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SOCIO-ECONOMIC IMPACT OF A RURAL WATER SUPPLY PROGRAMME IN THE UPPER EAST REGION OF GHANA

BY

AUGUSTINE AKUOKO-ASIBEY ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of DOCTOR OF PHILOSOPHY.

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undesigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled SOCIO-ECONOMIC IMPACT OF A RURAL WATER SUPPLY PROGRAMME IN THE UPPER EAST REGION OF GHANA submitted by AUGUSTINE AKUOKO-ASIBEY in partial fulfilment of the requirements for the degree of DOCTOR OF PHILOSOPHY.

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DEDICATION

To my late Dad, my Mum, Family and the Lord Almighty

ABSTRACT

Water is vital in an economy, not only in the urban-industrial countries, but also in rural areas through its more widespread use in productive activities, and its potential to improving living conditions. This recognition has led to substantial investments in rural water supply and sanitation projects in the developing world over the past years. Accompanying this, is the increased evaluation of such projects by developing countries, as well as by donors of foreign aid.

However, most evaluations have concentrated on health impacts and the reliance on project staff for information on programmes' impacts. The literature has failed to focus on rural people's knowledge, awareness, their practices related to the environment and impacts of issues related to programme objectives. Previous studies have also ignored the views of decision makers (government officials): their awareness, involvement and impacts of the programme on the beneficiaries.

Based on the views of both programme beneficiaries and decision makers, this dissertation assessed the socio-economic impacts of a rural water supply programme in the Upper East Region of Ghana, in an effort to contribute to the methods of impact evaluations. Using this approach, seven main findings about the impacts of the rural water supply programme have been identified and explained in this dissertation. First, the programme has made a marginal impact on waste disposal practices of the beneficiaries. Second, the programme beneficiaries have limited knowledge on the transmission mechanisms of water-borne and water-washed diseases. Third, women have not effectively utilized excess waste water in productive economic activities to supplement their incomes. Fourth, the programme has

resulted in improved social standing of women in the rural communities. There have been changes in attitude on the part of men towards women. Fifth, the rural people have problems paying the annual water tariff. Sixth, Community Water Organizers were more efficient than their Water User Committee counterparts in the performance of their duties. Seventh, the Radio Learning Group was the most effective medium in delivering health and hygiene education messages.

Although this study did not add to the development of theory in impact evaluations, it did make a significant contribution to evaluation research. It did show the need to broaden the research methods and an exploration into what programme beneficiaries experience, and ways to reconcile with views of local and regional level decision makers, in order to strengthen the ties of impact studies with the human-environment research tradition in geography.

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I would like to thank my Supervisor, Dr. K. J. Fairbairn, for taking me on at a critical stage of my programme. I thank Dr. L. A. Kosinski, for his constructive criticisms of initial drafts of this thesis. Dr. D. S. Gill's constructive suggestions helped a lot. The attention paid to discuss issues with me is greatly appreciated. Thanks are also due to Dr. D. B. Johnson, Dr. N. M. Seifried and Dr. Bruce Mitchell, my external examiner, for their critical examination of the final draft of the thesis. I thank Dr. H. J. McPherson for his comments on an earlier draft of the thesis.

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Abbreviations and Acronyms

CIDA	Canadian International Development Agency
GOG	Government of Ghana
$C	Canadian Dollars
GDP	Gross Domestic Product
GWSC	Ghana Water and Sewerage Corporation
UNICEF	United Nations International Children Emergency Fund
UNDP	United Nations Development Programme
ILO	International Labour Organization
IDWSSD	International Drinking Water Supply and Sanitation Decade
WHO	World Health Organization
UERA	Upper East Regional Administration
RWSU	Rural Water Supply Unit
HPC	Hand Pump Caretakers
CWO	Community Water Organizers
WUC	Water Users Committee
INSTRAW	United Nations International Research and Training Institute for the Advancement of Women
WUP	Water Utilization Project
¢G	Ghanaian Cedis
$US	United States Dollars
NCWD	National Council on Women and Development
31st DWM	31st December Women's Movement
DS	District Secretary
DRS	Deputy Regional Secretary
MFEP	Ministry of Finance and Economic Planning
MLG	Ministry of Local Government
MoWH	Ministry of [illegible] and Housing
IRC	International [illegible]r and Sanitation Centre

Chapter One

INTRODUCTION

In rural areas of the developing world, improving water supplies, providing adequate sanitation facilities, and encouraging hygienic practices are intrinsic to community development. One finds that, for example, in arid areas, a water supply system designed to permit the watering of livestock and irrigation of small gardens has a likelihood of significant impacts on the local economy (Saunders and Warford, 1976; Sorkin, 1988). Although by themselves, potable water supply and sanitation facilities are insufficient to stimulate socio-economic development, they have been seen as fundamental in the development process, influencing economic development, agriculture, health, and other sectors of the rural and national economy. Accordingly, the international development community has made substantial investments in the rural water sector over the past years.

In view of the numerous water supply and sanitation programmes that have sprung up in the developing world, there has been a consistent call on the part of both individuals and donors/organizations to evaluate the impacts of these programmes. In response to this call, a number of studies and assessments of rural water supply programmes have been carried out during the past decade, by the developing countries, as well as aid donors.

Notwithstanding this achievement, most evaluations that are available today are either health impact evaluations or they are limited to post-project evaluation of management efficiency (McGarry, 1987). Such studies overlook the explicit

objectives of many rural water supply programmes, for example, the change in social standing of women and the change in knowledge and attitudes to water- and sanitation-related diseases. Moreover, most studies end up providing inconclusive and sometimes contradictory results.

The question is, if rural water supply and sanitation programmes constitute a major driving force in the development of rural areas of the developing world, what are the reasons for the ambiguities surrounding the results of such impact studies?

Background to the Problem

Until the late 1970s, impact evaluation in the rural water sector was characterized as outside the mainstream of third world development. Development agencies were more concerned with the provision of physical infrastructure, with little or no attention paid to the impacts of such facilities on community development. This approach has changed and concern for impact studies has moved from the periphery to the centre stage of international development activities (Rahman and McDonnell, 1985). It has become an integral part of the operations of development agencies.

This change was the result of the need to balance the two issues which are vital in international development - the issue of accountability of aid assistance and the real issue of development *per se*, which is the impact of projects/programmes on beneficiaries (after Rahman and McDonnell, 1985; United Nations, 1987). Due to its recent evolution, the attempt to evaluate programme impact on beneficiaries and to establish some linkages of such impacts to overall societal development has not

been smooth-sailing. Several problems, including inadequate financial resources and inappropriate methods of data collection are some of the reasons, and are addressed in the next section. Some of these concerns are interconnected.

Problems Associated With Impact Studies in the Rural Water Sector

There are several problems related to evaluating the impacts of rural water supply and sanitation programmes in the developing world. One is simple lack of interest. Usually such studies require evaluators to collect data at the micro-level. This, in most cases, requires much more time in the communities for asking questions and observing people's behaviour and practices, time that the evaluators may not or cannot afford to spend. In cases where the studies are conducted, donors and governments are more concerned with the proportion of allocated resources that have been spent and the achievements of physical targets such as the installation of boreholes/hand pumps (Briscoe, 1978).

This problem is compounded by the lack of or inadequate financial, human and institutional resources. The current emphasis on impact evaluation is on multidisciplinary approaches and comprehensive analysis. Most developing world governments, already facing economic and human resources crises, do not have the capacity to engage in such studies. Under such conditions, evaluations are usually carried out by the programme staff or by a specialized evaluation team of external consultants, who may be misled by their informants [in most cases are senior level government officials] (Stephenson and Peterson, 1991).

There is also the age-old problem of institutional and political patronage. The use of qualified local personnel (who may have superior knowledge of social customs, local environment and institutional and legal constraints than do expatriates), to conduct impact studies offers a number of advantages. However, since the policy and decision makers of recipient countries do not want to jeopardize their relation with donor agencies or the government in case of negative results emanating from the study, local expertise is not utilized.

More significantly, impact studies are known to have methodological traps and ambiguous results which have become a subject of debate over the years (Blum and Feachem, 1983; Lindskog et al., 1987; Cairncross, 1989; United Nations, 1987; and The Imo State Evaluation Team, 1989).

The Significance of the Problem

These problems have led to the drawing of some conclusions about impact studies. The first is, the enlargement of impact evaluation to include inter-related projects/programmes, essentially changing the nature of impact evaluations. This, they claim, will be more feasible to link with broad developmental objectives and goals (Rahman and McDonnell, 1985). Second, the practice of external consultants evaluating externally funded water and sanitation programmes, should be avoided wherever possible (Cairncross, 1989; Stephenson and Peterson, 1991). This is justified for two reasons. Firstly, consultants could be misled or mistaken in their efforts, and may be fed with inaccurate information. Secondly, failure to entrust

locals with the task means the loss of an excellent opportunity to transform the approach to field research in many developing countries. Third, and an extreme scenario to the issue, has been the call to abandon impact studies of rural water supply programmes in their entirety.

These suggest that impact evaluators have become discouraged by the reputation that such studies have. However, with careful planning and the selection of appropriate methods, the impacts of such programmes could be done systematically. After all, as Munasinghe (1992: 320) puts it:

> "more systematic ex-post analysis of rural water supply schemes in the developing countries is important, in order to resolve some of these ambiguities, and to tailor future programs to be more effective in the widely varying conditions found in different parts of the world".

The main research issue is to systematically assess the impacts of a rural water supply programme on societal development in the absence of a baseline data.

Objectives of the Study

Specifically, the objectives of the study are:

1) to assess the economic, socio-cultural and environmental impacts of a rural water supply programme on the beneficiaries. The study will assess the impact of the programme on household water use patterns and practices, environmental sanitation practices, water-related economic activities and health.

2) to analyze the impacts of the programme on women.

3) to assess the views of government officials as to the socio-economic impacts of the rural water programme.

4) to compare responses of government officials and local people on the impacts of the programme. The aim is to establish areas of divergence and convergence on the part of policy/decision makers and programme beneficiaries.

5) to contribute to the methods of evaluating the impacts of rural water supply programmes.

The Upper East Region Rural Water Supply Programme in Ghana has been chosen for study.

Rationale for the study

As has been mentioned, rural water supply and sanitation programmes are important in the development process in the developing world. Even so, most developing country governments do not accord the rural water sector the priority it deserves in their development plans. Neither do they devote their attention to knowing the impacts of such programmes in the development process of the beneficiary communities. This is due largely to the difficulty in understanding the nature and magnitude of the benefits accruing from water and sanitation services, and the lack of adequate and accurate methods to gather data on such activities. However, the task of providing rural people with water and sanitation facilities and the huge investments involved will be meaningless, if the impacts of such programmes are not ascertained. For example, with the large expenditures in water and sanitation

activities in the Upper East Region of Ghana since 1973, failure to detect positive impacts in the development process of the rural communities would even put into question the soundness of that investment.

Why the Upper East Region Water Supply Programme?

The Upper East Region Water Supply Programme in Ghana represents an appropriate choice for such a study because of its unique temporal and spatial characteristics. It is one of the premier water supply programmes initiated by CIDA and the Government of Ghana (GOG) in the early 1970s, and has been continued since its inception, with changes in phases and objectives as required. The programme covers six districts and eight cultural divisions in Ghana (Birmingham, Neustadt and Omaboe, 1967). As well, the programme has received continuous financial, material and human resources support from CIDA since its inception in 1973, and by the end of 1992, CIDAs total financial contribution amounted to over $C36 million. Such a massive investment, coupled with the programme's time frame and spatial coverage renders it an appropriate choice for study.

Thesis Organization

Following this introductory chapter, the relevant background information of rural Ghana and a brief description of the Upper East Region is provided in Chapter Two. Chapter Three gives an overview of the Upper East Rural Water Supply Programme. In Chapter Four a review of the impacts of rural water supply programmes on

societal development is presented. A literature review of evaluations in the rural water sector is also included in the chapter. Chapter Five focuses on the research design, methods and instruments for data collection and techniques of analyzing the data. The results of the data analysis are dealt with in Chapters Six, Seven, and Eight. In Chapter Six, results of observations on water use patterns and environmental hygienic practices are presented. The economic, health and socio-cultural impacts of the programme are the focus of Chapter Seven. Chapter Eight examines the views of government officials as to the impacts of the programme, noting divergence in responses between the officials and local people. A summary of the thesis, main findings of the study and contribution to geographic research are provided in Chapter Nine.

Chapter Two

BACKGROUND OF THE STUDY AREA

The Republic of Ghana lies on the west coast of Africa, extending from Latitude $4\frac{1}{2}^0$ to 11^0 North of the Equator, with an area of approximately 238,537 sq. km. It extends for over 672 km. from North to South and some 526 km. from east to west. It is bordered to the east by the Republic of Togo, to the west by Cote d'Ivoire, to the north by the Republic of Burkina Faso and to the south by the Gulf of Guinea (Fig. 2.1). The population of the country was estimated to be 14.9 million in 1990 with an annual growth rate of 2.6 (World Bank, 1993). It is expected to exceed 26 million by the year 2010 (Population Reference Bureau, 1994). Ghana has a national population density of 62 persons per square kilometre.

Basic demographic, health and economic indicators show that Ghana is a developing country, typical of many Sub-Saharan African countries (Tables 2.1 and 2.2). Health conditions are poor but improving, with the infant mortality rate falling from 120 to 85 per thousand births between 1965 and 1990. Between 1980-1990, the country experienced a negative growth rate in real GNP per capita, but the situation has improved during the last two years of the 1980 decade, possibly as a result of the Economic Recovery Programme initiated by the Provisional National Defence Council government in 1983.

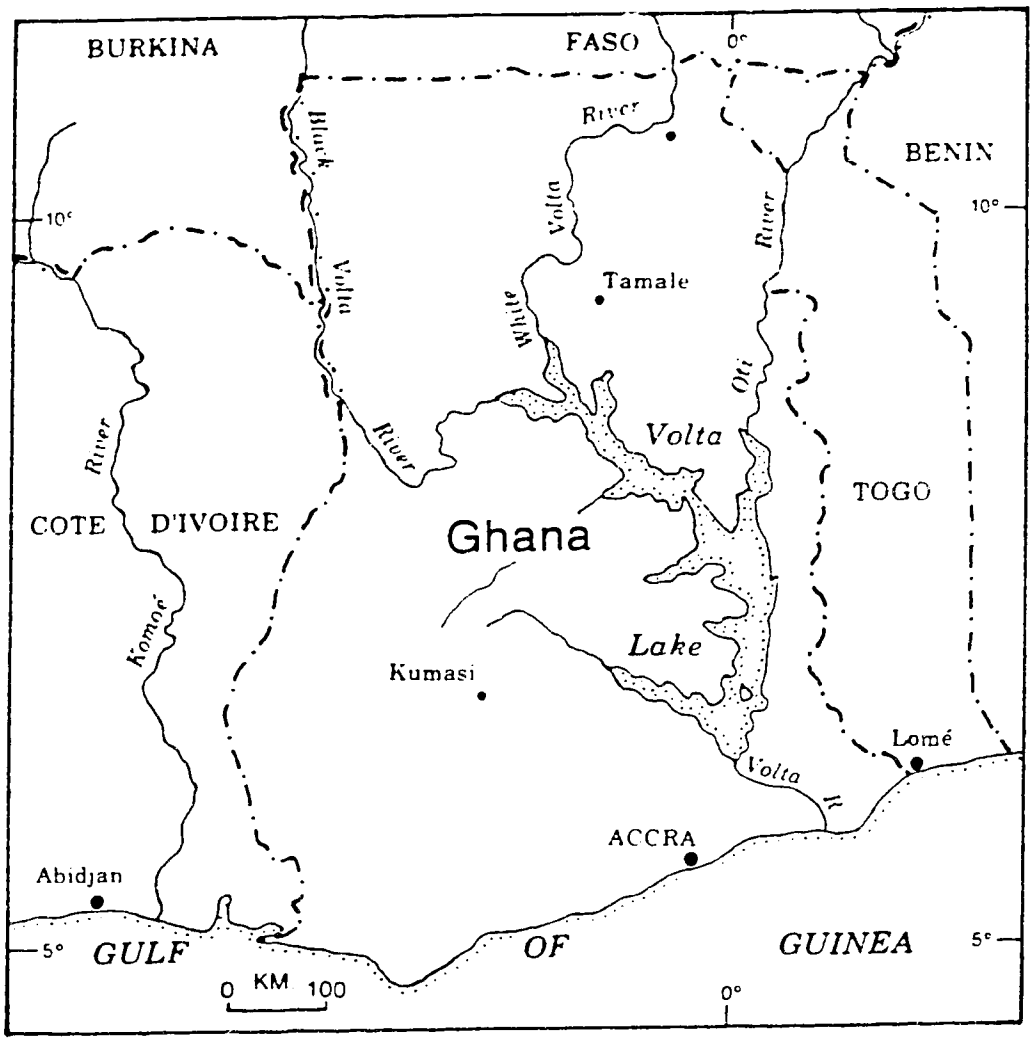


Fig. 2.1 Geographic Location of Ghana

Table 2.1
Basic Demographic and Health Indicators, Ghana

Indicator	Ghana	World
Population (1990) in million	14.9	5,283
Crude Birth rate per thousand (1990)	44	26
Crude Death rate per thousand (1990)	13	9
Infant Mortality rate	85	52
Total Fertility rate	6.2	3.4
Life Expectancy at Birth in years (1990)	55	66
Illiteracy rate (% of pop.) Age 15+	40	35
Access to Health Care (% of pop.)	65.0	
Prevalence of malnutrition in % (under 5 years)	35.5	

Sources: World Bank, 1993.

Table 2.2
Basic Economic Indicators, Ghana

	Ghana
GNP (1990 in $m)	5824
Real Growth Rate (% of GNP, 1980-1990	2.8
GNP per capita (1990) in US$	390
Real Growth rate (GNP per capita) (a) 1980-90	-0.6
(b) 1988-90	0.5

Source: World Resources Institute, 1991

Ghana has a mixed economy consisting of a large, traditional agricultural sector and a small, capital intensive modern sector. The traditional sector is

composed of small scale-farmers who make up 61% of the economically active adult population and account for over 45% of the Gross Domestic Product (Ghana Statistical Service, 1987a; The Africa Review, 1992). Cocoa is traditionally the most important crop and provides over 50% of aggregate export earnings. Other cash crops for export include bananas, kola nuts, limes, copra, shea nuts and palm kernels. Timber is also exported. Crops grown for the local agro-industry include rubber, sugar, cotton, oil palm and kenaf. Crops grown for subsistence include cassava, plantain, rice, maize, yams, sorghum and millet.

The modern sector focuses on mining and industrial activities. Mining is the second largest sector of the economy and major foreign exchange earner. Gold is the principal mineral export, accounting for around 15% of total exports. Diamond and manganese ore each account for 1-2% of export earnings. The industrial sector accounted for 17% of GDP in 1990 (The Africa Review, 1992). Apart from traditional agro-allied industries such as wood, cocoa processing and brewing, Ghana has a number of medium-sized modern enterprises, including an aluminium smelter, vehicle assembly plants, textiles, cement manufacturing and oil refining.

Profile of Rural Ghana

Over 9.7 million (65%) of the estimated 14.9 million people in Ghana live in rural communities of less than 5,000 persons. Ninety percent of the rural population live in about 16,000 communities with a population between 100 and 5,000 persons; the remaining 10% live in some 40,000 smaller settlements. Between 1970 and 1984, the

population growth rate was 2.2% in rural and 3.4% in urban areas. Infant mortality rates are different between rural and urban areas. The rate in the rural areas is about 25% higher than in the urban areas. The high infant mortality rate is largely attributed to inadequate health care and household sanitation facilities, poor water quality, and insufficient knowledge of the best child care practices (Republic of Ghana, 1991). This implies that more health facilities and services will be needed as the rural population increases.

However, the situation is not likely to get any better in the very near future, since only about 45% of rural communities in Ghana have ready access to health facilities. Although community health workers and medical assistants are available at the district level, their ability to serve the rural population effectively is restricted by lack of funds and transport.

In the educational sector, the rural areas of Ghana have experienced a steady increase in both primary and secondary enrolments since independence. Nevertheless, it is estimated that more than half of the population in rural areas is illiterate and the rate is rising (Republic of Ghana, 1991). The large illiterate population in the rural areas, coupled with inadequate health facilities and services suggest imbalances in the provision of social amenities in the country. This imbalance is also present in the water sector.

Rural Water Supply Development in Ghana

Rural services in Ghana are designated for communities with population below 5,000

people. The provision of basic services, such as health facilities, potable water supply and sanitation services to over 9.7 million rural people, has to contend with the spatial and demographic trend of the rural population. As well, the essential institutional, technical and organizational characteristics within the particular sector, must be taken into account.

Public rural water supply development had modest beginnings in Ghana, starting from 1948 with the creation of a Rural Water Development Division of the Ministry of Works and Housing. Its main objectives were country-wide installation of hand-dug wells (fitted sometimes with hand pumps), drilled boreholes fitted with hand pumps; spring tapping systems and "dug outs" (excavated reservoirs) for small communities with poor groundwater resources. The division was merged with the Hydraulic Division of the Public Works Department (which was responsible for urban water supply) in 1958. This division was incorporated into the Ghana Water and Sewerage Corporation (GWSC) through an Act of Parliament in 1966 (Brown and McGarry, 1988).

The Ghana Water and Sewerage Corporation assumed the responsibility for both urban and rural water supplies (development, management, operation and maintenance and water quality control) and for sewerage and sewage disposal. Since the creation of GWSC, water supply programmes have concentrated on the urban areas where the purely technical approaches adopted in this new institutional framework sufficed, much to the neglect of the rural communities. This situation has led to a large unserved rural population, which continued well into the 1980s. In

response to satisfying the needs of the rural communities, the GWSC has changed its technical focus from piped water to hand pump supplies.

Development of Sanitation Services in Ghana

Sanitation, on the other hand, as a national programme, was introduced by the colonial administrators, in conjunction with health services in Ghana. As a result of mass education campaigns mounted by the then Department of Social Welfare and Community Development during the 1950s, pit latrine construction became very popular in the rural areas, particularly in Southern Ghana (Republic of Ghana, 1991). With the creation of Regional, District and Local Councils in the 1960s, the provision of sanitation services became the responsibility of Local Councils by legislation (Brown and McGarry, 1988). Many communities still use these latrines and replace them when they collapse. Bucket latrines and aqua privies were introduced into some communities by the local councils. Most of the facilities have fallen into disrepair because conservancy labourers' salaries and pumper truck operation and maintenance exceed district council resources.

In the late 1970s, research at the University of Science and Technology in Kumasi led to the creation of Ventilated Pit Latrines which reduced maintenance costs and eliminated the health hazards associated with handling excreta. Only some 200 of these have been installed in rural communities in the country, primarily due to fragmented program execution and increasing materials costs (Republic of Ghana, 1991).

Thus, through a mix of factors (weak policy support, low financial input for basic tools and materials and, more importantly, lack of technical expertise), the district councils in Ghana have made little impact in rural sanitation and, therefore, have concentrated their activities in the district capitals and a few traditional market towns (Brown and McGarry, 1988). The inability of the district councils to provide each rural community with Ventilated Pit Latrines, implies that each community has been responsible for its own sanitation services.

Rural Water Supply and Sanitation Coverage in Ghana

About eighty piped water supply systems classified as rural have been constructed in Ghana during the past forty years, under the management of GWSC. These provide water for 1.7 million rural people (Republic of Ghana, 1991). In addition, there were 8,600 water points (as of 1992), many of which were installed in the mid-1970s and early 1980s, primarily through two major projects: The Upper Region Water Supply Programme and the 3000 Wells Project.

The Upper Regions Water Programme financed by Canada, drilled and installed 2,600 handpumps in Upper West and Upper East Regions of Ghana. Under the 3,000 Wells Project, financed by the Federal Republic of Germany, 3200 boreholes and handpumps were installed in seven southern regions in the country between 1978 and 1984. Quite recently, more support has been received from multilateral and bilateral agencies as well as non-governmental organizations (NGOs) in the provision of water and sanitation services to the rural people. Principal among

them are Japan, The Netherlands, Norway, Switzerland, United Kingdom, African Development Bank, United Nations Development Program, UNICEF, National Catholic Secretariat and World Vision International. About 175 of the 8600 water points are open wells; all the others are boreholes fitted with handpumps (CIDA, 1990; Republic of Ghana, 1991; UNDP/World Bank, 1992).

