Management of Rural Water Supply and Sanitation Systems. " The course graduates are then employed as Maintenance Management Assistants under the Supervision of District/Station Managers of GWSC. After one year of employment, they are then enrolled in the MDPI 6 week course on Maintenance Management, promoted as Maintenance Managers and posted to fill job vacancies in the districts. This procedure should be replicated annually with a targeted output of between 36 and 40 Maintenance Managers every year.

Staff Training

Materials and Equipment

(1) Training Materials and facilities for running the Maintenance Management Course are already available at the MDPI.

(2) The GWSC Training Schools will however, require additional literature to run the one-week orientation courses for Maintenance Management Assistants.

(3) The materials should cover the following key aspects of handpump and latrine maintenance ;

- construction, operation and maintenance of wells, boreholes, handpumps, VIP and ;

Pour Flush latrines; Water and Sanitation Interactions; Institutional and financial aspects of management and community participation in projects ; the importance of user participation in VLOM and the implementation of a user participation programme.

Sources of funds

- (1) Government of Ghana
- (2) World Bank
- (3) UNDP
- (4) CIDA

4.6 Orientation for Community Development Officers on Rural Water and Sanitation

(1) Job Description

- Assessment of district Water and Sanitation needs in the context of overall development problems and resources.
- Monitoring and Evaluation of on-going and planned water Supply and Sanitation plans, programmes and projects.
- Formulation of Water and Sanitation development plans in the context of overall district development plan.
- Preparation of Community animation and mobilisation strategies

Responsible Institutions, Course Contents and Linkages

- (1) The Training Network Centre will supplement the following regular courses offered by the Universities ;
- B.Sc Development Planning (U.S.T. Department of Planning)
 - B.A Social Sciences (University of Ghana, Department of Sociology.
 - B.A ; Dip.Ed (University of Cape Coast)

The TNC input will be to organise a 2 week post qualification orientation course for

- (i) regular graduates who will be recruited as Community Development Officers ; and
- (ii) Sector employees possessing the requisite qualifications and experience who desire to participate in these courses.

(2) In lieu of the job description of CDO's the course contents should cover the following main areas ;

- Rural Water Supply and Sanitation Systems.
- Management and Community Participation ; and
- Health and Hygiene.

(3) Community Development Officers (Rural Water and Sanitation, 1 for each region) are expected outputs for this training effort.

Staff Training

Materials and Equipment

(1) The existing training facilities of the Universities are expected to be available and sufficient in the foreseeable future for running the regular courses. The TNC will make use of the training materials and equipment recently supplied by the World Bank and UNDP.

Possible Sources of Funding

- Government of Ghana; UNDP; World Bank.

4.7 Training of Hydrogeological and Drilling Technicians

Responsible Institution, Course Contents and Linkages

(1) Since there is as yet no institution running programmes to produce the hydrogeological and drilling technicians, it is recommended that the Owabi and Weija Training Schools be strengthened in terms of staff and teaching materials to run the required programmes.

(2) Specific steps in staff improvement should include ;

- recruitment of part-time teaching staff from the Universities, Polytechnics, Institute of Mining and Mineral Engineering (at Obuasi), GWSC and NGO's to teach relevant subjects ; and
- organising for regular staff of other Training Schools to undergo short term overseas training courses to enhance their knowledge and teaching skills in the required subject areas.

(3) Practical job attachments should be arranged for trainees to work on on-going and planned drilling operations and hydrogeological studies for sector projects within and outside the country. The TNC will support this effort by generating a data base on sector projects and making this amicable to the training schools on request.

Possible Sources of Funding

- Government of Ghana
- All Donor Agencies currently involved in the sector

4.8 Training of Public Health Engineers

Responsible Institutions, Course Contents and Linkages

(1) The UST Department of Civil Engineering already has the training staff, materials and facilities to run the Sanitary Engineering Course which is relevant for Public Health Engineers. However, the intake has been limited as a result of a lack of adequate number of applicants for the course. This in turn arises from the drama of institutional arrangements for absorbing Public Health Engineers in the EHD, MOH, a problem whose solution has to be found as a prerequisite for training and recruiting the needed personnel.

(2) Prior to the implementation of the institutional proposals however, it is recommended that the role, prospects and responsibilities of Public Health Engineers should be communicated to the sector labour market by means of seminars and workshops. This should be organised by the TNC in collaboration with EHD (MOH), GWSC, and NGO's.