At the beginning of the International Drinking Water Supply and Sanitation Decade (IDWSSD) in 1981, an ambitious target was set to provide safe water "for all rural people by 1990". In regards to sanitation, the target was 30% by 1990 and 100% coverage by the year 2000 (WHO, 1990). However, as shown in Table 2.3, these targets were not achieved. It is estimated that only about 39% of the rural population in Ghana had access to safe water supply by 1990.

This indicates that over 6.9 million rural people were without access to "safe" drinking water. Apart from this high unserved population, the Republic of Ghana (1991) estimates that about 30% of the handpumps in the country are not operational at any one time, reducing rural service coverage to about 30%. The Upper West Region, with 100% rural population, and the least developed region (economically), has the highest percentage in terms of rural water supply coverage among all the ten regions in Ghana in 1991 (Table 2.4). The coverage in the Upper West Region, which is unusual for a least economically developed area, is attributed to the efforts of international donors, particularly CIDA and Catholic Relief.

Table 2.3
Estimated Water Supply and Sanitation Coverage in Ghana, 1973 and 1990.

	Population (million)		Water Supply Coverage (%)		Sanitation Coverage (%)	
	1973	1990	1973	1990	1973	1990
Urban	2.86	4.9	86	93	n/a	64
Rural	6.37	9.97	14	39	n/a	15

Sources: UNDP/World Bank, 1992; World Bank, 1988
n/a - not available

Table 2.4
Rural People Served with Safe Water in Ghana by Region, 1991

Region	Total Population ('000)	Rural Population ('000)	Population Served ('000)	% Served
Ashanti	2,090	1,645	345	21
Brong-Ahafo	1,207	1,033	258	25
Central	1,142	949	180	19
Eastern	1,690	1,405	295	21
Greater Accra	1,431	282	11	4
Northern	1,165	1,017	244	24
Upper East	773	673	502	74
Upper West	438	438	415	94
Volta	1,212	1,124	315	28
Western	1,158	1,044	292	28

Sources: Ghana Statistical Service, 1987a; Republic of Ghana, 1991.

In regards to rural sanitation, a little over half of the target set for 1990 was

achieved at the end of the Water Decade (Table 2.3). By 1991, about 60% of the rural population had access to trench latrines, 5% to bucket latrines and 1% to flush toilets; and the remainder had no facilities (Republic of Ghana, 1991). Overall, about 1.5 million (15%) rural people had adequate sanitary facilities in 1991. This is far less than the service coverage in the urban areas in Ghana. This situation is largely attributed to the biased nature of policies and programmes which are heavily skewed towards central urban facilities (Dovlo, 1992).

With current service provision, it will be extremely difficult to achieve 100% coverage for both rural water and sanitation facilities for all rural dwellers by the year 2000. The present level of service provision, coupled with moderate population growth, inadequate financial and lack of qualified human resources, will very likely result in a large rural population unserved by the year 2000.

Water, Sanitation and Health in Ghana

The above discussions indicate that Ghana has serious water supply problems, particularly, access in the rural areas. As well, it has sanitation problems in both rural and urban areas. The major sanitation problems include the management of domestic and human wastes. These problems tend to worsen the health situation in Ghana, since they play significant roles in the transmission of water and sanitation related diseases. According to the Ghana Ministry of Health, water and sanitation related diseases accounted for over 50% of the total reported morbidity cases in 1987 (Table 2.5). This pattern did not change very much over the period 1985-87.

Tablee 2.5
Patterns of Diseases in Ghana's Health Facilities

Disease	1985		1986		1987	
	Number	%	Number	%	Number	%
Malaria	593,368	36.9	807,019	39.3	1,141,893	42.8
Diarrhoeal Diseases	132,102	8.2	165,768	8.1	219,798	8.2
Upper Respiratory Tract Infection	126,632	7.9	168,660	8.2	212,548	8.0
Skin Diseases and Ulcer	80,161	5.0	95,180	4.6	120,829	4.5
Accidents and Injuries	69,133	4.3	83,379	4.1	103,107	3.9
Intestinal Worms	56,192	3.5	76,136	3.7	99,541	3.7
Measles	54,081	3.4	-	-	-	-
Pregnancy & Related Complication	49,667	3.1	63,221	3.1	87,202	3.3
All Other Diseases	446,045	27.7	592,138	28.9	634,452	23.8
Total All New Cases	1,607,381	100	2,051501	100	2,666,646	100

Source: Adjei et al., 1988

The data suggest that the major cause of morbidity may be controlled by providing safe reliable water, provision of simple sanitary facilities and through health and hygiene education. This, however, has not been achieved nationwide.

The Upper East Region of Ghana

As indicated in Chapter One, the region chosen for study is the Upper East Region. It is one of the two regions (the other being the Upper West) which CIDA and GWSC selected to implement a comprehensive water supply project in the early 1970s. Consequently, it serves as a model region for the delivery of rural water

services in Ghana. In fact at the time of the field work, the region was involved in a CIDA assisted project to transfer the management of water services to the communities. Moreover, plans were advanced to add another dimension to the programme: to provide the necessary institutional support and training to enable rural communities to effectively manage their water systems.

With such a broad spectrum of activities by CIDA, the region serves as an excellent setting for the study. Furthermore, the region has a good background data base. This is perhaps the only way the Upper East Region differs from the Upper West. The many ongoing projects and research work in the region has made this possible.

This region, chosen for study, lies between Longitude 0^0 and 1^0 35' West and Latitude 10^0 18' and 11^0 15' North, and is the most north-easterly region in the Republic of Ghana. It is bordered to the east by Togo, to the north by Burkina Faso and to the west and south by the Upper West and Northern Regions, respectively (Fig. 2.3).

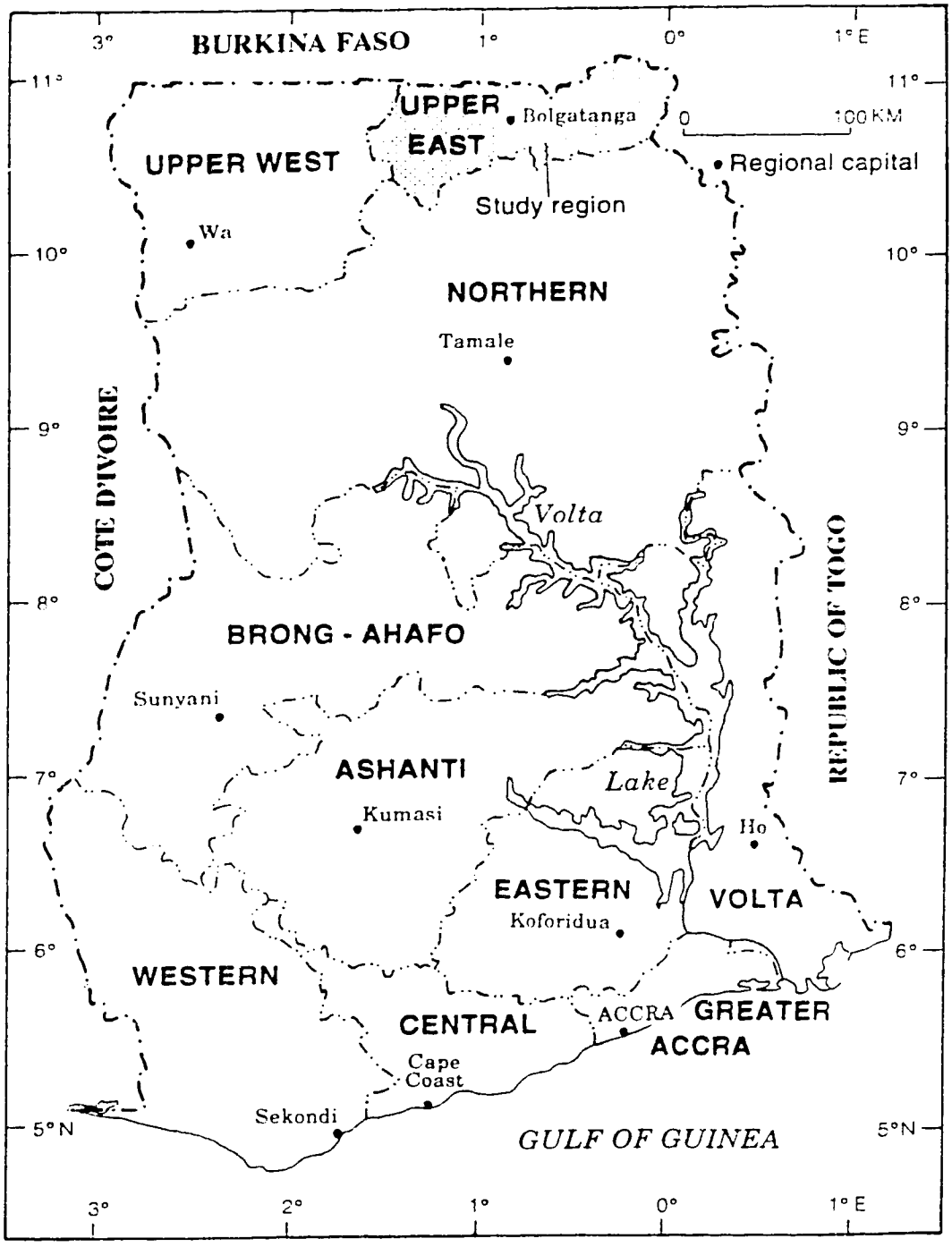


Fig. 2.3 Geographic Location of the Upper East Region

Physical Characteristics of the Region

The climate of the region is considered as Tropical Savanna. It is characterized most of the year by moderate to high temperatures and clear weather. The cold and dry (harmattan) season starts in November and ends in February, with average minimum temperatures of about 12.8^{0}C. There is a warm season between March and May, recording the highest temperature of about 42^{0}C. The region has a single rainy season, with most rains falling between the months of May and October. The rain reaches its peak in either August or September, after which there is a sharp decrease. The annual rainfall for the region averages between 1000 and 1250 mm. and rarely exceeds 1300 mm (Dickson and Benneh, 1980; Upper East Regional Administration [UERA], 1991). The rainfall pattern and associated dry conditions for almost six months of the year, reflect the importance of continuous supply of water in the region.

The climatic conditions have contributed in shaping the vegetation of the area, which consists of short grass studded with trees. During the rainy season, and the period immediately following it, plants look fresh and green and the ground is easily worked for cultivation. Almost all vegetation withers during the dry season and the region is barely able to support subsistence agriculture and livestock pasture. Partly as a result of this, but mainly because of long years of intensive farming, grazing and burning by man, serious degradation of vegetation has occured in the region (Dickson and Benneh, 1980).

Apart from its influence on vegetation, the climate has a major effect on the

reliability of surface water resources. The main source of water supply comes from the White Volta River and its tributaries, which drain the entire region. Most tributaries are unreliable in the dry season. During that season people rely on ponds, streams or unlined wells dug by hand (usually 10-15 m deep) or travel long distances, up to 8 km, in search of water. Apart from surface water, groundwater is a significant source of water supply in the Upper East Region. About 98% of the region is underlain by granitic and Birrimian rocks, with a well-developed fractured system (Parry et al., 1987; Bannerman, 1990). However, the rocks have fractured to lesser depths, resulting in the unreliability of hand dug wells (Bannerman, 1990).

Demographic Characteristics

The region, which covers an area of about 8,842 sq. km. (slightly more than 3% of the total land area of the country) had a population of 772,744 in 1984. This represents about 5.2% of the total population of Ghana. It has an annual growth rate of 2.5%, which is slightly lower than the national growth rate of 2.6% (UERA, 1991). About 87.1% of the region's population is rural with most settlements having less than 5,000 people (Table 2.6). From Table 2.6, it can be seen that only five settlements are classified as urban. The rest consist of many smaller settlements. With a large rural population, coupled with many smaller settlements, the provision of basic services, such as potable water or health facilities, poses a challenge for the people as well as policy makers/planners.

Table 2.6
Urban and Rural Population by District and Communities with 5000 or more people in the Upper East Region of Ghana, 1984.

District	Urban	Rural	% of rural	Communities with ≥ 5,000
Builsa	-	66,357	100	-
Kassena-Nankani	27,227	122,453	81.8	2
Bolgatanga	32,495	114,163	77.8	1
Bongo	-	95,263	100	-
Bawku West	5,711	57,854	91.0	1
Bawku East	34,074	217,147	86.4	1
Total	**99,507**	**673,237**	**87.1**	**5**

Source: Ghana Statistical Service, 1987b

Economic Activities

The large rural population is also reflected in the main economic activities pursued in the region. The major economic activity in the region is agriculture, with about 63% of the potential labour force (that is 15 years +) engaged in animal rearing, farming or hunting (Ghana Statistical Service, 1987b). Millet, sorghum and groundnuts are the main food crops cultivated, with the average farm size varying from 0.5 to 2.4 hectares. In regards to animal production, it is estimated that the region produces about 25% of the country's cattle and a sizeable percentage of sheep, goats and pigs. Nearly all the livestock in the region is owned by peasant farmers, who receive little or no support from the government (UERA, 1991).

Manufacturing and small-scale industries constitute subsidiary activities.

Informal small-scale industrial activities are by far the most important occupation of the people outside of agriculture. This is because of the simple technology involved as well as the availability of raw materials locally. The industries include *pito* (local beer) brewing, shea butter processing and groundnut (peanut) oil extraction, smock weaving, blacksmithing, leatherworks and pottery.

Health Conditions

Compared to the country as a whole, the region has one of the lowest number of health facilities. The limited number of health facilities in the region implies that the people will have to travel long distances to these facilities for service. With the exception of Bawku West and Bongo (the two newly created districts), there seems to be an equitable distribution of health institutions throughout the region (Table 2.7).

Table 2.7
Distribution of Health Facilities, Upper East Region, 1989

District	Hospital	Health Centre	Health Post	Private Clinic	Military Police	Total
Builsa	-	1	4	-	-	5
Kassena-Nankani	1	-	3	-	-	5
Bolgatanga	1	-	1	4	1	7
Bongo	-	-	1	-	-	1
Bawku West	-	1	-	-	-	1
Bawku East	1	-	2	1	-	4

Source: Regional Ministry of Health, Bolgatanga, 1991

The poor road network and inadequate transportation facilities, vis-a-vis the dispersed settlement pattern, make accessibility to health facilities difficult. The sick are always transported to health facilities on foot or by means of a bicycle (the principal means of transport in the region). To overcome this problem mobile clinics are operated as outreach health service by the health facilities.

The number of health facilities in the region is also reflected in the physician per patient ratio. The doctor per patient ratio is 2 per 100,000 and the nurse per patient ratio is 53 per 100,000. This situation tends to compound the poor health conditions of the people. Like other areas in the Sub-Saharan Africa, the serious tropical diseases of dracunculiasis (guinea worm), schistosomiasis (bilharzia), malaria and onchocerciasis are all present in the Upper East Region. However, the five common diseases reported in the region are malaria, diarrhoeal diseases, upper respiratory tract infections, rheumatism and joint pains, and diseases of skin and "ulcer" (Table 2.8). From Table 2.8, over 40% of the diseases could be eradicated or minimized through the provision of safe drinking water and adequate sanitation facilities. Health and hygiene education, of course, plays a major role.

The people of the Upper East Region live in small, scattered villages and hamlets with farms in and around the communities. Both men and women engage in agricultural activities with labour and responsibilities organized along distinct gender lines. Men are primarily responsible for the production and use of stable crops and livestock. Women, on the other hand, are also responsible for agricultural work, as well as household management, the preparation of food and childcare.

Women are also responsible for household water. They find the sources, collect, transport, store, and manage its use within the household.

Table 2.8
Most Frequently Reported Diseases in the Upper East Region (in %).

Disease	% of Disease Reported
Malaria	30.3
Diarrhoea	10.7
Upper respiratory tract infection	8.7
Rheumatism and joint pains	5.3
Diseases of skin and "ulcer"	5.0

Source: Regional Ministry of Health, Bolgatanga, 1991

With a large proportion of rural dwellers relative to the urban population, inadequate safe drinking water, high frequency of water-related diseases and illnesses, the CIDA/GWSC Rural Water Supply and Sanitation Programme was therefore a welcomed relief, not only to the people in the region, but also to the Ghana Government.

Chapter Three

AN OVERVIEW OF THE CIDA WATER SUPPLY PROGRAMME IN THE UPPER EAST REGION OF GHANA

CIDA has been extensively involved in the development of water resources in the Upper East Region of Ghana since 1973. Prior to CIDA's involvement, the people in the rural areas of the region did not have ready access to potable water, and the traditional supplies were often inadequate to assure sufficient water during the dry season. The deficiency of potable water, coupled with ignorance of appropriate health and sanitation practices and variable local food production, contributed to a cycle of disease and poverty that included a significant incidence of water-related diseases: diarrhoea, schistosomiasis, guinea worm and onchocerciasis (CIDA, 1985).

The lack of water (and a short rainy season) also meant that the people were unable to expand economic and other productive activities related to water. Thus, they were barely able to support subsistence agriculture and livestock, the most predominant economic activities in the region. Because of the shortages of water and unreliable growing conditions, and the resultant negative impacts on the rural people, CIDA targeted this region.

The Upper East Rural Water Supply Programme began in 1973, at a time when most development agencies (both bilateral and multilateral) were battling with basic needs strategies to help millions of "destitutes" in the developing world. The objectives of Phase I of the programme were to make available in adequate quantities a clean and hygienic supply of water to the majority of people living in

Northern Ghana, thereby:

> a) contributing significantly to the improvement of their health and to their productive capacity.
> b) opening up new opportunities for development and
> c) providing the Ghanaian government with the capacity to operate, maintain and expand water supply systems generally (CIDA, 1973: 2).

The programme was initially perceived as an engineering and technical project with the introduction of hand pumps into rural communities. Between 1973 and 1981, about 1,648 wells were sunk and hand pumps installed in rural communities in the Upper East region (Fig. 3.1). The communities were selected using population distribution figures from the 1960 Census of Ghana. This selection procedure neglected any changes in population that may have occurred between 1960 and 1973. As well, it did not consider any errors in the census data. The boreholes were sited based on geologic criteria, with little consideration given to such issues as proximity to compounds, or traditional boundaries between villages. This implies that the distance to the improved water source may be shorter/longer for some households, depending on the location of the hand pump. Moreover, community and especially, women's involvement during this phase was absent; it was therefore not surprising that they resorted to unprotected water sources closer to their homes during the wet season (CIDA, 1985).

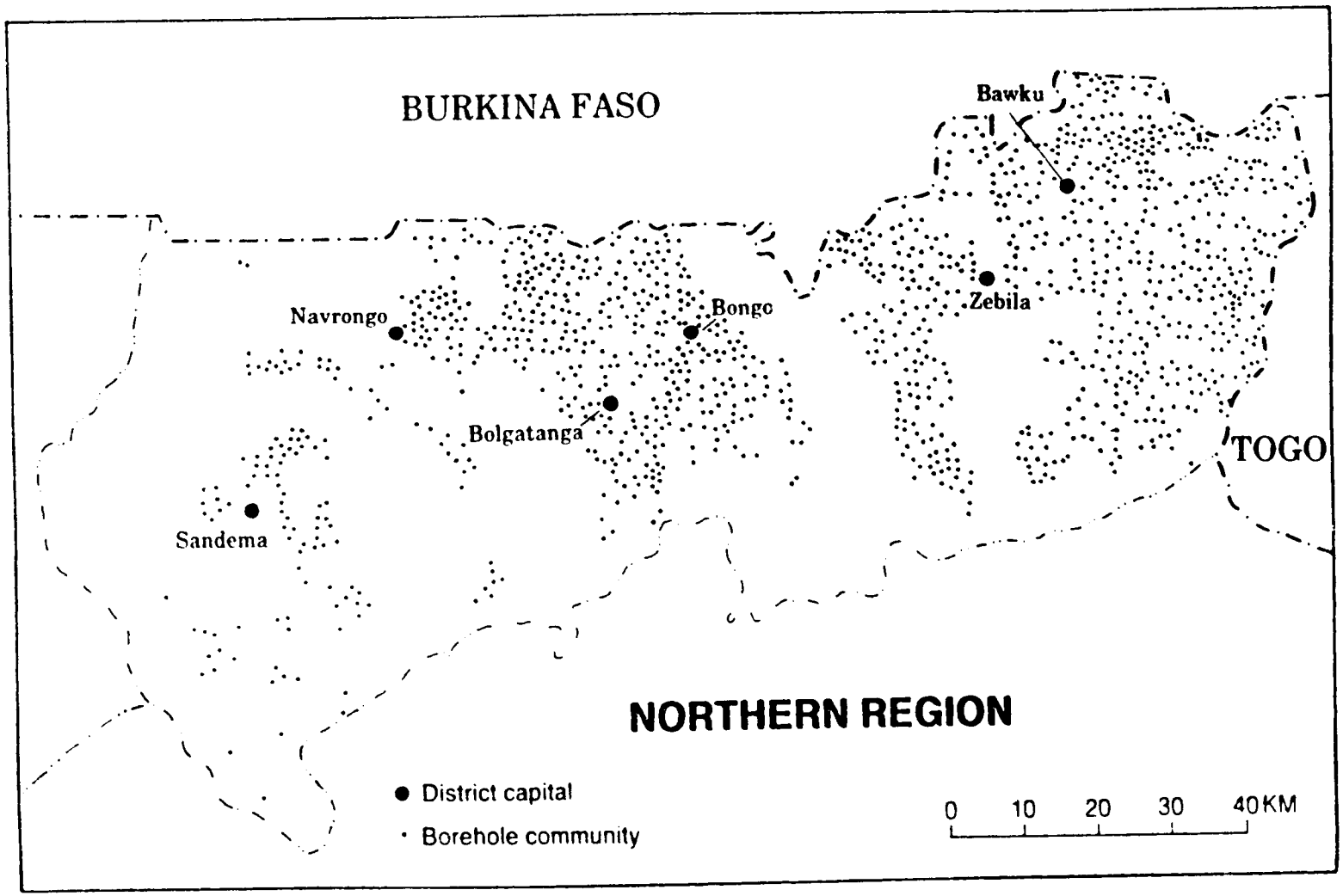


Fig. 3.1 The Upper East Region: Location of 1,648 Equipped Boreholes (modified after Horizon Pacific International, 1991)

Thus, this phase of the programme failed to take into account the social, economic and cultural conditions, as well as the geographical distribution of the settlements in the region. CIDA's concern, primarily, was to provide potable drinking water, and this was to be achieved within a specific time frame. The agency's financial contribution towards this phase of the project was approximately $C17 million.

By 1976, both CIDA and the GWSC had realized that the provision of technical facilities was not enough to improve the health and productive capacity of the beneficiaries. This was because certain issues like, users' awareness of the potential benefits of clean water, their responsibility for hand pump maintenance, as well as traditional beliefs that linked diseases to causes other than water had not been addressed. In 1978, through a 1977 Memorandum of Understanding between CIDA and GWSC, an entirely different phase of the programme was launched to improve health and water use through health education programmes, sanitation through latrine building programmes and, village level maintenance through the training of hand pump caretakers. This was the Water Utilization Project (WUP) Phase I.

Water Utilization Project Phase (WUP) I

The objectives of WUP I as listed in the early documentation were as follows:

1) ensuring continuity of water supplies by a pump testing program to:
   i) select the most durable handpump available
   ii) strengthen GWSC maintenance capacity and
   iii) instruct water users regarding proper pumping methods and

routine maintenance
2) prevention of water contamination
   a) at source, by improvements to site development, including drainage patterns and
   b) by ensuring that water is properly stored through adult education programmes
3) introducing self-help projects to complement the water supply programme (example, water conservation, sanitation and dry season gardening)
4) introducing sanitation and vaccination programmes to combat other major sources of diseases in Northern Ghana (CIDA, 1978: 3).

WUP I emphasized, as part of its mandate, community participation in the management and maintenance of hand pumps, community education in skills, knowledge and habits needed to maximize health benefits of potable water. This was the first attempt at introducing a social dimension into what had been primarily a technical and engineering programme. During this phase, CIDA contributed approximately $C2 million.

The activities under WUP I were assigned to a Rural Water Supply Unit (RWSU) within GWSC and the Community Education Programme (CEP). The RWSU was charged with keeping the hand pumps functioning and making physical improvements to the immediate area around the pumps, including keeping the pump site clean, constructing large drainage gutters and animal watering troughs, while the CEP was given the task of educating and mobilising the communities on health related issues. Although the programme had a social aspect to it, the major thrust was on physical infrastructure, with little or no co-ordination between the RWSU and CEP. This argument is supported by the fact that the CEP did not start until 1981, due to the lack of qualified full-time personnel.

The CEP was initiated in the Bawku District (now Bawku East and West Districts), and by the end of the 1982 dry season (ie. April), the districts of Builsa and Navrongo had been added. In addition, for the first time, women were called upon to play active roles in the programme. Eleven women were trained as Village Education Workers (VEWs), as part of seventy-two Village Education Workers. Although this represented a smaller percentage of the total number of VEWs trained, it marked an important step for women. For the first time, the social conditions in the area were recognized by the programme executing agency. In Frafra District (now Bolgatanga and Bongo Districts), the training of the VEWs started in 1983. During that period, twenty-one VEWs were trained.

In sum, WUP I assisted the rural people of the Upper East Region to participate in the maintenance of their water supply systems, and to protect their potable water supply sources. In addition, it provided an added advantage of increased livestock rearing through the construction of animal watering troughs. It also set the stage for the economic and social development of the region, by involving local people, especially women in the programme. Before WUP I officially ended in 1983, another equally important project began in 1982, with particular emphasis on hand pump maintenance. This was the Maintenance/Stabilization Project.

Maintenance/Stabilization Project

This project was designed to reinforce the water supply programme and enhance the maintenance and repair capability of the GWSC through the replacement of hand

pumps where required, the provision of equipment and spare parts, and the provision of technical assistance to assist with workshop training and pump testing. The financial contribution of CIDA towards this project was approximately $C8.1 million. Under this project, volunteer Hand Pump Caretakers (HPCs) were recruited to do preventive maintenance and to assist the RWSU to monitor the performance of the pumps. The recruitment exercise required people with mechanical aptitude such as bicycle repairmen and blacksmiths. These jobs are basically reserved for men, hence women were again excluded from maintenance of the hand pumps.

The replacement of Beatty pumps by Moyno and Monarch pumps, diminished the role of the HPCs in preventive maintenance of the pumps, because the Moyno and Monarch pumps did not lend themselves to a community-based maintenance system. This situation increased the role for the RWSU. A decentralized structure was created, whereby mobile mechanics, operating from the district centres, rather than from the regional office of GWSC, answered requests for repairs and monitored the performance of the pumps.

A comprehensive evaluation of WUP I was completed in 1985, which concluded among other things that the programme "had been a success" and that there was a significant reduction in guinea worm and possibly, in diarrhoea. However, the evaluators concluded that, inadequate educational resources had been spread too thinly over too many activities, resulting in low pay off, and latrine building and use have had little impact (Malone Given Parsons, 1985). Based on the conclusions and recommendations of the 1985 evaluation, Phase II of WUP was

launched with particular emphasis on education, with the total financial cost to CIDA at the end of 1992 estimated at $C8.6 million.

Water Utilization Project Phase II (WUP II)

The primary purpose of WUP II was to assist the Government of Ghana to improve local capability at the institutional and village level, as well as to provide a continuous supply of potable water from village hand pumps and to improve water use practices by villagers in order to maximize the health benefits of potable water. The latrine building component, initiated under WUP I, was dropped because it was realized that the responses from the communities were not encouraging. Priority was, therefore, given to the organization of a water/health education and to the training of hand pump caretakers (HPCs) [Horizon Pacific, 1991].

For the first time in the history of the Upper East Rural Water Supply Programme, active community participation was considered an essential element for the success of the programme, as well as the long-term viability of the rural water supply system. In addition to project management and procurement, WUP II included the following major components: Rural Water Supply Development; Commercial Optimization; Water Education for Health; Monitoring and Evaluation; and Training. Each of these components is explained below.

Rural Water Supply Development

This programme monitored the maintenance and repair of the hand pumps

by Ghanaian staff of GWSC; monitored the construction of extended pads, gutters and animal watering troughs; provided on the job training for hand pump mechanics; developed a hand pump caretaker training programme for villagers and researched and developed new initiatives to improve programme efficiency and effectiveness (CIDA, 1990). Essentially, this unit dealt with the engineering aspects of the programme.

The programme also took some measures to encourage villagers to take an active role in hand pump centred activities. Water Users Committees were established to discuss and address hand pump issues at the community level. These issues range from hand pump operations to tariff collection, in addition to supervising Community Water Organizers' activities. Moreover, the communities were asked to pay a small fee for cement, collecting sand and gravel and the provision of labour for the construction of extended pads, gutters and animal watering troughs at their pump sites; and maintaining an access road so that district inspection and maintenance vehicles could reach the pump site (Wardrop Engineering, 1986). In addition to well-site improvements, communities were encouraged to use pump sites for dry season gardening, tree planting, bath houses and laundry facilities. As shown in Chapter Six, this ambitious plan was not achieved as of the end of the project life in 1990.

Commercial Optimization Programme

For the first time, under the Commercial Optimization Programme, villagers became involved in making a financial contribution towards the on-going

maintenance of the hand pumps. Apart from the maintenance of the pumps, a water tariff was instituted. The idea behind the introduction of the water tariff was to develop a greater sense of community ownership of the pumps. Each hand pump community was responsible for paying an annual hand pump tariff. The community was responsible as a whole, rather than individually, for the payment of the water tariff. This resulted in a great deal of discussion about the pump at the community level concerning methods of assessing, collecting, fund-raising and disbursing of funds. It should be noted that, the water tariff was initiated and implemented through a government directive, without any consultation with the local communities, suggesting that the tariff was imposed on them.

Water Education for Health

Unlike the educational programme under WUP I, the Water Education for Health programme had a narrow focus and concentrated on water-related health issues. It trained trainers, government extension workers and community based workers to effectively use the programme methods to deliver selected messages to pump site communities. The programme involved extensive community participation through selection of Community Based Workers (CBWs), conducting village meetings and transfer of new skills, including for example, procedures for preparing Oral Rehydration Mixture.

Monitoring and Evaluation

The Monitoring and Evaluation was added to the project in 1986 to assess the performance of Water Education for Health on an on-going basis. The unit measured changes that occurred in the villages as a result of Water Education for Health activities. Results from the monitoring and evaluation programme were used to confirm, fine tune or modify the training and education programmes so that they were more relevant to the villagers and more effective in achieving project objectives.

Training

The training aspect of WUP II provided training not only for Ghanaian counterpart staff who worked with Canadian advisors and staff from co-operating agencies, but also volunteer community based workers. These workers were responsible for conducting Water Education for Health educational meetings in their communities. Apart from the overall improvement in community involvement, there was increased participation by women under WUP II. The majority of participants in Water Education for Health programmes were women. At the community level, women were the primary target group for educational sessions. Unlike the past, where hand pump caretaking activities were exclusively reserved for men, under WUP II each hand pump site had two caretakers. Each well-site had a woman caretaker. Under WUP II, the role of the caretaker shifted from on-site maintenance to fault-reporting, tariff collection, community education and mobilization.

Due to problems related to the roles of the Hand Pump Caretakers

(under RWSU) and the Community-based Workers (under WEFH), and the resulting competition for scarce resources and confusion, the roles of both were combined, and a new community based worker was identified, the Community Water Organiser (CWO). With the disbandment of the HPCs and CBWs, the trained CWO was responsible for delivering the Water Education for Health messages, pump site development and fault reporting and tariff collection. By the end of 1990, 3,296 CWOs had been trained in the Upper East Region, two for each of the 1,648 pump communities. This reflected the changing approach of the programme.

WUP II included also among its activities the use of radios, through Radio Learning Groups, to deliver water and health messages to groups and individuals across the region. This was made possible by the opening of a Ghana Broadcasting Corporation Upper Region Administration (URA) FM station in Bolgatanga in 1986. The use of radio strengthened the village education programme, by delivering a quality message directly. As well, it reduced the teaching load of CWOs and helped to legitimize both the messages and the CWOs. At the time of the field work, the Water Education for Health messages were delivered on the radio in four main languages of the region: Buli, Kassem, Gurune and Kasaal.

Summary

A summary of CIDA's activities in the water sector in the Upper East Region (Table 3.1) indicates a sustained programme over two decades, with continuous improvements and modifications to ensure sustainability and overall development of

the region. It could be seen from Table 3.1 that, the programme as it evolved through the 1970s and the early 1980s was mainly focused on hardware oriented engineering projects. Community involvement was incorporated into the programme during the second half of the 1980s, possibly due to the awareness from the International Drinking Water Supply and Sanitation Decade activities.

Table 3.1
Summary of CIDA Support for the Rural Water Sector in the Upper East Region of Ghana

Projects/Dates	CIDA Budget (million $C)*	Project Output
URWSP (1973-81)	17.0	1648 boreholes with hand pumps; operation and maintenance system organized.
WUP I (1978-83)	2.0	Pump maintenance and site development; training to rural water supply units; village level hand pump caretakers and water user committees; repayment to GWSC tariff facilitated in rural communities.
Maintenance and Stabilization (1981-87)	8.05	Rehabilitation of hand pumps
WUP II (1984-1990)	8.6	Development of delivery mechanisms for health/hygiene education; training of community water organizers; enhanced role of women.

* includes disbursements in the Upper West Region of Ghana

The total capital cost of the water supply programme to CIDA (a bilateral donor) between 1973 and 1992, estimated at about $C36 million, is an extravagant amount

in the context of contributions by other bilateral donors in the rural water sector in the developing world. In Malawi, for example, the USAID contributed a total of $US6.0 million for an eight year period in a rural water supply project (Warner et al., 1986). Thus, the evaluation of such a project is, therefore, particularly appropriate.

Chapter Four

LITERATURE REVIEW

The provision of water supply and sanitation facilities in rural areas of the developing world has been seen as a way of sparkling socio-economic development and improving quality of life. Yet most studies assessing the impacts of water supply and sanitation programmes limit their assessments to well-defined groups of diseases (for example, diarrhoeal and cholera diseases) [Cvjetanovic, 1986], rather than considering the impact of such programmes on a range of indicators essential to societal development. (The problems hindering such an undertaking have already been discussed in Chapter One.)

Although the former approach is the simplest, it should be realized that it only presents partial evidence, while the latter, presenting formidable obstacles in terms of quantification, more truly reflects the overall impact. The objective of this chapter is to review the impact of water supply and sanitation programmes, in order to highlight both the direct and indirect impacts which that such programmes have on the development of rural areas of the developing world. Another focus of the chapter is an examination of evaluations in the rural water sector. The emphasis is on the methods utilized in the studies, the results emanating from using such methods, and their inherent problems. The approach adopted for the study is discussed at the end of the chapter.

Impacts of Rural Water Supply Programmes in Societal Development

Safe water for drinking and domestic use and adequate sanitary services are considered basic human needs in the developing world (ILO, 1977). The underlying assumption is that the provision of the above facilities would greatly improve health, and provide benefits not directly related to health (Saunders and Warford, 1976; Okun, 1988). These benefits and the role they play in the development process in the rural areas of the developing world are addressed below.

Disease Prevention and Improved Nutrition

An initial input in the improvement of water supply and sanitation produces "direct" health benefits by preventing the spread of water borne diseases (Saunders and Warford, 1976). The transmission of dracunculiasis (guinea worm), for example, a delibilitating disease that affects 10 to 15 million people in West and Central Africa and Western India, depends upon direct contact of infected individuals with water used for drinking, generally in shallow ponds or wells where suitable cyclop species are present (Okun, 1988). In a 1982 Workshop, the United States National Research Council concluded that the most effective means of preventing dracunculiasis has been to provide safe water supplies (National Research Council, 1983).

This assertion has been confirmed by the introduction of hand pump-equipped boreholes in Kwara State, Nigeria. In Kwara State, the introduction of improved water supply systems resulted in the complete elimination of guinea worm (Rooy and

Donaldson, 1990). The elimination of the guinea worm improved the health status of the people, and enabled them to engage in economic and social activities, thereby increasing productivity and incomes, hence improving their quality of life.

In regards to diarrhoeal diseases, which are mostly spread through unhygienic food and inappropriate hygienic practices, water supply and sanitation programmes do have substantial impacts on their incidence and morbidity (WHO, 1985). In 1984, Feachem reported that reductions in diarrhoeal incidence attributable to hygiene education components of water and sanitation programmes alone, were between 14% and 48% in Bangladesh, the United States and Guatemala.

Similarly, in their critical assessment of studies dealing with the effects of water supply or excreta disposal on diarrhoea morbidity, Esrey et al. (1985), noted that most studies showed beneficial impact from water supply and sanitation interventions. Based on an analysis of 67 studies, they concluded that 53 of them showed a median reduction of 22%, for water supply or excreta interventions. Their study confirms the views expressed in earlier comprehensive reviews by Saunders and Warford (1976) and McJunkin (1982). Reductions in diarrhoea infection, especially in young children, not only improve their health status and reduce household medical expenses, but also allow the people (especially women) more time for productive work and other pursuits, thus increasing their general well-being. As well, preventing or reducing diarrhoea infection through appropriate hygienic practices, ensures normal growth in children, which in the long-term results in a healthy society.

The prevention of diarrhoeal diseases also improves nutrition, because enteric

infections decrease food intake and increase metabolic losses which in turn produces malabsorption of nutrients (Okun, 1988). The relationship between diarrhoea diseases, other infections and malnutrition has been documented by Schrimshaw et al. (1968), and has been confirmed by other researchers. In a two year study in St. Lucia, the population of each of three villages located in valleys was provided with different water supply and latrine facilities. As a result of the use of larger quantities of water and appropriate human excreta disposal by households, the incidence of diarrhoea and skin diseases decreased and the nutritional status of children improved (Henry, 1981).

Esrey et al. (1985), have also demonstrated the relationship between improved water supply or excreta disposal and nutritional status of children with variations related to different factors. Based on a comprehensive nutrition study conducted by the Institute of Nutrition of Central America and Panama in Guatemala, Torun (1983) concluded that improvements in water supply and sanitation aided and enhanced other measures tending to ameliorate the population's nutritional status.

Safe drinking water and improvements in sanitation are also known to be effective in controlling cholera and ascariasis, and other diseases such as typhoid, shigellosis and other helminthic diseases (Azurin and Alvero, 1974; Esrey et al., 1985; Okun, 1988). Any one of these diseases is likely to be a significant health problem in developing countries suffering from high diarrhoeal disease rates. In a study in the Philippines over a period of four and a half years, Azurin and Alvero (1974), observed that where both water supplies and toilets were provided, the incidence of

cholera was reduced by as much as 76%. In another study in St. Lucia, Henry (1983) reported significant reductions in ascariasis and trichuriasis, along with diarrhoea as a result of improved water supply and sanitation.

Although, it has been argued that water related health improvements are greatest among children who are not members of the labour force (Sorkin, 1988), a healthier population can reduce some categories of expenditure currently made for health and medical services. Specifically, fewer funds might be necessary for the eradication programmes (for example, guinea worm and onchocerciasis), hospital and health centre facilities and equipments, physicians and staff, drugs and medicine and transportation for health personnel.

Time Released for Women

Apart from improving the health status of people in rural communities, and its overall impact on community development, the provision of an adequate quantity of safe water, preferably in the home or at least at a reasonable distance from the home results in time savings and releases the burden of water collectors. For many rural people in the developing world, getting water is time consuming and heavy work, taking up to 15% of women's time (Briscoe and Ferranti, 1988). The time saved by not collecting water, frees the water collectors for many rewarding activities, such as child-caring, tending home gardens and animals, and proper food preparation.

Cairncross and Cliff (1987) report that, in a village on the Muenda Plateau

in Mozambique, the average time that women spent collecting water was reduced from 120 to 25 minutes per day, as a result of the introduction of improved water supply systems in the communities. Time savings have been reported in Belu District and in a rural periphery of Chaoz City in the People's Republic of China (Narayan-Parker, 1990; Jong, 1991). In all cases, the time saved enabled women to participate in village committee meetings and primary health care programmes, and in the case of China participated in township-run enterprises. These indicate that the time saved by not collecting water is essential in the development process of rural communities in the developing world. Even if there was no evidence that time saved from no longer carrying water is directly used for productive activities, "saving time is development, for time saved from humdrum tasks is time to invest in human capital" (Birdsall and Greevey, 1978:36).

Community Strengthening

The involvement of the programme beneficiaries in the planning, construction, operation and maintenance as well as the financing of their water supply and sanitation facilities, also has implications for the development of communities. Effective participation of the people in such activities, leads to community cohesion and strengthens the community and community institutions. These characteristics are important in the development process of rural communities in the developing world, since they can be used for other community projects. The lessons learned and experiences gained through their involvement can lead to the development of local

initiatives for other projects. With such experiences, the community can identify and resolve problems, organize themselves for action, and raise funds locally. Thus, the community is empowered through the process.

Experience in Nusa-Tenggara-Timur Province in Indonesia has demonstrated that the participatory experiences of the villagers in rural water projects led to community cohesion, and encouraged them to build three rain water tanks, as well as construct one new household toilet every month (Narayan-Parker, 1990). The water project, in effect, empowered and motivated the people to undertake a project of a completely different nature.

Improved Social Standing of Women

Associated with the participation of the beneficiaries is the enhancement of the status of women as a result of the introduction of water supply programmes. The recognition of women's tasks and organization and training for new tasks (for instance as co:nmunity water organizers [CWOs] or hand pump caretakers), are not only essential to achieving maximum benefits from improved facilities, but also provide other professional jobs for women. It also improves their social standing, both in the households and within their communities, and this marks an important step in their empowerment.

Improved social standing of women as a result of their participation in water supply and sanitation programmes has long been recognized. However, it has rarely been thoroughly addressed in impact studies, due to problems related to methods of

collecting such data (World Bank, 1987; Stephenson and Peterson, 1991). As such this issue is addressed in this study.

Improved Economic Activity

Improved access to water can generate economic activity through increased livestock, crop production (especially vegetables) and small-scale industries in rural communities. These are likely to provide positive effects on nutrition as well as on income generation, both of which are essential to improved quality of life and especially, the welfare of women, in themselves essential to the development of rural communities. Improved nutrition and income earning result if households use some of the animals and crops in the diets and sell some of the products in the market. Such benefits have been realized from water supply projects in Indonesia, Guinea-Bissau and Togo (Kompaore,1989; INSTRAW, 1990; Narayan-Parker, 1990). In all three cases, there were increases in vegetable production, with resultant improvements in nutrition and increase in incomes, especially for women.

Impact on the Environment

Studies undertaken in different parts of the world have thus revealed the positive impact of water supply and sanitation programmes in the development process of the developing world. However, some negative impact may result, especially as they relate to the environment, thereby hampering the overall development of communities. One such impact relates particularly to the fixed

nature of hand pumps and other water supply systems, and is a serious problem in arid and semi-arid regions of the developing world, where wells attract excessive numbers of humans and livestock.

The fixed nature of hand pumps suggest that increased activity can lead to land degradation, which has implications for both production and groundwater resources, and hence, affects the community in its development efforts. In the Sudan, Carrier (1988) found that the increase in and concentration of human and animal population around hand pumps led to such areas becoming "moderately to severely" desertified. Much of this problem stemmed from concentration of cattle at pump sites, as a result of nomadic herding. Under such circumstances, a programme that was initiated to aid in the development of rural communities had tended to hinder the development process of these areas.

Summary

Investments in water and sanitation services are vital to the development of rural communities in the developing world, since they offer high social and economic returns. The health benefits provided by better water and sanitation services are huge. The World Bank (1993), for instance, estimates that, if all people had adequate water and sanitation facilities, about two million fewer children would die from diarrhoea each year. Improved access to water and sanitation facilities also yields direct economic returns, through time savings and the cultivating of vegetables. These returns promote the health of the general population, encourage the

development of rural industries, increase incomes and enhance the status of women which inevitably promote community development.

Evaluations in the Rural Water Sector

Evaluating the impact of projects/programmes is not a new activity. It emerged as a specialized function after World War II, and therefore has a brief history (Suchman, 1967). Its emergence as a developing speciality in the social sciences was in response to public accountability for the continued support of social programmes (Franklin and Thrasher, 1976).

Project/programme evaluation shares with most specialities an over-abundance of definitions and a paucity of consensus. There are as many definitions as there are evaluators because definitions of programme evaluations tend to have a strong flavour of the disciplinary background of the definers.

Among the earlier definitions of evaluations was the one provided by Riecken (1952: 4), who defined evaluation as: "the measurement of desirable and undesirable consequences of an action that has been taken in order to forward some goal that we value." In this sense, an evaluation presupposes the existence of some programme or activity to be evaluated. Riecken further delimits the evaluation process when he concludes that any intentional social action can be the object of an evaluation study. According to this approach, the activity being evaluated will usually be one of deliberate social change. In other words, evaluation is the process whereby man attempts to check upon his own ability to influence other men or his environment.

This definition is supported by Borgatta (1966: 182), who finds that "research problems in evaluative research ... recur in the many circumstances where programs operate manifestly to improve existing conditions, or where efforts are being made to prevent or stop deterioration of existing conditions."

The emphasis upon social change and outputs as the subject of evaluation is underscored by writers such as Klineberg (1955), Suchman (1967), Fink and Kosecoff (1978) and Freeman et al. (1980), who take a somewhat broader perspective to include the analysis of efforts (programme inputs) as well as outcome. Fink and Kosecoff (1978: 1), for example, included in the definition of evaluation: "a set of procedures to appraise a program's merit and to provide information about its goals, activities, outcomes, impacts and costs."

Fink and Kosecoff advocate a systems approach to programme evaluation and, if taken literally, would leave very little outside the legitimate concern of the evaluator. In a similar context, Freeman et al. (1980: 25) defined evaluation as: "any information obtained by any means on either the conduct or the outcome of interventions, treatments or of social change projects."

Broad these definitions may be, but they do not describe usefully the current boundaries of the evaluation field and exclude the basic approaches to the gathering of valid and reliable evidence that have been developed in the social sciences. In view of these shortcomings, Rossi and Freeman (1985: 19) provide a "simple" definition of evaluation as: "the systematic application of social research procedures in assessing the conceptualization and design, implementation and utility of social

intervention programs."

Implicit in this definition is the use of social science research methods to judge and improve the planning and monitoring of the effectiveness and efficiency of human service programmes. In addition, evaluations are systematic to the extent that they employ social science approaches to the gathering of valid and reliable evidence.

Attempts have been made in the past years to employ social science research methods to evaluate the impacts of water supply programmes in the developing world. A review of some of these studies is the focus of the next section. The methods employed and the results that emerged from them are examined and the shortcomings of the studies related to this research are discussed.

Overview of Evaluations in the R l Water Sector

Several evaluative studies have been conducted in the rural water and sanitation sector in the developing world. These studies have employed a variety of methods and measures in their assessments. One such study is the comprehensive interdisciplinary evaluation conducted by Feachem et al. (1978) in Lesotho. In that study, the evaluators investigated the social and economic benefits that could be traced to a water supply programme that was implemented in rural communities in Lesotho. The evaluation design was based on comparisons between villages with and without improved water supplies. The indicators used for the assessment were impacts of the programme on health, sesotho beer (*joala*) brewing, livestock husbandry and communal gardens. The time frame for this interdisciplinary, cross-

sectional study was twenty-five months.

With the use of observational methods, Feachem and his colleagues concluded that there were no measurable reductions in water-related diseases in the villages with improved water supplies. As well, the programme had no impact on brewing, livestock and communal gardens in the beneficiary communities (Feachem et al., 1978). A shortcoming of this study was the reliance on hospital records in their assessment of the health impacts, in the absence of baseline data. Rather than relying on hospital records and observations, interviews with the project beneficiaries could have provided useful information on the measured indicators.

Utilizing a rather different approach, McGowan and Burns (1988) assessed the health, economic, social and environmental impacts of a CARE/Sudan Interim Water Supply and Management Project through interviews with project staff, Village Water Committees, random groups of water users at project water sites and non-project sites, as well as visits to water source sites of both project and non-project areas. Like the Lesotho study, this evaluation was conducted without baseline data. A more directly measurable economic benefit, according to McGowan and Burns, was the use of distribution-point wasted water for growing vegetable gardens and tree nurseries. Many villagers at project sites expressed considerable enthusiasm about both dietary benefits and income generation as a result of the gardens raised with wasted water. Socially, the attention given to women through extension lessons raised the awareness and educational levels of women in the project areas, thereby improving their social standing in the communities. However, according to the

evaluators, the lack of baseline data made it difficult to assess the health and environmental impacts of the project.

Although the evaluators utilized a variety of methods, the study had some flaws. They relied heavily on project staff rather than on project beneficiaries in their assessment of the impacts. As well, the time frame for the study puts into question the validity and reliability of their results. It took the evaluators fifteen days for the entire study, with only six days spent in all ten communities selected for the study, thus, contributing to the lack of information on health and the environment.

A similar time period was spent in evaluating another CARE Water Supply and Sanitation Project in the Dominican Republic. Silva et al. (1989), evaluated the economic, health, convenience and service level benefits to communities as a result of the project. In addition, they analyzed the Health Education component of the project and its impact on knowledge, attitudes, and practices of project beneficiaries. The evaluation team developed three instruments to assess the project's performance in the field. The instruments developed were: a) an engineering survey to collect data on water quality and quantity and to assess the knowledge of pump technicians and plumbers on operation and maintenance, b) a questionnaire for water committees to gather information on management practices of the water committees and, c) a households survey which sought information on water use and sanitation practices and the role of women in the project. Based on these methods, they concluded that the relationship between water and health was understood and that some health practices had improved. The failure of the evaluation team to specify

their measures/indicators made it difficult for them to assess the economic impacts and service level benefits of the project. Moreover, the short time frame prevented intensive observations in the households, in the assessment of the health education component of the programme.

In her study in Kati County, Mali, Belli (1988) assessed the impacts of the provision of three boreholes (one specifically installed for vegetable gardening) on vegetable production in Sougoula village. Based on participant observation, she observed how women utilized an Indian model pump for community vegetable gardening activities. She concluded that one hundred and twelve women were involved in market gardening activities, due mainly to the provision of the hand pumps, and technical advice from a woman agricultural expert.

Frankel (1974) in his impact study of water habits, sanitation, and health conditions, compared two Northeast Thai villages (Ban Fang and Ban Phongsawang) with similar socioeconomic characteristics and both having the advantage of a potable water project. His primary data collection method was through interviews with villagers. He concluded, based on responses from his interviews, that water habits were very similar in both villages and sanitation practices were identical. However, more frequent bathing, more water used for gardening and an observed improvement in gardening were apparent in Ban Phongsawang. His approach was systematic, yet, the study lacked a control sample. Moreover, the use of observations could have revealed water habits and sanitation practices better than direct interviews.

In assessing the benefits of a rural water supply project in Malawi, Glennie

(1983), utilized over ten years of his experience in the water sector as an approach for his evaluation. The assessment was therefore based on his own perspective. The most significant benefit he noticed was the reductions in time spent drawing water. The water supply also enabled people to return to their former deserted villages and thereby increased the area of land under cultivation. The problem with this study was the limited use of scientific research methods, thus rendering the analysis very subjective and the results difficult to verify.

In their evaluation of the Integrated Water and Sanitation Development Project in Nigeria, Rooy and Donaldson (1990), observed that there has been migration into some participatory villages with hand pump-equipped boreholes in Kwara, Imo and Gongola States. They also observed that in some areas of Kwara State where there has been complete eradication of guinea worm, quality of life has improved and this was reflected in increased school attendance and higher productivity of farmers. The findings of the study depended solely on observations, thus making it difficult to substantiate whether migration was due to water availability or to some other confounding variable. In addition, improved quality of life of the beneficiaries was assessed based on interviews with project staff, rather than soliciting the information from the beneficiaries.

Bah et al's., (1991) study in rural Sierra Leone utilized both qualitative and quantitative measures to assess the socioeconomic impacts of improved wells in four villages. Their approach involved the use of standard survey methods including structured questionnaires, semistructured interviews with key informants, participant

observation and quantitative monitoring of water extraction. They observed that 74% of the drinking water for the households studied came from traditional sources, rather than from the improved wells. The limited use of the wells was attributed to the taste of the water from the concrete lining.

According to the evaluators, the time spent in collecting water in the four villages under study was significantly longer from the improved wells than from the traditional sources, even though the wells were nearer than the traditional sources. This was largely attributed to the low flow rate of water from the wells resulting in long queues, hence the longer time. On the economic impacts of the project, the study showed that, there was no clear evidence that wells had affected lifestyles and commerce in the villages. The problem associated with the study is that, the indicators used to assess the economic impacts of the project were unknown, thus making verification of the results difficult. As well, the interview with key informants, rather than a random selection of individuals in the communities may tend to produce biased responses.

Although the USAID suggested an evaluation model which focused on system operation, performance and impact in 1980 (Warner, 1981), impact studies conducted by the agency or on its behalf had methodological problems. In the Philippines, an impact study was conducted for USAID after five years of the completion of a provincial water project. The purpose of the study was to assess the health and economic impacts of the project (Magnami et al., 1983). Through interviews with programme beneficiaries, the evaluators concluded there was no evidence the project

had a substantial impact on health. In addition, the evaluators could not assess the magnitude of economic gains resulting from the project due to the problem of quantification. Although one objective of the project was to establish an evaluation methodology for USAID, the disappointing results, due to the method employed, rendered its applicability in the future difficult. Rather than relying on quantitative information, qualitative information through observations and interviews with the users could have revealed some of the economic gains resulting to the programme.

Warner et al., (1986), in evaluating the USAID/Malawi Self-help Rural Water Supply Programme, focused on the actual performance of project institutions and the measurable health, economic and social impacts arising from the programme. Primary data collection for this study involved interviews with officials of USAID (both in Malawi and in Washington, D.C.), Ministries of Health and of Water Supply and visits to project sites. Based on these methods, the evaluators concluded that the project has developed leadership and organizational skills within the rural population, and in some areas, the project resulted in substantial time savings for women.

In another USAID Rural Water Supply and Sanitation Project in Togo, Roark et al (1988) considered not only the inputs and outputs but also placed emphasis on the project's impact on health, economy, environment and women. Similarly to the other USAID sponsored study in Malawi, data collection methods were based on a review of project documents, meetings with project staff and paying visits to sampled project villages. On the impacts of the project on the beneficiaries, the evaluators conceded that, direct evidence of impacts was often difficult to measure, even if there

had been a pre-project baseline study. Nonetheless, the evaluation team was confident that, because of the overall success of the project in meeting most of its objectives, the project's goal of improving the living conditions of the Togolese rural people had been achieved and that health had generally improved.

A shortcoming of the Malawi and Togo evaluations was the reliance on project staff and government officials. This approach made it difficult for the evaluation team to assess the economic and social impacts of the projects on the beneficiaries. As well, both studies lacked comprehensive research designs, control samples and observational methods.

In 1991, VanSant et al. assessed the health, environmental, community and institutional impacts of a Rural Water Borne Disease Control Project in four regions in Swaziland. Their design involved a random selection of seven sites in four regions, interviewing central, regional and field staff from home country implementing agencies, USAID and non-governmental organizations involved in the project. Based on this, the evaluators concluded that, the single most visible impact of the project was the provision of plentiful potable water for domestic use to an estimated 54,000 rural Swazis in 52 communities through some 529 water taps. According to them the available data were inadequate to document decreases in diarrhoea and schistosomiasis. Like other USAID studies, users views were not considered.

The focus of the Zomba East Piped Water Project evaluative study, also in Malawi, was on the socioeconomic impacts of the project on the beneficiaries, including the effectiveness of local organizations for management and maintenance

(Kandoole and Msukwa, 1981). Using Zomba South as the control area, the detailed village survey included a census, observations (for water collection and use) and household interviews about socioeconomic impacts. However, due to lack of reliable data, the study left out the impact of improved water supplies on the health of the rural population, which is one of the main justifications for introducing the rural water supply scheme.

With the use of observations and interviews, Narayan-Parker (1990), assessed the impacts of two year self-help rural water projects in four communities in Kupan and Belu Districts in Indonesia. Among the direct benefits of the project was a marked decline in diarrhoea and skin diseases as a result of the improved water supply in Belu District. There was also a marked increase in the number of women selling vegetables after two years of the project. The project also induced feelings of pride, self-confidence and competence in women, enabling them to emerge as leaders and undertake more challenges. A limitation of the study was the lack of a control sample to compare health status, in the absence of baseline data.

In analyzing the socio-economic impacts of the Upper Region Water Supply Project on the lives of women in Bolgatanga District, Harkness (1983) dwelt on time savings for women, recognizing the problems of resources, expertise and time. Utilizing questionnaires and participant observation techniques, her study looked at the lives of village women to ascertain how the provision of drilled wells has affected their lives. She compared this with earlier anthropological studies done in the area. She concluded, among other things, that the economic impacts of the water supply

project appeared to have been insignificant with respect to the income earning activities of women. A design flaw in the Harkness study was the lack of a control sample to compare income earning activities of women.

The studies discussed above have focused on a variety of indicators in evaluating the impacts of rural water supply programmes. However, other impact studies have concentrated on only single indicators, particularly health and on single diseases. The focus of the impact study in Mirzapur in Bangladesh, for example, was on health only (Aziz et al., 1990). In this study, a case control study design was adopted to assess the health impacts of a water supply, sanitation and hygiene education package implemented in rural communities in Mirzapur. The study was a longitudinal one, with the intervention and non-intervention areas followed up over a period of four years. Standard questionnaire surveys, combined with occasional observational studies to confirm the accuracy of responses, were used as data collection instruments.

The results of the Mirzapur study showed that 90% of households in the intervention area used handpump water for practically all domestic purposes. In addition, the project had a significant impact on childhood diarrhoea disease in the intervention area, where the incidence of diarrhoea fell to three-quarters of that in the control area. Furthermore, the project resulted in reductions in ascaris infection by more than one-third. A shortcoming of the Mirzapur study, apart from its focus on selected health indicators, was its time frame (five years). A study of this scale is costly and hardly provides a ready method for the operational evaluation of water

supply programmes.

A similar time frame was utilized by Azurin and Alvero (1974) to test the effect of either improved water supply or improved waste disposal (or both) against cholera infection in the Philippines. The method employed for the study was a house to house canvass by an epidemiological aid who visited the communities (both control and intervention) daily, taking rectal swab from persons found to have diarrhoea. The specimens were later brought to a project laboratory on the same day and examined for cholera vibrio. With this method, their results showed that improvements in either water supply or toilet facilities or both were effective in significantly reducing the incidence of cholera in the corresponding study communities as compared to the control area. After four and a half years of study, they concluded that the provision of sanitary facilities for human waste disposal can reduce the incidence of cholera by as much as 68%, while the provision of a safe water supply can reduce it by 73%. Where both toilets and water supply are provided, the incidence can be reduced by as much as 76%. This study has a similar methodological problem as the Mirzapur study.

In Upper Burma, the National Department of Medical Research carried out an evaluative study to determine the health impacts of a water supply and environmental sanitation programme. The study included both a cross sectional comparison between villages, with and without water supply and sanitation facilities, and a longitudinal comparison of villages before and after the introduction of the improved system (Rosenhall, 1990). The results of the study, based on observational

methods and household questionnaires, indicated large proportions of the population in the four of the six study villages used the improved water supply source. However, water from the improved source was free from contamination, but usually got contaminated during storage and handling at home. Thus, the impact of the improved system on the morbidity rates of diarrhoea was rather marginal, and there was no evidence of marked changes in villages with access to and use of the improved system.

Lindskog et al. (1987), using three villages (two with an intervention and one acting as a control), evaluated a piped water supply in rural Malawi. Observations and interviews were the instruments used in collecting the data. Both the comparison and intervention groups were examined for slightly more than one year before and one year after the intervention. The results of their study indicated that the storage and handling arrangements of water in dwellings were prone to contamination. There was also a 50% reduction of diarrhoea with increased water quantity and sanitation.

In another study in Nigeria, this time in Imo State, a quasi experimental study design was adopted. In this study data was collected from intervention and control areas, to evaluate a water supply and sanitation project (The Imo State Evaluation Team, 1989). The evaluators utilized both longitudinal and cross-sectional surveys to assess the health impacts of the rural water project. Approximately 850 households in the intervention area, and 420 in the control area were selected for the sample. The team concluded that, due to the widespread use of water from the

boreholes, the project showed an impact on dracunculiasis in the intervention area. In regards to diarrhoea, the impact was not clearly shown. The impact on diarrhoea was found to be limited to certain subgroups of the population within the intervention area. In their opinion, young children in particular were at greater risk of diarrhoea in the wet season if the estimated household water collection time was more than two hours per day. The short life cycle of the programme (two years) led to the inconclusiveness of the results.

Gaps in the Literature

The anticipated impacts of improved water supply and sanitation facilities, as well as the need for accountability for the huge investments in the sector, have initiated a number of evaluative studies in rural communities in the developing world. The preceding studies indicate that the methods and indicators/measures employed do vary, ranging from the evaluation of water and sanitation impacts on specifically defined diseases to multiple measures, involving health, economic, social and environmental. Results of these studies, therefore, vary and the validity of the conclusions are likely to be affected by the choice of the evaluation method. The question that needs to be asked is, with the numerous impacts studies in the rural water sector, what is the justification for another study? A summary of the studies reviewed (Table 4.1) brings to the fore certain issues that need to be addressed in the rural water evaluation literature.

From the literature review, it appears the core of most impact studies has

been to concentrate on health impacts and the reliance on project staff for information on the programmes' impacts. The literature has failed to focus on the rural peoples' knowledge, awareness and impacts of issues related to programme objectives. These issues are addressed in this study in an effort to fill this gap in the literature. In regards to the environment, the literature has rarely dealt with the practices related to the environment and which have been addressed by rural water supply and sanitation programmes. This study addresses these gaps in the existing literature. Previous studies have also ignored the views of decision makers (government officials): their awareness, involvement and impacts of the programme on the beneficiaries. Where their views were solicited, they have been limited to specific ministries at the national level. The viewpoints of local and regional government officials are seldom solicited. An examination of these issues is important before any sound plan to improve programmes can be instituted.

Table 4.1
Summary of Some Evaluations in The Rural Water Sector

Reference	Type of Study	Indicators/ Measures	Data Collection Instruments	Time Frame	Evaluators
Feachem et al., 1978	Case control	Health, gardens, beer and livestock	Observations	25 months	Consultants
McGowan & Burns, 1988	Case study	Health, economic, social and environmental	Interviews, observations	15 days	Consultants
Silva et al., 1989	Case study	Health, economic, convenience, service level	Interviews, household and engineering surveys	23 days	Consultants
Belli, 1988	Case study	Vegetable production	Participant observation	n/a	Consultant
Frankel, 1974	Case study	Water habits, vegetable gardening, sanitation	Interviews, visits to water supply Sites	n/a	Local specialist
Glennie, 1983	Case study	Migration, time savings	Personal experience	n/a	Consultant
Bah et al., 1991	Case-control	Socio-economic	Personal and key informant interviews, observations	n/a	Ph.D. study
Magnami et al., 1983	Case study	Economic, health	Interviews	n/a	Consultants
Warner et al., 1986	Case study	Health, economic, institutional and social	Interview with project Staff, visit to project sites	n/a	Consultants
Roark et al., 1988	Case study	Health, economy, environment and women	Interview with project Staff, visit to project sites	25 days	Consultants and Local specialists

VanSant, et al., 1991	Case study	Health, environment, institutional	Interview with project staff and site visits	21 days	Consultants
Narayan-Parker, 1990	Case study	Health, socio-economic	Community observations, interviews	n/a	Consultant
Harkness, 1983	Case study	Socio-economic, women	Interviews, observations	n/a	M. A. study
Aziz et al., 1990	Case-control, longitudinal	Health	Questionnaires and observations	4 years	Consultants and local specialists
Rooy & Donaldson, 1990	Case study	Migration, health	Observations	n/a	Project staff
Rosenhall, 1990	Case-control, longitudinal	Health	Observations, household interviews	n/a	Project staff
Blum et al., 1983	Case-control, longitudinal	Health	Observations, household interviews	n/a	Consultants and local specialists
Kandoole & Msukwa, 1981	Case-control	Socio-economic	Observations, household interviews	n/a	Local specialists
Lindskog et al., 1987	Case-control, longitudinal	Health, sanitation	observation, interviews	n/a	Consultants
The Imo State Team, 1989	Case-control, longitudinal	Health, nutrition	Observations, interviews	3 Years	Consultants

It is hoped that information from users and decision makers will provide further insights for both aid agencies and governments to tailor future efforts to those deficient areas of the programme. If differences exist, education and management efforts could be better designed and targeted to express local needs, concerns and knowledge levels of the beneficiaries who rely on programme facilities for a wide range of their needs.

Finally, and more importantly, by examining the views of programme beneficiaries on impacts related to programme objectives, as well as those of decision makers, the study will contribute to, and perhaps broaden, the methods employed in conducting evaluation studies of the rural water sector in the developing world.

Chapter Five

METHODS OF DATA COLLECTION AND TECHNIQUES OF ANALYSIS

This chapter sets out to provide the research design adopted for this present study. It also describes the various instruments used in collecting the data and the levels involved, as well as the sampling procedure. A documentation of the techniques used in analyzing the data is also presented. The final section of the chapter deals with data validity and reliability as well as the problems encountered in the field.

Research Design

The study designs of the studies reviewed in Chapter Four varied considerably. Some of these studies were case studies. Others were longitudinal, with a before and after comparison of conditions in intervention areas. The Upper East Region Water Supply Programme, which is the subject of the present study, was implemented without a baseline study conducted in the area. Under such circumstances, the choice of an appropriate study design becomes critical. This is because the validity and the verification of the conclusions from the impact study depends on the choice of the evaluation method (Schlesselman, 1982).

A method which has been proposed for evaluating the impacts of improvements in water supply, hygiene and sanitation in the absence of baseline data is the case-control method (Ibrahim, 1979; Esrey et al., 1985; Briscoe et al., 1986). Although this method has been utilized in impact studies in the rural water sector, its use has been largely limited to health impact studies. In a case-control study,

individuals with a particular condition are selected for comparison with a series of individuals in whom the condition is absent. It does not require the same population to be studied both before and after an intervention. It is relatively quick to mount, conduct and inexpensive and requires comparatively fewer subjects. Moreover, it can give reliable results (Schlesselman, 1982; United Nations, 1987; Lindskog et al., 1987).

Due to logistic reasons, the absence of baseline data and the relative merits of the approach, the case-control method was utilized in this present study. The object was to conduct a survey in areas that received the programme and areas that did not. This was to ensure meaningful interpretation of the data, because without a control sample, there was no way of distinguishing the impacts resulting from the water supply programme and the impacts that would have occurred in any case due to other factors of social, economic, and environmental change.

Methods of Data Collection

To achieve the research objectives, and in line with the approach selected for the study, data was collected from both primary and secondary sources. Primary data was collected by means of formal and informal interviews, participant and spot observations as well as through personal communication. A review of regional, central government and CIDA documents was conducted as secondary sources.

Interviews

Interviews were conducted at different levels. The first level involved interviews in the communities, in both programme and non-programme areas. The broad scope of information required necessitated the use of a household, interviewer-completed semistructured interview schedule. Unstructured group interviews with women constituted the second level of the interviews and were used to supplement information revealed by some of the interview schedules. The third and final level was to interview government officials involved with the sector.

Direct Observation

Direct observation by means of the participant observer approach was used to supplement data and also as a primary method of data collection. Two observation sheets were prepared. Village-wide observation was used in order to provide information on the physical environment and water sources (Appendix 1). The second observation dealt with the household and took into consideration household water use, personal hygiene, sanitation practices, waste disposal and food preparation and storage (Appendix 2). These structured observations were complemented by the use of spot checks.

Five female assistants were assigned the task of conducting the observations. They presented themselves at about 6 a.m. and continued observations till 6 p.m. or until members of the household left the house, then on their return, they (the assistants) returned to conduct the observations. The observations proved to be

useful in terms of identifying the environmental consequences of people's activities. Three days were devoted to each household for the observation. This was to ensure that what was observed was a consistent practice in the household.

Secondary Sources

Documentary information from regional and central government, as well as CIDA offices was the major secondary source. These places provided background information of the study area, village population size, economic activities, the health status in the region and programme activities. In addition, the Regional Ministry of Health Statistics Unit provided data on reported cases of water and sanitation-related diseases in the region.

Interview Schedule Design and Administration

Two different sets of interview schedules were designed for the programme and non-programme areas. All questions were open-ended. Open-ended questions were thought to be useful in order to fulfil the research objectives. It does not force the respondent to adapt to pre-conceived answers, allowing the respondent to answer questions more freely (Nachmias and Nachmias, 1987; Babbie, 1992). In this way their answers reflect their opinions, views and experiences. Thoughts can also be expressed more spontaneously, which can provide deeper insights into the respondents' attitudes, views and opinions. Despite the utility of open-ended questions, they are more difficult and time consuming to analyze.

The two sets of questions were written in English, and translated to Buli, Frafra and Dagbani, when administered in Builsa, Bongo and Bawku (the programme areas), and West Mamprusi (the non-programme area) respectively. The answers were recorded in English. The interview schedules were administered by the author with the assistance of nine interviewers, two each in the individual programme districts and three in the non-programme area.

The broad scope of the study required personnel who were familiar with particular community and fluent in both the local language and English. Interviewers were chosen to eliminate possible biases in the interview responses that are common in cross-cultural research. To prevent linguistic and conceptual errors, it was ensured that interviewers were from the community. This proved useful because it secured the support and approval of village leaders in conducting the study.

The selection process of the interviewers was done in consultation with local Community Development Officers, who suggested the use of both male and female interviewers. Their suggestions were reiterated by Mary Margaret Issaka, a Community Liaison Worker for WARDROP Engineering Ltd, who has been working in these communities, and as such has extensive knowledge of field survey issues in the villages. In all, five females and four males were selected.

Interview Schedule for the Programme Area

The interview schedule for the programme area were designed to provide information in the following areas related to the series of objectives of the

programme and also to programme activities:

a) economic activities pursued by respondents;

b) effects of borehole/handpump on livestock and vegetable production, and other economic activities, including *pito* brewing and shea butter oil processing;

c) knowledge of Water for Health Education;

d) knowledge of the mode of transmission, prevention and treatment of water- and sanitation-related diseases;

e) knowledge of the work and effectiveness of Community Water Organizers and Water User Committees.

f) the effects of the provision of water in the communities on women's workload and

g) the involvement of women in decision making at home as a result of women's participation in the programme (Appendix 3).

The interview schedules were directed to heads of households and spouses of heads of households, and in some cases to female heads of households, who had lived in the community for a period of not less than five years. The interviews were conducted either in the morning, afternoon or evening, depending on the time suitable for the interviewee, and were conducted in their courtyards. Any unusual information from the interview was cross-checked with an observation. For example, if a person indicates during the interview that he/she is a *pito* brewer, an attempt is made to identify the materials and equipments used for brewing in the household.

The questions were pre-tested with sixteen respondents (eight men and eight women) randomly selected from Sambruno, a rural community near Bolgatanga. As

a result of the pre-testing, two questions related to household income and number of livestock holdings were removed from the survey, as the respondents did not feel comfortable in responding to them.

Non-Programme Area Interview Schedule

The schedule administered in the non-programme area was designed in part to collect the same information, as that sought from the programme area (Appendix 4). However, it was not possible to interview both groups using one questionnaire, because the non-programme area did not benefit from the water and sanitation programme. Therefore, a separate interview schedule was justified.

Information collected dealt with economic activities pursued by respondents, knowledge on the mode of transmission, prevention and treatment of water- and sanitation-related diseases, and knowledge on water, health and sanitation education. The questions were pre-tested among ten residents randomly chosen from Kakasunanka, a community near Tamale, the capital of the Northern Region of Ghana. All the questions were answered without difficulty, as such, no changes were made.

Government Officials

The selection of the government officials was based on two basic criteria:

1. the linkage of that institution with the rural water sector in Ghana and,
2. the preparedness of the head or a designated official to engage in the study.

In all, nine government officials were interviewed. The interviews proceeded on the basis of a series of questions related to the research. In each case they were given considerable liberty in expressing their own views. The interview schedule was designed to provide information on: a) their awareness of the programme, b) impacts on vegetable production, c) environmental sanitation, d) health, e) transformation of the beneficiaries in terms of project planning and implementation and, f) the standard of living of the people in the region as a whole (Appendix 5). They were also provided with the opportunity to express their views on the economic and sociocultural impacts of the programme on the people.

The units of investigation were the political heads of the sector ministries: Finance and Economic Planning, Works and Housing, Local Government and Health. In view of the tight schedule of the political heads for Finance and Economic Planning and Local Government, their respective Principal Officers in charge of donor projects, were designated for the interviews. In the case of the Ministry of Health, the National Director in charge of Public Health indicated that the Regional Director of Health Services was the best resource person for such a study, since the head office in Accra was not really aware of what was happening on the "ground".

Interviews at the regional level involved the former Deputy Regional Secretary (now Deputy Regional Minister), the Regional Director of the National Council on Women and Development and, the Regional Representative of the 31st December Women's Movement in charge of projects. Former District Secretaries of two

programme districts constituted the final level of the interviews with the government officials.

The interviews with the government officials were conducted in their respective offices and were recorded on audio tapes. After the interviews the tapes were played to them to ensure verification of the information. Each interview lasted between twenty-five to thirty minutes.

t ructured Group Interviews

This aspect of the study involved group discussions to obtain in-depth information on the economic, social and cultural impacts of the programme on the community. The specific areas covered were:

i) the impact of the provision of water in changing economic activities in their community;

ii) impact on vegetable production;

iii) impact of water provision on their standard of living;

iv) impact on migration

v) impact on the community's attitude to project planning and implementation;

vi) impact on the traditional role of women;

vii) impact on children's health;

viii) impact on the overall cleanliness of the community;

ix) effect on water and sanitation-related traditional practices and;

x) community cohesion.

An average of seven women in each community were interviewed separately in four randomly selected communities in each of the programme districts. The discussions were held in the late evenings when most people had returned from their farms. In all cases, the discussions took place under shady trees to prevent both interviewers and interviewees from the scorching sun (Plate 5.1). The discussions usually lasted between two to three hours.

Plate 5.1 Interview with a Group of Women

Sampling Procedure

Having defined our study design and specified our data collection methods, the next step was to specify our method for selecting the study subjects. Ideally, all handpump communities should have been included, but time and cost constraints clearly made this unfeasible. In view of this, a form of multi-phase sampling was adopted for the study (Sheskin, 1985). This enabled one overcome the problem of interviewing at geographically dispersed settlements in the region.

In the first phase of the procedure, a representative sample of three districts were randomly selected from a total of six in the programme area. The selected districts were Builsa, Bongo and Bawku West (Fig. 5.1). In view of the spatial location of the selected districts, it was envisaged that the spatial qualities of the districts not included in the study (Bolgatanga, Bawku East and Kassena-Nankani) were catered for by the selected three, since they exhibit similar physical and socio-economic characteristics (Dickson and Benneh, 1980).

A fourth district, the West Mamprusi District, representing the non-programme area, was selected from the Northern Region. This district shares a border with the Upper East Region and lies to the south (Fig. 5.1). It was selected because it has similar social and physical characteristics as the Upper East Region but was not included in the programme.

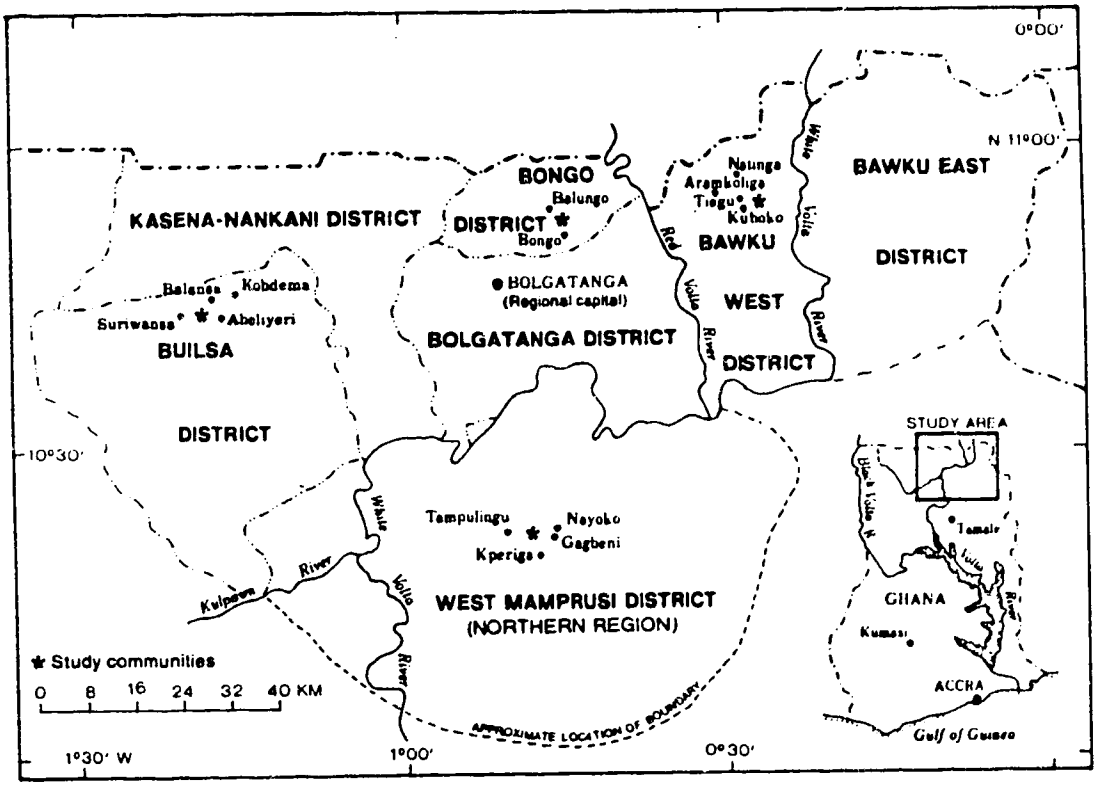


Fig. 5.1 Study Communities

The second stage entailed the selection of communities from the chosen districts. Due to the large number and dispersed nature of the communities, a list of communities was prepared in consultation with the respective District Administrative Officers and District Community Development Officers. The major criteria used for the selection of the surveyed communities were:

a) the presence of a CIDA/GWSC hand pump in the community

b) the absence of previous survey of any kind done in the village (based on their knowledge)

c) the community should be within 20 km. radius of the district capital (this was due to logistic reasons)

d) the village population should be less than 2000, and

e) the cooperative nature of the people in general.

From the list, four communities were randomly selected from Builsa, Bawku West and West Mamprusi Districts (Fig. 5.1).

In the final stage, four households were then selected from each community for the semi-structured interviews and for the observation. A sample of four was chosen because the research objective was to obtain an in-depth view, opinions and behavioral practices of the people. Sixteen households were selected in each of the programme districts, for a total of forty-eight. In the West Mamprusi District a total of thirty households was selected. The criterion for the selection was based on the willingness of the residents to allow visits to their house and to participate in the study. In all, seventy-eight households were observed for a total of two hundred and

thiry-four man-days, with a hundred and twenty-six people interviewed.

Techniques of Data Analysis

The thesis has three data analyses chapters (Chapters 6, 7 and 8). The first analytical technique was the use of descriptive statistics; specifically percentages. In the second approach, since the primary data were in the form of categories, much emphasis was placed on non-parametric statistical techniques. More specifically, the Chi-square test statistic was utilized.

The Chi-square test provided insights into whether or not the classification schemes differ significantly in relative frequency or proportions (Shaw and Wheeler, 1985). A major merit of this test is that it does not require strict assumptions of normality in regards to the distribution of the data. However, the test is valid only under certain conditions, namely; a) the data must ordinarily be obtained by simple random sampling, b) items in the sampled population must be classified independently of each other, c) the classes or cells must be mutually exclusive and exhaustive. That is, an item must qualify for one and only one class or cell and, finally, d) the expected frequency in each class or cell should be at least five (Williams, 1984; Shaw and Wheeler, 1985).

The test statistics is written in the form:

$$\chi^2=\sum_{i=1}^{k}\sum_{j=1}^{l}\frac{(O_{ij}-E_{ij})^2}{E_{ij}}$$

where k = the total number of categories
l = the total number of samples

Oij = the observed frequency in category i and sample j
Eij = the expected frequency in category i and sample j (Norcliffe, 1982: 98)

The CROSSTABS Procedure in *SPSS for Windows* displays the Chi-square values. The data for Chapter Eight were in the form of tape transcripts. These transcripts (from the interviews with the government officials) were played several times and the responses written down. All the responses were read through line by line, noting significant phrases. Interviewees own words were used as much as possible.

Validity and Reliability of Data

The research design and the methods employed for the study were not without their complications. The problem of validity arose because the measuring instruments employed in the study were indirect. As a result there was the need to assess the content of the questionnaires to determine their validity. This assessment was done in two phases. In the first phase, the questions were reviewed by the dissertation supervisory committee, and based on their constructive criticisms and suggestions, a final version was designed for the field. The second phase involved consultations with two specialists in the field. Dr. Andrew Livingstone, a Water and Community Development expert working in the region under study and Dr. S. Asamoah-Darko, a Rural Development expert with the University of Science and Technology, Kumasi, reviewed the questions.

To ensure the validity and replicability of the results of the study, a representative sample of three districts encompassing twelve communities was

selected. The same questions were asked respondents in the communities. At first, it was decided that sampled households would be grouped into two categories; "rich and poor", based on the type of roofing of the house. This was not possible at the time of the field work, because it was realized that most houses in the communities were built of mud with thatch/grass roofing. Grass roofing, it was observed is not a symbol of economic status, but rather a reflection of the physical environment. They are used to prevent excessive heat in the rooms, unlike corrugated iron sheets which absorb and transmit excessive heat.

A major problem which relates to the research design was the "spill-over" of radio messages from the Bolgatanga Rural FM radio station which could be heard in some parts of the non-programme area. People receiving the Water and Health Education Programme on the radio could be directly affected by such programmes in terms of the transmission mechanisms of water and sanitation diseases, as well as personal and environmental hygiene. This problem could affect the reliability of the results of the study.

However, the problem was overcome by selecting communities which were not receiving the radio transmissions. With the use of a radio, tests were conducted at various times in these communities to ensure that the radio transmissions were not received in these areas. A major advantage was that all the respondents could not speak any of the languages used in the radio broadcasts.

Initially, the presence of the author in some of the communities generated some suspicions, since it was the first time somebody speaking a different language

had come to their community to conduct a survey. This was a sign that responses would be unreliable and inaccurate. The use of local Community Development Personnel overcame many local taboos during the field work, and since the interviewers were well-known to the community, their activities did not generate suspicion or hostility in the course of the survey. Hence, interview answers were considered to be reliable. In addition the purpose of the research was made known to the respondents and the author partook in the social life of the people, especially in sharing with them *pito* (local beer).

Finally, the questions and their responses were re-read to them, and corrections made where necessary, to ensure accuracy of data collected.

Duration of Field Work

The field work was conducted in a five-month period, between August and December, 1992. This period was chosen because it coincided with the rainy season in Northern Ghana and the peak of the farming season when most farmers would be available in their communities. The period also marks the beginning of the dry season, when most people resort to other activities apart from farming.

Four months were spent in the communities, one month in each of the districts. The remaining one month of the field period was spent reviewing government documents and setting up interviews with government officials.

Problems Encountered in the Field

Many problems were encountered during the fieldwork. These were:

1) District Secretaries tried to influence the selection process of interviewers by suggesting the use of Committee for the Defense of the Revolution (CDR) personnel in the communities. Upon careful thought this suggestion was turned down, due to the fact that the CDR's were the watch-dogs of the then revolutionary government. The Secretaries were informed that to avoid biased responses revolutionary organs should not be involved in the study. Their involvement was considered inappropriate, since most people would be sceptical in their responses.

2) Accessibility to most of the communities proved to be difficult because of the rains. The absence of roads necessitated the use of motor-bikes or bicycles. During heavy rains, the use of these means of transport became unfeasible. Under such circumstamnces, the journey to and from the communities was made on foot. The dispersed nature of the settlements worsened the situation.

3) In some households, people expected some gifts (especially cola nuts or money). They expressed the view that since the borehole/handpumps were installed in their communities, no government project has been initiated in the communities. They advanced comments such as:

> "the government does not care about the plight of the rural people any longer. Don't they eat before drinking water?"
>
> "these questions will not bring me money."

4) Some women working on their farms were initially upset because they had to break for the interviews. Comments like these were heard:

> "you are going to weed my farm after the interview."
>
> "go and talk to the Ghana Water and Sewerage Corporation staff, because they have the time."

5) Data on reported cases of guinea worm and diarrhoea morbidity were incomplete and unreliable. The only complete and reliable data was from January 1989 to June 1992.

6) Setting up appointments with government officials and getting them to honour such appointments proved difficult. In some cases, appointments had to be re-scheduled three times. In addition, there were series of interruptions during interviews which tended to shift the focus of the interviews.

7) Organizing the women for the group discussions was painstaking. They argued that it was a waste of their time, since there were no financial gains involved. In some cases, they demanded that *pito* be served to ensure "frank" and cordial discussion.

Chapter Six

WATER USE PATTERNS AND ENVIRONMENTAL HYGIENIC PRACTICES

A functioning water supply system and the delivery of health and hygiene education messages do not of themselves guarantee improved health and living conditions. These benefits will occur, only if people use the water from the improved system as intended and engage in appropriate sanitation and hygienic practices (Briscoe, 1978; Sorkin, 1988). To assess the socio-economic impacts of a rural water supply programme without considering whether the beneficiaries utilize the system or engage in appropriate hygienic and environmental practices is inappropriate. This is because, if beneficiaries are not utilizing the improved system, then the programme is unlikely to generate a positive impact on them and societal development as a whole.

The central focus of the Upper East Region Water and Sanitation Programme (as noted in Chapter Three), is the development of water resources to supply potable water to the rural people, thereby improving health and productivity. Since 1981, the programme has reinforced its educational component by emphasizing the relationship among water, sanitation and health, under WUP 1 and II. With the ending of WUP II in early 1992, there is the need to ascertain the impact of the water, health and hygiene education component of the programme on the people. This will provide insights into whether the huge investments made have been worthwhile and the achievements sustained.

The objective of this chapter, therefore, is to examine water use practices and

associated behaviour in households and in the communities. The measures employed are the sources of water collection for households, time of collection and storage practices. Personal and domestic hygienic practices are also investigated, because it is felt that for any health impact to occur appropriate personal and domestic hygienic practices should be in place.

A second focus of the chapter is an examination of environmental hygienic practices. These patterns and practices were observed in the programme and non-programme areas to determine differences between them. This will provide an indication of whether the water supply programme has had any impact on water and sanitation related behaviour in the programme communities. Structured and spot observations were the methods used to investigate the water use patterns and practices in both programme and non-programme areas.

Water Use Patterns and Hygienic Practices in the Programme Area

The main sources of water supply for the residents of the programme area were from boreholes/hand pumps (Plate 6.1). Protected hand dug wells (lined) were also found in a few communities (Plate 6.2). A large majority of residents (89.6%) utilized the boreholes/hand pumps for drinking, cooking, bathing and other household chores.

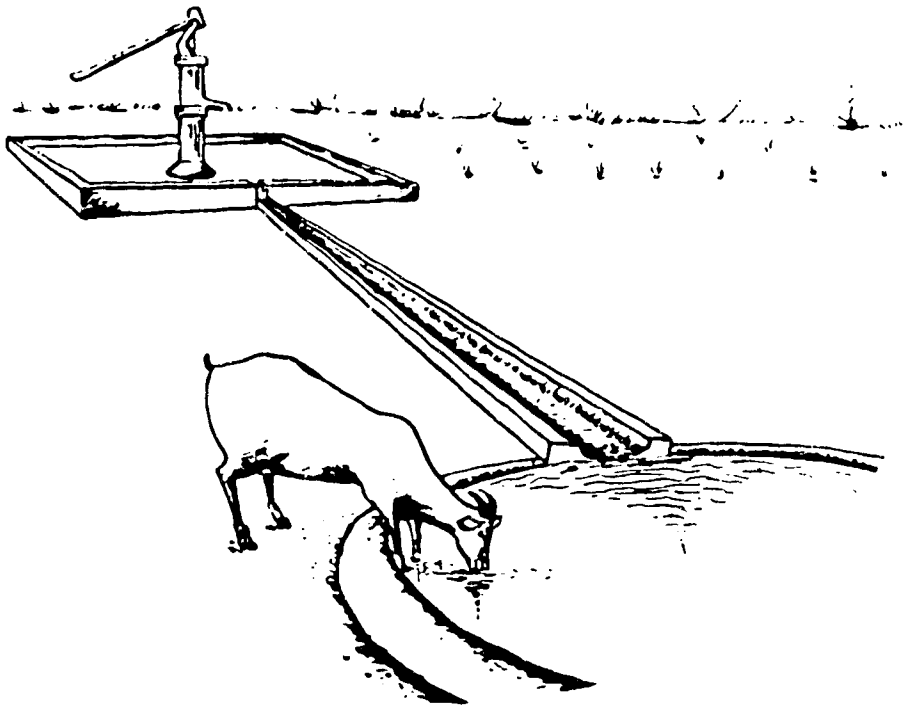
This indicates the widespread acceptance of the CIDA/GWSC improved water source. However, a few households (9.5%) fetched water from protected hand dug wells for their poultry and for washing of clothes, because the hand dug wells were closer to their residences.

Over half of women (54.2%) in the households observed, and a third of girls (36.1%) collected water for household activities. Boys played a minor role (9.7%). This implies that even with the installation of a readily accessible and easy-to-use water supply system, water collection remains the responsibility of females in the communities. Water collectors in the programme area spent an average of thirty-six minutes daily collecting water for household use and visited the water source four times on average. A large majority of households (91.7%) spent less than an hour on average collecting water, daily.

Borehole/hand pump site improvement (which includes backfilling, extended pads, and animal watering troughs) was one of the activities initiated under WUP I. A massive campaign was launched by CIDA/GWSC to educate the people on this issue (Fig. 6.1). Since 1986, initiatives for pump site improvements have been shifted to the CWOs (Horizon Pacific International, 1991). In view of this, observations were made at the water supply sources to determine if the people ensured careful use of the hand pumps, in addition to protecting the environment around the pumps. Evidence from spot observations indicate that water collectors handled the hand pumps with care. This suggests that the people would like to ensure the sustainable operation of their hand pumps.

The surroundings around some of the hand pumps (as Plate 6.1 illustrates) were clean and well-maintained (proper drainage and no stagnant water), suggesting the preparedness of the people to ensure that areas around their water supply sources were not degraded.

IMPROVE DRAINAGE



PROTECT YOUR WATER

GHANA WATER & SEWERAGE CORPORATION
WATER UTILIZATION PROJECT

Fig. 6.1 Hand Pump Site Improvement

With others, stagnant pools of water could be found near the pump sites, in addition to weedy surroundings (Plates 6.3 and 6.4), indicating a neglect on the part of people in these communities to avoid environmental degradation of their water supply sources. As well, it shows the lack of awareness of people, of the health implications of stagnant water and weedy environments in their communities. This, furthemore, casts doubts on the effectiveness of the educational programme.

It was observed that hand pump sites with improved drainage facilities were constructed between 1984 and 1986, the implementation period for WUP II. This suggests that the communities without improved drainage facilities have not taken the initiative to protect their water supply sources. This situation may be attributed to the communities' lack of financial and material resources, as well as the ineffectiveness of the CWOs (charged with this responsibility) in mobilizing the people to undertake such projects.

The spot observations revealed also that, water collectors used clean receptacles to collect water. They always rinsed their receptacles before collecting the water. One objective of WUP I was to ensure the proper storage of water through education (Fig. 6.2). As the figure illustrates, the approach was an attempt to prevent water contamination once inside the courtyard.

Observations in the households indicate that water collected was usually stored in covered clay pots and placed on platforms above ground to prevent contamination from animals and children. Water was drawn from the pots with calabashes equipped with handles.

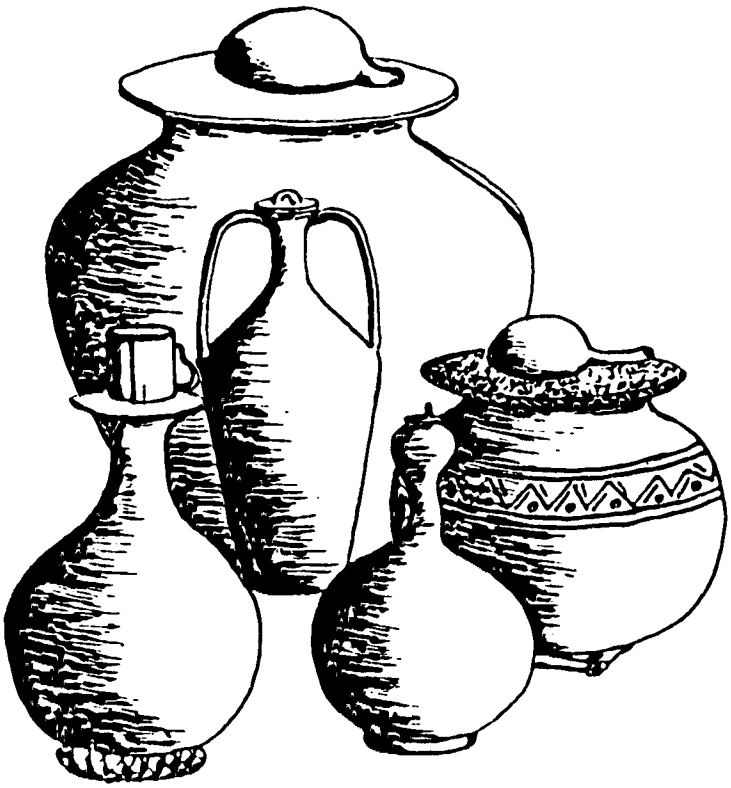
An observation of the storage and drawing arrangements also shows that the majority of households (87.5%) stored and handled water in a safe and hygienic manner. These observations imply that the approach (Fig. 6.2) adopted to educate the people to protect their water has been successful and is being sustained. Interestingly, this approach built on existing traditional methods, where people usually stored their water in clay pots.

Environmental Hygienic Practices in the Programme Area

Environmental hygiene education, which has been part of the programme also bestows potential health benefits, not only on the households that engaged in proper sanitary practices, but also on the neighbours, whose environments are protected to some degree from pollution. If positive health impact is to occur, there is the need to ascertain whether waste disposal practices of the beneficiaries work with, rather than against the ·-nment. This is because degrading the community's environment pose· · ect threat to better health. In this regard, the educational programme produced posters targeting households on the need to control refuse and to clean up compounds regularly (Fig. 6.3).

The survey indicated that most of the households (66%) in the programme area disposed of household waste water into private soak pits behind the house. This practice is safe on the grounds that it does not pollute the environment, because the waste water is drained out on a regular basis from the soak pits.

PROTECT YOUR WATER



COVERED CONTAINERS & HANDLED DIPPERS

GHANA WATER & SEWERAGE CORPORATION
WATER UTILIZATION PROJECT

Fig. 6.2 Storing Water in Village Households

REFUSE CONTROL

PROTECT YOUR WATER

GHANA WATER & SEWERAGE CORPORATION
WATER UTILIZATION PROJECT

Fig. 6.3 Solid Waste Dump

Despite this widespread practice, some households (34.0%) still dumped their waste water onto their farms and in bushes surrounding the house (Plate 6.5), hence polluting the environment.

The practices with regard to household garbage (solid wastes) disposal were quite different. A large majority of households (79.2%) disposed of household solid wastes onto their farms and in bushes. This is contrary to what the educational programme portrayed in the communities (as Fig. 6.3 illustrates), and therefore reveals the ineffectiveness of the educational programme in this regard. Few households (18.8%), however, engaged in a hygienic practice by disposing of garbage into private garbage pits, dug near the courtyard.

Plate 6.5 House Located Within a Farm

With reference to animal wastes, a large majority of households which had livestock (95.3%) in the programme area disposed of the wastes onto their farms/bushes. Animal wastes dumped onto farms may serve as a good source of organic fertilizer, hence increasing crop yield. However, it may pose a threat to groundwater resources and may generate flies, hence posing health risks to the community.

To conclude, the waste disposal practices of the people were inconsistent with what the educational programme portrayed, which in effect suggests some lapses in the strategy.

Personal and Domestic Hygienic Practices in the Programme Area

The need to change personal behaviour has been recognized as being at least as important as the construction of new facilities (Water and Sanitation for Health Project, 1993). This is due to the fact that the result of many aspects of behaviour can determine whether new facilities bring health benefits. Among the key issues emphasized in the rural FM radio messages, as part of the Water Education for Health programme of WUP II was personal hygienic practices. Three aspects of these practices were therefore observed to determine the impacts of the education programme on them. They were bath-taking and hand washing before eating, defecation and practices associated with faeces.

All the residents in the houses observed in the programme area washed their hands before eating. However, a few people, 18.8% and 6.3%, washed with soap and

water and water and ash, respectively. The practice of hand washing with water only by most people may not be effective in eliminating bacteria. Under such circumstances, the hand may serve as routes for faecal-oral and disease transmission. However, due to logistical reasons, there were no laboratory tests conducted to prove this.

Bath-taking was observed over a three-day period in each household. The observation revealed that majority of women (64.6%) and girls (66.7%) had two baths over the three-day period. Less than half of boys (35.4%) and males (48.7%) had two baths. Most boys (64.6%) had a single bath over the three day period. Taking into consideration the physical characteristics of the study area (as shown in Chapter Two), and the fact that most people engaged in agricultural work, the bathing practices of the people could not be considered as hygienic. Despite this, the findings indicate that personal cleanliness is more important to females than to males.

An extensive campaign was launched under WUP I to motivate the communities to construct latrines and to protect their water supply sources (Fig. 6.4). Although this component was abolished, one would expect the initiative to persist, at least in some of the communities. However, to the disappointment of the investigator, latrines were completely non-existent in all the communities surveyed in the programme area. With the exception of children (usually under five years), all the residents defecated in the bush, usually in an open field or in a farm around the house. This brings to mind an incident in a community during a visit.

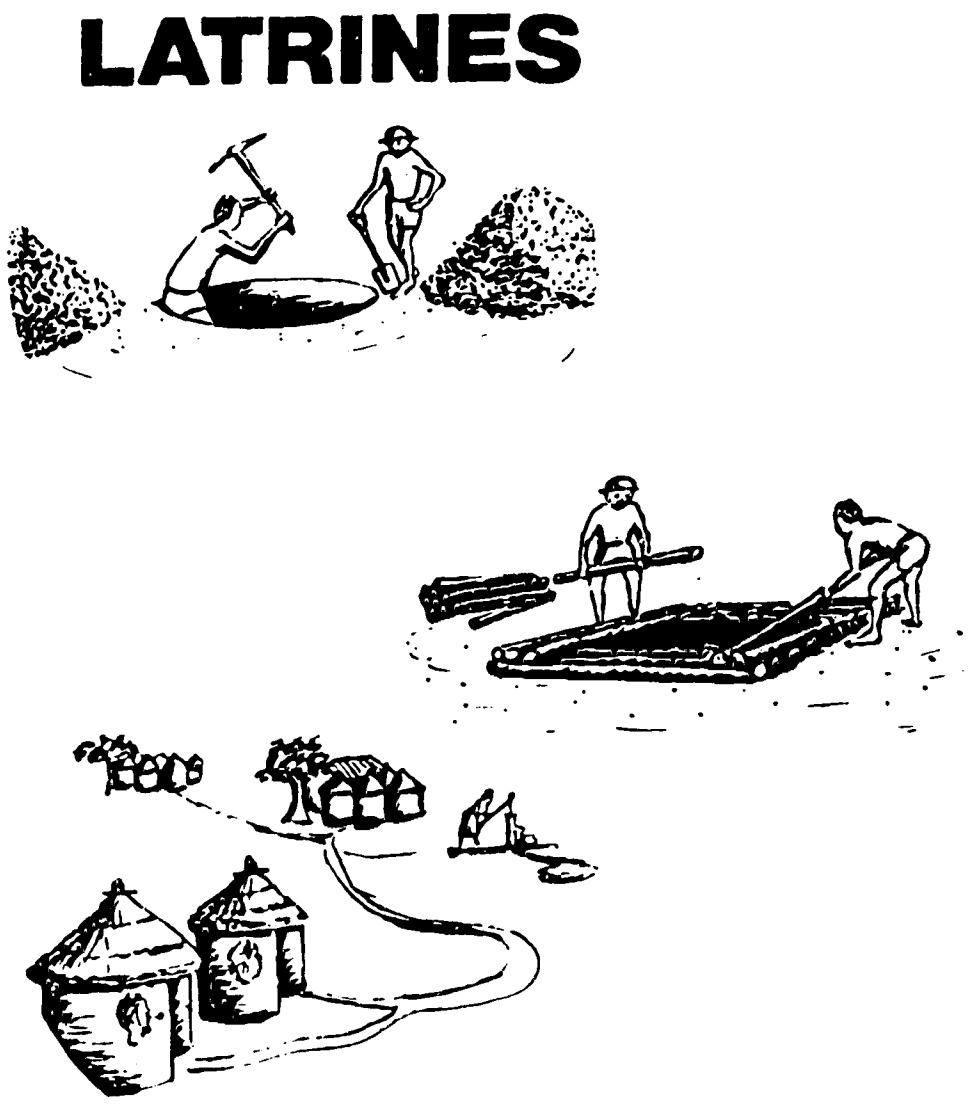


Fig. 6.4 Latrine Construction and Use

When I asked the residents of a household for a place to "ease" myself, they all burst into laughter and the head of household lamented in a jovial way saying:

> "why do you think when our children, after getting formal education do not come back to the village? Well, it rained last night, and its good you have asked for a latrine. Follow me and I will show you the best latrine in the village."

After leading me out of the house he showed me a farm, and continued his comments;" the whole area is for you, choose the best site."

Mothers neither buried the faeces of children who defecate in the compounds nor washed their hands after attending to their children during defecation. In one particular instance in a community, during an interview with a woman, she used an uprooted groundnut plant to clean the anus of a child who was less than one year old, after defecation and failed to wash her hands. These practices are inconsistent with the educational strategy on defecation (Fig. 6.5). The defecation practices of the people raise the question of why the latrine construction effort under WUP I was dropped with the coming into being of WUP II. Alternative approaches could have been employed to provide the people with latrines.

In regards to nutrition, the most common foodstuffs used in the programme area were beans (especially bambara beans), groundnuts, rice, millet and sorghum. *Tuo zafe* (a mixture of cassava flour and ground maize) was found to be the most popular food. Very little meat was usually included in the meals. However, the widespread use of beans and vegetables suggests that nutritious diets were prepared in the households and, on average, two meals were prepared daily in the households.

In many cases, some of the food prepared was reserved to be eaten at a later time. Evidence from the observations, indicates that most households (95.8%) covered left-over food and left it in the kitchen. The rest covered and stored it in the bedroom. This indicates that most people were aware of the health risks associated with unhygienic and infected food.

Child easing in compound

Bury faeces

Wash hands

Fig. 6.5 Children's Defecation and Associated Practices

Water Use and Hygienic Practices in the Non-programme Area

Water use patterns and hygienic practices were also observed in the non-programme communities. In this area, a majority of households (76.6%) obtained their water supply from hand dug wells, both protected and unprotected (Plates 6.6 and 6.7). The rest (23.4%) obtained their sources of supply from springs. Some of the hand dug wells were lined, while others were not. As illustrated in Plate 6.7, the unprotected wells were highly prone to contamination from running water, animals and other wastes. They also posed dangers to children.

Like the programme area, females dominated water collection in the non-programme area. Women were the main water collectors (71.1%), with girls playing a relatively minor role (28.9%). Water collectors in the households spent an average of forty-eight minutes daily collecting water, and visited the source seven times on average. In addition, 76.7% of households observed spent less than one hour collecting daily household water use. The practices of storing and drawing water were the same as those in the programme area. All the households observed stored water in clay pots raised on mud platforms, and drew water from the pots with a calabash. Water storage and handling practices were safe and hygienic in most households (86.7%). In the remaining households (13.3%), the practices were subjected to contamination because of hand contact with the water in the course of drawing.

In over half of the households (53.3%) in the non-programme area, food not immediately consumed was covered and left in the bedroom, to avoid being tampered with by animals. The rest was either covered (43.4%), or left it uncovered (3.3%) in the kitchen. This suggests that most people in the non-programme area are aware of the health risks associated with unhygienic food.

Wastes Disposal in the Non-programme Area

Almost three-quarters of households in the non-programme area (73.3%) disposed of household liquid wastes into private soak pits, dug behind their houses, and drained off regularly. This prevents it from serving as breeding grounds for mosquitoes. The practice implies that most people were aware of the health hazards posed by inappropriate handling of household waste water. The rest disposed of waste water onto their farms. Thus, over a quarter of households in the non-programme area did not perceive any risks associated with such a practice.

One would expect a similar approach would be applied in disposing of household solid wastes. However, this was not the case. In fact, the majority of households (66.7%) dumped household garbage onto their farms. Over 16% of households disposed of the garbage into pits, the rest left it littering in their courtyards. On the one hand, the widespread dumping of garbage onto farms may be a source of manure for crops. On the other hand, there are dangers associated with the practice. Quite apart from the fact that it may generate flies in the community, the contamination of groundwater is also a possibility. Littering garbage

in the courtyard also poses dangers to public health and also to aesthetic beauty.

With reference to animal waste, almost equal proportions of households observed disposed it either onto their farms (48.3%) or into garbage pits (51.7%). Based on this observation, one cannot safely conclude that the environmental sanitation practices of households in the non-programme area were hygienic.

Comparison of Practices Between Programme and Non-programme Areas

In previous sections of this chapter, we have examined the water use patterns, practices related to personal and domestic hygiene and environmental sanitation in the programme and non-programme areas. In this section, we compare the findings from the two areas. The comparison is necessary for two reasons:

1. to determine whether significant differences exist in the practices between the two areas, and
2. to determine if the Water Education for Health component of the CIDA/GWSC water supply programme has had significant impacts on hygiene and sanitation practices in the beneficiary communities.

The Chi-square test statistic with a 95% confidence level was employed to test for the significant differences in practices, where applicable.

Water Use Practices

The analysis indicate that in both areas, whatever the source of water supply, adult

females were mainly responsible for household water collection. This finding is consistent with other studies done in the rural areas of the developing world (White,Bradley and White, 1972; Feachem et al., 1978; Rooy and Donaldson, 1990; Government of India, 1990). In Cross River State, Nigeria, for example, a knowledge, attitude and practices survey showed that 49.9% of adult females were involved in water collection (Rooy and Donaldson, 1990). In India and Lesotho, the figures were slightly higher (63.4% and 96%, respectively) for all households surveyed (Government of India, 1990; Feachem et al., 1978). Although this finding has been known all along in the rural areas of the developing world, it stresses one important issue, especially as it relates to the Upper East Region Water Supply Programme. That females are the prime water collectors makes it necessary to expand the role of women in the programme more than has been done over the past two decades.

Comparatively, residents in the non-programme area spent more time and visited the water supply source more often than those in the programme area. Moreover, most households in the non-programme area spent more than two hours collecting water for their daily use (Table 6.1). The relative differences in collection times between the two areas were attributed not to distance to the source (since some hand dug wells were closer to the households than the boreholes were), but rather to the process of drawing water. The process of drawing water from the hand dug wells (as Plate 6.6 illustrates) is laborious, time consuming and sometimes risky, and can only be done with small pails, hence the time and the number of visits involved. This implies that in order to save considerable time in water collection,

future water resources development projects in Ghana should consider employing easy and quick-to-use systems, rather than the current emphasis on hand dug wells. This, of course, depends on a number of factors, including the geology of the area and the willingness and ability of the beneficiaries to finance and maintain the system.

Table 6.1
Average Time of Water Collection, Number of Visits and Water Storage Practices in Programme and Non-programme Areas

	Programme	Non-programme	χ^2
Average time of collection	36 mins.	48 mins.	
Average number of visits	4	7	
Households spending (% in brackets)			
≤ 1 hour	44 (91.7)	23 (76.7)	
> 1 hour	4 (8.3)	7 (23.3)	
Storage Practices (% in brackets)			
Storage pot on platform	42 (87.5)	26 (86.7)	
Storage pot on floor	6 (12.5)	4 (13.3)	
Drawing Practices (% in brackets)			
Prone to contamination	10 (20.8)	11 (36.7)	2.35
Not prone to contamination	38 (79.2)	19 (63.3)	

Source: Field Survey, August-December, 1992
Value of Chi-square (with d. f. = 1) not significant at 95% confidence level

In regards to water storage and drawing practices, there was no statistically significant difference between the two areas (see Appendix Six for example of Chi-

square calculation). However, there were relative differences in the approach to drawing water from the storage pots between the two areas (Table 6.1). Over one-third of households in the non-programme area drew their water from the storage containers with a calabash without handles, thus subjecting the water to possible contamination by the hand. In the programme area, one-fifth of households engaged in the same practice. This finding in our study area is in contrast to observations made in Imo State, Nigeria, where 88% took their water from the storage containers with a cup, leading to hand contact with the water (Blum et al., 1990). From the findings in our study area, there is a possibility that the health and hygiene education programme of the CIDA/GWSC rural water supply programme has had a positive impact on water storage and drawing practices in the rural communities in the Upper East Region of Ghana.

Personal Hygiene

Our observations indicate that people in both areas washed their hands on a regular basis before eating. However, the most important observation in our study was the statistically significant difference in washing practices between the two areas (Table 6.2). This practice is similar to observations made in Belize (where hand washing before eating was done regularly but in a common basin) and Lombok, Indonesia (Turner and Buzzard, 1987; Wilson and Chandler, 1993). In Lombok, Wilson and Chandler report that all women rinsed their hands before eating immediately after the implementation of a hygiene educational programme. Two

years later, 94% of women were still engaged in the practice. However, our findings are in contrast to Katsha and White's (1989) study in two Egyptian villages, Kafr Shawanan and Babil. After observing hand washing practices in 312 households, Katsha and White concluded that hands were not washed on a regular basis before eating. Our findings suggest that, to advance the benefits related to personal hygiene, education has to be linked to the time when food is likely to be contaminated in the households.

Table 6.2
Hand Washing and Waste Disposal Practices Between Programme and Non-programme Areas (% in brackets)

Practice	Programme	Non-Programme	χ^2
Hand Washing			
Water only	36 (75.0)	28 (93.3)	4.20
Water and soap/ash	12 (25.0)	2 (6.7)	
Liquid Waste			
Farm/courtyard	16 (34.0)	8 (26.7)	
Soak pit	31 (66.0)	22 (73.3)	0.46
Solid Waste			
Garbage pit	9 (18.8)	5 (16.7)	
Courtyard	1 (2.1)	5 (16.7)	5.54
Farm	38 (79.2)	20 (66.7)	
Animal Waste			
Farm/courtyard	41 (95.3)	14 (48.3)	
Garbage pit	2 (4.7)	15 (51.7)	21.28

Source: Field Survey, August-December, 1992
Values of Chi-square with d. f. = 1

Excreta Disposal

In both areas excreta disposal is by and large a matter of letting nature take

its own course. People in both areas disposed of their excreta in any manner and did not cover or bury the faeces. This presents potential disadvantages not only to the soil and groundwater, but also is a public health risk, since it leads to the transmission of intestinal nematodes (Duncan and Cairncross, 1989). Pigs, wandering in the communities, eat the faeces, thus cleaning up the disposal sites (farms/bushes). This suggests that the people do not perceive any clear link between excreta disposal and their own health. The practice also indicates that the Water Education for Health component of WUP II has had no impact on defecation practices of the people. A 1978 study on latrine-use patterns in the area found that the open bush was the most popular system in the region (Wright, Owusu and Handa, 1978). Our findings in regards to defecation practices are corroborated by a similar study in India, where over 92% of households observed defecated in the bush (Government of India, 1990). The defecating patterns in the rural areas suggest that a concerted effort must be made to educate the people on the need to bury their faeces.

Household Waste Disposal

In regards to waste disposal practices, the evidence (Table 6.2) suggests that, statistically no significant differences existed in methods of disposing of household waste water between the programme and non-programme areas. Table 6.2 also shows that most households in the programme area (79.2%) dumped solid wastes onto farms. This finding is contrary to findings in a similar study done in the Dominican Republic (Silva et al., 1989). In that study, 72% of households observed

burnt their garbage, while 14% dumped it in the countryside. The rest buried it or left it wherever they happened to be.

Statistically, a significant difference was observed in methods of disposing of animal wastes. A further examination of Table 6.2 shows that a relatively higher proportion of households in the programme area disposed of liquid and solid wastes onto farms. Moreover, households in the non-programme area engaged in appropriate hygienic practices in waste water and animal waste disposal. These practices observed in our study area may be attributed to the location of the farms and the dispersed settlement patterns found in these areas, which may not be the case in the Dominican Republic. Thus, our findings call for a revitalization of the educational programme on refuse control, and a modification of the approach, if and when necessary, to ensure that the practices in the communities are hygienic and sustainable.

Chapter Seven

ECONOMIC, SOCIAL AND HEALTH-RELATED IMPACTS

In Chapter Four, the various impacts of rural water supply and sanitation programmes were explored, and emphasis placed on the direct and indirect economic and social impacts of such programmes. For many rural people in Sub-Saharan Africa, poverty, poor health conditions and low social standing of women pose direct threats to better welfare, particularly over the long-term. It is also becoming increasingly obvious that the survival of most households in the rural areas of the developing world depends heavily on the economic and sociocultural emancipation of women, who are the unacknowledged backbone of the family economy.

The central focus of the Upper East Region Water Supply Programme is the development of water resources to improve the living conditions of people in the region. The aim of the programme, as has been evolving over the years, is to provide potable water to rural communities, thereby improving health and productivity, supporting small scale economic ventures, such as dry season gardening and enhancing rural life. If these are to occur, and the long-term development of the area assured, CIDA and the Government of Ghana need to ascertain that the water supply programme has resulted in positive impacts on the beneficiaries.

In line with the approach chosen for the study, the beneficiaries' views and knowledge on socio-economic impacts related to the objectives of the series of project-related activities are examined. This will provide an insight into whether the programme has had any impact on the beneficiaries. The indicators examined are

economic activities pursued by women, impact of water tariff payment on households' economic situation, knowledge of programme activities, social standing of women and knowledge of health issues. Due to the lack of baseline data, the assessment is made by comparing the responses in the programme and the non-programme areas. Semi-structured and group interviews, as well as personal observations, were the instruments used for gathering the information.

Women's Economic Patterns in the Programme Area

In rural areas of the developing world, women are traditionally the managers of water, the guardians of health, cleanliness and children's welfare and the backbone of the household economy. They are also the main users of water and waste, for example, in vegetable gardening, animal husbandry and brewing activities. The income derived from these and other activities is spent on basic needs, such as food, clothing and household utensils, and also on improvements to and payments for domestic water supply and household hygiene (Wijk-Sijbesma, 1981). To this end, it is important to examine the economic activities pursued by them. To determine whether women utilize the readily available water for income earning activities, their economic patterns are studied first. After all, this was one area emphasized under WUP I and II. Women in the study area engage in many economic activities. However, the principal source of income for the women interviewed in the programme area was from agricultural activities (farming, livestock and poultry rearing). Almost three-quarters of women (70.8%) derived their income from this

source. Apart from this, a third had incomes from *pito* (local beer) brewing and the processing of shea butter oil. Half also engaged in trading and other activities, and derived their incomes from these sources. A few women (12.5%) had seen changes in their sources of income, and they attributed this to the ready availability of water in their community.

The situation is quite different during the dry season, when most farming activities have ceased due to lack of adequate rainfall and women are occupied with other activities to supplement their incomes. *Pito* brewing and shea butter processing become the most important economic activities undertaken by women, with a quarter of women interviewed engaging in them. During this time of the year, the proportion of women engaged in trading is reduced to 29.2%. Others resort to vegetable production (12.5%) and firewood collection (12.85%). The majority of women (52.1%) assist their husbands to renovate the house and rest until the next farming season.

Since the installation of borehole/hand pumps in their communities, the majority of women interviewed (68.1%) have seen increases in household livestock holdings. They attributed this to the fact that their animals, especially goats, sheep, and pigs and poultry, did not have to travel in search of water. This helps in minimizing the loss of animals through theft. Of the *pito* and shea butter oil producers, 19.1% have seen increases in production. All the six women engaging in vegetable production indicated that they could grow more vegetables for home consumption due to readily available water in their community.

Impact of Water Tariff Payment on Households

The hand pump water tariff payment is seen as encouraging a much more effective and sustainable utilization of water supply systems and has attracted the attention of both donors and governments over the years. However, the collection of the water tariff has been one of the intractable problems of water utilities in the developing world (McGarry, 1991). At the time of the field work, the rate was between ¢3,000 and ¢5,000 per annum for each household in the surveyed communities. Those who brewed *pito* or processed shea butter oil had to pay more.

Since its inception, tariff collection has been a problem for the GWSC in the region, with some communities in arrears. Evidence from the survey indicates that for over seven years since it was introduced, the water tariff has not been fully accepted by the people. Of the 48 households surveyed, 6 (12.5%) did not pay. Of those who paid, 59.5% regarded the tariff as having no negative effect on their household finances, since they derived immense benefits from the improved system. They were of the view that it prompts them to take good care of the water supply system, in addition to providing good drinking water all year round.

The remaining 40.5% of those who paid the tariff, did so unwillingly. These people were of the view that it affected their household finances during the period of payment. According to them, if the payment coincided with the commencement of the school year, it implied choosing between school fees and the water tariff payment. They also had to forgo certain household items in order to make the payment.

The problem with the tariff re-surfaced during group interviews with the women in the communities. The women expressed their dissatisfaction with the way the water tariff was introduced. According to them, when the improved system was installed, they did not make any financial contribution. With the sudden introduction of the water tariff, they felt that the GWSC was trying to exploit them. This suggests that the Community Water Organizers, Water Utilization Committees and GWSC have been ineffective in communicating to the people the need for the water tariff.

Knowledge of Programme Institutions

One of the key elements of WUP I and II was the establishment of local institutions, CWOs and WUCs, both entrusted with the role of overseeing the sustainability of the programme outputs in the communities. In view of this, beneficiaries' knowledge on the existence and work of established local institutions was sought to determine the awareness of the people on some programme activities, and also to provide insights into the effectiveness of these volunteers.

Knowledge of CWO Activities

Respondents were asked to describe the work of the CWOs, if any, in their communities. Of the 96 respondents in the programme area, 9.3% had no idea of their existence. The large majority of respondents (77.1%) who were aware of the presence of CWOs in their communities, were of the view that, the CWOs were mainly responsible for repairing and reporting hand pump problems to GWSC in

Bolgatanga (the regional capital), in addition to maintaining a clean pump site. Some respondents (35.4%) cited re-organization of meetings and educating the people on water and health issues as part of CWO activities. Only one-fifth of interviewees attributed tariff collection duties to CWOs. This suggests that the CWOs have been concentrating largely on some aspects of their duties to the neglect of others, instead of a balanced approach to all of their functions. This suggestion is reinforced by a 1988 survey conducted by the Monitoring and Evaluation Unit of WUP II which concluded that the CWOs did not understand their function as tariff educators. It is therefore not surprising that they tended to concentrate on a few areas of their duties.

Evidence from the survey also points to the fact that the respondents have extensive knowledge of the person responsible for pump operations, maintenance and repairs. Thus, communities do not have to rely solely on GWSC or CIDA to ensure the sustainable operation of their pumps. This is supported by the fact that most respondents (74.7%), who had knowledge of the existence of CWOs, considered them to be hard working and their work to be effective. As well, the large majority of these people (87.4%) indicated that the CWOs were not imposed on them, were selected by the community, and are a direct benefit to developing a community-based managed water supply system. These suggest that if the CWOs could be motivated and provided with incentives, they could play a meaningful role in the rural communities, as far as water-related activities are concerned.

Knowledge of Activities of Water User Committees

Water User Committees were established for each hand pump community to supervise a hand pump caretaker, support pump site development activities, build concrete pads around hand pumps, and engage in latrine construction with the communities. These committees were viewed by the programme as the cornerstone of WUP I (Malone Given Parson, 1986). Four main duties were considered as the responsibilities of the water user committees by respondents who were aware of their presence in their communities (Table 7.1). Most of those who were aware of their presence (84.0%) considered them to be effective and hard working. However, almost half of the people interviewed (47.9%) had no idea of the existence of these committees in their communities. The lack of knowledge of the existence of these committees is a reflection of their composition. In most cases, they comprised the village chief and several elders, and rarely had women as members. Thus, the composition of the committees makes it difficult for them to function in such a way as to make their work well-known in their communities. This finding suggests the need for the re-appraisal of the community WUC concept and the training of its members so that they can play active roles in their communities.

Table 7.1
Responses on Activities of Water User Committees

Explain the Work of Water Committees, if any, in your community.*	**Number**	**% of Total**
Decision making on water issues	17	34.0
Tariff collection	9	18.0
Organize meetings/education	16	32.0
Supervise CWOs	18	36.0
No idea of water committee	46	47.9
If the response is yes, how were the members selected?		
By the community	44	88.0
No idea	6	12.0
What are your views on the work of the committee?		
They are effective and hard working	42	84.0
Not effective	6	12.0
No comment	2	4.0

Source: Field Survey, August-December, 1992
* Respondents could provide one or more response(s)

Women's Social Standing

Women's involvement in the programme and their training for new tasks are not only essential to achieving maximum benefits from water supply and sanitation activities, but also has a significant impact on their social standing both within the household and in the community. Implicit in the initial objectives of the programme was the reduction in the workloads of women, through the provision of water closer to the home. Under WUP II, the role of women in the programme was enhanced through

their training as CWOs, who helped in health and hygiene education, as well as undertaking pump related and tariff collection duties. All these were designed to improve their social standing in the communities.

In view of this, the impacts the programme has had on their social standing were therefore sought. This was achieved, by first, asking them to describe how the provision of water in their communities had affected their workloads in their households. Secondly, they were asked if women were involved in the day-to-day operation of the hand pump, and if yes, how that has affected decision making both at home and in the community. Thirdly, the impact of the programme on their traditional roles was also sought.

As expected, a large majority of women (83.3%) indicated reductions in their workloads at home, especially in regards to water collection. They, therefore had time to rest. Only 4.2% of women interviewed indicated increases in workloads as a result of readily available water in the community. As it turns out, these women were *pito* brewers. The rest (12.5%) had seen no changes in their workloads because they engaged in other household activities instead of resting.

Most women (77.1%) responded that women were involved in the operation and maintenance of the hand pumps. This has altered a traditional profession reserved exclusively for men. One may, therefore, assume that with such a change in roles men will be hostile towards women. However, the majority of these women (78.4%) were of the view that the involvement had changed decision making in their households. Their husbands involved them in all aspects of decision making. In

addition they were highly respected by their husbands. The rest of the women (21.6%) were involved in decisions concerning water issues only. These views were reiterated during group interviews with selected women in the communities. Women, according to them, have been given recognition and are treated with respect in the communities. All attributed it to their roles in the water and sanitation programme. These findings suggest that women's social standing has been enhanced in the rural communities. This is contrary to the argument that much of the development endeavor in the developing world has the effect of lowering the status of women (Boserup, 1970).

Knowledge of Health Education and Water-related Diseases

The primary aim of the Upper East Region Water Supply Programme was to improve the health status of the rural people. Since 1973, several aspects of the programme have been geared towards achieving this objective. A major breakthrough was achieved with the launching of WUP II, which emphasized among other things, the education of the people on the relations between water and health. However, the lack of baseline data on water and sanitation related diseases renders an assessment of the health impacts of the programme difficult.

Moreover, as pointed out in Chapter Four, health impacts have been difficult to prove, and the methods used in the assessments unfeasible to replicate. In addition, health centres are completely absent in the rural communities under study. Therefore, data collected at the district and regional hospitals are based on patients

who attend the clinics. Data collected at the clinics tend to be unsystematic and are unreliable. In this regard, the beneficiaries' knowledge of the transmission mechanisms of water and sanitation related diseases was used as a measure to assess the impacts of the programme on the health status of the people.

Before assessing their knowledge of the infection mechanisms of water and sanitation-related diseases, the respondents' awareness of water and sanitation education messages was sought. Specifically, they were asked if they had heard of any messages on health and hygiene education, how they heard of the messages, and what they learnt. As well, they were asked if they had heard of any health messages on how to treat such diseases as diarrhoea and cholera.

Evidence from the interviews indicates that one-fifth (20.8%) of respondents had not heard any messages on health and hygiene education. This suggests that the health and hygiene education messages disseminated through the CWOs and the Radio Learning Groups have not received overall coverage. In spite of this, over half of the respondents (55.3%) who had heard of the education messages, attributed the source of the message to the Radio Learning Groups, while 18.4% heard the messages through the CWOs. The rest heard it either through public health staff (15.8%) or friends, relatives and neighbours (11.8%). This indicates that the Radio Learning Groups have been the most effective media in transmitting the health and hygiene messages to the people, despite their late introduction in WUP II, and the problems associated with the quality of the radios as well as the initial broadcasting problems (Horizon Pacific International, 1991).

This corroborates the earlier assertion that CWOs have not been effective in all their duties. However, these findings are in contrast to findings in a recent report by Horizon Pacific International (1991), findings that were arrived at by way of interviews with WUP personnel in the Upper East Region. They indicated that CWOs have been very effective in disseminating health messages. Regarding health messages on how to prevent and treat such diseases as diarrhoea and cholera, 83.3% of respondents indicated that they had heard the messages. The majority of these (61.5%) heard through the Radio Learning Groups. Few respondents heard it from the CWOs.

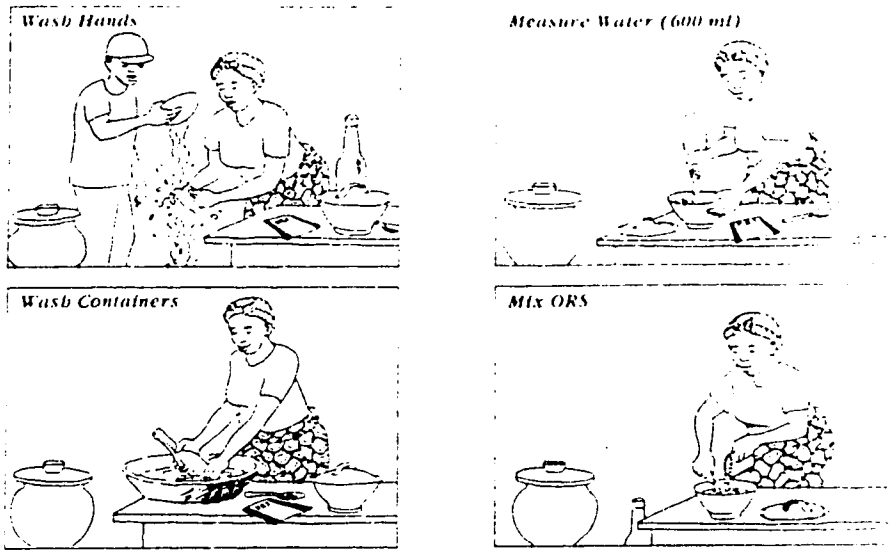
On the transmission mechanisms of the diseases, a large majority of respondents (76.0%) attributed dracunculiasis infection to unsafe drinking water. Food, personal and domestic hygiene were the responses of 6.3% of interviewees, while the rest (28.1%) attributed its infection to other causes including, nature, evil spirits and visiting infected river valleys. All the respondents who attributed the infection of guinea worm to unsafe drinking water would seek treatment at a nearby hospital or clinic if any member of their household is infected with the disease. The rest apply local herbs, oral rehydration salt (ORS) or just do nothing.

Diarrhoea infection was attributed to unhygienic food and inappropriate personal and domestic hygienic practices by a large majority of respondents (84.4%) in the programme area. The majority of the rest (44.6%) attributed it to unsafe drinking water. Although the Water Education for Health component of WUP II has been emphasizing the use of oral rehydration salts in treating minor cases of

diarrhoea, few respondents (17.7%) will actually employ the method. This suggests that the delivery of the ORS messages was ineffective and unsustainable (Fig. 7.1). On a positive note, however, over half of respondents (58.3%) will send the affected individual to the clinic or hospital.

Similarly, most respondents in the programme area (85.4%) attributed cholera infection to unhygienic food and inappropriate personal and domestic hygiene. Few interviewees (14.6%) considered it to be a natural phenomenon or had no idea on the transmission mechanisms of the disease. Although most respondents (70.8%) will seek treatment at the clinic or hospital, over a third will apply local herbs. Some of these, of course, include people who will seek treatment at the hospital if conditions get worse.

Of all the diseases mentioned in the interview, trachoma was the least known by the respondents. A large majority of respondents (78.1%) had no idea how the disease was transmitted. Only 4.2% attributed its infection to inappropriate hygienic practices. Similarly, less than a third of respondents (29.1%) will visit a health facility for treatment. Over 43% will not seek any treatment.



Radio Learning Group discusses prevention of diarrhoea

Fig. 7.1 Oral Rehydration Salt Preparation and Discussion on Diarrhoea

Economic Patterns in the Non-programme Area

Most women interviewed in the non-programme area obtained their incomes from either agricultural activities (50.0%) or from *pito* brewing and shea butter oil processing (50.0%). Only 3.3% had seen some changes in their sources of income over the past ten years, attributed to a dug well close to the house. In the dry season, half of the women engaged in *pito* brewing and shea butter processing. This suggests that irrespective of the season, some women in the non-programme area do not abandon their primary source of income. Others, however, resort to the collection of firewood (30.0%) for household use during the rainy season, vegetable production (20.0%) or engage in trading activities (26.7%) to earn extra income.

Knowledge of Water and Health Education and Diseases in the Non-programme Area

Over half of respondents in the non-programme area (53.3%) had heard of education messages on water, health and sanitation. The majority of these (70%) heard it through public health workers. According to them, the public health workers educated them on how to filter their drinking water and even provided them with filters, which were replaced if worn out. This suggests that even in the absence of a comprehensive water supply and sanitation programme (such as the one in the Upper East region), it is possible for rural communities in Northern Ghana to receive education messages on water and health. Ironically, none of the households was seen filtering their water after collecting it from the dug wells.

Pertaining to their knowledge of diseases, the majority of respondents (66.7%)

attributed guinea worm infection to unsafe drinking water. However, a quarter (33.3%) had no idea on the transmission mechanisms of the disease. Based on this, one would expect that appropriate treatment methods would be resorted to by most respondents to deal with the disease. Contrary to this expectation, only 36.6% of all interviewees will seek treatment in a clinic or hospital. Most respondents (50.0%) will not know what to do, while the rest will apply local herbs.

Unhygienic food and inappropriate personal and domestic hygienic practices were the main sources of diarrhoea infection, according to most respondents (63.3%) in the non-programme area. Some respondents (40.0%) will send the affected individual to the clinic or hospital, while almost a third (30.0) will apply oral rehydration salt in treating minor cases of the disease. The rest will employ local herbs in treating the disease.

Unlike diarrhoea, over half of respondents (53.3%) had little or no knowledge of cholera infection. Although 43.3% cited unhygienic food as a transmission mechanism, appropriate personal and domestic hygienic practices were completely absent from the responses. However, this extensive lack of knowledge is compensated for by the majority of interviewees (66.7%) who will seek treatment in a hospital or clinic.

Regarding trachoma, a large majority of respondents (96.7%) had no idea how it infected people. Only one individual attributed the disease to inappropriate personal hygiene. This lack of knowledge is reflected in a variety of responses in regards to its treatment. As it turns out, 63.4% of respondents did not have any idea

on how to treat the disease. Almost a quarter (23.3%), however, will seek treatment in a nearby hospital or clinic.

Comparison of Women's Economic Patterns

A comparison of responses between women in the programme and non-programme areas indicates that agricultural activities were the principal sources of income for the women in the programme area (Table 7.2). Relatively, a smaller proportion of women in the programme area engaged in *pito* brewing and shea butter oil processing. Further evidence is provided if we examine the various economic activities pursued by the women in the dry season, where we see differences in economic activities pursued by the women.

The evidence (Table 7.2) indicates that, in the dry season, while half of women respondents in the non-programme area engaged in *pito*/shea butter processing, just over a third engaged in such activities in the programme area. Similarly, a relatively higher proportion of women in the non-programme area (20.0%) engaged in vegetable production than in the programme area (12.5%). These suggest that few women in the programme area utilized the readily available water for vegetable production and for *pito* brewing/shea butter processing. This finding is in contrast to findings in studies done in Botswana, Mali and Indonesia (Copperman et al. (1978); Belli, 1988; Narayan-Parker, 1990). In Botswana, for example, Copperman et al. (1978) observed that, with the introduction of piped water in a rural community, more women engaged in beer brewing. This provided a source

of income for the women. Although 12.5% of women interviewed in our study area had seen changes in their sources of income attributed to the ready availability of water, most women would either rest or help their husbands renovate the house.

The finding in the programme area is, however, not surprising, since the one activity included in the water supply programme which could have resulted in earnings for women was dry season gardening.

Table 7.2
Women's Economic Patterns in Programme and Non-programme Areas (% in brackets)

Activity	Programme	Non-programme
Major sources of income		
Agriculture	34 (70.8)	15 (50.0)
Pito brewing/shea processing	16 (33.3)	15 (50.0)
Others (including trading)	24 (50.0)	8 (26.7)
Activities pursued in the dry season		
Trading	14 (29.2)	8 (26.7)
Vegetable Production	6 (12.5)	6 (20.0)
Pito brewing/shea processing	17 (35.4)	15 (50.0)
Firewood Collection	6 (12.5)	9 (30.0)
Rest/Renovate House	25 (52.1)	0 (0.0)

Source: Field Survey, August-December, 1992
N/B. Totals differ because they were given the opportunity to provide one or more responses

There is, therefore, the need for complementary inputs and initiatives to assist local

women to pursue other income generating activities, since this would not only aid in improving the household financial situation, but could also have far reaching effects on water tariff payments. Although, assisting in household renovations is an important component of rural development, it should not be a stumbling-block to women to engage in other activities.

Comparison of Responses on Health Issues

As has been indicated, various responses were provided with regard to the sources of the water and health education messages. A comparison of responses between the programme and non-programme areas is presented in Table 7.3.

Table 7.3
Sources of Water and Health Education Messages (% in brackets)

Sources of Health Messages*	Programme Area	Non-programme
Radio Learning Groups	42 (55.3)	1 (5.0)
Community Water Organizers	14 (18.4)	0 (0.0)
Public health staff	12 (15.8)	14 (70.0)
Others (eg. friends, relatives)	9 (11.8)	5 (25.0)

Source: Field Survey, August - December, 1992
* Respondents could provide one or more response(s)

Of the mechanisms employed for the dissemination of the water and health

education messages in the programme area, the Radio Learning Groups were the most used. This is contrary to findings in a knowledge, attitude and practices (KAP) study conducted in Cross River State, Nigeria. The KAP study found that 51.1%, 26.2% and 11.3% of health education messages occurred through criers, age graders and churches, respectively. Radio was not effective, possibly because of its high cost and the preference of people to interact with one another (Rooy and Donaldson, 1990). Similarly, in Lombok, Indonesia, Wilson and Chandler (1993), report that community organizers were the only information source women could recall, and that none of them remembered having acquired any hygiene information from posters, radio and other sources used in disseminating the messages.

The high proportion of public health staff engaged in disseminating health education messages in the non-programme area suggests that the Ministry of Health should complement the activities of the Radio Learning Groups and the CWOs in the programme communities, in an effort to broaden people's knowledge of water and sanitation related diseases. One would expect large differences in knowledge between respondents in the programme and non-programme areas on the etiology of water and sanitation diseases because the large majority of respondents in the programme area had heard messages on how to prevent and treat water and sanitation diseases. However, with the exception of cholera, the similarities in responses between the two areas on the infection mechanisms were remarkable (Table 7.4).

Although the majority of respondents in both areas recognized the direct link

between guinea worm infection and unsafe drinking water, differences exist in their responses to the treatment of the disease. Respondents' extensive knowledge of guinea worm infection and treatment translates into significant reductions in the disease's infection and morbidity in the Upper East Region. Data obtained from the Regional Ministry of Health in Bolgatanga, the Upper Regional capital, corroborate this finding. Between 1989 and 1991, the number of reported and morbidity cases of guinea worm dropped by 90.6% and 62.1%, respectively (Regional Ministry of Health, 1991).

Table 7.4
Responses on the Transmission Mechanisms and Treatment of Water and Sanitation Diseases (% in brackets)

Disease/Responses*	Programme Area	Non-programme area
Guinea Worm Infection		
Unsafe drinking water	73 (76.0)	20 (66.7)
Food and personal hygiene	6 (6.3)	1 (3.3)
Others	27 (28.1)	10 (33.3)
Treatment of Guinea Worm		
Hospital/clinic	74 (77.1)	11 (36.6)
Local herbs/ORS	21 (21.9)	6 (20.0)
No idea	8 (8.3)	15 (50.0)
Diarrhoeal Infection		
Unsafe drinking water	43 (44.6)	10 (33.3)
Food and hygiene	81 (84.4)	19 (63.3)
Others	8 (8.3)	5 (16.7)

Diarrhoeal Treatment		
Hospital/clinic	56 (58.3)	12 (40.0)
Herbs/local food/no idea	42 (43.8)	9 (30.0)
ORS	17 (17.7)	9 (30.0)
Cholera Infection		
Unsafe drinking water	32 (33.9)	1 (3.3)
Food and hygiene	82 (85.4)	13 (43.3)
Others	14 (14.6)	16 (53.3)
Treatment of cholera		
Hospital/clinic	68 (70.8)	20 (66.7)
Local herbs/no idea	39 (40.6)	10 (33.3)
ORS	5 (5.2)	0 (0.0)
Infection of Trachoma		
Unsafe drinking water	15 (15.6)	0 (0.0)
Unhygienic food	3 (3.1)	0 (0.0)
Hygiene	4 (4.2)	1 (3.3)
Others	75 (78.1)	29 (96.7)
Treatment of Trachoma		
Hospital	28 (29.1)	7 (23.3)
Local herbs	26 (27.1)	4 (13.3)
ORS/No Idea	42 (43.8)	19 (63.4)

Source: Field Survey, August - December, 1992
* Respondents could provide one or more response(s)

There is a relatively slight difference in responses between the interviewees in the two areas with regard to diarrhoea infection. On the contrary, a large difference exist in responses relating to cholera. Respondents in both areas were

clearly unaware of the connection between these diseases and unsafe excreta disposal practices. This situation does not augur well for significant reductions in morbidity in diarrhoea, for example, which is the second most reported disease in the Upper East Region (refer to Table 2.7), and the disease most extensively covered in the health educational programme. Reductions in diarrhoeal morbidity, according to the Regional Ministry of Health, was 13.8%, between 1989 and 1991. Interestingly, a smaller proportion of respondents in the programme area recalled the use of ORS in treating minor cases of diarrhoea, despite the special attention given to the treatment of the disease during the health education campaign under WUP II.

The limited knowledge on the use of the ORS in diarrhoeal treatment in our study area is contrary to the findings in a study conducted in Imo State, Nigeria. According to Blum et al. (1990), the introduction of a Drinking Water Supply and Sanitation Project increased the number of people with substantial knowledge of ORS. The extensive knowledge of home-based therapy in the Nigerian study was reflected in a decrease in the proportion of women saying they would consult medically-related personnel for treatment. The findings in our study area indicate that either the messages about the remedy were poorly delivered or they were soon forgotten. The results, therefore, suggest the intensification of the educational programme to include health personnel, to ensure the sustainability of the programme outputs.

Trachoma seems to be an unknown disease in both areas. Evidence from the responses (Table 7.4) also indicates that most respondents in the programme area

will most likely employ ORS in its treatment. This is, however, not surprising, since trachoma was not included in the health education campaigns.

Chapter Eight

VIEWS OF GOVERNMENT OFFICIALS

Government officials play important roles in the rural water sector in the developing world. Since governments often own water resources (both surface and ground), they influence their development by signing Memorandum of Agreements with development agencies and by setting the institutional and legal frameworks through policies that affect water users. In an effort to deepen our understanding of the impacts of the Upper East Region of Ghana rural water supply programme, their views must be sought.

The objective of this chapter, therefore, is to assess government officials' awareness, involvement and roles played in the Upper East Rural Water Supply Programme. Their views on the impact of the programme on the rural beneficiaries were also sought, noting differences in the responses between them and the beneficiaries, and the observations conducted in the households and in the communities. The assessment of the awareness and impacts employed a set of semi-structured questions that revealed their awareness levels, the economic and socio-cultural impact, and the impact of the programme on the living standards of the rural people.

Awareness of the Rural Water Supply Programme

Ghana has experienced five changes in government, since the CIDA/GWSC water supply programme began in 1973. As in many parts of the developing world, a

change in government implies significant changes in government appointments at the local, regional and national ministerial levels. In view of this, the first set of questions dealing with government officials asked them of their awareness of the programme, how they heard of it, what it is about, the stage of involvement and the role(s) played by their respective organizations. Their responses are presented in Table 8.1.

It can be seen from the table that all the nine government officials interviewed were aware of the CIDA/GWSC rural water supply programme in the Upper East Region of Ghana. There was a general consensus that the programme was designed to provide potable water for the rural dwellers in the Upper East Region. However, the stage of involvement and the role played by them varied. The responses revealed that regional and district level government officials became involved in the programme during the implementation of WUP II. Although this may be a reflection of changes in national government, it suggests that for over a decade, and upon national government approval, the CIDA/GWSC water supply programme by-passed local and regional level government officials and institutions better situated to provide support to the communities.

Table 8.1
Government Officials Awareness, Involvement and Roles in the Upper East Region Water Supply Programme

	NCWD	31st DWM	Bongo DS	DRS	Bawku West DS	MFEP	MLG	MoWH
Awareness	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
What programme is about	Potable drinking water in rural areas	Provision of potable water	Improve rural water supply	Provide safe drinking water for rural communities	Improving water supply for the rural people	Provide water supply	Improve water supply	Provision of water for rural communities
Stage of involvement	WUP II	WUP II	WUP II	WUP II	WUP II	URWSP (1973)	WUP I	WUP I
Role(s)	Mobilized women	Mobilized women	Assisted in tariff collection	Facilitator, training CWOs	To assist in tariff collection	Signed agreement with CIDA	Adviced GWSC on decentralization	Organizing workshops & seminars

Source: Personal Interviews, 1992

Responses of Government Officials on the Impacts of the Programme

> "I would rather emphasize on the policy aspects of rural water supply than on impacts, due to the fact that the implementation of any programme under my ministry is left to the various regional departments, and especially with water to GWSC, which is supposed to be an autonomous institution" (Ampratwum, Personal Interview, 1992).

> "My Ministry, together with the Ministries of Works and Housing, Finance and Economic Planning and GWSC are more concerned with policy issues. The day-to-day reporting and assessment of the water project are taken care of by the districts themselves" (Mensah, Personal Interview, 1992)

The above responses from the then Secretary for the Ministry of Works and Housing and the Principal Economic Planning Officer in-charge of donor projects of the Ministry of Local Government clearly indicate that government officials for the sector ministries at the national level had little or no idea about the impacts of the water supply programme on the rural people in the Upper East Region of Ghana. They were more concerned with setting up a national policy framework for rural water supply in the country.

Although they were involved earlier in the programme than their local and regional counterparts, and their actions as policy makers affect the lives of thousands of people in the Upper East Region, their lack of or limited knowledge of the impacts of the programme suggests that they are out of touch with the rural communities. This also suggests that development agencies should consult with a local level government official at the initial stages of development programmes since they are in a better position to have first hand information about the impacts (be

they accurate or not) of such programmes.

Views on Impacts of the Programme

From the preceding discussion, it must be noted, the impacts of the programme were restricted to local and regional level decision makers. Their rated responses in relation to the questions asked (Appendix 5) are summarized in Table 8.2.

Three bureaucrats indicated a partial impact on vegetable production in the region as a result of the water supply programme. According to these officials, waste water from the borehole/handpumps was utilized by livestock for drinking purposes, instead of using it to grow vegetables. Women do not use excess water to engage in large-scale production of vegetables. Few women engaged in vegetable production and then is mainly for home consumption. These views of the bureaucrats on vegetable gardening are consistent with the responses of the beneficiaries. These officials, however, did recommend that other sectors of the national economy should provide support to the rural communities in order to ensure maximum benefits from the improved water systems.

The programme has had a positive impact on women, according to three of the bureaucrats. To them, time saved by not collecting water has been an important positive impact of the programme on women in the region. In the view of the officials, this translates into energy savings and extra time for other productive activities. The programme has also enhanced the social standing of women in the communities, particularly through their training as CWOs.

Table 8.2
Impacts as Solicited from Local and Regional Decision Makers in the Upper East Region

	NCWD	31st DWM	Bongo DS	DRS	Bawku West DS
Vegetable Gardening	3	3	2	3	2
Women	3	4	4	3	4
Mobilization	4	4	4	4	4
Sanitation	2	2	2	2	2
Hygiene	3	3	4	4	2
Living Standards	4	4	4	4	4
Socio-cultural	4	4	4	4	4
Health	4	4	4	4	4

Source: Personal Interviews, 1992

Negative Impact	1
No Impact	2
Partial Impact	3
Positive Impact	4

Women are playing active roles in their communities as community water organizers (educating people on water and health); they are now highly recognized in their communities and they have demonstrated that they can take responsibilities. All these have enhanced their social status in the communities. These views are confirmed by the responses from the women during the field surveys. The converging views of both officials and women suggest that broadening women's role in the programme will further improved their social status in the communities.

Despite this positive impact on the women, two officials indicated a partially

positive impact of the programme on women. They noted that, in that part of Ghana, where women have the responsibility for water collection, storage and use, the introduction of a water tariff payment by the GWSC has placed a burden on them. This is because the water tariff payment is passed onto them. However, this view of the two officials is inconsistent with the responses from the women. Although they were critical of the approach adopted by the GWSC in introducing the tariff, there were no criticisms levelled against their husbands in reference to the tariff payments.

The government officials were asked about the effects of the health and hygiene education programme on sanitation and environmental hygienic practices in the rural communities. As Table 8.2 shows, the general response was "no impact" for sanitation, consistent with the observations in the study communities. The responses of the government officials in regards to the question on sanitation was summed up by the then District Secretary for Bawku West, Mr. Francis Ayaba. He emphasized that:

> "sanitation has been a headache for the District Assembly. People defecate anywhere; waste is disposed anywhere. The educational programme drives home the health problems associated with these practices, but it has not been easy" (Personal Interview, 1992).

Regarding domestic and environmental hygienic practices, there were divergent views among the decision makers. Two officials indicated that the communities clean around the pump sites and within their compounds regularly and

waste disposal practices have also improved. Two also indicated a partial impact, while one indicated no impact. However, this evidence from the four bureaucrats is inconsistent with the results of observations conducted in the selected communities in the region. The observations indicate that most households in the programme communities disposed of wastes unhygienically compared to a neighbouring non-programme district. The differences in responses between the government officials may be attributed to the fact that the government officials seldom pay visits to the rural communities, and if so, they do it very briefly. Hence, practices observed by individual officials may vary.

There was general consensus among the government officials that the long-term interaction with foreigners, especially the Canadian project staff, has had a partial impact on the people. While their presence in the rural communities has had no impact on their way of dressing and the conduct of traditional festivals, there has been positive impacts on certain traditional beliefs and practices of the people. Previously, people in rural communities viewed the presence of white people in their communities with suspicion but these views have changed. Moreover, the long-term interaction with foreigners and their education efforts, have taught the people that certain diseases were not the result of natural phenomena or religious practices, but rather the result of certain unhygienic practices of a personal, domestic and environmental nature.

Health was another area where there was a general consensus of views, specifically the reduction of onchocerciasis and dracunculiasis. In the words of Mrs.

Veronica Amunya, the Regional Director of the National Council on Women and Development:

> "oncho and guinea worm have been eradicated or minimized in borehole communities; cholera and diarrhoea have reduced drastically. If people catch them, then it is through carelessness on their part, not because of bad water. The urban areas are now complaining because the rural people are benefiting" (Personal Interview, 1992).

Apart from reductions in such diseases, there has been a positive response to immunization programmes in the rural communities, attributed largely to the water and health education programme. As a result of the health education programme, the region reached 80-85% coverage in immunization, exceeding the coverage for the other two northern regions [Northern and Upper West Regions] (Anaba, 1992). In the opinion of the DRS and 31st DWM, the programme has created an awareness by the people of the causes of diarrhoea and how to employ ORS in treatment. Although diarrhoea morbidity has been reduced in the region, these views of the decision makers are supported by results of interviews conducted in the rural communities.

Generally, the programme has improved the living standards of the people. Improved health in the words of the former Bawku West District Secretary, Mr. Ayaba, "is an indicator of improved living standards". With reductions in guinea worm infection, for example, people have the strength to work on their farms and at the market, thereby contributing to the family's livelihood, and improving their living conditions. However, "this is difficult to prove statistically" (Anaba, 1992).

Summary

This chapter has examined the awareness and impacts of the Upper East Water Supply Programme from the point of view of bureaucrats involved with the rural water sector in Ghana. It also highlighted the differences in responses on these impacts, between the bureaucrats on the one hand and the programme beneficiaries and our observations on the other. The analysis indicates that, regional and district level bureaucrats are more aware of the programme's activities and impacts than those at the national level, although the district and regional decision makers were not consulted in the earlier phases of the programme. From the responses from the officials and local women it is evident that the programme has not achieved the anticipated impacts on economic activities beneficial to women. The results also reveal diverging views on the programme's role in enhancing people's knowledge of water- and sanitation-related diseases, but the views converge on the sanitation and the social standing of women.

Chapter Nine

CONCLUSIONS

This chapter presents the main conclusions drawn from the study, the contribution of the study to research, its limitations and avenues for further research, as well as the recommendation for overall programme improvement. The chapter is divided into three main parts: the first addresses the second, third, fourth and fifth objectives of the study and discusses the findings produced from the case study; the second, focuses on the first objective, and assesses the contribution the study can make to the methodology of impacts evaluations and, the third, deals with the limitations of the programme and recommends how it can be improved.

The Main Findings

For many decades, rural water supply and sanitation programmes have been promoted by "enthusiasts" as a major driving force for the development of rural areas of the developing world. The expectations include rapid economic development, improvements in the quality of rural life, improved health and hygiene, increased use of water for productive activities and attitudinal changes (Stephenson and Peterson, 1991; Munasinghe, 1992). Although economic growth and development imply improved living standards for all people, including better nutrition, housing, educational opportunities, health and health services, as well as higher income, few development alternatives have greater potential for improving the health and socio-

economic well-being of people than water supply programmes (Stephenson and Peterson, 1991). Therefore, it has long been regarded as a way of sparking development and improving sagging or developing economies.

In the following discussion, seven main findings resulting from the case study will be presented, together with their policy implications. First, in the Upper East Region of Ghana, health and hygiene education, necessary to achieve behavioral changes needed to obtain optimum benefits for improved water supplies have remained high priorities. However, the study has revealed that a marginal impact has been made in waste (human excreta, household solid and liquid) disposal practices. The reliance on the Radio Learning Groups, Community Water Organizers and posters in the dissemination of the Water Education for Health messages has not been effective in changing these practices. The policy implication is that the environmental hygienic practices will not be changed by the existing educational strategies. To be more effective, public policy must ensure a change in strategy to include other relevant sectors of the national economy, and to motivate the people to change their attitude towards the environment. The study has also shown that not enough attention has been given to drainage and the accumulation of surface water near pump sites in some communities.

Second, using diarrhoea, cholera and trachoma as examples, the study has demonstrated that the programme beneficiaries have limited knowledge on the transmission mechanisms of water-borne and water-washed diseases. On a brighter note, however, most people will seek help from a nearby health facility when infected

with water-borne diseases. The results have also shown that women have extensive knowledge of the infection mechanisms of water-based diseases. The implication of these findings for the rural water and sanitation sector is that any educational programme on water and sanitation related diseases will be more effective on diseases related mostly to water quality than those which are the result of poor sanitation and hygiene, and also inadequate garbage disposal. The elimination or minization of water-borne and water-washed diseases depends on the encouragement of better personal and domestic hygiene. This has proved difficult to achieve.

Third, women have not effectively utilized excess waste water in productive economic activities that might supplement their incomes. This indicates that providing water and, simply informing women to utilize excess waste water for vegetable gardening and other economic activities, will not motivate them to engage in such ventures. What is needed is an effective promotion and support from other sectors of the national economy to achieve such an objective. This can be achieved, for example, by closely working with the Ministry of Agriculture to provide agricultural extension workers to work with the communities and to possibly set up communal vegetable gardens with the use of simple tools and good improved seeds.

Fourth, the programme has resulted in improved social standing of women in the rural communities. There have been changes in attitude on the part of men towards women. Women are no longer looked down upon when it comes to decisions concerning water. The policy implication of this finding is that the extension of women's roles from their contribution to construction and caretaking to

management and economic production, will further enhance their status in the communities.

Fifth, the study shows that people have problems paying the annual water tariff. This has a major policy implication: increasing the annual water tariff to conform with changing economic conditions in the country will exacerbate the problem. Moreover, restricting non-tariff payers access to the improved system will defeat the primary objective of the entire endeavor. Mindful of the complexities surrounding water tariff payments, the study recommends, in the short-term, the subsidization of those households which are unwilling and unable to pay, in order to wean them from traditional and unsafe water supply sources. As a long-term measure, a comprehensive study should be done to test the willingness and ability of communities to finance the water systems. Based on the findings of this study, an appropriate educational programme on the need for the water tariffs could be designed, targeting defiant households.

Sixth, the research reveals that CWOs were more efficient than their Water User Committee counterparts in the performance of their duties. Moreover, the CWOs were highly visible and recognized by the rural people. The implication of this finding for rural water development policy is that the method employed to select community leaders is more important, since democratically elected leaders have a greater impact on communities.

Seventh, the research has shown that the Radio Learning Group is the most effective medium for delivering health and hygiene education messages. None of the

respondents remembered having acquired any hygiene information from posters. This indicates that any sustainable educational policy designed for the rural communities should include some elements of public broadcasting.

Contribution to Evaluation Research

Having discussed the potential impacts of the water supply programme on the beneficiaries, the discussion will now attempt to assess the contribution of this study to the field of impact evaluation. In Chapter Four, it was observed that the literature on impact studies in the rural water sector in the developing world had ignored the views of programme beneficiaries and decision makers. It was emphasized that the examination of their views would provide insights into the impacts of rural water supply programmes, and perhaps lead to broadening impact evaluation research methods.

Recognition has been growing in the geographic literature that impact assessments are needed for policies and programmes as well as for specific projects (O'Riordan and Sewell, 1981). This recognition may be due to the fact that impact evaluation has strong ties with the man-environment or ecological research tradition. However, existing work demonstrates little development of theory, due to numerous problems which often lead to the rejection of findings. According to Mitchell (1989), much of the methodological controversy centres on approaches to conceptualization, research design and measurement.

To assess the impacts of development programmes, it is essential to recognize

first, a host of variables and relationships; second, the adoption of team-work or interdisciplinary approach and third, the recognition should not be limited to reductionist views or opinions but to a reconciliation of views from the project beneficiaries with those of decision makers. However, much of the work in impact studies in the rural water sector in the developing world has focused on the first two. In the parlance of geographic research, this tends to relegate the strong ties that impact studies have with the human-environment research tradition.

Within the rural water sector, it is widely acknowledged that local people must be involved in the implementation of water and sanitation programmes. As yet, they are often seen as "ignorant" beneficiaries. They are seldom consulted on the benefits of the facilities to them. The literature on impact studies indicates that, for the most part, evaluators have ignored the fact that users of these facilities exist. Their practices, views, knowledge and awareness of programme activities are still not considered. Similarly, views of government officials whose decisions influence the manner in which rural people adapt to or utilize the environment, are often ignored.

The case study of the socio-economic impacts of the Upper East Water Supply Programme in Ghana provided an important opportunity to broaden the research methods of impact evaluation. It shows that by reconciling the views of users and decision makers we will be able to assess the "totality" of the impact resulting from the water supply programme. It showed that government officials at the national ministerial level cannot provide "accurate" information in regards to the impacts of rural water supply programmes. Therefore, any attempt to assess the socio-economic

impacts of rural water supply programmes in the developing world should not focus soley on their views.

This study did not add to the development of theory in impact evaluations, in the sense that it did uncover any new ideas or "earth-shattering" findings. After all, as Mitchell (1989: 241) puts it:

> "in many ways, evaluation research represents a conscious search to determine whether or not holes might be found, or if existing holes could be found".

However, it did show the need to broaden the research methods by exploring what programme beneficiaries experience, and the ways their views might be reconciled with the views of local and regional level decision makers. In this way, the ties of impact studies with the human-environment research tradition in geography are strengthened.

Recommendation For Programme's Improvement

An examination of the CIDA/GWSC water supply programme in the Upper East Region of Ghana reveals that no cohesive set of goals has been guiding the programme for the past two decades (see Chapter Four). Although all phases of the programme have been aimed at developing rural water supply in the region, each phase has had its own goals and objectives, which are not necessarily related to those of previous or subsequent phases. Based on the main findings of the study and, mindful of the fact that the programme is on-going, the study makes the following recommendations to ensure that the programme contributes meaningfully to the

socio-economic development of the rural communities in the Upper East Region.

1. The programme should be re-oriented to include goals and objectives which focus on health, behaviour change and socio-economic impacts. These should be based on a thorough assessment of the household and community conditions.

2. The donors and government should restructure the water and sanitation budget to reflect a greater focus on hygiene education and health related issues.

3. Capacity building at the community level should be strengthened and be an integral part of the water and sanitation programme. This should be an on-going activity.

4. Community leaders (chiefs, elders, community development committees) should be trained in health and personal hygiene topics so that they can effectively contribute to public education and awareness in their communities.

5. Alongside CIDA/GWSC programme of education, a self-supporting house-to-house health and hygiene education service needs to be undertaken by the communities in a sustained manner.

6. District community development officers should be encouraged to explain government policy to the rural people and motivate them for village water supply work. They must also encourage those communities which seem reluctant to participate.

7. There must be active collaboration and co-operation between the donor agencies, GWSC and other sectors of the national economy to ensure that women, in particular, have access to the necessary resources and a favourable economic

environment in order to use the time saved for additional income generating activities.

Limitations of the Study and Avenues for Future Research

The study is not without its limitations. These limitations are addressed in this section and provide useful grounds for further research. The first inadequacy of this study is that, it failed to solicit information from males in the non-programme area. While data from all gender groups were relatively easy to obtain, resources precluded such a survey that would have yielded information on these groups. As well, information from children is not known. Since they have much to gain from the programme, every effort must be made to obtain information from them. In this way, a comprehensive and broadly based data set can be obtained to review the programme's impacts.

The second limitation of the study relates to the grouping of the six villages with boreholes into one category: programme. This does not address the issue of differences in practices and responses between and within the communities. For example, one community may be practicing better waste disposal methods than another in the same district. This, however, is not portrayed by the study. Further research is needed in this respect in order to obtain a better understanding of the situation in each of the communities.

The criteria employed in selecting the communities constitute the final limitation of the study. Selecting communities within 20 km. of the district capital

based on the hospitality of residents excluded many communities from the study. A broader framework embracing all programme communities in the region should be incorporated in the village selection criteria. This will provide a more extensive information about the impact of the programme.

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APPENDICES

Appendix 1
Structured Guide for Community Observations

District .....
Village/community .....

Check ( ) the appropriate practice.
Water sources
1. Observation (all pump sites in the village)
   How effective is the enforcement of ensuring careful use of the hand pump/
   a. very effective
   b. effective
   c. not effective

2. Observation (all sources of water supply)
   Are the receptacles in which the people collect water clean at the time of collection?
   a. all the receptacles are clean
   b. most of the receptacles are clean
   c. none of the receptacles are clean

3. Observation (all sources of water supply)
   Is the area around the source clean and well-maintained (proper drainage, no stagnant water etc.)? a. Yes b. No

4. Observation (community)
   What is the state of cleanliness of latrines?
   a. very clean b. clean c. dirty

5. Observation (community)
   To what extent are latrines used?
   a. used a lot b. minimal use c. not used

Appendix 2

Structured Guide for Observations in Households

District .....
Village/community .....
Housetype .....

Check () the correct practice/observation

WATER COLLECTION

1. Who collects water for the household?
   a. women b. girls c. boys d. men

2. Where do the household collect water?
   a. hand pump b. dug well c. ponds, streams or lakes
   d. spring e. other (specify) .....

3. How much time do water collectors require to collect water needed for one day?

Day	# of days
1	
2	
3	

4. How many times do water collectors visit the water source in a day?

Day	# of Visits
1	
2	
3	

WATER STORAGE

5. Ask households to show you where they store their water. Inspect storage arrangements and determine its cleanliness.
   a. clean b. dirty, prone to contamination

6. Ask for a drink of water. Determine if the way people draw water from the storage pot could contaminate it.
   a. Yes, prone to contamination b. No

WASTE DISPOSAL/HOUSEHOLD HYGIENE

7. What happens to household waste water generated in the household?
   a. let out into the village street
   b. private soak pit
   c. used to irrigate vegetable garden
   d. other (state) .....

8. What happens to household (solid) waste?
   a. thrown into a private or common garbage pit
   b. thrown anywhere within or outside the courtyard
   c. used for manure
   d. other (state) .....

9. What happens to animal waste generated in the compound?
   a. thrown away as garbage
   b. store and used as fuel, for plastering walls or manure
   c. left littering in the compound
   d. other (state) .....

PERSONAL HYGIENE

10. Do people wash their hands before eating? a. Yes b. No
   If Yes, how do they wash their hands?
   a. water only b. water and soap c. water and ash/mud
   d. other (specify) .....

11. How many times (on average) do people in the household take their bath over the three day period?

Person	# of baths
girls	
boys	
men	
women	

LATRINES

12. Is there a private latrine in the household? a. Yes b. No
   If yes, what type of latrine?
   How often is the latrine cleaned?

FOOD PREPARATION AND STORAGE

13. What kinds of foodstuffs are prepared? List .....

14. How many meals are prepared (on average) in a day?

Day	# of meals
1	
2	
3	

15. How is food not immediately consumed after preparation stored?
   a. covered and left in the kitchen
   b. left uncovered in the kitchen

Appendix 3

An Interview Guide Used in Programme Areas.

District .....
Village/community .....
Housetype .....

1. What are the sources of income for the household? .....
Describe the changes, if any, of the sources of income for the household over the past ten years.
.....
What brought about such changes?
.....

2. Describe how the provision of water in the village has affected the following activities:
   a. the number of livestock owned by the household
.....
   b. the growing of vegetables
.....
   c. other economic activities(for example the brewing of *pito*)
.....

3. What major activities do you undertake during the dry season (November-April).
.....

4. Either
   If you pay for using the hand pump every month, what are the effects of such payments on the living conditions of your household?
.....
   Or
   If not, how would it affect your household if you are asked to pay some money towards the maintenance of the hand pump?
.....

5. Have you heard of any health messages on how to prevent and treat such diseases as diarrhoea and guinea worm? .....
   If yes, how did you hear of the message and from whom?
.....

6. What in your opinion are the causes of the following diseases and how would you treat/prevent them?

a. guinea worm
.....
b. diarrhoea
.....
c. trachoma

.....

d. cholera

.....

What would you do if any member of your household has any of the above diseases?

.....

7. Have you heard of any program to educate people on water and sanitation in the village?
If yes, describe how you heard of the program and whether you took part of the program or not?

.....

What did you learn form the program?

.....

8. Describe the work of the community water organizer, if any, in the village?

.....

How was he/she selected and how effective is the organizer in pursuing his/her work? .....

9.Explain the work of the water committee, if there is any in the village?

.....

How were the members selected?

.....

What are your views on the work of the committee?

.....

Describe how the provision of water in the village has affected your workload at home.

.....

11. Are women involved in the day to day operation of the handpump?

.....

If yes, how has such an involvement affected decision making in the household?

.....

Appendix 4

An Interview Guide for females in non-programme areas

District .....
Village/community .....
Housetype .....

1. What are the sources of income for the household?

.....

Describe the changes if any, of the sources of income for the household over the past ten years.

.....

What brought about such changes?

.....

2.What major activities do you undertake during the dry season (November-April).

.....

What in your opinion are the causes of the following diseases and how would you prevent/treat such diseases?

a. guinea worm

.....

b. diarrhoea

.....

c. trachoma

.....

d. cholera

.....

4. What would you do if any member of your household have any of the above diseases?

.....

5. Have you heard of any programme to educate people on water and sanitation in the village?

.....

If yes, describe how you heard of the programme and whether you took part or not?

.....

What did you learn from the programme? .....

Appendix 5

An Interview Schedule Used to Interview Officials of Government Agencies and Senior-level Political Representatives

1. Are you aware of the rural water and sanitation programme in the Upper East region?
If yes, how did you hear of the programme? What is the programme about? Was your department/organization involved? If Yes, at what stage? What role did your organization play?
If no, why?

2. Describe any impacts the water supply programme has had on vegetable gardening in the Upper East region.

3. What are the specific impacts (both negative and positive) of the programme on women in the region?

4. Describe how the programme has transformed the rural dwellers in the mobilization and utilization of their own resources to achieve improved living standards.

5. What have been the effects of the health education programme on sanitation and environmental hygienic practices in the region?

6. Regarding the living standards of the rural people, what in your view are the major achievements of the programme in the region?

7. Describe how the long-term interaction with foreigners has affected the social and cultural life of people in the region.

8. Has the programme resulted in health improvements? If so, what are the improvements?

Any Comments on the programme?

Appendix Six
Calculation of the Chi-square Statistic: An Example

To Test whether Water Drawing Practices Differ Significantly Between Programme and Non-programme Areas

H_o: There is no significant difference in drawing Practices between the two areas.
H_1: There is a significant difference in drawing practices between the two areas.

Contingency Table of Programme and Non-programme Areas

Drawing Practices	Programme	Non-programme	Total
Prone to contamination	10 (*a*)	11 (*c*)	21
Not prone to contamination	38 (*b*)	19 (*d*)	57
Total	**48**	**30**	**78**

Calculate the Expected Frequencies

For *a*: (21/78)(48) = 12.92 For *b*: (57/78)(48) = 35.08

For *c*: (21/78)(30) = 8.08 For *d*: (57/78)(30) = 21.92

Expected Frequencies Corresponding to the Observed Freqencies Listed in the Above Table

Drawing Practices	Programme	Non-programme	Total
Prone to contamination	12.92	8.08	21
Not prone to contamination	35.08	21.92	57
Total	**48**	**30**	**78**

Calculate Chi-square using Equation on Page 84

$$\chi^2=\frac{(10-12.92)^2}{12.92}+\frac{(11-8.08)^2}{8.08}+\frac{(38-35.08)^2}{35.08}+\frac{(19-21.92)^2}{21.92}$$

$$= 0.65 + 1.06 + 0.24 + 0.39 = 2.34$$

with d. f. = (r-1)(c-1) = 1